A Study of Strategy Formulation in an Automotive Manufacturer

James Robert Alan Pilkington

Doctor of Philosophy

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Summary:

The strategies and operations of the Rover Group were investigated using a behaviour based longitudinal examination. The investigating method used was developed from Mintzberg's classical diachronic study approach through the adoption of an observing participant approach supplemented with probes into specific areas of the organisation's activities. The thesis argues, through the use of a future-forward perspective of organisation capability, that an organisation's future capability can be assessed.

The thesis questions the periodisation approach normally adopted in longitudinal studies and proposes an alternative method which the author believes generates a better understanding of the operations and future potential of the organisation. This method also produces generalisations which can be readily applied to other organisations.

The introduction of a process perspective to behavioural studies has led to the promise of a unified understanding of strategic management and organisation development.

(N.B. The author would like to emphasise the equivalence in the terms formulation as used in this thesis and formation as used in the work of Mintzberg).

Key Words: Strategic Management, Organisation, Management, Automotive Manufacturing.

For Trisha

I would like to acknowledge the great help and support given to me by my friends and many colleagues at Rover, Aston University and at the ATC, Warwick University.

Particular thankyous are warranted for Trisha, my parents, my friends in Prospect Road: Vanda, Andy, and David, and also Russ, Julian, Helen, Clive, Andy, Mike and Jane.

This thesis would also not have been possible without the support of the Rover departments who have had the dubious benefit of my wisdom during the project: The Manufacturing Policy Unit and Land Rover's Enhanced Technology.

I would also like to thank Peter Burcher, Alastair Cochran, Roger Butler and George Steele for their supervision and Peter Clark in particular for his guidance and contribution in helping my thoughts and strategies emerge.

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Chapter 1. Introduction

1.1 Introduction

This thesis records the development of an analysis of the significant strategies found in the Rover Group. It considers the areas of innovation, design and organisation and is investigated through participant observation supplemented by probes into specific organisational transitions. It aims to contribute to the development of a process type strategic theory through the use of an organisation capability perspective.

1.2 An Unfolding Exploration

The study was a university-industry thesis jointly funded by the supporting company as a Total Technology SERC industrial studentship. The project was run as part of the IHD scheme at Aston University which offered multidisciplinary higher degrees derived from the needs of industrial organisations (1).

This thesis is a Total Technology study by a researcher previously trained in Systems Engineering and so does not have any pretentions to be a sociological analysis. The researcher believes that his lack of previous training in social research helped him to introduce a critical and exploratory perspective of organisation and strategy theory.

The IHD scheme was established in 1968 following the recommendations of the Swann Report (2) which urged the development of new approaches to increase the value and accessibility of the traditional PhD. The Scheme managed the location of multidisciplinary studentships, including ESRC and SERC CASE awards, across the university's faculties until it was discontinued in the early part of 1991. This happened despite offering an established means of developing industrial links with the University's research activities. It occurred at a time when many universities are trying to develop industrial ties in order to introduce more pointed research and supplement their financial position.

The SERC's Industrial Studentship programme allows the researcher to study towards a doctorate whilst continuing employment. The Total Technology stream within IHD was intended to provide the support needed for students carrying out both industrially based and multidisciplinary research. A Total Technology thesis should satisfy three criteria, 1. benefits to the industrial organisation, 2. advanced training for the student, and 3. add to and develop a particular area of applied knowledge.

The thesis unfolded in two distinct moments. First the researcher examined the introduction of automation

and factory information systems, paying particular attention to the financial justification techniques adopted within Land Rover. This was in line with the employing department's activities (3) and represented a continuation of the student's previous Systems Engineering training. Secondly the chance conjecture of changes of concern within the employer and project supervision led to a focus on organisational aspects of corporate adaptation to the market and incoming innovations in manufacturing process to be developed.

The thesis concerns the strategic capabilities of an organisation and covers how they may be analyzed and the application of the analysis in a reliable public manner.

1.3 The Role of the Researcher

Being employed in a variety of positions within the company enabled the researcher considerable mobility about the organisation's managerial and staff strata.

September 1987-August 1989:	Project Engineer, Manufacturing Engineering, Land Rover.
August 1989-December 1990:	Project Leader, Manufacturing Policy Group, Rover Group.
December 1990-April 1991:	Team Member, Distribution Development Programme, Rover Group Sales/Commercial.
April 1991-June 1991:	Strategist, Projects and Policies, Rover Group.

Despite this relative freedom to study the organisation the researcher has been trapped by the same constraints covering all employees. These include having a place in the hierarchy and being identified as part of one of the functional factions of the organisation. The potential problems associated with participant observation and its implementation at Rover under the Total Technology scheme are discussed in the next chapter.

1.4 Guiding Theories

The thesis was originally formulated from observations made from within the organisation, which were developed, shaped and supported by various investigating strategies. This process generated six detailed probes of attempted change in the organisation:

a. Material Requirements Planning (MRP) introduction at Land Rover
b. Operational innovation in Rover
c. Rover's relationship with Honda
d. Rover's relationship with Warwick University
e. The adoption of Breakthrough Technology
f. A review of the organisation's corporate planning activities.

The research strategies which have been developed to further investigate the organisation were primarily intended to overcome the basic problem inherent in participant observation, that of distortion resulting from the observer's own position and relationship to the organisation. As well as generating a level of enhanced detachment from the original observation's position the investigating strategies were used to further identify and clarify the causal factors of the company's strategies.

It should be emphasised that the researcher was not operating in a true participant observation role in the company. Because of his dual relationship with the organisation the researcher has been in a situation of participating - occupying a role in the organisation in which he has to perform for his own development and credibility - which has been combined with a role of observation of the company. The appreciation of this distinction between participant observation and a participating observer has been significant in developing and assessing the perspectives discussed in this thesis.

Once it was realised that strategic management as practised at Land Rover would be influential in the analysis of the organisation's capabilities the researcher attempted to gain a more detailed picture of the relevant theories than had been experienced during his graduate engineering training.

The first area to be studied was the theories developed by the management scientists, as typified by Schendel and Hofer (4). These were easily approachable by someone with a systems engineering background but were soon found to be very limited in explaining or expanding the observations already made. This limited value related to the general prescriptive style adopted by the management science writers. This was supplemented by a study of the corporate planning activities practised at Rover. This study found that, despite the organisation's belief that it was operating its planning along the lines developed in the pedagogical approach of the management scientists, the role of the planning process was limited to recording the strategies which had already been developed by certain clearly identified factions present in the organisation.

Secondly the behaviourist texts were examined and found, despite their being less approachable because of the researcher's background, to present a more useable framework for understanding the activities and

capabilities at Rover.

The key guiding theories and perspectives which have been adopted in this thesis are outlined below.

1. Abernathy's perspective on the road block to innovation which is developed in his study of Ford and the Japanese rejuvenation of the US automotive market (5). Abernathy uses the sector life cycle model, a view of organisational theory as presenting structural blueprints, the portfolio concept of the firm and implies briefly how existing political factions may reduce the malleability of the organisation to make quick strategic alignments.
2. The perspective developed in the WORC (Work Organisation Research Centre) and IDOM (Innovation Design and Operations Management) groups at Aston University. This uses Abernathy's theories to promote the value of design innovation and capability location (6). The development of design capability through innovation and its resultant location are viewed as being a crucial indication of the organisation's ability to prosper. This thesis aims at clarifying some of the hidden assumptions in this perspective and assesses the fidelity of the perspective against analytical and applied criteria.
3. The configurational perspective developed by Mintzberg (7) which also includes archetypical diachronic dimensions (8) which have been used in developing the research methodology. Miller and Freisen's application of configurations to the study of organisational transitions (9) is also used to develop the understanding of Rover's intended transitions found in the company's strategies.

This thesis can thus be classified by its approach as behavioural-processual as much as it is behavioural-structural, as typified in the existing theories of Abernathy and the WORC. Its start point is the use of the forward-longitudinal approach from a past perspective as seen in Mintzberg, and it develops this into a forward-future dimension, something which has previously only been implied in the literature. It also aims to develop further the creation of a hybrid interface between the behavioural and management science perspectives.

1.5 Two Rovers

The application of the focus outlined above, organisational aspects of capability and adaptation, has led the researcher to a separation of the organisation into two as part of the analysis. This was performed at

the British Aerospace (BAe)/Rover Group level and presents a major disaggregation along the same lines as Abernathy's portfolio approach. It differs from the latter because it is used to generate a cleavage point to help investigate the organisation and its processes more fully, and not as a means of determining units of manageable proportions. The two parts for analysis are:

a) The capability found in the 4x4 production at the Solihull, Land Rover Ltd. plant. (SLR)
b) The capability of BAe/Rover saloon manufacturing covered in the cars group. (BARS)

This separation is performed in two dimensions and is based on the results of the structured study following the general observations of the organisation.

The first dimension covers the retention of capability as seen at SLR compared to its apparent loss at BARS. The second covers the attempts of BARS to survive through an alliance with Honda and the long term implications of this strategy. The latter follows the analytical notion that firms should retain control of, if not possess, their own design capability.

The implications of this strategy of alliance are viewed from two perspectives, first as a revivalist Rover, having acquired its own design and capital capabilities to become and survive as an independent manufacturer. Alternatively the strategy and implications are seen as they may be viewed by the BAe board, of the company having commercial assets, primarily land, which can be acquired with Rover being sold to Honda or elsewhere.

The significant factors which have been identified in each segment of the organisation are summarised as follows:

Solihull-Land Rover (SLR)

* Has its own design capability which is located internally.
* Has its own international distribution system.
* Is viewed as a world class firm.
* Ingests external process-production innovations as being derived from within. This results in increased technology adoption.
* Copes with the (slow) pace of its market change.
* Is able to fund model development through incremental change.

Rover Saloon (BARS)

* Dependent on Honda for its car design capability and cost reduction development.
* Dependent on Honda for some process-production principles and their development.
* Possesses political factions which are changing too slowly relative to the market.
* Is coming late into the adoption of time based solutions.
* Despite two major attempts (developing links with Warwick University and introducing Breakthrough Technology) lacks the leverage for adaptation.
* Has a historical discontinuity in organisation structure.
* Possesses a hidden agenda in its factions concerning the control of funding for new models.

If these limitations at BARS are not reversed then it looks likely that, without external support, the company will fail. This is particularly so given the current economic climate which has hit the UK motor industry particularly hard.

The thesis contains some recommendations for the company based on the areas studied and the researcher's own limited experiences. These are introduced at the end of the thesis.

1.6 Areas of Discussion

From this focus and the Rover data, the thesis has addressed the processual aspects of behaviour analysis in organisational strategy. Particular areas covered are:

1. The use of probes in investigating organisational capability against the adoption of case studies. It is argued that the use of indicators in the case study methodology as found in Mintzberg's analyses does not provide sufficient focus or detail to fully identify the significant issues in organisational capability. The adoption of a probing strategy, similar to that used by Abernathy (using 20 key innovations at Ford) and WORC (detailed analysis of key organisational transitions), rectifies this problem, particularly when allied to the participant observation approach.

2. The reconstruction of strategies from historical data. Previously this process was achieved through adopting a backward looking perspective. This is despite Mintzberg's development of theories concerning emerging strategies (10). However the strategies themselves were originally developed by the organisation from a forward perspective.

   The detailed data gathered has enabled an attempted disaggregation of Rover's strategies to be made which introduces the influential factors causing the emergence of the strategies. The introduction of these factors attempts to capture the nuance of the intent behind the strategy and

its context during formulation. It is felt that the nuance greatly influences the possible success of strategies.

3. The periodisation process found in the diachronic study method. This was found to be not only highly subjective but its results did not appear to capture the macro aspects responsible for the resultant strategy periods. The development of a means of identifying these factors should promote generalisations to be inferred from case specific studies.

   The factors identified at Rover were: government strategies regarding the company and its market, changing asset values and their effect on new model funding, the different approaches of the many CEO's, Honda's impact through innovation and the shifts in the company's design capabilities.

4. The thesis also proposes that an organisation's ability to achieve certain strategies is dependent on its capability which can be estimated from its past ability to achieve change. This has been implied in the theories which have been used to guide the investigations but has never been made explicit, and is a potentially powerful tool in the analysis and development of future organisational strategies. It is this application of historical capability which has helped formulate the recommendations for the company.

1.7 Structure of the Thesis

The thesis is divided into four parts in order to provide a structure similar to the study's development.

Part I - Problem and Framework - How the researcher unravelled the notion of strategic capabilities.

Chapters 1 and 2 examine the status of the literature pertaining to strategic management and organisational capabilities. Some of the significant methodological problems and discrepancies are identified and discussed. Chapter 2 also contains a longitudinal study of Rover which identifies the major periods in strategy development and organisational change and discusses the global causal factors concerning these strategies.

Part II - The Land Rover Organisation and its Capability.

Part III - An Examination of British Aerospace-Rover Group.

The bulk of the thesis, Chapters 3 to 8, include the probes into the organisation and covers the discussions specific to the organisational element or technology being examined.

Part IV - Interpretation of Organisation and Design Capability.

Chapter 9 represents a discussion of the data which identifies the contributions made in the thesis and the recommendations for Rover and how they have been developed. The conclusion, Chapter 10, identifies the future work which is required to enhance the developments made in methodology and theory and summarises the project.

At the end of the thesis there are several appendices which form part of the evidence gathered in the probes.

1.8 Conclusion

This thesis represents a development towards a unified management science and behavioural strategic theory of the process type. It uses a behavioural-processual and -structural methodology of studying organisational capability.

The thesis uses data gathered from a longitudinal study of Rover and utilises probes into the organisation to support and develop observations made whilst the researcher was employed as a staff analyst in the organisation.

Chapter 2. Literature Review

2.1 Introduction

The literature concerning strategic management and organisational capability will be reviewed in this chapter as the investigating methodology and influential theories used in the study of Rover are explored. The literature relating to the specific areas of the probes of the Rover organisation is not reviewed in this chapter. Reference to this case related literature can be found in the chapters covering the specific probes, e.g. production control literature is discussed in Chapter 4: Manufacturing Resource Planning (MRPII) Introduction to Land Rover, similarly the literature concerning innovation is described in Chapter 8: Operational Innovation in Rover.

A distinction between the management science and behavioural approaches is used to classify the many ideas conveyed in the sources. Similarly the review uses a perspective developed by identifying the differences between the adoption of a process or structural view of strategy formulation methods. The combination of these two classifications enables the value of this thesis, being largely behavioural-processual, to be assessed.

The chapter also examines the issue of periodisation as applied to longitudinal studies. It is argued, through the development of a longitudinal study of Rover, that the criteria used for such strategy period segregation greatly effects the findings of longitudinal studies. The development of a detailed understanding of strategy formulation and the identification of the factors causing their emergence is found to be of greater value than the normal, highly subjective methods. The use of influencing factors also leads to the development of generalisations from longitudinal studies.

The implications of utilising a participant observation study method are also discussed in order to show how these issues were addressed in the probing methodology which covered specific areas of the Rover organisation.

2.2 Observation of Rover

The observations made by the researcher and used as the basis for this study were developed from the perspectives generated by the researcher's roles in the organisation. The observations essentially cover the differing design capabilities and operating methods found in Land Rover at Solihull and Rover cars saloon operations.

Participant observation was originally used by anthropologists to study the societies of groups and families (11). Its application to sociological and organisational studies followed because of the detail which can be captured when, as Moser outlined:

> *'the participant observer shares in the life and activities of the community, observing what is going on around him but supplementing this by conversations and interviews.' (12).*

Participant observation is one of the only true ways of escaping the inaccuracy problems of reconstructing events. The inaccuracies are primarily due to people introducing distortion and memory errors and are reduced in participant observation by recording, through the observer, events as they occur.

Because of the involvement of the observer in the system under investigation there is an accepted chance that the results of the study can be coloured or subjected to bias. The understanding of the biases introduced is vital in preserving the validity of observation based studies.

One of the potentially most influential sources of errors in participant observation is the result of the observer's influence on the group under investigation. Whyte called this the *'control effect'* (13).

The effect of the observer on the organisation can be reduced by covert observation but this has many ethical implications. The Rover observations were conducted in an open manner, the researcher was originally only part of the organisation because of the research. As the researcher's role in the organisation developed into the analyst function exhibited whilst working in manufacturing strategy, an element of 'cover' was introduced. The link with Warwick University, the location of the ATC, and the accompanying academic identification has been made clear to most of the people questioned in connection with the observations. The researcher has tried to explain the reasons for particular interviews in terms of the doctoral study at Aston University but very few people were found to understand the area or detail of the research.

Attempts at explaining the situation left the researcher feeling that those informed believed the project to be similar to the many brief, technically based MSc projects which are found in the Rover organisation. These MSc projects result from the IGDS programme run by Rover with Warwick University. The MSc projects receive significant support from the company. The MSc studies offer no threat to the standing and authority of individuals in the organisation, being an academic reflection of interesting technical or operational elements of the company and do not contain anything of strategic value.

A major influence on the success of participant observations is the ability to access the right type of data. Lupton, in observing work organisation in two workshops had difficulty investigating management activities from his location on the shop floor (14). The researcher studying Rover is well placed to examine the company's strategic concerns from his location which affords great flexibility to move about the managerial and staff strata of the organisation. The same view would have been impossible to generate from the shop floor.

Clark and Ford adopted the consultant/researcher approach to ensure the neccessary access to data but still remained uninfluenced by the prejudices resulting from being located in the organisation (15). The bias was also reduced by using the tandem research technique, having two researchers interpreting the same data. A degree of this double checking of interpretation has been achieved in the Rover study by the student discussing ideas with the project supervision team and with colleagues within the company. The detachment required to provide an unbiased interpretation of the researcher's involvement has been very hard to generate in this thesis. The use of detailed probes into several different areas and activities of the company was intended to reduce the impact of his prejudices by analyzing areas which were beyond the normal experience of the researcher.

The entry of the researcher into the Land Rover organisation at the start of the project from a relatively inexperienced position, and the later move into Rover, have helped ensure that the significant occurrences and situations which would have been all-too-obvious to people located within the organisation have been recorded because of their novelty to the researcher.

The relative success of the researcher at combating the potential bias resulting form his involvement in the organisation is assessed in the discussion chapter of this thesis.

2.3 Classifications of Strategic Management Literature

The observations concerning the Rover organisation required confirmation and explanation through the use of theories found in the strategic management literature.

Several notable attempts have been made to describe a framework for the literature concerning strategic management (16)(17). Most are in agreement that there are two distinct schools, derived from their intentions toward the subject. These schools can be labelled as the management science and behavioural schools. The first is based on the belief that long term planning is a necessary and key part

of an organisation which can best be achieved through a formalised process (Quinn termed this the classical formal method (18)). This school is based on the assumption that given enough analytical power it is possible to develop strategies which can adjust a firm's stance. It is this approach which is widely taught in business schools and is typified in the writings of Schendel and Hofer. The investigations which support the basis of this school have been largely derived from synchronic studies across many industries.

The other major body of literature, the behavioural approach, aims at explaining organisational activity by studying that which actually occurred in the development of particular strategies. The behavioural school draws much of its data from diachronic studies of one organisation or industry sector and contains two alternative perspectives:

1. That concerned with developing configurations of organisational structures and forces (as developed by Mintzberg).
2. The development of organisational capabilities through innovation (as found in the writings of Abernathy and the WORC/IDOM groups at Aston University).

These perspectives adopt a behavioural-structural approach to analyzing strategies.

This thesis aims to develop a link from a behavioural-processual perspective (accommodating the behavioural-structural approach) into the management science school, which is largely processual in its approach, and so move towards a unified strategic management theory.

2.4 The Management Science School of Strategic Management

Strategic management really started to emerge as a field in its own right when US business schools adopted a prescriptive approach to their analyses, based on a pedagogical paradigm intended to promote strategic thinking amongst their students. The basic premise was that planning could only be successful if it was operated as a formalised, rational mechanism. This approach developed as a result of the widely accepted definition of strategic management first introduced by Drucker.

'What is our business? What should it be?' (19)

was a question used by Drucker to promote thinking into the development of management styles and practices.

One of the most influential early texts to deal with an examination of management at a strategic level was

written by Chandler, a business historian studying the development of diversified structures within expanding organisations. He believed that:

> *'Strategy can be defined as the determination of the basic long term goals and objectives of an enterprise and the adoption of courses of action and the allocation of resources necessary for carrying out these goals.'* (20).

Chandler originally concluded from his studies that the structure of organisations was determined by the strategy that the firms had adopted. His firms had planned to expand and subsequently developed their structures as a direct result of this expansion strategy. In the preface to a later edition of his work Chandler concedes that this was not the essence of his original observation, but an oversimplification which does not bear close scrutiny (21).

Chandler's approach to strategy study was adopted and developed by Ansoff to cover the processes which were thought to be involved in strategy formulation. Ansoff was studying a large organisation intending to diversify in a similar way to those examined by Chandler. The formulation of both Chandler and Ansoff's theories from studies of diversifying organisations may have introduced a bias towards expansion strategies into the premises of the inheriting theories of strategic management.

Ansoff developed a model of strategy which included certain elements which he described as:

> **Product Market Scope** - 'the particular industries to which the firm confines its product/market position.'
>
> **Growth Vector** - 'the direction in which the firm is moving with respect to its current product/market posture.'
>
> **Competitive Advantage** - 'it seeks to identify particular properties of individual product/markets which will give the firm a strong competitive position.'
>
> **Synergy** - the joint effects of the above and company identity.(22)

Ansoff analyzed the elements above in some detail using a system-based perspective in an attempt to determine the components neccessary for effective strategies. It is this belief that strategies can be exhaustively defined which has promoted the emphasis on strategic planning as the formal and analytical development of statements.

Ansoff's narrow approach to strategy was extended by Andrews to cover goals, policies and plans. This extension enabled Andrews to draw together two ideas: what to achieve (goals) and how it might be achieved (strategy) (23).

From the views of Ansoff and Andrews developed the ideas of resource utilisation and management which led to the establishment of four components of strategy: Scope, Resource Deployments (distinctive competencies in his terms), Competitive Advantages and Synergy, which could be managed in a scientific manner, hence the description of this school as management science.

From the four components above, a view of strategy as a plan and a belief in the potentially high value of strategy management, followed the development of formal methods of strategy formulation.

One of the most detailed management science strategy formulation processes is that proposed by Schendel and Hofer. They believed that strategy was a:

> *'fundamental pattern of present and planned resource deployments and environmental interactions that indicates how the organisation will achieve its objectives.'* (24).

From this statement Schendel and Hofer identified six exhaustive and all encompassing steps (25) which they believed were explicitly required for the development of strategies:

1. Goal Formulation,
2. Environmental Analysis,
3. Strategy Formulation,
4. Strategy Evaluation,
5. Strategy Implementation,
6. Strategic Control (26).

This process approach was supported by a composite model of how to develop strategies at both the corporate or 'grand plan' and business levels.

> *'The Hofer/Schendel models depict an interactive top-down approach for multi-industry firms and an interactive, bottom-up approach for single- and dominant product-line firms. More specifically we (Schendel and Hofer) assert that multi industry firms should first establish the tentative objectives and portfolio profile they would like to have, after which their individual strategic business units would formulate business strategies. Then any gaps would be closed in a strategic decision-making session involving both corporate- and business level managers.' (27).*

The identification that differences in strategy are found at different levels of an organisation was first proposed by Granger (28). The theory states that the differences in strategy experienced in different levels are required to generate actions at each level. Different actions are needed because of the varying responsibilities and focuses found in the hierarchies of most organisations. Recently Kanter has further developed, in discussing innovation in a behaviour-based prescriptive manner, the importance of organisation levels in change processes. She advocates strategies which create increased flexibility in the lower levels of an organisation to harness the abilities of this level which she found to be the main source

of innovative ideas (29). The approach shown in Kanter owes much to the work of Argyris concerning the role of individuals in organisations (30) and is a more formal approach than that used by Peters. Peter's work studies successful organisations and vividly captures their innovative ideas to create a customer driven perspective (31).

The Schendel and Hofer approach closely resembles the formal management science methodology believed to be adopted by most organisations and is most generally visualised as strategic management. Many techniques have been developed to aid or improve the performance of the six stages, primarily through their applicability to different levels in the organisation (32).

The management science approach is process based, intending to develop a method of producing strategies for the organisation. Its main failing is that it does not consider the organisation's general ability to realise strategies. The organisation may not have the capability (as distinct from the resources) to implement the strategy which the management science formulation process develops or may be unable to adjust to the implications behind the strategies.

It is the prescriptive nature of this process perspective which limited the investigative value of the management science approach to the strategies within Rover and led the author to follow a behavioural approach in the research.

2.5 Behaviour Theories of Management

The behaviour school of strategic management concentrates on specific aspects or modes of the strategy formulation process which manifest themselves within the organisation. The behavioural approach applies many existing organisational and psychological theories to explain change and strategy formation. Mintzberg attempted to develop classification labels for the activities of the behavioural approach and arrived at Entrepreneurial, Cognitive, Learning, Political, Cultural and Environmental (33).

The behavioural theories are based on work examining the forces to be found operating in organisations. A key factor in these forces is the influence of the networks of individuals which make up organisations (34).

Cyert and March examined the goal formulation process from the behavioural perspective and concluded that:

> *'Goals arise in such a form [through independent constraints derived from bargaining] because the firm is, in fact, a coalition of participants with disparate demands,*

changing foci of attention, and limited ability to attend to all organisation problems simultaneously.' (35).

One of the most significant forces used in the behavioural school to explain organisational activity is that of power, which was most influentially examined by Weber. He determined power to be the ability to carry out one's own will despite resistance (36). This definition of power was refined to include the important distinction between actual power and potential power, the latter being the way in which resources could be developed as a base for power but which can have effect without actually being used (37). Bacharach and Lawler were instrumental in developing the link between the individual based power theories and organisations (38).

The large volume of theory concerning organisational interaction with the environment also falls into the behavioural school. Dill's work, though not conclusive in developing its aims of exhaustively classifying environmental variables, does identify the way in which the same environment is conceived differently by groups and individuals in the same organisation.

'Even in situations where the parties presumably have access to the same information, they may interpret it quite differently.' (39).

One theory concerning the ways in which firms operate focuses on the idea that organisations by passing information around cause its meaning and content to be distorted (40). The importance of language in these communication processes was developed by Pfeffer whilst exploring organisational contingencies (41).

There is another facet within the behaviour theory dedicated to the study and examination of how decision processes operate within the mind of the decision maker. One of the most influential studies into decision making was performed by Hickson et. al. and is commonly referred to as the Bradford Studies. The Bradford Studies concentrated on the selection processes utilised by experts in addressing 130 decisions in 30 different organisations. The studies found a heavy reliance on the 'interest' (or vision) of the organisation or individual in formulating the different decision scenarios. From these studies the authors developed a complex model of decision making (42).

Within the behavioural school there has been a growing amount of literature, based on the results of empirical studies, which criticises the management science approach. Lindblom, in some early work, established that individuals could not effectively assimilate all the information required to make true

analytical decisions and surmised that a process of second guessing occurred in strategy formation (43).

Other studies tried to determine the success of companies utilising strategic planning methods (44) (45) (46). These studies rely on the perhaps naive assumption that the companies investigated utilise 'strategic planning' without fully studying what the strategic planning activities are and how effective the organisation is at following these strategies.

Quinn's studies left him with the opinion that neither the formal planning methods or the existing purely behavioural models of organisations described adequately the way in which successful strategic management processes operate (47). These thoughts led to the development of the behavioural approach to strategic management study.

Quinn developed a behavioural perspective, termed logical incrementalism, which despite its source in the management science planning school, was able to identify the adaptive and continually changing nature of planning within organisations (48). Logical incrementalism is based on the belief that change within organisations is made of small steps. These steps are a result of individual managers constantly taking decisions, small in magnitude, which represent an acceptable level of risk to themselves or the organisation. Thus a large shift in organisation perspective requires a long time for the cumulative effect of the small steps to happen.

Tushman and Romanelli's studies contradict Quinn's view of constancy in the organisation, by finding periods of stability (incrementalism), punctuated by times of rapid change (49). Stopford and Baden-Fuller also found this cyclical nature of change within organisations and showed that it was connected to changes in leadership (50). Miller and Friesen, who discovered quantum states of organisational configurations, outlined other possible reasons for this discontinuity. Their work identified quantum transitions between organisational configurations as the explanation of the cyclical bursts of organisational realignment. They believed that periods of organisation consolidation, achieved through incremental changes in structure, were broken by periods of transition or realignment from one organisational typology to another of the distinct and isolated configurations identified by Mintzberg.

2.5.1 Contingency and Organisational Configuration

The configurational approach to the study of strategy formation is based on the belief that organisation

development and strategy transitions are complex processes which combine many different elements, including those outlined above.

Configuration theory is a development of the contingency approach. Contingency recommends that an organisation's design should follow its context. Contingency theory was developed by writers such as Woodward (51) and Perrow (52) and is supported by various studies of organisations and their behaviour in certain contexts (53). It is these studies which have been used to develop ideal structures for organisations intending to follow certain routes or adopt certain characteristics.

The configurational approach to the study of strategy formation encompasses a much wider sphere than that of planning, being centred upon understanding organisational typologies. Configuration was developed from the finding that organisational contingencies could be grouped into simple recurrent patterns and that these configurations were the result of certain fundamental forces. Once the various forces operating within an organisation have been identified, the configurational approach believes that it is possible to study how these realise and reflect themselves in the organisation's strategic development activities.

A detailed use of configuration as a modelling tool was developed by Hakansson (54) to examine industry wide activities and was subsequently used by Clark and Staunton to study factors of innovation in design capability (55).

The flexibility of the configuration approach relies on determining organisation structure archetypes. The researcher feels it is necessary to explain the approach used and the typologies discovered to help examine the value of configurations in strategic management generally and in the examination of the Rover organisation's strategic capabilities in particular.

The original ideas which have developed into the study of organisation configurations were introduced by Mintzberg and first published in 1983 (56). This work outlined an organisational typology based on the belief that certain factors or parameters could best be used to describe the organisation. These factors are shown in table 1.

The most influential are the controlling factors which describe how the different parts of the organisation coordinate. The organisational elements adopted by the methodology (shown in figure 1) are those which Mintzberg determined in his earlier work examining management roles within the organisation (57).

The theory continues by stating that the coordinating factors also require a means of dividing labour to ensure different tasks are performed. The achievement of these tasks is accomplished through a set of design parameters. These design parameters are grouped to determine: 1.the various positions through the use of procedures and task specialisation (marked *), 2.the basic design of the hierarchy (**), 3.the lateral relationships required for it to function (***) and 4.the decision making systems (****).

Table 1. Mintzberg's Parameters used in Describing Organisational Configuration

(58)

The factors discussed so far were thought not able to describe the organisation fully and so a number of situational factors, which have contingency effects on the design parameters, were introduced. These parameters result from the context of the organisation and reflect contingency effects on the organisation. The nature of all the elements, when exposed to theoretical scrutiny, determine five pure structural extremes or organisational configurations. These five are a result of the mechanisms represented in the

parameters. The configurations and their derivation are described through the dominant forces which pull the organisation towards archetypes, and are shown in table 2.

Figure 1. The Elements of Organisation Structure, (59)

Table 2. The Pure Configuration Archetypes.
(60)

As was stated earlier, the pure configurations represent the extremes of a multi-dimensional continuum which can be used to analyze the forces and resultant structures of organisations. As Mintzberg stresses:

> *'The point to be emphasized is not that the five configurations represent some final typology, but that together as a set they represent a conceptual framework that can be used to help us comprehend organizational behaviour: how structures emerge, how and why they change over time, and why certain pathologies plague organizational design.'* (61).

Mintzberg later explained several observed anomalies to his pure five sided framework by introducing two extra 'catalytic forces' which described the existence of two configurations or forms previously unplaceable in the pentagon described by the pure configuration apexes. The catalytic forces, missionary and political, are seen as opposing each other and are described respectively as: ideology, which encourages members to pull together (this leads to pure decentralisation where each member is trusted to decide and act for the overall good of the organisation) and conflict, forcing people to pull apart (this leads to no stable form of centralisation or decentralisation). These catalytic forces have a maximum influence when no other part of the organisation is dominant (62).

The configuration approach to organisation study in relation to strategy formation has the effect of producing a language to describe organisation transitions as part of strategies. Configuration also adds

to the behavioural school of management by providing a method of organisational analysis which is able to determine the forces generating, pertaining to or resisting change within the organisation.

Miller and Friesen examined organisation transitions from the perspective of organisational configurations. They found that transitions in successful companies occurred as quantum changes, explained as shifts from one dominant configuration to another in line with changes in the company's strategies (63).

It was the configuration basis which enabled Mintzberg to identify strategy formation as an active crafting process. This definition challenged the previously accepted belief that strategy was divided into formation and implementation actions. The linear formulation implementation perspective is at its most evident in the prescriptive management science approaches found in many influential works, for example Porter (64) and Ansoff (65).

The generation of a contrasting view of strategy, not as the static content found in the management science approach which:

> *'describes and prescribes techniques for identifying current strategy, analyzing environments, resources and gaps, revealing and assessing strategic alternatives, and choosing and implementing carefully analyzed and well-thought-through outcomes' (66)*

but as historical consistency over time in a stream of decisions has proved to be the start of a behavioural approach to the study of strategy.

Mintzberg developed a methodology for examining organisations and built up a collection of case studies tracking organisations' strategies. The methodology can be classified, in terms of the model presented at the start of this review, as behavioural-structural, being concerned with organisation behaviour viewed from a structural perspective.

The longitudinal approach which Mintzberg developed has remained constant across the period of his project study: 'Patterns of Strategy Formation'.

Mintzberg's studies reconstructed the strategy patterns perceived within certain organisations, e.g. National Film Board of Canada, US involvement in Vietnam, Volkswagen, Stienberg Supermarkets Inc., Pacific Western Airlines and Canadian Lady lingerie manufacturer (67) (68) (69) (70) (71).

Other studies following similar lines have been made by Pettigrew into ICI (72) and Bahrami and Evans into Silicon Valley firms (73). The same methods were adopted by Bijker et al in investigating

the historical innovations found in certain products like the bicycle (74).

Mintzberg's methodology is based on four steps:

1. Collection of Basic Data
Each study involves an extensive search for traces of decisions and actions taken by the organisation within its own archives and any other source available. This data is sorted into various strategy areas and supplemented by information on external trends, events in the environment and indicators of performance. Any gaps in this data are the subject of supplementary interviews.

2. Inference of Strategies and Patterns
The data is then graphically represented on a common timescale and the research team analyzes this chart to establish patterns of consistencies over time (Mintzberg's favoured definition of strategy). These consistencies are then scanned to infer distinct periods of the organisation's history.

3. Analyze Each Period
This activity involves extensive interviews to explain the major changes in strategies and represents a shift into more qualitative study from the earlier relatively hard data.

4. Theoretical Analysis
This step is a brain-storming session for the academic team and focuses on a number of theoretical questions in order to try and interpret each period and summarise the entire study. Issues examined include the relationships between environment, leadership, organisation, etc.

Mintzberg's method, by principally analyzing and reconstructing the strategies of an organisation across great tracts of its history, is able to identify the dominance of certain strategies. This identification of significant strategies is the reason that Mintzberg's approach was adopted as the basis for developing the study of the initial observations of the Rover organisation.

One point which Mintzberg raised about this methodology is the need to accept that the study is not able to follow the events as they occur and has to reconstruct them. This reconstruction approach is partly forced by Mintzberg's definition which insists that strategies are long term patterns. Reconstruction has introduced possible inaccuracies because the studies have to rely on an interpretation derived from people's views of what happened in the organisation.

Mintzberg noted this problem and used it to make the distinction between the different characteristics of intended and realised strategy (and realised despite intention). The emergence process is shown in the diagram (figure 2) and includes the notion of unintended strategies, or those which have been derived

beyond the control of the organisation.

The types of organisation covered in Mintzberg's studies occupy positions in slow moving-markets, are normally made successful by an individual who remains in control for a long time and generates stability in the organisation by following clearly defined strategies. In this situation changes in strategy are relatively infrequent.

In different types of organisations and in Rover in particular, strategies change much faster, making their reconstruction significantly harder. Mintzberg attempts to reduce the problems of identifying these frequent changes by capturing only emerged strategies, those which have had a clear effect on the organisation's performance and structure.

The role of the researcher in the Rover organisation enabled a fuller picture of the data to be gathered than if Mintzberg's approach had been followed closely, e.g. by including emerging strategies and ones which have not had a clear effect on the organisation's performance. Several of the probes into Rover which were developed with the use of the longitudinal methodology were recorded as the strategies actually emerged, so reducing the associated reconstruction problems.

Figure 2. Emergent and Unrealised Strategy (75).

The inference of strategies, without the understanding of the intentions present within the organisation during strategy formulation, produces a highly judgemental and arbitrary periodisation of the organisation's history. By imposing departmented criteria on data, the methodology excludes many factors which explain the intent behind the subsequently realised strategies.

These periodisation issues are detailed in the discussion of the periodisation of a longitudinal study of Rover which is recorded later. An approach to periodisation is introduced which shows an alternative view of the process and attempts to capture and analyze the significant aspects of the periods, rather than just imposing a rigid classification onto the emergent strategies.

Mintzberg's patterns in strategy definition, the longitudinal investigation methodology and his organisational structure concern have enabled strategies to be seen as cycles of events. This supports the findings presented by Tushman and Romanelli, and Quinn. Pettigrew also found this cyclical nature of change at I.C.I.:

> *'patterns of strategic change at the level of the firm may be understood in terms of long periods of continuity, learning, and incremental adjustment interspersed with hiatuses or revolutions featuring abnormally high levels of change activity.' (76).*

Abernathy found cycles present in product lines and translated these into corresponding patterns of organisation innovation (77).

Allport predicted that changes in organisational strategy could flow in complete circles:

> *'returning in circular fashion to reinstate the cycle.' (78).*

The existence of such cycles appears to be supported in the management science and behavioural strategy literature but they have never established at what levels these occur or the identity of the mechanisms which support the cycles. The longitudinal technique should be able to generate an understanding of this cyclical phenomenon and identify if it is an inherent trait in certain organisation configurations, part of certain strategies or the result of often-repeated chance alignments in organisational and environmental forces.

The Rover study has seen a re-emergence of the expansionist strategies found in the Ryder era and suggests that strategy cycles can occur as a result of changing circumstances promoting the organisation's acceptance of certain already-existing strategies. This illustrates that strategies can exist in dormant states before being reinstated and are not just created by planning activities as held fundamental to the

management science approach.

The identification and operation of factions and their impact on strategies as seen at Rover is not contained in Mintzberg's theories. In fact his machine bureaucracy configuration explicitly excludes a non-homogeneous culture by describing a unified organisation force.

2.5.2 A Longitudinal View of Rover

Some of the above criticisms of Mintzberg's longitudinal methodology are illustrated in this longitudinal study of the Rover Group, 1968 to 1991. This study also develops a contextual framework for the detailed probes and general observations and was originally performed to assess the exploratory power of Mintzberg's model in relation to the Rover observations. The previous development of the company is described in great detail by Whipp and Clark (79).

The present organisation first existed as a whole in 1968 when Austin's and Morris' organisation BMC, which was formed in 1959, was taken over by Leyland. Leyland had already taken control of Standard Triumph in 1961. The new company was called BLMC and was headed by Leyland's Lord Stokes (80).

Leyland's declared strategy, which was adopted by the new BLMC, was based on keeping the business stable in the UK and Europe markets through takeover activities.

Financial problems beset the organisation in a succession of events from autumn 1973. These events were compounded by the oil crisis, the three day week and the deteriorating UK economic prospects due to the rapid increase in inflation. These problems caused a 1973 pre-tax profit of £68m to turn into a half-year 1974 loss of £16m (81). The company was subsequently unable to fund its own expansion based recovery plans (expansion to benefit from economies of scale) and so the government was invited to intervene. This intervention formally happened in December 1974. The first product of the passing of control to the government was a Parliamentary Study, 'British Leyland: the next decade' (known widely as the Ryder Plan (82)).

The Ryder Plan established some guidelines which the government required the company to follow. The concluding recommendations of the report were that:

> *'British Leyland should not diversify away from the industry and should remain a manufacturer in all sectors'* (83).

and gave support to B.L.M.C.'s original expansion plans. The government supported the Ryder Plan on

the condition that there was a *'substantial programme of product rationalisation' (84)*, and on the basis that greater exports would be able to generate extra cost reductions.

The Ryder policy was pursued superficially until the appointment of Michael Edwardes in 1977 began to show effect. The corporation had not really been rationalised since the Ryder report's recommendations and was continually absorbing government funds. The capital injections are summarised in table 3. The financial involvement of the British Government was handled by the N.E.B. (National Enterprise Board), a body newly established from the I.R.C. (Industrial Relations Corporation) to generate finance for struggling industries (85).

Table 3. Capital Injections from Public Money.
(86)

The first task which Edwardes undertook was the rapid rationalisation of the company's model and market structures, following the original proposals of the Ryder Plan. This is an example of a dormant strategy, the Ryder Plan's rationalisation aspects having remained in the organisation despite not being acted upon. The company was effectively competing against itself particular with the very similar Rover, Triumph and larger Austin products and had massive excess capacity. This period of model reduction is shown in table 4, and a more complete picture is shown in figure 3. Edwardes himself called this phase 'The Term of Shrinking' (87) which led to the ending of production at Speke, Cowley, Solihull and Seneffe in Belgium. The model rationalisation nearly halved production capacity from 687,875 units in 1977 to 395,820 in 1980 (see figure 4).

The introduction of new models was a major problem for Edwardes. A relatively high number of model

developments was required to replace existing products in the rationalised range. Because of the financial failure of BLMC the new model plans had been severely curtailed for the past 5 years. To fill the gap the Honda-licensed Acclaim was introduced, originally until the late running LM-10/11 (Maestro/Montego) models came into production. The Metro was developed and introduced in 1981, after a record-breaking short development time as a result of Edwardes' model replacement focus.

Arguably Edwardes' most public achievement was that of reducing the power of the unions within the organisation (88). He believed he had returned the power to the management by concentrating on the new models (89). The present chairman of the company believes that Edwardes also focused the firm on the market place through the new model plan and enabled it to survive by introducing improved productivity along with those models (90).

The role of the Unions represents a clear example of a non-homogeneous organisation culture. There being radically different principles embedded in one of the company's factions to the accepted mainstream.

Edwardes left in 1982 to be followed by Sir Graham Day. His strategies for the company involved concentrating on customer targeted vehicles with higher product profit levels. His approach also included contracting the company to a 'base level' (91) as Edwardes had stated. Day also extended the collaboration with Honda whilst trying to explore and capture niche sectors of the market. The time of Day's direct control saw the sale of many surplus facilities, the flotation of Jaguar in 1984 (92) and the sale of the truck and bus, and Freight Rover businesses. The change from Edwardes to Day can be contrasted to Mintzberg's studies where long-term leadership stability was found to generate gradual shifts in the organisation's strategies. The change of leadership to Day showed a significant shift in management style but did not result in a prompt change in the fortunes of the company, one of Mintzberg's primary strategy tracking measures.

Figure 3. The Number of BL Models over the Period of the Tracked Strategy.
(93)

Figure 4. The Change in Rover's Production Volumes.
(94)

The sale of the company into the private hands of B.Ae. in January 1989 saw another change in leadership for the Rover organisation. Day was made chairman and replaced as CEO by George Simpson, the previous financial director who had a background as an accountant in many of the group's companies. This was the fourth change in leadership in seven years and shows the lack of stability in the Rover organisation unlike Mintzberg's companies which rarely show any change in senior management over an average 50 year study.

Table 4. The B.L. (Non-commercial Vehicle) Model Ranges 1979 and 1981.
(95)

The policies of Simpson's leadership are many, varied and not yet fully certain. The current strategies of the company under his leadership centre on the continuation of those activities and strategies developed by Day but also intend to create an organisation capable of determining its own future (96). Simpson's strategies appear to be centred on the introduction of the Breakthrough approach as a means of finding the company's own direction (see Chapter 7 for an explanation of the Breakthrough approach). There has also been a large degree of centralisation within the Group, with the Land Rover organisation and the duplicated functions of Cowley and Longbridge being combined.

The recent introduction of a Product Supply organisation (with a combined manufacturing and product design function) has seen this centralisation trend reversed with the introduction of business units. These

units are effectively independent plants measured financially and with a large degree of autonomy. The final results of this reorganisation are not yet fully clear. The position of this study to investigate the processes shaping the company's current re-alignment can be contrasted to Mintzberg's retrospective approach which only captures fully developed strategies.

2.5.2.1 Periodisation

The above represents stage one and part of stage two of Mintzberg's longitudinal methodology. It has reconstructed a historical perspective of the organisation and identified some of the organisation's most important intended strategies.

Because of the observations already made into the organisation the researcher was able to see the possible problems encountered by continuing to follow Mintzberg's methodology. The importance of the strategies which would not be captured in the normal periodisation process and the role of the factions already observed prompted the researcher to make the periodisation in a different way.

Assessing the repeated and significant factors outlined in the longitudinal study, without relying directly on the declared intended strategies of the organisation presented the following recurrent influential key factors:

1. Government Strategies Regarding the Company
2. Changing Asset Values
3. The Approaches of Different CEO's
4. The Honda Impact as a result of Rover's Strategies
5. Shifts in Design Capability.

The factors listed above had shaped the organisation's activities and so, using Mintzberg's definition, its strategies.

The identification of these significant factors remains subjective, despite being backed by the general observations. Consideration of all of the factors whilst periodising the history independently helps remove the problems associated with trying to impose exclusive periods on the history of the organisation as found in Mintzberg's methodology.

The detailed reasons for the selection of the above factors will be identified as the factors are described in more depth but the primary qualification is their repeated involvement in the actions of the company.

2.5.2.2 Government Influence

The British Government has played a dominant role throughout the Rover organisation's history. This includes a substantial period when Rover was a publicly-owned corporation. The involvement of the government can itself be periodised by the intentions of the government of the day towards the company's future, either as a result of the role of the firm in the state's plans or as a result of the government's economic policies.

The early involvement of the government, around 1973, was to ensure the struggling manufacturer's future in the face of rising costs and development requirements as a result of an inflationary and slowing economy. Once the company had been secured, there then followed a phase of promoting and supporting the company without direct involvement in its actions or strategy development processes. This passive involvement is seen in the form of capital injections from the NEB to support the Ryder plan.

There then followed a time of greater political involvement through the government's approval of the corporate plans.

The next highly significant effect of the government on the company was its sale to British Aerospace (BAe). Rover's sale to BAe was orchestrated by the government as a means of removing its obligation to the company whilst assuring its survival as a wholly-owned British concern. The sale itself has not radically changed the company but has prevented the massive alterations which would have resulted if the company had passed into a competitor's control. An example of what might have resulted can be seen in the shifts in the operating criteria adopted by Saab and Jaguar following their respective take-overs by GM and Ford. Under Mintzberg's method this change in the company's ownership would not have warranted the identification of a new phase because it had no effect on Rover's performance. The impact of the sale will however be very significant for Rover's future, particularly when the clause restricting the company's onward sale lapses in 1994/5 and BAe has an opportunity to realise the company's market value.

The role of the government concerning the industrial relations problems has also effected the strategies of the company. In the 1970's and early 1980's the different governments' varying degrees of opposition to trades unions affected the company by seriously curtailing production and so sales and revenue.

The same political involvement can also be seen with the recent discussions between the CBI and TUC

concerning the introduction of a 37 hour week. Rover will not be directly affected by this, having already implemented the shorter hours, but the effect on its suppliers may be significant.

The change cultivated at the national level in terms of the UK's Thatcherite enterprise culture, described by Keats and Abercrombie (97) may have had a significant effect on Rover's markets and suppliers. This is very hard to evaluate in terms of the company's strategies but serves to illustrate further the potential impact of governments in shaping organisations' strategies.

The role of the state (both UK and of other nations) in the company's competitive ability would have been neglected in a Mintzbergian analysis. The French and Italian governments have regularly supported their own manufacturers, through import restrictions and capital investment. The effects on the competitiveness of Rover models in these markets would have been quite marked until the advent of EC legislation to promote free competition in the Community.

The recent relaxation of car imports to Japan has had an effect on Rover's sales of the Mini. This particular model is keenly sought after in Japan and the company is now able to capitalise on this situation.

Legislation can also change an organisation's product strategies. A long debated US ruling had placed the Range Rover in a commercial vehicle taxation category instead of the domestic car classification. This classification would have incurred a doubling of the import tax on the vehicles had the decision not been overruled.

The 1992 European Open Market is causing concern for UK manufacturers. They have previously been able to charge higher prices for their models in the UK than in the rest of the EC. This EC price harmonisation issue is yet to be resolved but may result in a 10% to 15% cut in prices in the UK. To cover this various strategies are undoubtedly being developed by those manufacturers with significant sales in the UK market.

Having detected the importance of party politics and governmental influence in relation to Rover, the author found that there was little appreciation of their significance in other longitudinal studies in the strategic management literature. Pettigrew's analysis of ICI and Mintzberg's study of PW Airlines do not discuss what surely must have been the considerable impact of the government on the organisation's strategies (98) (99).

The British agricultural economy's dependence on ICI's products (and the importance of the company as an explosives manufacturer to national defence) and the Canadian Government's safety legislation and wilderness development policies on the airline would have had a great impact on the organisations' strategies.

2.5.2.3 Asset Valuation

The changes in the value of the company's assets, primarily due to increasing land prices in premium areas, was also found to be very influential to the company's strategies and should be considered in periodising the study. Leyland in 1968 was not able to fund Rover's proposed new model introductions despite being the company with the highest amount of capital to invest (100). It was this capital richness that made the Rover CEO of the time opt for Leyland rather than another manufacturer in order to secure his company's future (101).

The large assets of the new BLMC company grew rapidly as a result of the property boom of the 1970's and 1980's increasing the general value of land. The company was unable to use this growing wealth, partly because of it's massive debts but also because of operating constraints.

The primary operating constraints were a result of the land being divided into small pockets by facilities as a result of the incremental expansion of the many different companies in the group. This division of sites also prevented suitable access, thereby further reducing the saleability of the land. The value of the land itself was possibly distorted from its true value by being valued at the going rate, despite being located adjacent to unsightly factories.

The sale of the company was greatly effected by the company's asset valuation. The change in the balance sheet which was created by the government's writing off of the amassed debts incurred in the 1970's made the sale possible. These capital debts amounted to nearly £3bn (102).

The price to BAe, excluding the deferred payments which are still under examination, was £148m. This was not a true representation of the company's value. At the time Rover Group was operating with finished vehicle stocks of around £440m. These stocks were vehicles at dealers ready for sale and included Land Rover's stocks located in the UK (103).

The payments which could be generated by Arlington Securities (BAe's property development concern which was used in the Royal Ordnance land sales) could far outweigh the risk taken by BAe in entering

the agreement. Examples of land which could be sold include the likely event of BAe closing either Hobart Place (Rover's Central London HQ) or its own HQ in the City; any of the Solihull, Longbridge and Cowley plants, each occupying large amounts of housing development land and together potentially providing nearly three times the production capacity needed for Rover's present sales (104). It should be noted that the Longbridge site does not occupy a location with the same desirability as the other plants. Rover has already rationalised its Cowley site by closing the South works and will shortly close its Drews Lane plant in Birmingham, incorporating its production into Longbridge and Solihull.

A comparison of the contribution of potential - but maybe unrealisable - asset value to a company's sale can be made with Jaguar's sale to Ford. It is difficult to believe that Ford paid the reported £1.6bn (105) for Jaguar's manufacturing and product development activities. Only if the marque's value, particularly in the US where Jaguar has a very strong image, despite being tarnished with recent quality problems, is included then the company's value could conceivably approach the selling price.

Changing labour rates have also effected the company's strategy formulation processes. The use of robotics in the Metro 'Body-in-White' line (106), introduced in 1980, was justified on the basis of reduced manning. The same decision for the Discovery model in 1989, following the relative fall in labour rates in comparison to the other costs involved in manufacture in the mean time, relied much more heavily on the value of the increased quality generated by the use of the technology than the relative piece prices. This relative fall in labour cost and content has seen the emergence of a policy of pursuing flexibility in manned assembly cells and the adoption of quality assurance techniques similar to Poka-yoke. Poka-yoke is a method of ensuring fail proof manufacturing by eliminating potential assembly errors (107).

2.5.2.4 The Approaches of the CEO's

The ways in which Rover addresses itself towards its strategies has been seen to be largely dependent on the different management methods used by the CEO's. Reconstructing the strategies as Mintzberg describes would only discover realised deliberate strategies (108) and probably rightly attribute these phases to the changes of CEO.

The various era of the Group's management since 1968 would promote a periodisation as shown in table 5.

Table 5 also includes the labels which would be attached to the periods resulting from the dominant strategies and not from the changes in leadership.

1968-1975	Conglomeration Phase
1975-1977	Ryder Plan Driven Expansion (Failed)
1977-1982	Rationalisation
1982-1989	Profit Centred Contraction
1989-present	Uncertainty

Table 5. The Different Phases of Management at Rover.

Identification of the strategies and not the reasons behind them, in this case the changes in CEO, would have missed several protracted changes in strategy. These strategy changes would not have been captured in Mintzberg's analysis because their substantial effects on the company's performance only became visible after a lengthy period of time. An example of the strategic changes which would be missed is seen in the period between Edwardes' leaving and Day acquiring full control. This period during 1982 was managed by Harold Musgrove.

The approach adopted by Musgrove during his short time in charge did not immediately change the company's performance but by concentrating on volume build without much concern for quality, the company incurred heavy warranty costs and setbacks to the funding of its model programme. It is felt in the company that many lessons were learnt during this time as to the importance of quality in generating sales (109). The image problem which was created for the Maestro and Montego models is still an issue today, despite the vehicles' steady performances in the CSI (Customer Satisfaction Index) ratings. A distinction of the difference in strategy would not normally be made between the last two phases shown in table 5 because of the small immediate effect on company performance. This is despite the magnitude of the strategic redirection involved.

The performance measures which Mintzberg's methodology uses would remain stable during the change of leadership, e.g. profit (Rover Group profit before tax and interest, first half: 1988 £28.3m (110), 1990 £33m (111)) and marketshare (Rover Group marketshare: 1989 13.5% (112) 1991 13.4% (113)), primarily because of the continued introduction of models developed within the profit centred

phase. These models have only recently entered production and reflect a legacy of Day's strategies, despite their being replaced within the organisation. Any change in performance resulting from the present searching for direction would be fitted neatly against the performance remnants of the profit focused models.

2.5.2.5 Shifts in Design Capability

A recurring factor in the longitudinal study of Rover has been the company's model development programmes, their failure, the sourcing of design from Honda and the resultant further decline of Rover's design capability. The importance of design capability is supported in the literature which is discussed later.

The Honda collaboration and its effects on Rover is the subject of one of the exploratory probes and is summarised below.

Honda has provided Rover with design expertise and models which have become highly rated in the market, e.g.: the Rover 200/400 models and the Triumph Acclaim.

The Acclaim model was introduced under license from Honda. This was followed by a joint design phase which was strengthened in the Rover 800/Honda Legend project. Differences over manufacturing performance led to a cooling in the relationship before it was resumed in a different fashion for the present R8 model, the 1991 Rover 200/400 and Honda Concerto. The arrival of a Honda manufacturing facility (Honda Motor UK in Swindon) will add a further significant dimension to the relationship with Rover supplying some components to Honda.

The way that the relationship with Honda has evolved would not have been detected with Mintzberg's methodology because it supported a continuation in performance. This is despite the relationship's considerable impact on the company through its provision of new Rover models for manufacture.

The significance of the relationship rests mainly in the effects it has had on the design capability of Rover and the work organisation methods used in production following the adoption of Honda designed facilities.

The continued decline of Rover's design capability or the shift in this capability to a development of Honda engineering has not apparently been recognised by the company as having an impact on Rover's strategies.

The researcher believes that the significant effect of the continued relationship on the company's design

practices is the way that it has changed the reference framework for the company's design recipes and not the recipes or practices themselves, i.e. Rover's new models are seen by many of the company's managers as inferior when compared against Honda's equivalents but Rover's models are developed in a manner which is little different from the methods which were used in the pre-Honda BL organisation. The changes in operational strategies have been realised as the inclusion of new, contingency strategies into Rover's portfolio. The inclusion of such strategies, primarily to adjust to Honda's operating methods introduced with new facilities, have not altered the company's existing dominant strategies or their ascendent positions.

The future effect of the shift in design capability is likely to be that Rover will not be able to develop any new models without their being Honda sourced. Similarly the company's entrenchment in Honda manufacturing practices (large batches produced with little flexibility to the market after programme establishment) will limit the company's choice of strategy and in particular the adoption of customer satisfaction and time based sources of competitive advantage.

2.6 Innovation and Capability Development

The criticisms of Mintzberg's strategy model and the problems outlined above with the longitudinal methodology encouraged the researcher to utilise other behavioural theories in order to help with the analysis of Rover.

Abernathy presents an alternative behavioural-structural perspective of strategy and organisation which has been very influential in guiding the study of Rover represented in this thesis.

Abernathy's theories were developed from a longitudinal study of innovation in the US automotive industry. The study detailed 20 key innovations at Ford in order to answer the question: What was Ford's corporate strategy for innovation? (114).

The study reconstructed Ford's strategy and found that the company had hidden basic recipes which:

> *'had informed decision making for several decades. The implication is that there was a corporate strategy controlled and steered from the top level.' (115).*

The term recipe, originally adopted by Grinyer and Spender, represents:

> *'a set of beliefs that guides action' (116)*

and was originally used to describe industry-wide beliefs. Johnson and Scholes adapted this definition to capture the power of undeclared recipes within individual companies (117).

Abernathy adopted a view of the company as a portfolio of productive units (not to be confused with the financial view of a firm as a portfolio of assets). This view helps organisational study because:

1. Large enterprises can be disaggregated for study.

2. It refers to both the product and production and so captures the differences in the design and operations levels of the organisation, something which the management science approach and Mintzberg do not incorporate.

The study helped develop the sector and technology life-cycle model which:

> *'has provided a fruitful debate for examining organisational innovation in a coherent framework embracing the product (or service), the production processes and work organisation.' (118)*

The essence of this model is that product or major innovation generates a growth in the market. Once this change has been fully absorbed the focus is changed to a restrictive drive for increased efficiency in the manufacturing processes. Abernathy found that this process focus led to minor innovation which encouraged the further entrenchment of old technology into the organisation.

> *'This conservative effect, in turn, allows a company to do better what it currently does, not to do something entirely different.' (119).*

Abernathy was thus able to identify the primary importance of product innovation in organisational prosperity. He also showed how mature markets can be rejuvenated by major innovation.

The US auto industry's recent poor performance has been attributed to its inability to refocus on the major innovations being introduced by the Japanese manufacturers. The US firms have remained concerned with manufacturing efficiency whilst the market has been rejuvenated by the Japanese. Abernathy and his colleagues recommend that the US companies should now try to catch up and themselves rejuvenate the market once again to regain their dominant position (120).

The value of Abernathy in the study of Rover is derived from:

1. The use of the sector life-cycle model to help explain the differences between Land Rover (SLR) and Rover saloons (BARS) in terms of linkage to the market and technology.

2. The implication from the portfolio view of the firm that organisations can contain factions with radically different cultures.

3. Abernathy's implication of how factions may reduce the malleability of the existing

capability to make quick strategic alignments.

Abernathy's perspective has been found to be limited, particularly in the areas outlined below.

1. It lacks a sufficiently complex model of the perspectives of top managers which effects the interpretation of the corporate innovation strategy (121).

2. Abernathy had correctly identified rigidity (technological and organisational) as one of the major roadblocks to organisational success but had not detailed how this rigidity could be overcome. He, Clark and Kantrow have left the question: how rigid are the UK and European manufacturers in relation to the US, and how might this help when faced with the potential rejuvenation of their own markets?

3. The portfolio approach only implies the existence of cultural detachments from a unified entity as a result of localised socio-economic conditions. The cultural detachment problem has only recently been identified in the behavioural school's founding sociological roots, through works by sociologists like Archer. Archer discusses and challenges the view and acceptance of integrated and unified cultures:

> *'by distinguishing logical relations (pertaining to the cultural system) from causal relations (pertaining to the socio-cultural level) and allowing of their independent variation, the interface between them becomes a problematic area for intensive exploration.' (122).*

4. The roadblocks theory had not considered the significant relationships between capital management and labour (123). The spiralling costs of new models in the automotive sector, from £50 million for the SD1 in 1980 to some £200 million for the Rover R8 in 1990, have had a significant effect on model and innovation development strategies.

The development of Abernathy's perspective of innovation roadblocks led to the WORC perspective on design capability.

The work of this group is based on the premise, shown by Abernathy, that:

> *'design and innovation should be seen as required capacities in large enterprises.' (124).*

The WORC perspective focuses on strategies concerning the source, location, flexibility and funding of design capability and how these strategies are exhibited in organisation structures.

Whipp and Clark examined the location and derivation of the design capability in the Rover of 1982,

focusing on the SD1 model. In analyzing design capability and its diachronic development they were able to reconstruct the organisation's transitions. Their study ranged from Rover's externally designed bicycles in 1895 to the in-house designed SD1 of 1982. The use of Rover in this thesis enables Whipp and Clark's thesis to be extended using the same organisation as the source of data. The findings from Whipp and Clark can be extended and applied in an attempt to explain the resulting shift of the company's design capability towards reliance on Honda.

A major reason for the failure of the SD1 was thought by Whipp and Clark to be the result of the cosmetic introduction of mass production techniques onto Rover's traditional craft-based methods of work organisation. The company's work organisation methods were unable to adjust to the new ways of working. This shows the same organisational rigidity which Abernathy found in the US manufacturers but Whipp and Clark do not examine if this is exhibited because of entrenchment in an older form of work organisation or aspects of strategy.

The IDOM group at Aston University has developed a framework for studying organisation transitions. This approach highlights the development of capability through innovation processes and views organisation innovation as the primary way that capabilities can be acquired and developed (125). The acquisition of design capabilities is viewed by the IDOM approach from an internal perspective. This does not consider the possibility illustrated in Rover where such capability has been successfully acquired from an external source, Honda. The author's current study of Rover is able to clarify hidden assumptions in the IDOM and WORC theories and assess the fidelity of the perspective. The success of this thesis in achieving this aim will be analyzed in the discussion.

Rothwell and Gardiner developed a model which distinguishes between different types of design flexibility and has been used by the IDOM group and in this thesis to examine the relative success of the innovation processes at Rover.

Rothwell and Gardiner's study examined state of the art design trajectories in the automotive and aviation industries. The study found that these trajectories could be executed with contrasting results: lean and robust designs. Which of these occurred depended to a large degree on the approach of the organisation to its innovation strategy (126).

A lean design may contain totally revolutionary ideas but its leanness stems from its inability to be used

as the template for future development. Lean designs may be profitable but limit the potential total return throughout the life-cycle of the design.

Robust designs create a platform for future development. They are generally more costly and harder to develop than an equivalent lean design but manage to cover the overheads associated with future 'stretched arrays' of similar products.

Gardiner analyzed the designs of the BMC 1100 and Ford Cortina. He found that despite the innovations of transverse engines and hydrogas suspensions, the 1100 models proved very lean and effectively locked the company into products for the 1970's. These products, whose trajectory was found to include the Allegro, Marina, Princess and Ambassador models, quickly fell behind the competition.

The Cortina model was subsequently developed to include transverse engines (a capability which could have been exploited with the initial model but it was chosen not to). Despite its initial lukewarm reception the Cortina has been one of the sector leaders through its many incarnations up to the present Sierra model (127).

The addition of the lean and robust dimension to design capability, i.e. that the capability should also introduce inherent flexibility (robustness), amplifies the importance of design activities to an organisation's strategic success.

The failure, and inherent leanness, of the Rover SD1 model effectively consumed the capital needed by the company to fund new models and ensure the firm's survival.

It was a similar lack of capital across the whole BL group which forced Edwardes into the cooperation with Honda and has resulted in the continued erosion of the company's design capabilities.

One criticism which this thesis has of the work of Whipp and Clark is that they did not examine the other Rover products at the time of the SD1 study. These other products are those which carried Land Rover marques, i.e. the Range Rover and Land Rover models. Using Whipp and Clark's perspective, and using direct comparison with Rover Cars (BARS), it has been possible to see how the Land Rover Ltd. (SLR) organisation has become successful. LRS has always developed robust designs and taken advantage of the company's craft-based working practice heritage in opening and defending its market position.

2.7 Discussion of Points Raised from the Literature

In examining organisational transitions in Rover the researcher has tried to develop a means of continuing

the periodisation process to develop a future-forward perspective of the organisation. This cumulative approach has only been implied before, most obviously in the periodisation and strategy inference processes found in the methodology developed by Mintzberg.

The perspective developed in this thesis concerning the development of organisational capabilities in line with the organisation's strategies represents a behavioural-processual approach to strategic management. The development of organisational strategies for the future is one of the fundamental aims of the management science school. It is the movement towards a linkage between the management science and the behavioural schools which this thesis promotes.

The behavioural theories concerning organisation change and strategic management rarely address the magnitude of the intended transition involved in the strategies analyzed. Stopford and Baden-Fuller have argued in their work for an appreciation of the importance of nuance in strategy, or the magnitude of change inherently exhibited by the strategy (128). Their findings indicate that strategies requiring larger changes of the organisation are more likely to succeed than strategies which represent only a moderate change in the organisation's operations or performance.

Stopford and Baden-Fuller developed the concepts of turnaround and rejuvenation strategies which have been important in trying to explain the potential success of Rover's Breakthrough initiative in developing the company's capabilities. A turnaround strategy is one which makes a company successful but is unlikely to maintain the organisation's prosperity. Rejuvenation strategies produce similar success to turnarounds but the organisation is able to generate continued success (129).

Miller and Friesen's quantum changes can be allied with the turnaround strategies but fail, as does Mintzberg, to consider the exact nuance of the strategies involved.

The researcher has found the magnitude of the intent behind a strategy to be very influential in ensuring the implementation or continued dominance of the strategy in the organisation. The alternative method he used in the periodisation of Rover was able to identify the sources of the intent behind the strategies. The findings of the study can then be used to assess the future potential and direction of the specific organisation, as well as being useful in the development of generalisations from longitudinal studies.

The reasons for defining periods in the classical longitudinal study method is to help with the inference of strategies. This study of Rover had already established the strategies through observations and was able

to focus on what lay behind them. The new approach has shown that an improved level of understanding can be gained from the analysis of the causes and development of the strategies.

The recognition in Rover that strategies do not occur discontinuously and that the company's portfolio of strategies can contain numerous examples all at different stages of development within the organisation's factions, helped in developing the view of the potential value and capability to be gained from investigating the source of organisational strategies.

2.8 Conclusion

The strategic management and organisational transition literature which has been influential in this thesis has been discussed. The discussion has been helped by using the distinctions between the behavioural and management science schools and the approach used in organisational investigation which was found to have either a processual or structural perspective of the organisation.

The way in which the longitudinal methodology was adopted and used to investigate the observations of Rover's planning activities centres on the periodisation activity. By gaining an understanding of the factors influencing the strategies and their development it has been shown that the organisation's capabilities can be assessed. It has been argued that this forward-future perspective of the organisation can be used to help predict the future capability of the organisation and give an indication of the potential success of certain strategies.

The development in this thesis of a behavioural-processual perspective represents a move towards a unified theory of strategic management linking the behavioural-structural and management science-processual perspectives.

Part II - The Land Rover Organisation

Chapter 3. Corporate Planning at Rover Group

3.1 Introduction

In order to appreciate change and strategies in the Rover organisation the process used in Rover to develop the corporate plan was investigated. This is an example of the formal planning processes, as distinct from the informal processes. During the course of the study the significance of the relationship between these two fora was explored. This showed change to be directed from the informal fora and merely recorded in the company's public arenas. This chapter records the results of this investigation and also identifies the other formal planning methods used by the company. The relative impact of the formal planning processes on organisation change within Land Rover is assessed and a comparison is made of the Land Rover process and that found in the rest of the Rover Group.

The investigation was carried out using interviews with many of the parties involved, including the the main coordinators, in producing both the Land Rover corporate plan and the Rover Group equivalent. This information is supplemented by the author's observations of this process, much of which was undertaken in the manufacturing departments in which he worked at Land Rover and the Rover Group. The first section examines the process involved in the annual formulation of the corporate plan and the other formal planning procedures present within the Land Rover company prior to the re-organisation of 1989. This is followed by a study of the formal planning methods which replaced those outlined in the above section. This new process encompassed the entire Rover organisation. The two methods are contrasted and used to identify several key differences between the Land Rover and Rover cars organisations.

As part of the study the past highly significant impact of the ISTEL organisation (formerly BL Systems Ltd) on the past strategies of the Rover Group was identified as highly significant. This chapter contains an assessment of how this influence developed and analyses its possible future effect on the Rover organisation and its capabilities.

3.2 Corporate Planning at Land Rover Prior to January 1989

The characteristics of the organisation involved in the process of producing a corporate plan clearly has an impact upon its contents, being the environment and people who decide the exact content of the plan. The location of the prime authors/coordinators of the Land Rover plan was in the Business and Product

Planning department. This department's responsibility was passed onto the Rover Group Corporate Planning department at Canley following the 1989 re-organisation. The Land Rover Business and Product Planning department's role was to coordinate the future business of Land Rover Ltd. by developing the company's product plan and assessing the effects of other market, operations and environmental changes on the company.

The location of the main coordination of the corporate plan was identified and found to be an individual manager working alone with brief guidance from his director (130). The majority of the input for the corporate plan came from personnel within the operational areas of the company and was developed from objectives determined by the corporate planning executive from the discussions of the Land Rover Board of Directors.

The development of the Land Rover corporate plan was performed annually with the plan being written for the Land Rover Board and ultimately for final approval by the Rover Group Board.

Due to the nature of the information and the high level of security present in the company, examples from the corporate plan have not been cited in this study unless they have since become public knowledge. The high level of secrecy has made this investigation of the corporate planning process difficult because past copies of the plan have not always been available for inspection. However the researcher has been aware of the significant developments contained in the plans and feels that this has not prevented the study from centring on the processes involved. The researcher feels that a focus on content rather than process is something which has deminished the value of some studies into corporate planning (131).

Figure 5 represents the process involved in the production of the corporate plan and gives the major stages undertaken in the plan's development and identifies the key inputs to the public development process.

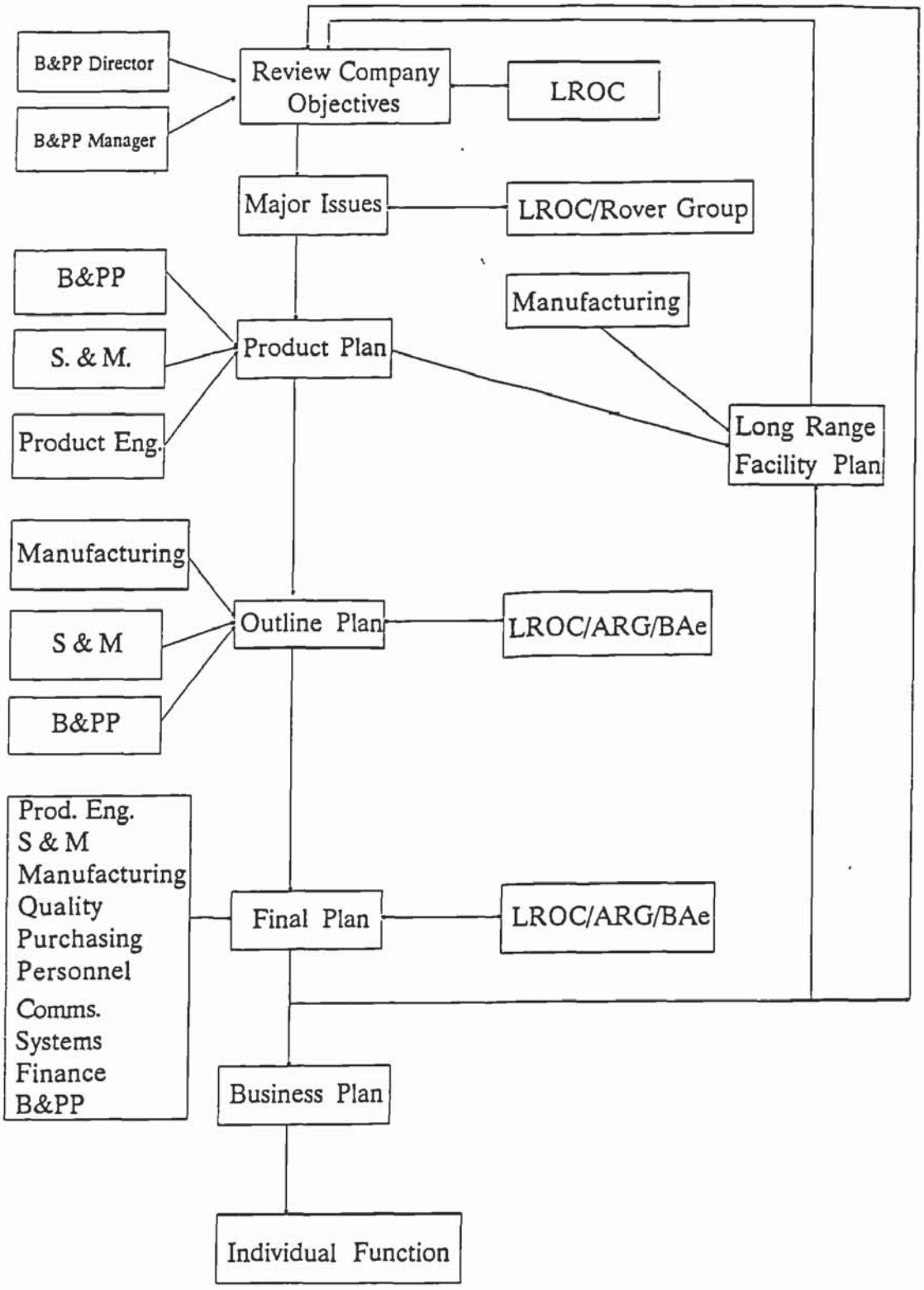

Figure 5. Corporate Planning at Land Rover (pre 1989) as Identified by the Researcher.

The key stages in the process were:

(1) A Review of Company Objectives.
(2) The Major Issues Paper.
(3) Assumptions on the Product Plan.
(4) The Outline Plan.
(5) The Final Plan.

Some peripheral activities involved in the formal corporate planning process at Land Rover were also identified during this investigation, including: 1.Annual Business Plans and 2. The Parallel Long Range Facility Plan. These are examined in a later part of this study which discusses the other significant formal sources of change in the company which occured outside of the corporate plan production process.

The first stage in developing a corporate plan was the Review of Company Objectives paper produced by the Business and Product Planning department based upon the previous year's plan. This paper was intended to highlight the major objectives warranting inclusion in the corporate plan.

These objectives were itemised under three headings (132):

(1) Strategic Aims - Derived from carrying over the previous plan.
(2) Financial Aims - Based on what performance was expected.
(3) Key Aims - Other issues not covered above.

The Review of Objectives paper was then sent to the Land Rover Operations Committee (LROC) for discussion and then to the Rover Executive Committee for final approval. The paper was rarely modified by the Rover Group Board. Examination of this review paper shows it to resemble the environmental analysis section of the Schendel/Hofer management science approach to strategy development (133). Examples of the level of detail covered in this document include potential new vehicles, financial turnover targets, and legislation changes which were likely to effect the global operations of the company.

The second document produced as part of the corporate plan production was the Major Issues Paper. This identified the key effects and areas covered by the Company Objectives Paper and was produced solely by Business and Product Planning without the involvement of the other departments in the company. The Major Issues Paper was intended to serve as a guide for the company's different departments by giving them the information needed to complete their inputs to the plan. The paper generally expanded the company objectives by placing them into context within the organisation and explained how Business and Product Planning thought these changes and key objectives could be realised within the organisation. Thus

it represented a declaration of the strategies which had already been agreed elsewhere in the organisation and was effectively asking the rest of the company to develop a means of implementing these strategies. The Major Issues Paper and the results of the Company Objectives Paper were consolidated and reviewed by the LROC or Executive Committee, before being sent to the Rover Group Board for approval (134).

The third step in the development of the corporate plan centred on producing a paper of assumptions concerning the product plan. This paper was written by the Business and Product Planning department and represented support material detailing product volumes which were to be used as the basis for any calculations in the main body of the corporate plan. This assumptions document also involved updating the timing aspects of future product changes from those contained in the previous year's document. These changes were introduced in the light of the company's existing sales performances. The company's long term sales forecasts were also altered to reflect the changes in the product plan.

If the time scale of the corporate plan, normally 5 years into the future, exceeded that contained in the product plan then discussions between the Business and Product Planning department and the LROC/Executive Committee (the most involved members of which represented the Sales and Marketing and Product Engineering departments) were held to establish how the product plan should be extended. It was at this stage that any product changes (i.e. new model introductions or face lifts) which had developed over the past year were formalised and consolidated into the company's plans (135).

A need for specific product changes could occur at any time throughout the year but were only openly discussed at this stage of the planning process. The PPC (Product Planning Committee), essentially the LROC, was the forum used to debate possible alterations to current models.

The two Rover organisations, Land Rover and Rover Cars, cooperated very closely at this stage in the corporate planning process as a result of the car's Sales & Marketing department's economic and market forecasts. These gave details of expected market volumes and competitor positions for the next 5 years and included break downs of model groups (e.g.: small, family and executive class) and international markets. However, the individual product plans, despite relying on the same forecasts, remained parochial until the 1989 reorganisation.

The Land Rover Outline Plan was produced by Business and Product Planning as the next stage of the

planning process. This was a paper which presented the main considerations of the Main Plan. It contained papers from Manufacturing and Sales and Marketing but mainly consisted of articles written by Business and Product Planning taken from the major issues paper. The paper effectually set out how the Business and Product Planning manager expected the major issues to be interpreted when related to the rest of the organisation. The sections which were to be included in the 1990 plan were: Market Profile, Target Customers, Technology Developments, Productivity Aims, Corporate Objectives and Product Information.

The Outline Plan was given to the organisations' departments for them to develop their own parts of the main plan and was reviewed by the LROC or Executive Committee before being passed to the Rover Group Board for approval. The 1989 Outline Plan (developed in 1988) was also passed onto the BAe Board during the negotiations over its purchase of Rover (136).

The Technology Developments paper included in the Outline Plan analyzed discussed the developments which competitors were thought to be making. This paper had inputs from Manufacturing and Product Engineering and also outlined the company's position on technology development and how Land Rover was thought to stand in relation to the rest of the industry. The 1989 paper saw the company stressing the belief that:

i. Flexibility was of key importance.

ii. The company intended to be a fast follower of innovations.

iii. The company saw itself in the vanguard of development in certain areas, particularly:

(a) Manufacturing Control
(b) Communication Networks (137).

It is interesting to see this declared belief that Land Rover was a leading exponent of manufacturing control. The cars side of the business has been openly critical of the systems found at the Solihull site following their amalgamation (138). The researcher has identified that this criticism is un-justified because Land Rover has an advanced production control system based on the requirements planning method. The car organisation's criticism can be explained because the system is not based on the JIT methodology which is being widely extolled as the only way for automotive manufacturers to economically manage their operations. The probes into Land Rover's M.R.P. system and operational

innovation contained elsewhere in this thesis examine this aspect in some detail.

The writing of the final version of the Corporate Plan involved each of the company's departments recording how they intended to implement the strategies contained in the Outline Plan. The final plan also contained a financial evaluation of the effects of the proposed changes including predictions of their expected profitability. This financial summary was the final test of the plan's acceptability to the board of directors (139).

The departments involved in writing elements of the plan were:

Sales & Marketing
Product Engineering
Manufacturing
Finance
Parts*
Quality
Purchasing
Personnel
Communications
Systems
(any other parts required were written by business planning).

*This organisation, being a separate but wholly-owned company developed its own plan but was involved in this process to ensure no divergence or conflict of strategy occurred.

The inputs of the various departments involved were tied together by Business and Product Planning and sent to the LROC/Executive Committee for review and then on to the Rover Group main board. The 1989 plan (prepared in 1988) was intended to go onto BAe but the amalgamating organisation changes occurred and the corporate planning process was altered before this could happen.

The researcher identified the author of each of the constituent parts of the 1988 Land Rover corporate plan in an interview with the corporate plan coordinator. It was interesting to see the location of these authors in the organisational hierarchy and which directors carried out the plan formulation task themselves, and those who delegated it, and how far what was believed by the organisation to be a very important activity was delegated. The result of this investigation is shown in table 6.

Functional Department	Delegation
Product Engineering	Director himself
Sales and Marketing	Delegated 2 levels
Manufacturing	Delegated 2 levels
Quality	Delegated 1 level
Purchasing	Director himself
Personnel	Delegated 1 level
Public Affairs	Director (only 6 in dept.)
Systems	Systems Manager (equal status to a Director)
Finance	Director
Business + Product Planning	Delegated 1 level

Table 6. Personnel in Land Rover who Provided Information for the Plan Coordinator to use in the Preparation of the Corporate Plan (Information derived from interview with the Plan Coordinator).

The reasons offered by these directors for this delegation of duties are those often observed by the researcher in the company: the pressure of current problems detracts the attention of senior management away from any future and strategic planning activities.

The existence and scale of this delegation confirms the researcher's observation that producing the corporate plan was not in reality an exercise in plan formulation but merely a routine, public recording of events or predetermined strategies. Those areas of the corporate plan which were thought by the researcher and the middle management of Land Rover to be key to the development of the company's objectives, were found to contain little real input from the people charged with leading the departments most closely involved. For example the Sales and Marketing organisation was not formally involved in the product plan's development until its content had already been determined. Similarly the Manufacturing part of the organisation (including the Production and Manufacturing Engineering departments) was not invited to assess the implications of proposed strategies but had to try and develop ways of achieving pre-determined strategies.

The time-scale of the corporate plan production process further encouraged the delegation of the planning activities by putting increased pressure on the operational directors. By having the corporate plan

presented to them in its outline form by Business and Product Planning at a late stage only gave a few weeks for their formal contributions to be developed and included (140). The directors themselves did not appear to object to this added pressure because it provided them with an excuse to delegate the task.

The approximate month of occurrence of each of the key stages in the development of the corporate plan at Land Rover is shown below.

March _____ Major Issues Paper

May _____ Outline Plan

August _____ Final Plan

These milestones were always open to flexibility and were generally achieved. These dates were set historically and subsequently expected by the LROC/Executive Committee.

The Rover Group re-organisation made it impossible to compare this investigation of Land Rover with the cars side of the business, but a previous cars plan author stated that most of his discussions were with line managers rather than Directors and so the thoughts offered above relating to delegation are likely to be equally true for the rest of the Rover organisation. The issue of where the strategies came from, if not from the formal corporate planning process, is examined in the other probes contained in this thesis.

3.3 Other Formal Planning Processes found in Land Rover

In the course of investigating the corporate planning process in Land Rover the researcher discovered several other influential formal planning activities: Annual Business plans, the Long Range Facility Options paper, Capital and Revenue budgets and System Strategies. These are outlined here, with examples to illustrate their differing scopes and impacts on the organisation and its operations, in order to determine their influence as possible sources of strategy formulation.

After the completion of the corporate plan most operational departments in the company developed a Business Plan. This was developed from the main plan and examined the next year's activities in such detail as to include, for example, definite dates for the installation of facilities and the identification of those managers responsible for achieving the changes (141).

The Business Plans were only used to formalise activities and allocate responsibility for projects within

part of the organisation and helped establish the detailed timing of activities which needed coordination with the operations of other areas. Steering committees, of which there were many normally headed by senior managers, were subsequently established as the primary source of monitoring the timing between the departments. These committees were latterly replaced by the introduction of project teams which became responsible for larger tasks like new model introductions. The annual plan was also often used as the basis for a department to derive its budgetary requests for finance (142). The budgeting techniques are discussed later in this section.

The Land Rover Long Range Facility Options study was a manufacturing led initiative which examined the location of production facilities, primarily to aid the planning of future model changes (143).

This paper was able to prevent short term considerations hampering long term plans. For example a new vehicle would normally be introduced in the least congested part of the factory. However if several years later another project of higher volume was planned the location of the first product may be reconsidered because of long range considerations contained in the Facility Options paper.

Similarly the process of designing new or updated facilities was able to incorporate measures for the manufacture of future models. An example of this type of application of the Long Range Facility Options paper was in the refurbishment of the paint shop to allow the extra ceiling room for the Discovery model. This work was carried out as part of a major refurbishment three years before the product's launch.

During the above investigation of the corporate planning methods in the company the relative importance attached by the organisation to the allocation of budgets was revealed. Gaining a large budget ensured a certain degree of power to be held over others, provided a higher status in the organisation and also meant that a department's activities could be achieved more easily by not having to negotiate extra funds at a later date.

The Land Rover board had a power of veto over established budgets and could redistribute the resources at short notice to support special projects. This happened fairly regularly, despite the resulting confusion caused further down the organisation (144).

There were two types of budget within the Land Rover organisation, and also in the rest of Rover, determined by whether the expenditure was allocated to an revenue or capital outlay. Revenue budgets related to the operating expenses of the company whilst capital budgets covered the costs incurred by

specific projects, e.g. new model programmes.

Capital budgets covered not only the product development work but also the facility changes required. The major users of capital budgets were the Manufacturing, Product Engineering and Systems departments. The director of each department presented their own requests for the budgets through head to head negotiations with the finance director. The requests would be based on estimates made at the start of the project and generally contained few contingency considerations, often leading to many cost cutting exercises in the departments concerned when the programmes over-ran their budgets or the full amount requested was not awarded (145).

An attempt was made, at the request of one finance director, to develop more accurate itemised budgets at the start of each year but the effort needed to operate the system made its introduction impractical and the idea was dropped (146).

The determination of capital budgets on a head to head basis was found to be highly significant in the development of power bases within the organisation and also explained the dominance of certain strategies.

The use of budgets as a source of influence in the organisation highlighted the finance director as one of the most influential members of the board of directors despite his holding a non-operational role. The de-centralisation of the finance function which resulted from the 1989 reorganisation/amalgamation as reduced the power of the finance role but also effectively transferred this power to the control of the managing director (147).

Another highly influential source of formal strategy formation at Land Rover was seen in the systems strategies developed by ISTEL/BL Systems Ltd. during the 1980's. Originally at the request of the Managing Director, BL Systems/ISTEL were charged with developing operating strategies for each operating department in the light of emerging I.T. (information technology) technology. The following (table 7) is a list of the strategies which were still in evidence in the Land Rover organisation:

Table 7. Land Rover Related System Strategies
Developed by ISTEL/Land Rover systems.
(148)

These system strategies clearly cover virtually every operation of the company and show the massive involvement of ISTEL in the development of the company's strategies. Originally developed as plans intended to enable the effective development of current and future systems the ISTEL strategies were based on the expressed belief that:

'Systems had to determine the strategy so that they could systematise it.' (149).

The importance of ISTEL in the strategy development process at Rover is particularly interesting, since it shows the company willing to involve an external organisation in developing its planning activities. One reason for this is the way in which ISTEL has developed historically and has been transformed from being within the Rover organisation to being an external supplier and this is discussed later.

The above study has shown the process used before January 1989 to develop the annual 5 year corporate plans for Land Rover. It has outlined some of the significant observations made concerning the process, mainly the lack of departmental input to the core of the plan and the way in which the planning process was treated as a public strategy recording exercise, to be delegated by the company's executives, and not as a formalised means of developing strategy.

3.4 Corporate Planning at Rover following January 1989

After the initial study (above) was completed the Rover Group was reorganised and this doctoral project was extended to cover the strategies and operations of the whole group. Land Rover Ltd. became part

of a centralised Rover organisation. The new, Group wide, corporate planning process was examined to establish if the significant characteristics identified in the Land Rover study remained present in the new process and organisation.

The process of developing a corporate plan at Rover Cars (BARS), since 1989, shares many of the steps, if not under the same titles, found in the above study into the Land Rover process, e.g. review, issues and outline papers and a product plan. The replacement process involves the centralised Corporate Planning department laying the foundations of the plan based on the previous year's plan and including any important changes (e.g.: legislation, competitive actions, changes to the product plan etc.) which may have become important since the last planning cycle. This is then sent out to the organisation's departments for them to develop their own final plan, using this outline structure as the basis.

Each department has their own section of the plan to develop, these are then combined to generate the whole Rover Group corporate plan. The process of developing the content of these separate final plans is much more involved than that observed at Land Rover. This is primarily because the operation now has to includes both 4x4 and saloon car considerations and so requires managing on a much larger scale. Also the traditional management operating approach in the cars organisation involves having much closer financial controls and tolerances over spend in the company than at Land Rover as a result of its less successful standing in the market place and past poor financial performance.

The final agreement of the plan involves a great deal of discussion and scrutiny by the Rover Group board. The departments which the board members represent appear to be continually trading and negotiating the contents of the plan. This leads to many recalculations and redrafts of the plan. The author is well aware of this redrafting, being employed in the manufacturing strategy department whilst it prepared and re-prepared the 1991 plan.

As at Land Rover the planning process is repeated annually and the plan is totally rewritten every year. This is despite the attention to detail included in the four years at the latter extent of the plan. These years are regarded as out of date at the start of the next planning cycle which commences as the previous year's is completed (150).

3.5 The Identification of Rover's Factions

The primary source of strategies and contributions to the corporate plan were observed to be from groups

of departments. These groups exhibited certain tendencies, including canvassing support for ideas, forming alliances and a general mistrust of other group's motives. This prompted the researcher to describe these observed groups as factions of the organisation.

These factions have subsequently been investigated using the other probes in this study and have been found to be the source or champions of Rover's many and conflicting strategies. The researcher believes that this thesis can show this factional approach to be the primary force involved in any changes in the organisation.

The alliances between the factions which were identified as having the most significant impact on the organisation's activities were grouped into the product supply, commercial and non-operational groups. The constituent elements of these factions were:

Product Supply Faction

Product Development
Central Manufacturing and Group Engineering
The Operations areas (the 4 manufacturing plants)
Material Management functions (PMC departments and Group Purchasing)

Commercial Faction

Sales departments (both Cars and Land Rover)
Marketing

Non-Operational Faction

Strategic Planning
Managing Director's office
Central Finance

These factions are only those which function at the highest level of the organisation but the constitution of factional activities was also observed in many different levels within the organisation. This is illustrated in the other probes recorded in this thesis. The existence of the factions was also observed to change as the subject under debate itself altered.

The identification of the factional processes in the company explains why the formal planning process was devoid of strategy formulation aspects, the strategies had already been developed in the factions.

The operations of the factional mechanism is investigated in the rest of the thesis which also examines the company's capabilities and abilities to successfully implement its chosen strategies.

The factional activities were seen to be concentrated in the Rover saloon part of the organisation. This

supports the researcher's already noted observation, following his transfer from Land Rover to a role in the centralised Rover Group, that the larger cars part of the organisation was more political in its factional operations than the 4x4 organisation.

3.6 A Longitudinal Examination of ISTEL

One striking finding from the examination of Land Rover's corporate planning (and the introduction of M.R.P. at Land Rover) was the high level of involvement of ISTEL (formally BL Systems) in the development of Land Rover's business strategies. The same level of involvement has also occurred in the cars side of the Group but recently the impact on the cars side has been greatly reduced.

Before the effect of the relationship can be examined it is necessary to investigate the history and development of the ISTEL organisation. This historical perspective is necessary because of the changing impact of the relationship upon ISTEL's operations and its future. This resulted in ISTEL's transition from an internal department to external company.

ISTEL was first formed in 1979 as BL Systems Ltd. from the various systems departments of BL. Its aim was:

> *'To bring together the many skills and resources spread across the BL product companies and to create an organisation dedicated to providing computing and communications expertise.' (151)*

Still under the guidance of its original director, the organisation's name was changed to ISTEL in 1982 (152) and the role of the company altered to allow the exploitation of customers external to the BL group (153). At this time ISTEL was reorganised into six marketing divisions intended to support the objective declared by ISTEL's managing director that:

> *'Above all else we are about systems integration.' (154).*

3.6.1 The Privatisation of ISTEL

The next milestone in the history of the company occurred in 1987 after much speculation concerning ISTEL's possible privatisation and the potential bidders (155)(156). Rover's primary concern was how to privatise ISTEL, as expected by its major shareholder, the government, but also maintain sufficient control to prevent its systems supplier from falling into the grasp of a direct competitor (157). These factors eventually led to ISTEL being the subject of a controlled, non-hostile management

buy-out. The Rover Group realised £26 million from the sale which involved a thousand ISTEL employees (158) and left ISTEL's equity distribution as:

Rover	25 %
ISTEL Management	45 %
Financial Institutions	30 %

(Mainly Kleinworth Benson and Arthur Young)(159).

Despite the sale there was still much speculation in the press as to the future of the company. This was encouraged by ISTEL's market strategies (examined later) which were moving the company towards diversification and speculative statements from the Managing Director, who hinted that *'Privatisation is a possibility'* (160).

The speculation concerning the future ownership of ISTEL was ended in 1990 when the company merged with A.T.&T. This gave ISTEL the possibility to exploit previously untapped market opportunities outside Europe, particular Japan and the U.S.A.

ISTEL's relationship with Rover is still unclear following these changes, but the company is now more removed from the operations of it's parent than ever before. For example, ISTEL's consultancy activities within Rover, have been halted except for those concerning existing systems. The company still provides most of Rover's mainframe computing capacity and maintains the company's dealer communications systems. This follows the trend towards an autonomous systems organisation which was present and has developed since the company's initial conception in 1979.

ISTEL's activities are still centred on its original communications and 'manufacturing advice' base. The communications side of the business concentrates upon telecommunications, data transfer and latterly EDI (electronic data interchange, specifically of technical information between suppliers and customers). As with the manufacturing side of the company's business these products were originally developed for BL (and its later Austin Rover Group incarnation) and have been successfully marketed externally along with hardware (sales and processing sub-contracts) and software development contracts.

The first product to follow this well illustrated route of development for Rover followed by external marketing, was 'SEE WHY ?', a simulation package developed to help the optimisation of Austin production lines at the Longbridge plant. This has been followed by many other software packages including: TARDIS (time and attendance), CAMEO (a design bureau facility) and PACS (the pensions

administration system). Lately the manufacturing consultancy part of the company, ISTEL Automation, has undertaken more advanced bespoke dealings for external companies.

The 1989 figures showed that despite its official independence, ISTEL still gained approximately 57% of it's revenue from Rover Group work with 90% of the remaining turnover arising from the UK. The majority (60%) of ISTEL's non-Rover work is for the automotive industry but the company is trying to change this dependence on one industry by entering the service and leisure areas (161). ISTEL's declared strategies include expanding into Europe and the USA, something which should be greatly helped by the merger with A.T.&T. which is a major international player.

The dominance of the Rover Group was emphasised by the way that ISTEL was structured until 1991. There were autonomous groups within the company dedicated to particular units of the Rover Group. For example the ISTEL 'Land Rover Division' had over 120 staff permanently located on Land Rover premises and working solely on Land Rover based projects with only minimal contact with the other ISTEL and Rover Group sections.

The standing of the relationship between this division and Land Rover was based on the declaration that:

> *'The mutual success of our two organisations is dependent upon professionally delivering, operating and maintaining systems which effectively resolve Land Rover's business problems.' (162).*

3.7 ISTEL's Relationship with Rover

ISTEL's relationship with Rover showed distinct patterns of operation functioning at two levels:

(i) Service level
(ii) Strategic level.

The service level relationship was when ISTEL acted as any other supplier of goods or services to Rover. As solutions to normal production problems were developed in the Rover Group, e.g. the Land Rover project control system, the need for integration with current systems previously developed by ISTEL and the utilisation of computing services necessitates the involvement of one of Rover's the systems departments. These departments, due to their limited size and available skills, sub-contract the solution system's specification and development work to Rover's preferred I.T. supplier, ISTEL. The preferred supplier network is a system of identifying frequently-used suppler companies which have been pre-selected because of their past proven ability to fulfil contracts.

This involvement of ISTEL in a supplier role sometimes developed into a strategic level project which involved debating the strategic implications of certain systems design decisions. This type of relationship is examined in detail later, but one example is the quality inspection data capture project at Land Rover. This project was elevated from a small localised application of I.T. into a million pound plus company wide project after ISTEL became involved.

The supplier relationship which ISTEL still enjoys in some areas of expertise has many benefits for both organisations mainly resulting from the external location of ISTEL.

> *'The nature of the service which a specialist organisation supplies is intrinsically different from the nature of the service that could be provided by an internal department of the same company.' (163).*
>
> *'The quality of the professional staff which ISTEL plans to provide Land Rover will be significantly better than that which Land Rover could achieve by directly employing their own systems department staff.' (164).*

However these benefits would also be equally true for any large external systems house, some of which, because of their specialisations, would be more able to perform the contracts. These other organisations however are excluded from entering negotiations because of ISTEL's special status.

Another advantage of having ISTEL as a sole supplier is that of utilising existing knowledge and relationships concerning specific operating procedures and systems, already present in Rover.

By continually relying on an external organisation the researcher concludes that much of the control of certain projects which should be retained by the customer, in this case Rover, could be passed onto the supplier who has different interests from the originating company.

It was this feeling that the relationship may not be giving Rover any choice or control over its direction, which led to the Rover Car's Manufacturing Director declaring a break from ISTEL wherever possible in 1990 (165).

The strategic level relationship, which was effectively ended in 1989, was an apparently unique situation in the industry whereby ISTEL was closely involved in defining Rover's strategic business objectives. The researcher has established that this situation can be attributed to two factors, the historical development of ISTEL and the dominant management styles of both organisations.

In the past the Rover organisation implemented its strategies with central autocratic controls. A central systems department would have been involved very early on to help determine how these strategies could be achieved. This would have led to the strategies being re-defined or tailored to meet possible systems capabilities. The high degree of influence of the systems practitioners in strategy tailoring was maintained by the BL Systems organisation and eventually passed onto ISTEL.

The management buy-out of ISTEL saw this strategic level relationship severely curtailed by the Rover organisation's senior management who realised that the situation was not in the best interest of the company. ISTEL was still used to provide consultancy type advice on how to implement strategies but now had little influence on those strategies. The 1989 re-organisation of Rover Group and A.T. and T.'s takeover of ISTEL led Rover to re-establish an internal central I.T. department under the responsibility of its strategic planning director. The establishment of a Group I.T. (GIT) department effectively ended the involvement of ISTEL in Rover's formal and informal planning processes.

3.8 Discussion

The formal strategy development methods used by Land Rover before 1989 and those subsequently adopted by the amalgamated Rover Group have been examined in this study.

The most significant finding is that the formal planning methods served only to record strategies which had been developed elsewhere in the organisation, not to introduce change. The source of changes in the organisation's strategies was identified to be within certain groups of alliances or factions within the company. These factions are believed to be the most influential force in controlling change in the organisation either through using political lobbying to solicit sufficient support for a particular strategy or by vetoing strategies which are likely to be detrimental to the strategies adopted by the faction.

The comparison possible between Land Rover and Rover saloons in the ways that each approached the corporate planning process has confirmed the previously observed existence of different cultures in each organisation. The identification and explanation of this factor were used to help establish the focus of the subsequent probes reported in, and the general direction of, this thesis.

The Solihull based Land Rover organisation, even after the amalgamating re-organisation of 1989, was found to have a more easily identifiable focus and to be significantly less factional in operation than the saloon part of the organisation. This does not mean to reduce the significance of the factions in the 4x4

organisation but suggests to the researcher that the factions are less polar in their differences than their cars equivalents. This would reflect the historical operations of the Land Rover company which has consistently maintained a less complex structure and approach to the market place which restricts the degree of polarity possible between the factions. The low volume high profit markets and the company's continuing success has ensured that Land Rover has been able to concentrate on the smooth operation of its business. At Rover cars the impression which the researcher has formed is that the organisation is in a constant state of desperately trying to prevent its own collapse. The desperation of the situation promotes a less thoughtful approach to be adopted in the company. This is seen in the same delegation of the responsibility for the corporate planning role by the directors as observed in Land Rover and in an orthodoxy of adopting ideas with uncritical acceptance, i.e. Quality Circles and MIC (minimal inventory concept - Rover Car's version of JIT). This is reflected in the increased conflict exhibited by the operations of the factions.

At first this difference in decision environments between Rover Cars and Land Rover appears to share much with the Bradford Studies which identified several types of decision making situations (166). However, the use of the Bradford Studies' theory to investigate Rover was discounted because of the way that the researcher thought that the Bradford framework would detract from the exploratory nature of the study and discourage the development of the capability perspective.

ISTEL was identified as having a major effect on determining Rover's strategies from the systems organisation's conception in 1979 until the management buy-out of 1987. The researcher believes that the accumulated power, primarily with a strategic focus, of the systems supplier and the way in which this power was successfully and repeatedly exerted by an external organisation shows historical evidence of Rover's delegation of capability to external organisations. This is also observed in the Honda relationship. Unfortunately for Rover's future the acquisition of I.T. skills is relatively easy compared to the acquisition of design capability and so Rover's past separation from ISTEL can not be used as conclusive evidence that it can take any initiative to move away from Honda.

The strategic influence of ISTEL has been virtually removed from the Rover organisation but the influence of its past involvement is likely to limit the future adaptability of Rover's operations to new strategies. This is not least because the separation sees Rover losing access to the vast majority of its I.T.

expertise which has moved away into the ISTEL organisation.

This study does not doubt the value of generating a level of agreement and consolidation in Rover's strategies via its pursuing the present corporate planning process. The study does however question the logic behind developing a detailed analysis in the plan for the later years (3 to 5 say) if, as observed, the strategies are to be changed as a matter of course after the first year. The researcher's understanding of the Japanese corporate planning process is that once a plan is declared then the strategies behind that, and so the plan itself, remain constant until significant problems occur which prompt the strategies to be altered (167).

Rover may have a more responsive approach to plan development in which case it should use this to gain advantage by continually re-addressing its strategies and not bother developing them in such detail for the latter years. However the researcher doubts that the organisation is capable of acting successfully in such a dynamic way and should therefore try and generate a greater constancy in its strategies. This would involve the very difficult task of reducing the conflict between the factions and this is unlikely to help the organisation's present precarious financial position.

3.9 Conclusion

The formal planning processes in the Rover Group have been described in this study which has shown that they serve only to record and formalise strategies which have previously been developed by various factions of the organisation. The exploration of how these strategies are formed within/by the factions and how these factions effect the future performance of the company was established as a primary aim of this thesis.

Significant differences in culture between the Land Rover, and Rover saloon constituents of the Rover Group were also established. These also require further investigation.

Chapter 4. MRPII Introduction at Land Rover

4.1 Introduction

This chapter contains a longitudinal examination of the introduction of the MRPII (manufacturing resource planning or MRP mark 2) production control system at Land Rover from 1979 to 1991. See figure 10 at the end of the chapter for a summary of the introduction and a pictoral representation of the timing of the MRPII introduction. This probe was performed to study how the strategic processes in the company operate, following the discovery that the corporate planning process was merely a public formalisation of the true strategy formulation mechanism, and provided an opportunity to assess the organisation's ability to achieve a significant change in its operations. This study, because of the way that the company has been re-organised, was also able to compare the cultures of the Rover saloon and 4x4 organisations as they conflicted for control of the production operations of the Solihull site.

The chapter is divided into two parts, the first concerning a discussion of RP (Requirements Planning) techniques and other production control methods and their effects on the organisation of adopting companies. The second section concentrates on the causes and management of the MRPII initiative at Land Rover and the effects of the systems on the organisation's operations.

These two sections are then drawn together to discuss MRPII introduction and the specific future development of such systems in Land Rover.

MRPII is the latest development in a line of capacity planning based production control systems including MRP (material requirements planning), closed loop MRP and MRPII. These cover varying amounts of the operations control aspects of a manufacturing company and so have differing roles and applications. To help prevent possible complication, references made in this study to requirements planning (RP) cover all the MRP derivatives as separate from other production control techniques. The differences between the different RP techniques are examined in the following section.

4.2 Capacity Based Production Control Techniques

At the heart of any production control methodology is the need to utilise resources (including materials, equipment, people and facilities) to achieve certain business aims (168).

RP was developed as a means of predetermining the inventory variant of the production environment in a centralised, formal process which focussed on the planning of future operations. The technique has

produced three different techniques: MRP, closed loop MRP and MRPII, each successively encompassing more of the company's production control activities.

MRP (sometimes called mini or little MRP) was originally developed in the 1950's by IBM in the US. The original systems were planning aids based on an inventory of what was available in the factory. The heart of the system is a very simple calculation which uses information on expected deliveries, the volume required for production, and the parts already held in stock to estimate the number of parts needed to satisfy the planned production (169). Hence the term material requirements planning.

The MRP calculation is best explained using a simple example:

> This week we need to build 2 cars. Using the BOM (bill of materials, a statement of how many of what parts are used in producing products) this tells us that we need 8 wheels (4 for each vehicle). We already have 3 wheels that were made last week so this week we need to manufacture 5 wheels.

This simple calculation is complicated when the timing of orders and raw material deliveries is included. When the added complexity of most company's B.O.M is also considered the actual calculation of material requirements becomes a very involved process and suited to the application of computers. This is why the MRP technique was not widely used until the 1970's when computer power was first available which could realistically cope with performing the vast number of calculations fast enough for MRP to be useful. MRP also relies very heavily on thoroughly maintained data bases to ensure that the calculations of requirements and stocks are accurate, an area where many companies' MRP introductions have been found lacking. The MRP calculation (shown schematically in figure 6) was nothing new since it had been performed on an informal and localised basis for many years with the use of shortage lists which expedite usage against available stocks. This was argued by Wight who developed some of the early MRP systems when he worked for IBM (170):

> *'MRP is simply the logic of the informal system - the shortage list - developed into a formal scheduling system.' (171).*

Figure 6. The MRP Process (172).

Closed Loop MRP or CRP (Capacity Requirements Planning) was a development of the basic MRP principle which addressed not only the issue of available inventory but also the available production capacity. Instead of just calculating that 'X' number of part type 'ZZZZ' were needed, the CRP process asks the question how many parts are needed, do we have the capacity available to make them? and if not how many should we try and make? Going back to the example used earlier, operating under a CRP system it would now read:

> We want to build 2 vehicles which requires 8 wheels. We already have 3 so we need to make 5 more. We only have the capacity to build 3 leaving us with a potential shortage of 2.

The CRP system performs this calculation and reports the shortage leaving the company to solve the problem. This could either be achieved by altering the demanded production, re-running the CRP calculation to see if the new schedule is achievable with the existing capacity, or by altering the capacity by buying in needed components or employing extra staff to increase the production capacity.

At the heart of the CRP system is a master production schedule (MPS). The MPS is a statement of what the company intends to manufacture and is the basis for the test to establish if the company can make its sales objectives (173).

> *'The master production schedule should be a statement of what can and will be produced, rather than what management wishes had been produced in the past and/or would like to be able to produce in the immediate future.' (174).*

Figure 7. Closed Loop MRP.
(175)

The CRP calculation requires even more, equally accurate, information than the MRP calculation, most notably that concerning production routings, manufacturing capacities, process times, set up times, batch sizes etc.

Many company executives and consultants confuse CRP and the more advanced technique MRPII. It is very likely that this misconception is reflected in surveys which show many organisations believing they have MRPII systems, but being disappointed with the results, not achieving those predicted or reported from true MRPII organisations (see the conflicting reports of New et. al. (176) and the Industrial Computing Survey (177)).

According to Wight, who coined the phrase, MRPII (manufacturing resource planning) has a much wider role within the organisation than just materials and capacity planning (178).

Wight explains that:

'MRPII evolved from the closed loop system' (179)

and that true MRPII should contain certain characteristics for it to effectively control the conflicting interests of the different parts of the company. The characteristics included:

1. The operating and financial systems should be inseparable.
2. The system should be capable of being used for simulation.
3. The system is company wide since all MRPII's aspects are the fundamentals of planning and controlling the business.

This implies that an MRPII system should integrate, under a central control, such functions as finance ledgers, shop floor control, SPC (Statistical Process Control), Payroll Systems, Sales Management Systems, etc.

Wight coined the term MRPIII to represent his belief that one day it may be possible to add such aspects as tooling and product development to the MRPII process, thus capturing the whole product supply process of an organisation into one system of control (180). MRPIII also hopes to integrate both forwards, into the company's distribution activities, and backwards into the company's suppliers and their operations (181).

The availability of OSI (Open Systems Interconnection) may be a key to this by enabling computers to freely exchange information without hardware or software compatibility problems. However the design logistics problems involved in such an approach, and the past reluctance for the equipment manufacturers

to agree on standards, make its advent highly unlikely in the near future.

So far this section has recorded the development of the requirement planning systems which were marketed by IBM from it's development in the 1950's. These RP systems are, in their pure form, able to drive organisations by developing production plans and issuing factory floor instructions which result in the coordinated manufacture and delivery of finished goods. The benefits gained by these planning techniques come primarily from reducing the value of stocks held in line with improved schedules.

The researcher notes that the expansion of such centralised MRP based systems will be severely limited by the advent of more efficient and responsive production control methods. The increasing importance of lean production techniques (182), as originally developed by Japanese manufacturers like Toyota, has superseded MRP systems as the focus of recent literature.

The guiding principle of lean systems is to focus on eliminating waste including part stocks and finished product inventory. The production control system adopted in most lean organisations is based on JIT (just-in-time) principles. These intend to produce a part only when it is needed by another process. This reduces expensive inter-process and finished product stocks to a minimum and also provides very fast responses to individual orders. JIT was first practised by Taiichi Ohno for use at Toyota (183) and was originally intended to overcome a cash shortage in the company and to ensure that part shortages created because of stocking policies did not interfere with adherence to the production schedule (184).

RP and JIT are often treated as if they are mutually exclusive with papers and articles often only focusing on one technique, i.e. Wight and Orlicky deal purely with scheduling whilst Shingo refers only to Kanban/JIT systems. The more developed RP implementations, particularly CRP and MRPII, are very effective at developing realistic production plans. These approaches classically adopt a scheduling means of achieving the plans which pushes batches of material through the production process. Hence RP is sometimes called a push system. The same production plan can also be achieved, often more efficiently and faster, using JIT techniques. In this case the production plan is issued to the final assembly area which pulls material from the suppliers and sub-assembly areas to manufacture the finished product. Hence the term pull material control systems.

Another approach to shop floor production control which can also be driven by RP derived production

plans is Optimised Production Technology (OPT). This was developed in Israel by Goldratt (185) and is based on the idea that within a production system there is a single process (the bottle-neck) which determines the effectiveness of the whole operation (186). If the bottle-neck is identified then the entire process should be scheduled around the constraints imposed by the bottle-neck, hence OPT's other name, the 'theory of constraints' (187).

The planning and central control emphasised in MRPII and OPT make them applicable to bureaucratic, rigid structured organisations. The JIT methods because of their flexibility and responsiveness to pull signals, do not require such total control and can be used effectively in decentralised organisations.

4.3 The Decision to Introduce MRPII at Land Rover

The decision to pursue MRP at Land Rover was taken in 1985 by the Managing Director and the LROC (Land Rover Operations Committee), following much internal discussion. The LROC then consisted of the company's executive board of directors:

Managing Director
Manufacturing Director
Product Engineering Director
Sales & Marketing Director
Business & Product Planning Director
Finance Director
Quality Director
Personnel Director
Company Secretary

However the factors influencing this decision went back much further, even before the 1983 site rationalisation. This rationalisation followed the cessation of production of the SD1 model which enabled the satellite factories producing Land Rover components (engine, chassis, suspension and body parts) to be brought onto the one Solihull site. The site rationalisation programme enabled a company-wide production control system to be considered.

The production control systems at Land Rover preceding the MRP initiative were originally devised by BL Systems in 1971 and had subsequently been developed in a piecemeal fashion (188). Because of the dominance of the cars business in the previous BL-wide production control systems and the geographical separation of the Land Rover production areas, the systems were not operating effectively and caused many problems:

'Stores and material control was in a shambles' (189).

One of the major problems with these systems was the wide variety and isolated nature of their product specification data. There were in fact 14 B.O.M within the 4x4 organisation relating to the different needs of production, engineering, finance and sales functions within the company (190). These systems were under increasing pressure for change because they were now operating independently from the cars systems following the establishment of the separate Land Rover/Freight Rover Group.

Because many departments within the organisation were experiencing difficulties with the current systems, many approaches to possible solutions were being developed, most of which represented piecemeal, incremental alterations of the existing systems to solve parochial problems and did not contain much consideration for the potential benefits of integrating and consolidating the system developments (191). Details of some of these approaches and the past development and operations of the various existing systems at Land Rover is examined in appendix A. This appendix also describes the introduction of the MRPII systems.

The MRPII initiative was not one of these incremental solutions but marked a radical re-design of the company's production control operations. The first official move towards the MRPII initiative was traced back to early 1983, a time when the then manufacturing director established a:

'need to do something positive at the top to control the site' (192).

This requirement was seized by the P & MC (Parts and Material Control) department in the manufacturing organisation. The potential support of the powerful manufacturing director gave sanction to an informal group of managers within the company who had been thinking about introducing such a new production control system for several years. This group has included personnel located in the PMC and systems departments.

The two key players who started this informal group were located in the PMC department. They had both previously worked for BL in one form or another and arrived at approximately the same time, around the site rationalisation, from Thompson Industries and Massey Fergusson. Both had previously been heavily involved in the implementation and development of MRP based systems for their previous companies and had worked on MRP projects for at least five years before joining Land Rover.

The exact reasons for their appointment has not been established but both stressed (in interviews) that they believed they were recruited because of their past work on inventory control and management systems

rather than for their interests in RP. This supports their own expressed opinions that there was no pre-existing strategy to adopt an MRP based company-wide production control system.

AT the same time the ISTEL/BL Systems organisation was busy developing a systems hardware strategy for the Land Rover organisation. A manufacturing systems element was included in the hardware strategy to encourage the use of IT solutions to solve the company's production problems and was based on a three levelled structure:

(i) Planning Systems

(ii) Execution Systems

(iii) Facility Control (193).

The Land Rover systems department was involved in developing this strategy. This department was reportedly becoming more dynamic following an intentional building up of skilled people following the distancing of Rover's relationship with ISTEL as a result of the management buy-out (see the study of ISTEL included in chapter 3 of this thesis for more information).

Investigations have shown that this build-up of Land Rover's systems capability was achieved by the recruitment of BL Systems/ISTEL personnel who were already working solely on Land Rover operations (194) and so did not represent an injection of new skills to the organisation.

These two groups of organisation changes, new PMC personnel and a focus on systems capabilities, had much in common and so they combined their interests to form the informal group at the heart of the introduction of the MRPII initiative to Land Rover. This group examined the development of the logistics function of the company (the future role of the PMC department) and the systems strategy and identified some operating principles for the business, as shown in figure 8 - 'Interaction of System and Business Proposals'.

These informal proposals prompted the realisation in this group that a radical departure was required to address the company's present operating problems and that such a solution should encompass product description data (BOM), the hardware strategy, proposals concerning the long term logistics policy of the company and site rationalisation opportunity elements.

Figure 8. Interaction of System and Business Proposals.
(195)

It was stated that,

> *[there was a] 'tremendous consonance between what we wanted to do and what MRPII offered' (196).*

The researcher feels that this congruity may have been more due to the personnel's past exposure and familiarity with RP techniques than with any objective analysis of the possible solutions.

This belief that this informal group had already chosen MRPII as the direction the company should take was confirmed by interviews with the people involved who expressed the belief that MRPII was the only option available to Land Rover (197) and also the fact that there was no mention in any records examined of any approach other than MRPII ever having been considered.

The choice of system to use was made after comparing five MRPII implementation systems with the IBM COPICS system being selected (198). The reasons for the eventual selection of COPICS were:

1. A large system like COPICS was required to cope with the scale of Land Rover's operations.
2. COPICS offered an excellent BOM structure, necessary for Land Rover's complicated part structures.
3. The system would be supported by IBM, an organisation with an established record and convenient location in its European operations base in the UK.

The arrival of a new Manufacturing director from Massey Fergusson and a new PMC director from Delta Metals (though both had previously worked in senior management roles within Austin Rover Group) gave the impetus needed to convince the higher levels of the company to pursue an MRPII initiative:

> *'We knew that we wanted MRP ..... and had to sell it to the rest of the company' (199).*

People within the manufacturing organisation, slightly removed from the immediate situation, expressed a belief that these two senior managers appeared to arrive with a pre-conviction to MRPII. However, on closer investigation the backgrounds of the new manufacturing director and PMC director do not indicate any previous contact with MRPII, though both will have been aware of its existence.

The true source of the impetus to adopt MRPII was found to have been from the informal group already operating in the company. This group persuaded the new executives that MRPII was the best choice for the company. This may have been as a result of the large amount of work which had already taken place including the identification of the IBM solution as the most suitable. This was also probably helped by

the increasing public exposure being given to MRPII in the press and trade journals of that time.

These senior managers, once recruited to the MRPII cause by the informal group, approached the LROC and Managing Director. This approach resulted in the entire Land Rover board of directors undertaking a full day's training course run by the O. Wight organisation (200). This course was to provide a basic understanding of the principles and possibilities of MRPII.

Another factor identified as having a significant influence over the LROC's decision to adopt MRPII concerns the company's auditors. At this time the company was receiving a certain amount of criticism from its auditors (Coopers & Lybrand) about the accuracy of its accounting systems. In what can be viewed as a political gesture, Cooper and Lybrand's own manufacturing consultants were enlisted to help identify the reasons for the problems in the accounting systems and make recommendations concerning possible solutions. This consultation found the same underlying operating problems as the PMC/systems group had, and also suggested that the adoption of a RP based system would be a suitable means of rectifying these problems. The Coopers and Lybrand consultants developed an incremental approach, which included a financial justification, to the introduction of MRPII at Land Rover which became the formal plan of the Solihull organisation when it was accepted by the board of directors.

The Coopers & Lybrand approach was followed until the consultants and the internal group disagreed over the choice of BOM system to adopt. The Coopers and Lybrand preferred BOM structure was not wholly compatible with the in-house group's IBM COPICS BOM which was believed to provide greater benefits in the area of product definition (201). This led to the end of the involvement of Coopers and Lybrand in the MRPII initiative and their role as external experts in MRPII introduction was assumed by combined inputs from IBM and ISTEL.

4.4 The Implementation of MRPII in Land Rover

The MRPII initiative, i.e. the implementation of the systems needed for Land Rover to adopt the MRPII production control system, was coordinated by a steering committee and undertaken by a multidisciplinary project team. The steering committee was chaired by the Managing Director who remained at its head throughout the project. The members of the project team were (202):

Project Leader (Finance)	1 full time
Secretary	1 full time
Manufacturing (PMC)	1 full time
Sales & Marketing	1 full time
Engineering	1 full/1 part
Business & Product Planning	1 full time
Finance	1 full time
Quality	none
Systems	1 part time
Personnel/Training	1 part time
Purchasing	none

In addition to these were ten 'functional tutors' from the many departments involved in introducing new operations and systems. It was the functional tutors' task, in association with the project team, to develop the working practices which would enable the transition to the MRPII system. There was also a large contingent of systems and ISTEL people, at one point 108, working on specific system developments, i.e. the tailoring of existing systems (203). In fact the adjustment of the existing systems caused larger problems and required more resources than the introduction of the COPICS modules (204).

Another major problem was how to keep the company functioning as the various existing systems were replaced or new MRPII modules introduced. This required careful studies of possible data migration routes and the development of contingency plans to undo the switch-overs with the minimum of disruption if there were any problems (205). The project team accredit much of their success in this transition management to the idea of 'prime authorship' (206). This is the means of assigning, for all data fields, only one person with the responsibility of ensuring the maintenance of the data's accuracy and availability during the migration period.

A very extensive training programme was embarked upon which covered the entire organisation and resulted in circa 200,000 hours of training for the whole project (207). One senior manager did express the belief that too many people were exposed to the in depth 5 day courses than was strictly necessary and also that some personnel were trained too early before the systems had started to effect their jobs. It may have been better to wait until the systems were in place before task specific training was introduced (208).

An important control on the implementation process was the early establishment of quantifiable data in the form of measures which were reported to the steering committee:

. Stores Record Accuracy
. Bill of Material Accuracy
. SQA Demerits (Supplier Quality Audit)
. Supplier Delivery Accuracy
. Number of days stock
. Credit Balances
. Excess Obsolescence
. Stock shrinkage
. Built on Time
. To Sales on Time
. Average Misfits per vehicle
. Order Amendments before Sequencing
. Order Amendments during Build Sequence
. Order Amendments in Build and in Sales
. Forecast Accuracy
. Restricted Stock
. Report Run Achievement
. System on Line Availability
. Computer Response Time
. System Running Cost
. Delivery Lead Time
. Third Party Supply
. System Log on Time

Table 8. MRPII System Introduction Benchmarks.

These enabled a measure of programme progression to be monitored by the board (209) and resources directed to the areas which were progressing too slowly.

One problem with the implementation procedure was thought to be the over running of the early adjustments to the existing systems. This caused knock-on effects which could not be retrieved. This did not hamper the success of the project itself but certain personnel were removed from the project team before their tasks were fully completed as a result of the slippage in timing. One area where this was particularly evident was the ZBA study (210). ZBA (zero base analysis) was an internal departmental streamlining exercise which ran at the same time as the later MRP introduction and caused the potentially damaging withdrawal of the PMC director from the MRPII project team.

Much of the literature on MRPII (211) blames its failure to provide the expected benefits for adopting companies on poor management during the implementation stage.

The main points raised by the many studies of MRPII implementation are summarised below in table 9. This list shows the implementation recommendations from several of the most significant studies (212), (213), (214), (215) and (216).

1. Top management commitment must be shown.
2. Adopt appropriate education processes for the whole organisation.
3. Accurate data (best achieved through data ownership programmes).
4. Develop achievable MPS's.
5. Pay particular attention to overcoming resistances to change.
6. Improve communications before introducing the new systems, don't rely on the MRPII systems to do this itself.

Table 9. Summary of Recommendations for Successful MRP Implementation.

The Land Rover implementation method appears to have followed these recommendations very closely. But the benefits, identified in Land Rover's own audit, do not appear to have been as great as those originally predicted (217). The major benefits included inventory savings in the region of £24 million. The audit concluded that the data used to estimate the potential benefits has been inaccurate and could only be shown so after the new, more accurate systems were installed. The audit was very keen to emphasise the intangible benefits of the MRPII initiative i.e. the change in attitudes promoted by the MRP concept and the introduction of a disciplined approach to many tasks. Company internal communication is also reportedly much freer, with information being openly visible to anyone with access to the systems. However, for the company to make the best use of its new potential much of this attitude changing needs extending and deepening, particularly in the areas not directly connected with MRPII data development. It is hoped by the Land Rover board that the TQI (total quality initiative) will provide this cultural change (218).

The way in which the MRPII system eventually adopted at Land Rover differs from other implementations or theoretical MRPII systems may have also had an effect on the returns seen to date.

The completed systems introduced (as shown in figure 9), are examined in greater detail in the appendix A which details the system's development.

Examination of the systems adopted and those described by Wight (219) shows that Land Rover has not managed to achieve MRPII operation and has only a loose form of Closed Loop MRP in place. The reasons for this misalignment between the actual and classical systems are shown in table 10.

Figure 9. Manufacturing Systems Framework. (220).

1. No capacity planning information is contained in the system, the capacities are estimated and not supported by routing information.

2. Poor parts resolution with most of the scheduling kept to the major unit level (i.e. engine, gearbox etc.).

3. There is no commonality of data and operations with the company's finance systems.

4. No simulation is performed with the system, because it is not powerful enough to manage simulation and the processing neccessary for the schedules to be developed.

5. Very few real company-wide links exist except for the preparation of data which was demanded by the functioning of the previous systems.

6. The MPS is often modified, particularly between the production units to improve their own effectiveness.

7. There are no links down to the growing number of facility monitoring and control systems on the factory floor.

Table 10. The Short Falls of the MRP System
Introduced at Land Rover in Comparison to MRPII.

This highlights the common misconception held regarding MRPII definitions. The Land Rover organisation terms its systems MRP, believing them to be MRPII and yet they actually most closely resemble closed-loop MRP or CRP.

The widespread misconception of MRPII and what it actually involves explains some of the recent developments in the Land Rover systems. These developments have been required to expand the system and use bespoke systems to reap some of the benefits neglected at the expense of quick rewards during the initial implementation phase (221).

The aspects examined as part of the post-MRPII system improvements include the integration of the company's finance systems and low level scheduling extensions. The later were being developed (222) as part of the second stage of the systems hierarchy but were stopped following the reorganisation of 1989.

The analysis and use of the data now available to everyone in the company using tools such as A.S. (standing for Application System, a data investigation and analysis environment) is encouraging people to seek localised solutions to their own operating problems. However it was felt by several managers that the systems were generating:

'too much data, [people] need to draw back and see the business need instead of just

the figures.' (223).

This development of parochial solutions without assessing the needs of the whole organisation is one of the symptoms which first led to the MRPII initiative. It is interesting to see whether this new bout differs from the last round. Preliminary investigations suggested that many of the people developing localised solutions are abiding by the same macro considerations which were evident in the MRP initiative, but that some, notably those who were new to the organisation, are not, leading to inconsistancy and data inaccuracies. This requires a training programme to be implemented which would raise the awareness of the organisation to maintain a structured approach to localised systems development.

4.5 The Future of MRP at Land Rover

The 1989 organisational changes at the Rover Group following the purchase by British Aerospace re-created a centralised approach to the Group's manufacturing and business operations, through the effective removal of the Land Rover board (224). Many departments at the Land Rover Solihull site no longer reported directly to Land Rover personnel but to Rover Group functional directors (225)(226). These changes were seen by some people as a take over of Land Rover by the cars divisions, particularly in the light of the fact that the new Rover Group board was derived predominantly from people with a cars background (227).

During this period of centralised control the Land Rover MRPII operation was challenged by the cars part of the organisation as not being suitable for automotive manufacturing operations. Its inherent batching policies, resulting from the need to schedule predetermined capacities through the production facilities, were seen as an inefficient means of operating.

The cars side production control system is largely based on the cosmetic introduction of JIT principles. However these have been achieved by the adoption of large distribution centres holding 2 days of suppliers' stocks. This material is then released to the tracks in a scheduled manner which imitates true JIT in which the parts would not be made until they were required. This means of operating is viewed with some scepticism by the researcher and also some 4x4 manufacturing personnel:

'they [cars] have all the inventory in a warehouse just down the road.' (228).

The initention of the Cars' JIT programme (called MIC) was to remove the stock from the trackside followed by a stock reduction programme which has not been implemented.

The product supply reorganisation of 1990 established a decentralised Rover organisation and so re-created Land Rover as an independently functioning operation.

Perhaps, because of their nature, the low margin, high volume cars operations are best suited to JIT techniques whilst MRPII is best suited to operations like Land Rover's which have low volumes and high product complexity (229). The level of complexity may limit the capability of developing production facilities which are able to support JIT operation or, as is likely in Land Rover's case, make such operation prohibitively expensive.

Management at Land Rover, while not admitting that any conflict exists between the two organisations still believe that:

> *'MRP is the road to pursue and that Land Rover are to become a reference of what could be achieved in the future by the Group' (230).*

The researcher has found that to facilitate this, informal strategies have been developed which intend to protect and enhance the existing MRPII systems. One such example is rooted in the same core of personnel who introduced the original MRPII initiative (231). This strategy seeks not only to preserve the MRPII systems but also to convince the cars organisation that such an approach is required for it to gain control of its production operations.

The establishment of a centralised Rover Group purchasing department in 1989 has now been confirmed as a transitory stage. The primary task of the purchasing director appointed in March 1991 has been openly declared to be the management of a move towards a totally decentralised purchasing role (232). This role would be carried out by the engineers designing the new vehicles and the newly established logistics departments within each of the manufacturing plants, or 'business units' as they are now being called.

A centralised purchasing function would have had almost total control over any changes in the logistics functions of the company. This may have been the intention of the previous manufacturing director who, with his autocratic style, was convinced that MIC (minimal inventory control - Rover cars cosmetic introduction of JIT) was the only way to control vehicle production (233).

The evidence presented in this study of MRPII at Land Rover has shown that the RP basis of operation has survived an attack from the cars part of the organisation which believes that JIT is a more appropriate

solution to the production control problem. The researcher believes that this situation may not last long because of the moves to try and make Rover (and Land Rover) a time-based company (i.e. one which satisfies its customers' orders quickly). The MRPII schedules are developed on a monthly cycle which would not be sufficiently fast enough to accommodate a time based philosophy. Using the current response times in the UK automotive industry, a time-based organisation would need to deliver a vehicle to order in under 3 weeks. The current market is operated with massive stocks of finished vehicles and so customers generally receive their vehicles in about 2 weeks.

JIT techniques, requiring less detailed planning, would provide the responsiveness that Rover would need without requiring the heavy investment needed to speed up the MRPII cycle to provide, for example, a weekly calculation. Similar JIT techniques are used by Toyota in Japan which are currently able to satisfy most orders in 4 to 10 days, depending on when the order enters the programming cycle.

4.6 Discussion

This probe of the Rover organisation has examined the introduction of an MRPII based production control system at Land Rover (see figure 10).

The study identified that the source of the initiative with two individuals who joined the company from other organisations in 1979. These individuals brought with them a pre-conviction towards MRPII and set about convincing others in the organisation that such an approach would solve their many operating problems. This recruitment of Land Rover personnel to support MRPII ideas was helped by the existing acute problems caused by the company's current unsuitable and outdated production control systems which were the result of piece-meal developments of systems originally developed for the BL company. A small informal core of MRPII believers was established in the PMC and system departments of the organisation and this group developed strategies which selected an appropriate system and introduced a hardware strategy to support a future MRPII system. This group remained informal until 1983 when it was able to recruit two senior executives to their cause who were able to influence the Land Rover board of directors. The board was finally convinced to adopt MRPII following consultations with Coopers and Lybrand and the O.Wight organisation.

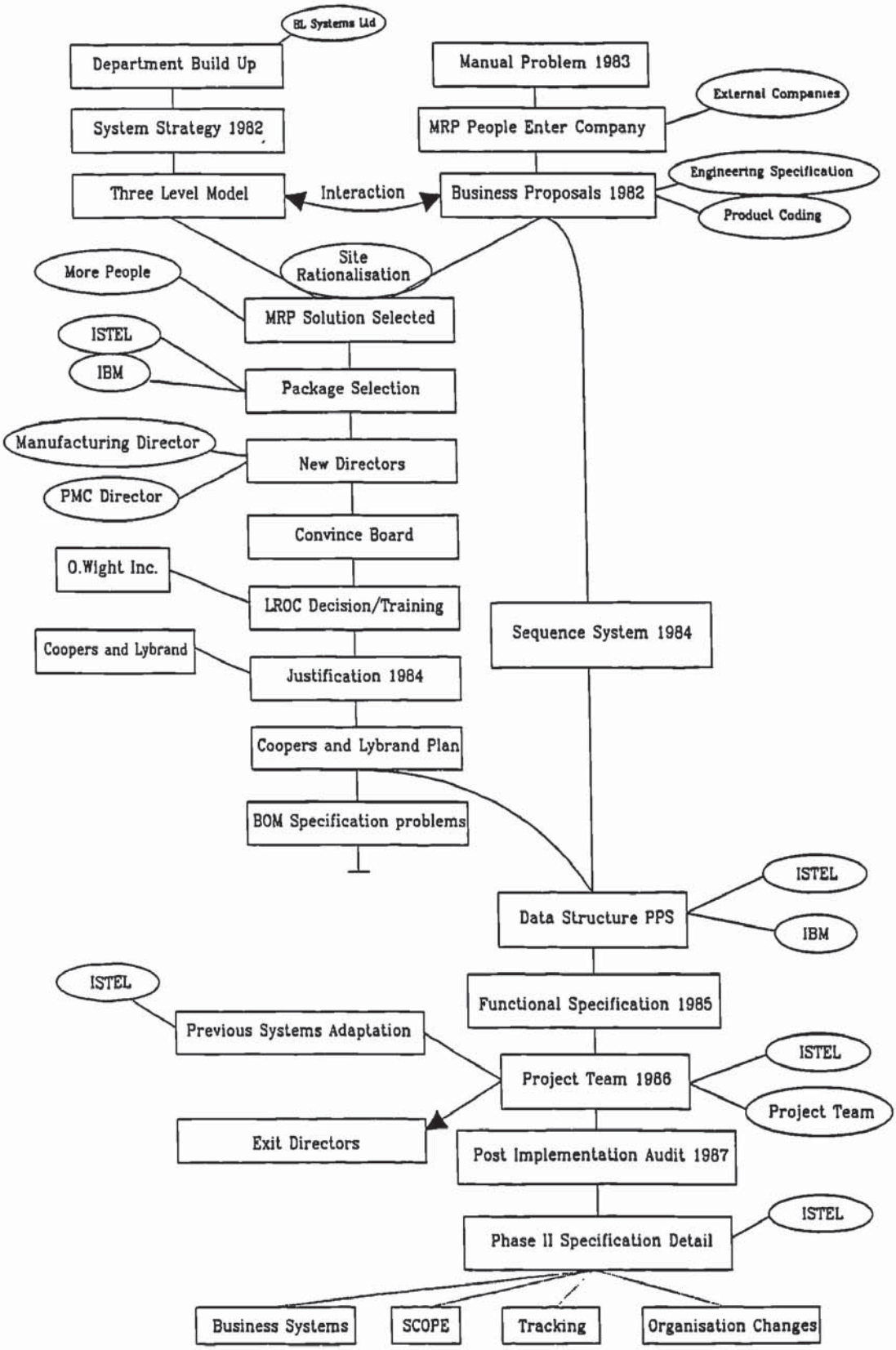

Figure 10. A Representation of the Sources and Development of the MRP Initiative at Land Rover.

It is interesting to note that the two senior executives who convinced the Land Rover board of directors have since both joined the Jaguar organisation in senior positions. Before the recent takeover by Ford, Jaguar was seen to also be introducing an MRPII based programme (234)(235). The author has expressed above his doubts concerning the suitability of MRPII systems to the relatively low complexity, in comparison with Land Rover's products, Jaguar products.

The study has shown that not only is the Land Rover organisation susceptible to implanted ideas, but it is also open to the influence of external organisations, i.e. ISTEL, O.Wight and Associates, IBM and Coopers and Lybrand. This reliance on external organisations is also seen in the saloon part of the organisation with its relationships with Warwick University and Honda which are examined in chapters 5 and 6 of this thesis. However the cars operation does not appear to be able to properly ingest the innovations with which it is presented, i.e. its approach to JIT which was introduced as part of the relationship with Warwick University. This aspect of innovation and acceptance of ideas is examined in the study of operational innovation in chapter 8.

The MRPII system was found to have been under threat from the Rover saloon organisation during the short period of operational centralisation in 1989. The cars part of the organisation believes that RP production control systems are not as appropriate as JIT methods in automotive manufacturing. This was the basis for a strategy which sought to remove control of the MRPII system from Land Rover and establish a centralised programming and material control department. However this pressure was not sufficient to significantly effect the MRPII systems and has now been removed with the 1990/1 move towards a decentralised product supply organisation.

The researcher thinks that the MRPII approach may have survived this factionally based pressure for change but may not be able to resist the future changes demanded of Rover's material control and planning functions. The next source of pressure is likely to come from the moves towards Rover becoming a time-based company. The MRPII system will require much expenditure to enable it to operate in the shorter cycle times demanded in the future. The researcher has noted that it is likely that the cars production control systems, which are more able to provide the responsiveness demanded of a time-based organisation, will be used as the basis of any new systems rather than the MRPII systems.

If the MRPII systems at Land Rover are replaced by a centralised or generic cars-derived approach then

the researcher is concerned that the unique operating culture of the Solihull based organisation may also be destroyed. The findings of the rest of this thesis suggest that this would not help Land Rover's future success and may restrict the Rover Group's ability to develop some of the capabilities of Land Rover which it sorely needs. The cars organisation has several capabilities missing from its portfolio and these gaps may also be introduced into the Land Rover organisation at the expense of some capabilities, i.e. production technology acquisition and incremental incorporation of design innovation, which are the source of Land Rover's recent success.

It was interesting to note the definitions adopted by Land Rover personnel of what activities MRPII involves. Without exception the managers interviewed believed Land Rover to be successfully using MRPII, but only ever referred to it as MRP. When the classifications developed by Wight are used the Land Rover system resembles a very loose form of closed-loop MRP. Examination of the systems framework used at Land Rover, identified the scope of the system and shows it to be concerned solely with production planning, lacking the shop floor and supplier controls and company-wide links necessary for true MRPII operation.

This illustrates a problem which the researcher understands to be widespread, of having many different conceptualisations of RP. This would explain the wide ranging results of surveys into the relative success of MRPII system introductions, there being no commonly used definition (and the failure to recognise Wight's) of what constitutes MRPII. See for example the conflicting results contained in the surveys of New et. al. (236) and the Industrial Computing Survey (237).

4.7 Conclusion

The introduction of the MRPII based production control system at Land Rover has been examined in this chapter. The study has shown that the original idea for the system was introduced to the organisation from outside the firm following the arrival of several new personnel.

The influence of these personnel was charted and this has shown how the strategy took hold and became dominant in the senior executives of the company who implemented the MRPII approach. This involved much factional activity within the organisation supported by external parties like IBM and Coopers and Lybrand.

The conflict between the Land Rover organisation and its sister organisation in the Rover saloon part of

the company over the control of the MRPII systems and their future has revealed several differences in culture. These most notably concern the role of the factions and the adoption of externally sourced ideas into the company's normal operations and has added a new angle to the development of capability in the Rover Group.

The battle for control of the MRPII systems may have been won by the Land Rover organisation but the future of MRPII in the company is yet again under threat. This is because of the advent of more efficient and more responsive production control techniques from the Japanese manufacturers. It was these lean production systems which saw the rejuvenation of the US market described by Abernathy. The US manufacturers were slow to react to this rejuvenation and are still struggling to catch up with the Japanese. The arrival of the Japanese manufacturers to the UK is likely to have a similar impact on Europe and the indigenous companies need to be able to respond to the changes or they will struggle in much the same way as the American companies.

Part III - British Aerospace - Rover Group

Chapter 5. An Examination of Rover Cars' Relationship with Warwick University

5.1 Introduction

One of the potentially most significant strategic alliances made by the Rover Group is that which has created the A.T.C. (Advanced Technology Centre) at Warwick University.

The ATC represents the latest development of a collaboration between Rover (i.e. the saloon manufacturing operations of Rover Group and not necessarily those concerned with Land Rover products) and the M.S.E. (Manufacturing Systems Engineering) Group within Warwick University's Engineering Faculty.

The collaboration has provided Rover with opportunities in training its people and acquiring advanced manufacturing and product technologies and techniques.

Because of the potential value of the relationship and the expressed hope of Rover senior managers that the ATC would become a focus for the company's future strategies, the nature and development of the relationship between Rover and Warwick, recorded in this chapter, was investigated as part of this study. The relationship represents an example of a major strategic decision for Rover saloon cars and so warrants investigation in this study to identify how the relationship and strategy has formed. Also, because the relationship concerns the capability of the company to acquire technology from external sources, this chapter can explore the ability of Rover Cars to acquire new skills and examines the company's chances of acquiring the capabilities it needs to satisfy its future intentions. This includes the possible ability of Rover Cars to move away from its other major collaborative venture, that with Honda. This creation of independent capabilities was identified during this study, during interviews with the two individuals who have created the collaboration, as a hidden reason for developing the Warwick relationship.

For the true value and development of the relationship to be understood requires its examination in comparison to other collaborative ventures between universities and industry. To help this comparison the researcher has developed a generic model of the stages frequently found in university-industry collaborations. The chapter also compares the Rover-Warwick relationship with one between another large Midlands based manufacturing company, Lucas Engineering, and Birmingham University. This comparison highlights the significance of the operations and organisation found at Warwick University

as an enabling factor in allowing the development of the relationship to its present level.

The development of the model of stages of collaboration and the analysis of several examples, including Lucas-Birmingham, allows some thoughts to be recorded which recommend, from the author's experiences, possible ways of increasing the frequency and value of such collaborations.

5.2 University/Industry Collaboration

The historical source of most 'ancient' universities was a result of gifts from wealthy benefactors. However the academic community in the UK has become divorced from industry, the modern source of wealth, and universities are often visualised as being ivory towers or at the extreme of a continuum ranging from wealth creation to knowledge creation with little overlap.

Increasing economic pressure has prompted a tightening of financial constraints on higher education and the encouragement of alternative funding within universities. The use of industry as a source of such funding has been helped by the recent increase in technological advancement and the desire for new technology as a means of ensuring economic survival for industry. This has prompted industry to search out new means of generating ideas and the utilisation of technology. An obvious source of this knowledge is present in most universities with technology related departments.

These factors have led to the increased presence and encouragement of university/industry cooperation as a potential solution to the universities' funding problem and industry's thirst for technology.

On examining the documented accounts of university/industry collaboration it becomes clear that there is no set model available for tracking the development of such cooperations. What is evident is the existence of various stages or levels of commitment. An attempt at classifying these stages was made in the Docksey report (238) which identified the 5 following states of collaboration in academic institutes:

1. Personal assistance from industry with university activities
2. Use of university staff and facilities
3. Joint activities
4. Positive roles for third parties
5. Financial support from industry for university activities.

This framework, although being very pertinent to the formal and distanced types of cooperation occurring at its time, does not cover the state of some present collaborations or potential future alliances,

particularly those currently developing overseas. It is also very one-sided, concentrating on what the universities can give to industry.

To facilitate comparative examination of collaborations the Docksey framework requires restructuring and extending. The criteria used to revise the Docksey framework is based on differentiating the levels of commitment (financial or otherwise) found in the collaborating organisations.

The stages which have been developed to help this study of the Rover-Warwick collaboration are:

1. Personal Contacts
2. Teaching and Course Development
3. Industry Funding of Research
4. The Teaching Company
5. Science Parks*
6. Research Institutes
7. Partnership Programmes
8. Mergers

* This stage does not fit the pattern of relationship development, drawing on the availability of low overheads and venture capital, but may have a sizeable impact on the location of high technology off-shoots from large parent organisations and so lead to future collaboration on other issues.

However these stages effect the academic and industrial organisations to differing degrees, something which any collaboration classification method should reflect. This is included in the final Stages Model of Collaboration Development framework (shown in figure 11) by introducing different axis for each organisation's involvement. It also solves the methodological weakness of one-sidedness in the Docksey analysis.

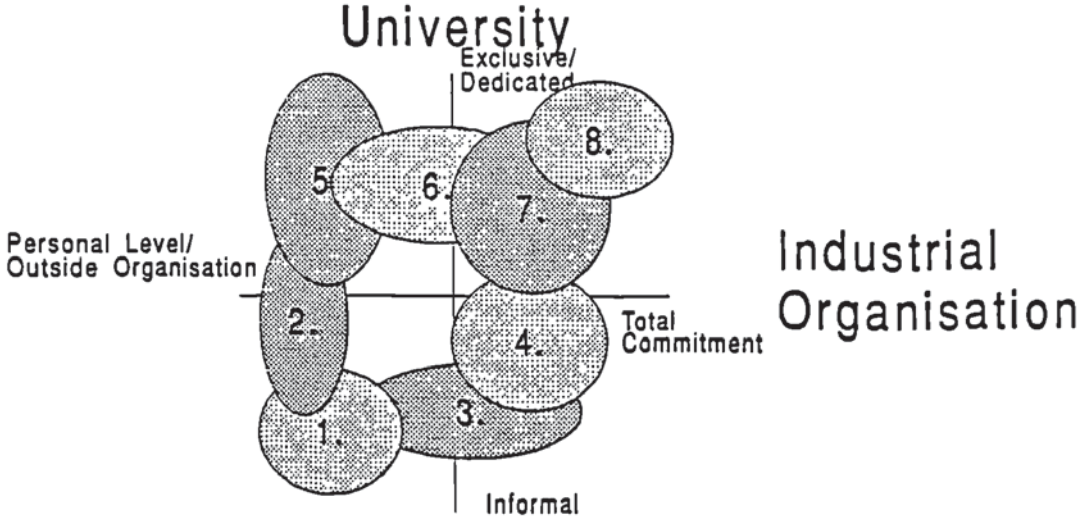

Figure 11. University Industry Relation Model.

This framework will now be examined to describe, with examples, the relationship and benefits for the collaborating organisations resulting from the different stages.

5.3 University-Industry Collaboration Stages

Personal contact was identified as the normal starting point of collaborations and is probably the most frequent, but least evident or documented stage. The casual acquaintances made at conferences and professional institution functions are many but:

> *'many of these contacts are developed informally and on a person to person basis they are largely unquantifiable, particularly because many involve no exchange of funds and are not therefore noticed in the accounts of the universities or the companies concerned.' (239).*

The importance of these contacts in helping produce successful partnerships has been stressed in several reports and their value has never been disputed (240)(241). However there is still much debate as to how these contacts can be encouraged but there is a consensus that such contacts must be handled carefully because of the great effect any decisions may have on the future potential of the relationship. It was noted by Rosenezweig that it is at this stage

> *'that experience can be used to improve later practice and so that unreasonable expectations do not lead to disappointment and disenchantment.' (242).*

Government involvement has, particularly in the U.K., been seen as the best policy for generating these personal links (243). However evidence from Switzerland gathered by the OECD contradicts this belief by reporting that:

> *'Unusually close relations have developed over a long period' and that 'intimate and effective relations have seemingly owed little or nothing to governmental initiatives: Federal government policy as been highly non-interventionist.' (244).*

The researcher wonders if there would not be a greater number of these contacts if they had been encouraged by governmental initiatives.

Personal contacts are fairly difficult to reconstruct in a study of university-industry collaboration. As well as the non-documentation of these relationships, both successful and unfruitful, the original links become obscured by any subsequent cooperation. The formal relationship normally receives maximum publicity

from the leaders of both organisations involved, whether or not they have been involved in forming the relationship, and any other third party involved (e.g.: national and local government for grants provided, etc.).

In a study of 200 Scottish academics, Connor found that:

> *'the most frequent forms of contact arose through formal and informal visiting and through requests for advice and information' (245).*

Connor analyzed the origins of personal contacts and identified that the link was slightly more likely to be the result of an approach from the industrially located individual (246). This contradicts the intention of the Docksey method which focussed on motivating academic personnel to approach industry.

One surprising finding of this survey was the unwillingness of academics to divulge their contacts to colleagues:

> *'It was suggested by respondents that recommending others, whose capabilities were perhaps unknown, could perhaps jeopardise the continuing credibility of existing relationships.' (247)*

This would clearly prevent the proliferation of personal contacts, particularly in fields where access to research case material or technical support is rare.

The researcher reasons that increasing the number of personal contacts between academics and industrialists is likely to increase the number of collaborating ventures and that the proliferation of such contacts should be encouraged by governmental initiatives. These initiatives are most likely to be successful if they focus on getting industrialists to approach universities. Because the industrial organisations know the general area of the skills and technology they would like to acquire they are in a better position to approach suitable academic departments. The academics would however have a lower chance of successfully identifying a company which would benefit from their expertise. Such approaches also enable industry to preserve secrecy over its products and would also benefit from serving the factional interests like those which have been identified in this study.

The value and management of training is a much debated subject but few people doubt that it should be a key part of any industrial country's strategies to improve its international standing. In the UK there has been a move in recent years to involving industrial organisations in helping to design the courses offered

by education establishments. This cooperation is one of the stages in the framework of collaboration development.

There are two major sources of the course development and teaching stage of cooperation described in the literature:

(i) Consultations between existing contacts.

(ii) Third party initiatives.

The course development type of collaboration has received much publicity lately. Both industry and academia are agreed on the need to offer courses which train and educate future and present employees. This is thought by most involved commentators to be best achieved by establishing the needs of industry and incorporating them into the courses offered and has been encouraged by many training boards and government schemes:

> *'engineering departments are now being positively encouraged to collaborate with industry to make sure that the courses they provide are relevant to the needs of industry.' (248)*

Perhaps one of the largest contributions by a third party is that from the professional institutions, e.g. the Institute of Mechanical Engineers, etc., which encourage course accreditation to facilitate the future career development of a course's graduates.

For clarity the involvement in course design can be separated into those concerning undergraduate and post-experience education courses. The term post-experience education is being used in this study to cover postgraduate, non-research higher degrees and diplomas and short course training initiatives offered by organisations through the involvement of higher education institutes.

Cooperation in the UK at the undergraduate level has primarily developed from recommendations contained in the Finniston Report, of 1978/9, which examined the future of the country's engineering skills. The Finniston report recommended a change in traditional engineering courses and advocated the introduction of broad based courses like the new B.Eng and M.Eng degrees (249).

The Finniston report also promoted the widespread use of sandwich courses:

> *'periods of industrial/professional training are planned to integrate with the periods of academic study in a pattern appropriate to the particular discipline.' (250)*

which, only 3 years after Finniston, accounted for 16,000 student's courses (251). The researcher finds that this increase in sandwich courses is advantageous providing that the placement part of the course is well managed and not used as a means of helping fund students through periods of employment. The benefit of a sandwich approach (either thick or thin dependent on the length and number of industrial placements) to the student is in providing exposure of students to the working environment and its practices. Possibly the biggest benefit from these courses comes from the liaison between academic and industrial supervisors feeding back into future course material:

> *'engineering educators must themselves be aware of the needs of industry, of modern design and problem solving techniques, of industrial processes and of the financing and management of engineering. Industrial liaison is of paramount importance at every stage of the development of a course, and through it's execution.' (252)*

and, since the supervisors work with industrial contacts,

> *'it also leads to a better understanding between university and the employer and often to a practical cooperation in research and development work.' (253).*

Some exceptions to the standard sandwich course exhibit a greater level of cooperation between the academic and industrial supervision:

Table 11. Examples of Extended Relationships within Degree Courses.
(254)

A consultative approach to course development is not uncommon in the rest of the world but certain examples show an even greater extent of cooperation. Siemens, the electronics firm, selects the students

for an undergraduate course at the Technical Universities of Munich and Berlin. It is not rare for entire classes to be recruited from the course and into the company (255). Philips and Eindhoven University have a similar relationship, though this relationship is closer than purely course development and is examined later. The GMI (General Motors Institute) in Michigan, an independent but closely coupled 'cooperative education' college, was formed in response to approaches by GM. The realisation by the local authorities that the collapse of the U.S. motor giant would mean the devastation of the employment prospects for the city of Flint encouraged GMI to be set up as a joint venture to ensure a high calibre workforce was available for the GM plants (256). GM now has a stake in the venture which is now known as the GMI Engineering and Management Institute.

An increased focus on providing tailor-made undergraduate courses may help the colleges by reducing the amount of recruitment, with the classes being provided by the industrial organisation, and with the inclusion of industry specific subject matter, but the training given may be restricted by the demands of the industrial partner. These courses should be careful not to lose, as part of their aims, the development of the students' intellectual capabilities. This development of intellect may be discouraged by a more vocational focus and over-dependence on one source of income/outplacement body.

The importance of relevant training, being provided by industry but divorced from academic involvement, may be seen in an international example, Japan, where only recently (1988) was there any cooperation between universities and industry.

> *'In Japan college industry cooperation has been regarded as taboo since the 1960's when the student movement was at it's most active.' (257).*

This forced the development of internal educational processes at all levels within Japanese industry and encouraged the firms to concentrate specifically on their educational needs leaving colleges to focus on developing academic and intellectual strengths. The success of the Japanese as an industrial force may be partially attributable to this segregation of academic and vocational professional education because of the increased focus on each aspect it encourages.

The level of cooperation found in post-experience education is normally higher than that involved for undergraduate training, with post-experience education courses being tailored for individual companies or small groups of companies. The courses often involve case studies and working examples derived from

the industrial organisation and are jointly developed with a large input from the collaborating company. The types of courses offered normally lead to masters degrees (M.Sc./M.B.A.) or diplomas and rely on the cooperation of the industrial organisation to release managers and executives to take part. Most larger, progressive companies offer such chances to their executives and so this level of involvement is fairly widespread and relatively well understood. Notable variations from the normal courses offered are:

* Nottingham University offers an M.B.A. purely for Boots Ltd. which uses 'the company's in-house experience and independent specialists from the university.' (258)

* The IGDS scheme (Integrated Graduate Development) at Warwick University for Rover, Lucas and Rolls Royce, which is examined in detail later.

* Durham University offers a postgraduate M.Eng. specifically for its promising first degree graduates with the support of their first employer. (259)

Short courses are also widespread, with most concentrating on new developments or refreshing areas of skills and knowledge which may have been first studied by the employee over 30 years ago. These courses are normally instigated by professional institutions or university staff who identify the need for the courses. Short courses may also be the result of in-house initiatives, e.g.: Land Rover offered a series of lectures examining new technology with Birmingham Polytechnic which sought to promote the understanding of advanced manufacturing technology (AMT) in the company.

The teaching experience and specialist knowledge of academic institutions makes them effective sources of training for industrial organisations. The development and success of such courses appears to benefit future collaborations between industry and academia, as well as providing qualifications for the personal development of employees, and improving the knowledge and skills available within the organisation.

The researcher feels that the intellectual basis of non-vocational education should be closely guarded to prevent its loss. It is this intellect which produces advances through research and enhances industrial performance by developing flexible minded personnel capable of solving problems with novel solutions. One of the primary objectives of the academic community is to extend the boundaries of knowledge, i.e. to undertake research. The involvement of industry in this research has been limited in the past because of the focus of academic institutions on pure research rather than its application.

The external industrial funding of research has long been recognised as a source of resources beneficial to the teaching and other research activities of universities (260)(261). The involvement of

industry is not welcomed by all academics who do not want the intentions of their study for understanding to be distorted into providing applications for their work.

To give a specific example, the researcher has found it very difficult to balance studying the operational and strategy processes of Rover whilst contributing at an acceptable level in the organisations activities. The expectation of much of the senior management involved in this project was that the researcher should not appear to be receiving any special treatment or resources over those normally extended to the MSc projects taking place by the company's IGDS students and should perform his studies over and above standard staff activities. This pressure to perform two jobs, that of a staff analyst and also having to carry out the depth of rigorous study required for a doctorate, has been very demanding on the researcher. It also highlights the value placed on research in the Rover Cars organisation, to be performed as a peripheral activity, without interfering with the normal operations of the company.

This possible interference of industry in research apart, much research would not attract funding from central resources, particularly under current trends, and requires industrial support, e.g. market studies and non-mainstream manufacturing technology with only limited applicability. This industrial support also provides a focus for the development of collaborative links and applied technology.

Several means of developing and administrating industrially supported research in higher education establishments have been developed and can be classified using the following framework developed by Stankiewicz (262):

(i) Liaison Offices/Officers

(ii) Consultancy Companies

(iii) University-Industry Consortium

Saunders found that such initiatives were predominantly derived from the academic sector and not in response to industry based requests (263). This is explained as a result of the need for universities to be 'actively marketed' to encourage industry awareness and try to increase their proportion of external research funding (264).

The classes mentioned above of initiatives to generate industry funded research in academic institutes will now be explored to asses the relative benefits of each.

Liaison offices have proliferated during the 1980's with every university and polytechnic now having at

least a contact point for industrial enquiries, and many an entire technology transfer department, compared with only 15 such institutions as reported in the Docksey report (265). The function of liaison units vary but it is normal for such units to present to industry the available expertise, coordinate university resources and provide the legal/contractual management necessary in the undertaking. These are important skills which university staff have never needed to acquire in the past and their provision from a central point ensures that the commercial integrity of the contracts and intellectual property rights are maintained. Consultancy companies were defined by Stankiewicz as:

> *'university affiliated quasi-commercial organisations which sell the consultancy services of academic scientists affiliated with them.' (266).*

These consultancy companies may, on the surface, resemble the liaison offices of certain universities but they mark a change in approach for the institution concerned. They constitute an entry into direct competition to other external consultancy firms. The Docksey report envisaged this state of affairs and warned that the universities would have to be careful not to be seen to undercut the regular consultancies by off-setting their consultation costs against teaching and other centrally funded activities (267). They were thought able to do this by adopting consultancy work into their already subsidised research activities. This fear does not appear to be a reality, most academics successfully divorcing their teaching and research activities from the contracted consultancy, and use consultancy income to subsidise research.

University-Industry consortia are very specialist examples of consultancy companies which may often be supported by more that one organisation. The success of these has largely been in the area of utilising advances in electronics and computing, e.g.: the Semiconductor Research Cooperative in the U.S.A. Because of the resources required to support such a centre these have primarily been limited to the USA where multinational companies use them in a pooling of expertise and funding.

The advantages of consortia over the other types of initiatives result from the scale which can be achieved. Some of the research projects are just too big for individual universities and companies to support.

For smaller projects the consultancy and contract approaches are more suitable. Consultancy companies can provide total solutions including a high degree of project management but are not as adept at developing links and technology transfer as the more traditional liaison office-based research projects

because the focus is on a formal relationship rather than on informal contact to resolve a particular problem.

Research as an educational activity e.g.: PhD, MPhil degrees, enjoy the advantage of attracting a degree of central funding in the U.K. from the various research councils (SERC, MRC, ESRC). These can be used to limit the financial commitment from a company into the research with schemes like CASE (cooperative awards in science and engineering), industrial studentships and Total Technology.

They are all aimed at providing traditional university-based research at the request of industry and to provide the exposure of academic individuals to industry practices (268). They also have a broad base, tending to encourage a balance of different disciplines to arrive at a compromise solution to a genuine industry problem.

> *'the Total Technology Scheme provides PhD training by means of problem-solving projects in, and of importance to, companies or other collaborating bodies. Each project requires research study and course work which crosses boundaries between academic disciplines.' (269).*

The future development of industry sponsored research looks certain but the methods of generating contracts will probably radically change in the near future. The OECD report suggested that:

> *'If the universities ever had this liaison function to themselves, they no longer do so, now and in the future it is likely that the pressure of competition will drive the universities into trying to identify as yet unoccupied market niches.' (270).*

The researcher concludes from his own experiences that such research should be encouraged, not only because of the shared financial burden and application of academic research to industrial situations but also because of it offers a unique multidisciplinary training for future industrial managers to develop intellectual capabilities.

The Teaching Company scheme is U.K. based and began in 1976 as a joint venture between the SERC and Department of Industry, now the DTI. Its main aims are to encourage new technology development in industry and to promote university-industry interaction:

> *'The scheme involves commitment by a firm and a university to tackle a programme of work in the firm.' (271).*

It is not uncommon for more than one firm to be involved in a particular teaching company, e.g.: the Land Rover/Jaguar/Birmingham University Teaching Company, 1986 to 1989 which was concerned with introducing new manufacturing technologies such as robotics and laser welding.

A teaching company is jointly managed by senior staff from the university and cooperating company/companies with an external consultant appointed by the SERC (272). The teaching company, if successful, may lead to further cooperation and other teaching companies examining different problem areas. Success appears to depend on the accurate and realistic management of the programme, and an alignment of the mutual expectations of the partners involved.

> *'The primary advantage to the industrial partner is the access to specialist knowledge and techniques and through this an unprecedented opportunity for industrial experiment and low risk evaluation of innovation processes. The industrial environment provides a practical 'test bed' for existing research and may formulate new research areas.' (273).*

The change and training processes attached to teaching companies may not end with the cessation of the scheme because often the associates (personnel employed in the teaching company) are retained within the company and so:

> *'take the knowledge gained from the university with them, that is real technology transfer by people transfer.' (274).*

The teaching company's benefits in cross barrier idea flow are great but because the relationship is very formal, it may not lead to any closer long term cooperation or integration between universities and industry. The scheme between Land Rover, Jaguar and Birmingham University for example was not extended despite its success and the subsequent employment by the companies of 50% of the associates. The possibility of continuation or repetition of the teaching company was not helped by the divisions which developed between the commercial organisations following Jaguar's privatisation and subsequent move away from the Rover Group. Neither organisation could afford to fund a replacement teaching company alone.

The idea of the science park was developed after the war in the U.S. The principal motivations have been found to be the increased profitability of the universities through real estate activities and the nurturing

of a high technology industry sector.

> *'The idea is to create in the vicinity of universities, sufficient room for small high technology companies and the R & D laboratories of larger ones. It is hoped that this will lead to the development of dense networks of informal contacts, consultancies and joint projects between the host universities and the companies in the parks.' (275).*

Different science parks are set up for differing reasons and with different intentions. Most, but not all, exclude mass production activities, some exclude established companies whilst others aim at attracting the research laboratories of multinationals. The funding of the parks is also very varied with the resultant influence this has on the type of tenant organisations. The funding is nearly always from the public sector, either through the university itself or from local and national government (276).

There are approximately 35 science parks in the U.K., almost 100 in the U.S.A. and as many in the rest of the E.E.C. (277). However their success is hard to gauge. Stankiewicz argued that success could not be measured for these ventures since most are too new and should be judged against a long term profitable existence of the companies they nurture. The Docksey report and the OECD study of University Industry relations both determined that there were more company failures than successes in the science parks. This supports the belief that the conditions required for successful parks are not fully understood (278)(279).

Difficulties experienced in other industry/university ventures i.e.: confidentiality, mismatched needs, patent right difficulties and conflicts over industrial and academic values and attitudes may be avoided in science parks because of the involvement of the researchers in exploiting their own innovations. Also the risk of failure is effectively exported to a private company, sink or swim, and so any failures do not reflect on the university or industry.

Some evidence does exist to show that the success rate of start-up companies is higher than outside the park environment (280) but this is by no means conclusive.

One of the most successful parks apart from Stanford, Route 128 in Boston and the Research Triangle Park in North Carolina in the USA has been the UK's Cambridge Science Park (C.S.P.).

Established in 1973 the C.S.P. was the result of the Mott report (281) being taken to heart by Trinity College. The C.S.P. and its effect on local industry has been examined in some detail (282).

It's success in the early 1980's was attributed to factors beyond the park's control which have historically lead to successful high technology firms e.g.: Pye, Acorn, Sinclair Computers, etc., in the area. The C.S.P. report states that it accounts for:

'a little over 10% of the high technology scene.' (283).

Recent reports have suggested that C.S.P. companies have been hard hit by the recent decline in economic growth (284).

As part of the university-industry collaboration mechanism, the contribution of the science parks has been limited in comparison to the rapid growth in science parks. This is possibly because of the very high emphasis on commercial exploitation rather than partnership. The future of the science park concept seems assured but it is not a primary source of industry integration into the academic environment, but as a means of capital generation for universities.

The establishment of independent research institutes constitutes a classic source of university-industry interface. Institutes normally have close relationships with local universities and are concerned with a particular area of research and the training of professionals within that field (285). There is a risk that an institute's specialisation may limit its potential market but this seems to vary from industry to industry and country to country (286). Institutes are available for contract research, which because of their focus onto industrial rather than academic study, reduces the problems of secrecy and ownership rights can have hinder other forms of cooperation.

The most prolific example of institutes established in the U.K. are those supported by the Wolfson Foundation. These cover many areas of applied research e.g.: semiconductors at Birmingham, acoustics and vibration at Southampton, heat treatment at Aston, metallurgy at Imperial, off-shore engineering at Heriot-Watt, etc. (287).

An international example is SINTEF (The Foundation for Scientific and Industrial Research at the Norwegian Institute of Technology) in Norway, which is closely linked with Trondheim Technical University. These links are promoted through the university appointing SINTEF's board of directors, cross appointments and free access to the university's facilities and resources. This model of institute operation has been copied by Linkping at the University of Linkoping, in Sweden and PAPRICAN (Pulp and Paper Research Institute of Canada) at McGill University (288).

The Dutch government has set up three regional microelectronics centres in Delft, Twente and Eindhoven which are closely related to the local technical universities. These centres provide services to the industry which is concentrated in these areas (289), much along the same lines as the Edinburgh-based Wolfson Institutes of Microelectronics and Applied Computing (290) furnish Silicon Glen (the area of high technology development in Scotland).

It is important for institutes to keep a high degree of linkage with universities, without this they:

> *'will "degenerate" to the same status as private contract research laboratories or the "branch laboratories" of industrial associations.' (291).*

and lose contact with the advances being made in the academic world.

The next step in increased cooperation between universities and industry is centred upon a positive joining of the organisations involved. This partnership may be exclusive of any other organisation or, as is most likely, involve only certain departments within each parent organisation leaving the remainder to form and develop their own contacts if they wish.

The partnership stage may be extended into full merger or union which should, because of the depth of the relationship, involve the exclusion of significant collaborations with other organisations. There are presently no true examples of this, the closest being Eindhoven University and Philips where, because of the employment structure of the town, the two have grown together and are dependent on each other, Philips for the university's provision of qualified and skilled employees and basic research and the university for much of its funding from Philips. Other examples may be readily apparent but closer observation shows that these are normally universities created by large industrial concerns and have had no previous independent existence. Interestingly a model example to this approach, G.M.I. in Michigan, U.S.A., has recently moved away from its raison d'etre G.M. and now contracts training and research from other organisations.

It is at this partnership stage that the Rover/Warwick relationship resides. The mechanisms involved in its development and operation are examined in the next section.

Beyond this partnership, the merged level of cooperation, each organisation theoretically loses its own corporate identity and so no longer represents a form of collaboration. If a university or one of its departments becomes so close to a particular organisation, it is in a much better position to influence that

organisation but may lose its standing as a credible academic entity. This may limit the quality of staff and students which it is able to attract and prevent the company from gaining any more capability than it already has in the form of the partnership arrangement.

5.4 Development of the Rover Warwick Relationship

The introduction explained that the A.T.C. is only the latest realisation of a long relationship between Rover Cars and Warwick University which effectively began in the 1970's. A representation of the stages involved in the development of the relationship and the chronological detail is shown in the diagram at the end of this chapter.

The association of Rover with Warwick University is not primarily between the two organisations but is based on a rapport between Professor Kumar Bhattacharyya of the Manufacturing Systems Engineering Group at the University and Andy Barr, Manufacturing Director, Rover Group until November 1990. Barr was only involved with the Land Rover part of the Rover Group from January 1989, before this his responsibility was solely for the saloon car manufacturing organisation.

In the earliest stages, in the mid-1970's, Bhattacharyya was part of the Production Engineering Department of Birmingham University and was involved in undergraduate projects. Through the various projects and student placements contact was made with Bill Horton at Sherpa Vans in Washwood Heath, Birmingham. This regular contact and communication led to the establishment of a teaching company to examine the suitability of a P.C. (personal computer) based inventory management system for the light truck manufacturer.

The Teaching Company was successful and led to four more teaching companies with Birmingham University including simulation, low pressure sand casting and abrasive belt machining. The involvement of the B.L. board and manufacturing managers in the early stages of these projects formed the first contact between Bhattacharyya and Barr, then BL manufacturing director (292) who was required to authorise Rover's funding of the projects. The two established a close relationship which still remains today.

In 1980 Bhattacharyya moved to Warwick University to take the chair as Professor of Manufacturing Systems Engineering (293). The importance of this move to a different academic organisation is believed by the researcher to be very significant for the subsequent development of the relationship and

is discussed later. Bhattacharyya's involvement in Austin Rover (as Rover was then called) was developed through a personal interest in what was still a major manufacturing industry and its problems, and also as a response to the bidding of the government to encourage academics to examine the problems of British manufacturing industry. The problems Austin Rover had at this time were:

> *'Highly visible, needing short term reward but also the need to develop for the future.' (294).*

The process required to provide these rewards and long term prosperity were thought by Bhattacharyya to be hindered by the organisation's existing structure.

> *'No matter what strategy you had you couldn't implement it...the majority of the directors were barons, fiefdoms...most of the people in the organisation were survivors and highly political, we needed to inject new people to overcome this.' (295).*

The personal relationship which had developed between the two, Bhattacharyya and Barr, was strengthened with the joint development of a recovery strategy for Rover Cars (296). This was formalised in Rover Cars as the Integrated Technology Strategy (I.T.S.) of 1980. The ITS aimed to use technology to achieve flexibility in Rover's manufacturing operations and so alleviate some of the organisation's pressing business problems, i.e. a:

> *'manufacturing [rather than product or marketing] led recovery was necessary.' (297).*

The strategy also involved increasing the technological training in the organisation or 'investing in people' as the strategy termed it. This increased training was provided by initiatives like the IGDS (Integrated Graduate Development Scheme) and a large teaching company.

The ITS assumed that any model development for the near future would be a joint operation with Honda and that Austin Rover's input to this would be limited because of the company's weak financial position. The Teaching Company developed from the ITS has grown and is now one of the largest and longest running in the country. It has been largely involved with the introduction of new techniques and facilities across Rover Car's sites and specialises in production and material flow simulation exercises (298).

The reputation of the manufacturing technology activities of Warwick based personnel is not high amongst Rover's manufacturing departments, there being several examples of solutions developed by Teaching

Company projects, which have created more problems than they have solved, e.g. the FMS (flexible manufacturing system) in the Longbridge Power Train Business Unit and the R8 (Rover 200/400 model) line-balancing performed by the simulation team. These have resulted from a poor understanding of the problem by Warwick staff and from too high expectations on the part of Rover Cars managers not being realised. There are also examples, normally accompanied by the inclusion of manufacturing people in the project teams, where effective solutions to urgent problems have been found, e.g. solving the 'engine-stuff' (the assembly station where the engine is joined to the body) cycle time inconsistencies with the introduction of a work-buffer following simulation work (a work-buffer is a queue of material which prevents localised problems effecting the smooth running of the rest of the production facility).

The IGDS (Integrated Graduate Development Scheme) originated at the same time as the ITS from a government initiative to examine the value and implementation of M.Sc. degrees for industry. This initiative was taken by the M.S.E. Group with help from previously established contacts with Rover and consultations with B.Ae. and Lucas. The scheme was later widened to accept entrants from other organisations and now boasts 50 such participating companies (299).

The IGDS scheme was created to introduce advanced manufacturing technology and techniques to managers. The scheme still has its original modular structure with each student attending fourteen modules over a two year period, normally on a week's block release. The modules are assessed by coursework completed in the student's own time and normally involving the application of module material to a work related problem. There is also a final dissertation on an area of relevance to the student's own work.

The IGDS was extended in 1989 to cover design activities as well as the manufacturing disciplines. The available modules are shown in figure 12.

The IGDS is a unique example of postgraduate training cooperation between university and industry. The industrial organisations not only provide students and funding but are also deeply involved in the course management and teaching. Case study material from cooperating companies and discussions with senior managers are also common in the modules. Industrial supervisors are appointed to assist each student through the course.

Common Modules

Automation
Computer Aided Design
Computer Aided Manufacture
Computer Systems
Corporate Management
Criteria for Competitive Design
Financial Analysis and Control Systems
Human Factors in Industry
Industrial Statistics
Influencing Skills
Information Technology
Inegrated Manufacturing and Deign Systems
Management of Integration
Manufacturing and Design System Fundamentals
Materials and Processes for the Future
Metallic Materials Selection
Microcomputers in Engineering
Non-Metallic Composites
Polymer Materials Processes and Products
Product Evaluation
Project Planning, Management and Control
Risk Analysis
Simulation
Systems Analysis for Management
Technology for Integration

Manufacturing Modules

Applications of Production Planning and Control
Casting and Powder Processes and Products
Design of Manufacturing Systems
Facilities Planning and Plant Layout
Industrial Engineering and Manpower Planning
Joining and Finishing Processes
Machine Tools
Machining Processes and Products
Mechanical Working Processes and Products
Quality Systems
Reliability and Maintenance Systems
Robotics
Techniques of Production Planning and Control

Design Modules

Analytical Design Techniques
Applied Aerodynamics
Applied Thermodynamics
Control Systems
Creative Design
Machining, Joining and Finishing
Noise and Vibration
Performance and Development Testing
Primary Processes
Product and Systems Quality and Reliability

Figure 12. Modules Available as part of the IGDS Scheme.

The researcher is concerned that the IGDS focuses too closely on acquiring knowledge of manufacturing techniques rather than applying those techniques and associated management approaches. The IGDS is, from the course material examined by the researcher, an MSc in AMT (advanced manufacturing technology) (and now also design technology) and not about graduate development in a broader sense. The success of the IGDS (measured by the organisation in terms of numbers graduating rather than the development of the organisation's capabilities) coupled with a desire to expand the approach across the organisation from the Rover end and the increased involvement of Warwick staff in the company has led not only to the introduction of a design stream but also to other post-graduate training activities including the IMDS (Integrated Manager Development Scheme),

> *'aimed at providing Rover Group with a new breed of production manager and to support him or her in the newly evolved team environment to be found in Rover's factories.' (300).*

Another course, the Integrated Purchasing Development Programme (IPDP), intends to give the company's buyers improved skills to try and maximise the benefits of any decisions they make by providing a company-wide perspective to replace the traditional parochial focus of price reduction. Senior management are also trained through specially tailored courses and IGDS modules as part of the collaboration between Warwick and Rover.

It is an ambition of Rover's chairman to be able to offer everyone in the company the chance to partake in any education or training activity they choose, irrespective of the relevance to their work (301). This has been realised in the Rover Learning Business (RLB) introduced in 1991. The RLB scheme entitles any employee to a £100 annual bursary for part time study outside normal working hours.

The relationship between Bhattacharyya and Barr after the ITS produced the introduction of the cell manager concept. A production management technique which involves the setting up of small work units (called cells) on the shop floor with a mini-managing director (the cell manager) in control of nearly all the functions connected with production from the cell. This technique is now widely applied across the company and is likely to be extended to give the cell manager even more control and autonomy.

The personal relationship between Barr and Bhattacharyya has also lead to the adoption of several JIT (just-in-time) principles under the title MIC (minimal inventory control). This is discussed in chapter 4,

which examines the way that MIC has created JIT delivery rather than JIT manufacture.

The forum for idea generation between Bhattacharyya and Barr was formalised into a 'think tank' in late 1984 which included other executives from both groups (Rover Cars and MSEG). It is in this forum that the idea of the ATC was developed, the 'think tank' has since become the ATC Steering Committee.

5.5 The ATC

The stated purposes of the ATC for Rover are:

> *'to create an environment, in purpose-built premises, where a mix of Rover staff and university staff could work together and share facilities. This pooling of skills and experience has created a focus, not just on technologies at the leading edge of automotive manufacture and development, but also in the development of people.' (302).*

In summary, these are:

(i) The transfer of knowledge and skills into the company

(ii) The creation of an environment away from the daily business to enable a clear vision of the future of the company.

This section is intended to outline the nature and future potential operation of the ATC part of the Warwick-Rover relationship.

The ATC has been promoted as a centre for strategy development, being removed (though supposedly not distant) from the daily environment of production and the pressures for results this presents. The work of the ATC is outlined in the table of projects (table 12) but essentially covers technology application and a small amount of manufacturing based policy and planning work.

Manufacturing Policy Unit
IT Strategy Group
Vehicle Thermodynamics
Intelligent CAD
Advanced Chassis Design
Adaptive Engine Management
BOM (Bill of Materials)
Vehicle Electronics Development and Testing
Catalytic Converter Development
Expert Systems Application
Facility Simulation
Thermal Imaging
Suspension Control Development
Electronic Interface Testing
Injection Moulding
Advanced Assembly Techniques

Table 12. Groups Operating in the ATC.

The centre was built by the university and rented to Rover and Rolls Royce. The university also allows its staff time to become involved in the centre's projects without formal releases and provides access to equipment with the same informality.

The ATC also houses certain Rolls Royce research personnel. The relationship between the two companies is limited to housekeeping, in common with other examples of two organisations sharing the same building. Rolls Royce has a stronger link with the university than with Rover, but their link with the Unversity is not nearly as developed as that of Rover and Warwick University. The Rolls Royce part of the ATC is concerned with materials research, particularly in the area of advanced ceramics and has little of the mixing of staff as intended in the Rover-Warwick relationship, possibly because of the Rolls Royce management of the relationship which does not involve the employment of research staff by the University.

The ATC's future role in the Rover company's organisation is still not clear. It has always been stated that personnel will be encouraged to use the centre as a transition point, where skills can be developed and then redeployed back into the organisation's operations. The centre's position in the development of technological advances in both product design and manufacturing techniques is well defined and it is here that the cooperative nature of the relationship is presently most fruitful. This side of the centre's operations are under the direct control of the A.T.C. steering committee which consisted until November

1990 of the engineering, manufacturing and planning directors of the company and two senior lecturers from the university as well as Barr and Bhattacharyya.

The intended people strategy role of the ATC is not as evident as declared in the ITS or other public statements of intent (303). There is no fast turnaround of staff back into the operational areas of the company. However, there is an increasing trend towards involving senior and middle managers in specific project discussions and management groups based there. This is not increasing the flow of ideas and thoughts into the company because no additional inputs from university staff are involved. The researcher has been based at the ATC for two years and has never been approached by any of the universit'y staff except those specifically employed to support the ATC. The approaches made to the university staff for help on specific projects (e.g. for information concerning lean production techniques) have been met with guarded responses and little else. This observed disinterest from the university's academic staff has been confirmed by other groups of Rover employees working in the ATC (304). The ATC does have certain advantages for Rover employees working there like its pleasant location, and being withdrawn from production pressures. Its location on the university campus has enabled, through the use of the universities library facilities, Rover personnel to conduct wider searches of information than are available through the company's own resources and establish improved understandings of some technological and management issues.

5.6 The Lucas/Birmingham University Relationship and the Warwick Factor

Another large Midlands-based company with long-established links to a university is Lucas, the electrical and automotive suppliers. This section of the chapter briefly examines the relationship between Lucas and Birmingham University and contrasts this with that of Rover and Warwick.

Between the wars, the Lucas board recognised the value of recruiting highly qualified people into the organisation, and practised a selection procedure examining graduates from Cambridge, Leeds, Manchester and Birmingham Universities (305). The process also involved developing two-year training courses within the company with the intention of producing better engineering or production managers than were available through the traditional recruitment/training methods.

> *'Taking a wider view, the Lucas directors decided that they would be doing a service to the industrial community of Birmingham in general and to themselves in particular,*

if they provided the money for the University of Birmingham to set up a post-graduate department of production engineering.' (306).

This was started in 1944 but was slow to develop, reportedly due to the university's desire to use the funds provided to research a particular engineering area rather than on education in the production and management fields (307).

The department was relocated in 1953 from pre-fabricated buildings into a large house near to the university to become the Lucas Institute of Engineering Production. It was to take another 20 years before the institute was provided with proper facilities, again solely funded by the company. This failure of the university to help develop the relationship further distanced the institute form the university.

Internal differences within Lucas also reduced the influence of this relationship with several senior Lucas people preferring to work with staff at Birmingham College of Advanced Technology (later to become Aston University), because of the

'practical atmosphere of the Aston College of Technology [over the feeling that] the Birmingham University people tended to live in an ivory tower.' (308).

The relationship with Aston did not flourish either, probably because of the lack of formal support from the Lucas organisation as a whole.

The latest Lucas Professor of Manufacturing Systems Engineering, Dr.John Parnaby, has had a large influence on the company but not as a result of cooperation with the university. Prof. Parnaby now works full time for the company in the capacity of Managing Director of Lucas Engineering Systems (309) and has promoted the introduction across almost all the company's manufacturing activities of a simple non-value added activity removal methodology (310). The removal of non-value added activities improves the efficiency of an organisation by reducing wasted effort, transport, material etc.

The relationship between Lucas and Birmingham University now consists of the contracting of certain limited research activities to the university through the company's research centre which has replaced the Lucas Institute. The informal links with the university still exist but these have not been developed on a cooperative basis.

The researcher noted that the same level of contact, over a much shorter time, has led to a closer relationship between Rover and Warwick than between Lucas and Birmingham because of two reasons,

the roles of the two key players, i.e. Barr and Bhattacharyya, and the different cultures of the universities. The move from Birmingham to Warwick by Bhattacharyya may be construed to have had a major influence on the relationship's ability to prosper. This is illustrated by the failing of the Lucas relationship, which remains with Birmingham, whilst Rover's relationship has flourished since Bhattacharyya moved from Birmingham to Warwick.

The history of Warwick University makes its operation very different from that of Birmingham. Warwick was founded n the 1960's as part of the government's plan to increase the availability of locally-supported higher education. The availability of support for the new university was taken by Warwickshire County Council, Coventry City Council, Lanchester (Coventry) Polytechnic and local industrialists (Lord Rootes, William Lyons, Gilbert Hunt etc.). There were many debates and arguments for control of the new university and its charter. The controlling influence was finally gained by the industrialists who created an organisation which functions in a way unlike most other universities, specifically:

> *'the Vice-Chancellor's style of operation, [as reviewed in] the Tyzack Report, the apparent attempt to limit democratic processes and to ensure the loyalty of administrators and staff, the peculiarly subordinate relationship with 'industry' - and the degree of power exerted by a few industrialists on the University's Council - all these may indicate a situation in Warwick which is, in some ways, unique.' (311).*

The continued involvement of industrialists since the university's turbulent days in the 1960's, in which student demonstrators uncovered conspiracies in the University Council against certain staff and students, has led to a concentration of power on the Council and it's industrial advisers. There are also few restricting regulations which would prevent the establishment of a venture like the ATC.

A similar move by a single professor to enter into a collaborative venture of the size of the ATC would be almost impossible under the plural society of most universities' senates which would insist on the relationship benefiting the whole academic community and not just part of it, as occurred at Birmingham with the Lucas investment. The Warwick organisation actively fosters independent entrepreneurial activities and has supported the MSEG's movements towards providing the training requirements of Rover and Rolls Royce.

5.7 Discussion

The developments which resulted in the relationship between Rover and Warwick University, as shown in figure 13 at the end of the chapter, can be split into two phases, firstly the Sherpa Van/Birmingham University connections which followed traditional collaborative methods and secondly the involvement of Barr with Bhattacharyya and the flourishing relationship between the two organisations under their control.

The first phase progressed as the stages model suggests, but was restricted by repeated organisational changes in Rover to the teaching company level. The reorganisations of the Rover company prevented any continuity (except through Barr in the second phase) to allow the contacts to propagate.

The existence of new, closer personal contacts and a more supportive academic organisation in the second phase of the Rover-Warwick relationship led to rapid developments which, despite repeated reorganisations at Rover Cars which did not reduce the standing of Barr, have been sustained with increased effect on both organisations. The researcher concludes that it was the formalisation of the ITS which spawned the formal relationship, educational initiatives and the ATC, with all its strategic implications.

The importance of the individuals' involvement in causing the prosperity of the relationship is unquestionable. This element was not present at Lucas and Sherpa in their collaborations which have been less successful than Rover's, but it has been observed to be the cause of another university-industry collaboration. BAe Aerostuctures and Warwick University have entered into a recent partnership based on a personal relationship following the appointment of a new managing director, Barr.

The approach of Warwick University, in contrast to the environment at Birmingham University which probably stifled Lucas' attempts at collaboration, had a significant effect in the development of the Rover Cars relationship. Warwick, because of the focus of power with a few industrialists following a battle for its early control, is more able to allow it's departments the autonomy needed to build significant relationships with individual companies.

The researcher reasons that the number of significant university/industry cooperations is unlikely to increase, despite the recent moves towards information or consultancy offices at universities. These offices are likely to increase the number of relationships but encourage formal and short-term contracts

at the expense of the informal more fruitful relationships like that which was significant in developing the Rover relationship. These closer collaborations may still develop but the conditions for their prosperity are less favourable, not least because of the added economic pressures placed on academic staff to generate financial benefits from such relationships.

A key factor necessary for a productive relationship between industry and universities to develop appears to be the existence of personal contact. Saunders thought that this is most likely in larger organisations where more informal links can exist (312). These can be strengthened by generating a thorough understanding of the requirements of each party and developing mutual involvements and sharing of benefits. Locality of contacts has also been cited as having an important role to play,

> *'Proximity is such a simple idea that we tend to overlook it, but when one analyzes the success of business-university interactions around Boston, in California's Silicon Valley, or in the Research Triangle of North Carolina, proximity is an important stimulus for the synergy that has developed.' (313).*

The researcher noted a distinct lack of literature concerning the development of industry-university relationships. This is particularly puzzling when considering that writing articles and papers is one of the major measures of productivity in the academic community. The opposite appears true of the areas of technical research which have resulted from such contacts. The researcher concludes that this anomaly of there being no literature on collaboration but copious papers on the technical advances achieved through such relationships is probably a result of introducing an element of direction, structure or reward into academic research. This deflects the academics' attention fully into the subject matter at the expense of philosophical discussions which would result in papers on the management of such research, including those concerned with collaboration.

The absence of Honda from the Warwick-Rover relationship and the strategy which has generated the design and manufacturing elements in the ATC projects which cover the areas traditionally derived from Honda, suggests to the researcher that the Warwick relationship was being used as a means to move Rover Cars away from its dependency on Honda. This dependency is discussed in chapter 6. The use of Warwick as a means of developing Rover's own capabilities in order to reduce its dependence on Honda has never been publicly declared but is supported by Barr's expressed fear that Honda was not providing

Rover Cars (and Land Rover) with the most appropriate technology and restricting its future options (314).

The effect of the recent departure of Barr, one of the founding members of the Warwick-Rover partnership, has already seen a decrease in the significance of the relationship to Rover with an effective cessation of the high level discussions between Bhattacharyya and Barr. How the relationship's role develops following the establishment of the Product Supply organisation is crucial to its future. The Product Supply Organisation is the amalgamation of the previous Manufacturing and Product Engineering Departments which resulted from Barr's leaving the Manufacturing Director's job. It is in this new department that any impetus for the Warwick relationship resides.

It is likely that the role of Warwick University in Rover will develop backwards (in terms of the Docksey-based model) into providing education packages and limited contracted engineering research. This is as a result of the non-intellectual, fire-fighting type of resource-starved attitudes observed to be present in the Product Supply organisation. Many of these traits are not new to the Rover Cars organisation but did not effect the potential development of the Warwick relationship until now. This decline of the influence of the relationship will be accelerated by the decentralisation of product development which will limit the size of future projects to those which can be sourced from one business unit rather than from centralised functions. These future projects will not command sufficient funds to expand the Warwick relationship.

The relationship with Warwick University is centred on Rover's saloon manufacturing operations and excludes the Land Rover organisation. This is as a result of the way that the relationship has developed. The focus of the collaboration was on Barr and his positions in the saloon part of Rover Group. This has meant that Land Rover was not involved in the relationship, except through the inclusion of Land Rover managers in the IGDS scheme as part of a general Rover Group personnel development policy, until the amalgamating reorganisation of 1989.

Following the 1989 merger, Land Rover's product development and manufacturing departments have not moved any closer to collaborating with Warwick University. They have no immediate need for a collaboration because Land Rover already has all the capabilities it needs to develop and manufacture top-class vehicles for its existing markets.

The entire saloon manufacturing organisation has had contact with Warwick University staff, and the ideas

they have developed, for many years through the IGDS scheme. However the prevalent culture observed by the researcher to operate in the saloon car organisation actively discourages consultation with external personnel. The saloon car organisation believes itself to be unique and so has nothing to learn from academics. This has not been helped by the broad isolated content of much of the IGDS course which is not a good advertisement for the skills which should be present in the MSEG of the university.

The lack of willingness of Rover Cars employees to approach external sources of capability in an informal manner (the formal approaches to Honda and past reliance on ISTEL are recorded elsewhere in this thesis) is not helped by their adopting the belief that progress can only be made if the members of the organisation are busy fire-fighting (i.e. developing short-term fixes for urgent problems without addressing the causes of the problem). This has been experienced by the researcher, in his planning roles in the organisation, where his removal from the everyday panic situations is seen by most other employees to indicate that he is not contributing at all to the operation of the company or ensuring its future.

The inability of the saloon car part of the Rover organisation to develop a willingness to approach external organisations for help, even when such help is very close as it is with Warwick University, is investigated in chapter 8's study of innovation. The same study also analyses the ability of Rover saloons (in comparison to Land Rover) to accept and implement the few ideas which are forced onto it from outside, i.e. from the Teaching Company or those favoured by senior managers and applied through dictum.

5.8 Conclusions

This probe has longitudinally examined the relationship which exists between Rover and Warwick University and has shown, through means of a levels of cooperation model and comparison with other examples, that the present close partnership is the product of two individuals.

Links between industry and universities are widespread but their long term success and growth into partnership arrangements has been found to depend largely on the development of personal relationships between individuals. Warwick University's unique organisation and culture was also identified and discussed as a key factor in the formulation and success of the relationship.

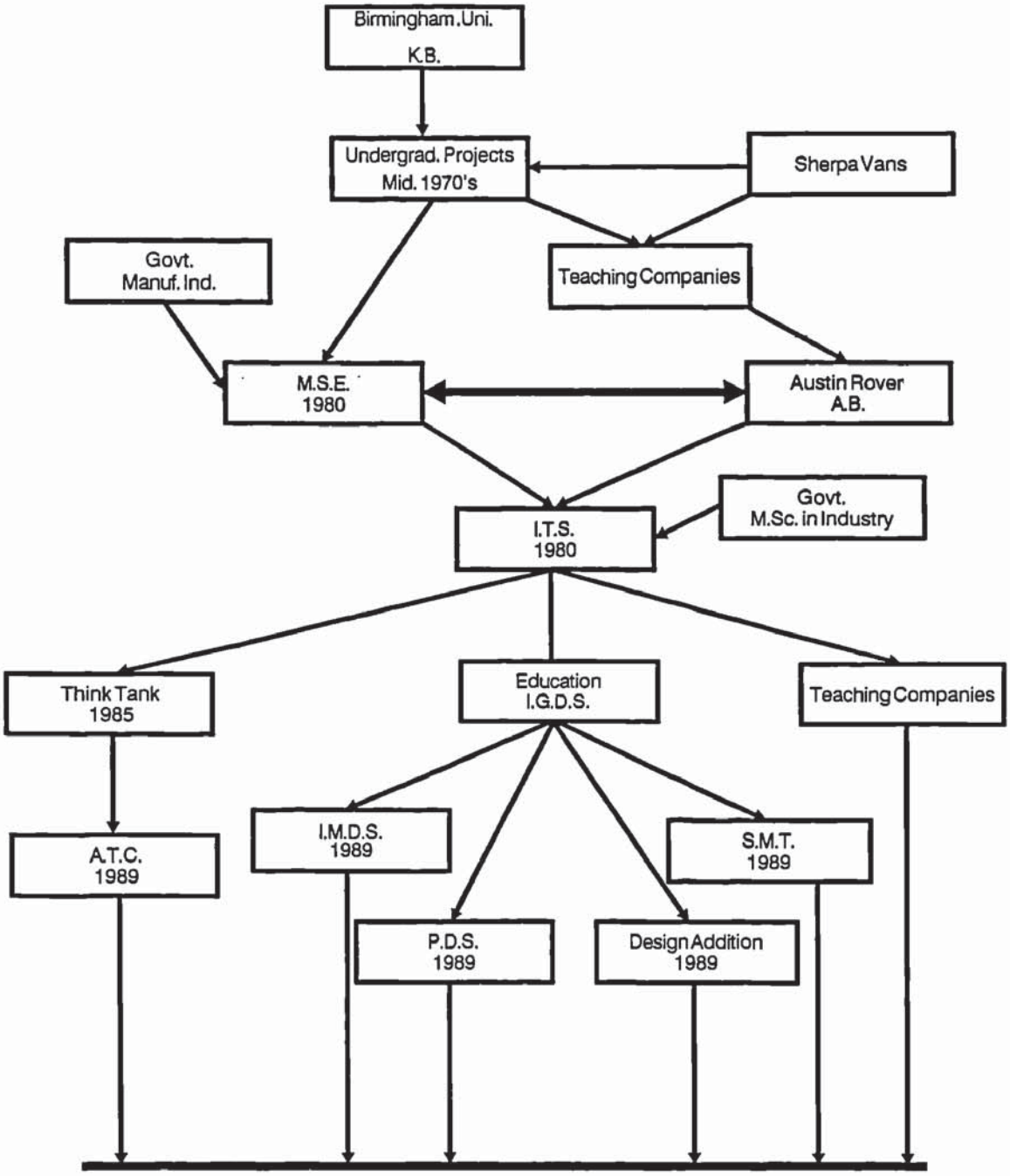

Figure 13. A Representation of the Development of the Rover/Warwick Relationship.

A hidden Rover saloon organisation (manufacturing faction) strategy was identified which showed the relationship to have been used as a means of protecting Rover Cars from a deepening dependency on Honda but this strategy is now unlikely to be successful because of the recent reorganisations at Rover. These reorganisations also threaten the long-term future existence of the collaboration between Rover and Warwick.

This chapter has also confirmed the observation made during the study of production control methods in the Rover Group (Chapter 4, The Introduction of MRPII at Land Rover) that the cars part of the organisation is unable, and to a certain degree unwilling, to investigate and incorporate externally located ideas which would provide capability in the organisation and improve its operations because of its observed disinterested and unsuccessful approach to the relationship with Warwick University. Paradoxically the Land Rover organisation, by having no immediate need to develop a relationship with Warwick, is thought by the researcher able to examine and selectively adopt external ideas. A fuller investigation of this capability was subsequently made and is recorded in chapter 8, Operational Innovation in the Rover Group, which confirms that the Land Rover organisation is indeed selective and capable, whilst the Rover saloon organisation is incapable, of investigating, understanding and implementing externally located technology and techniques.

Chapter 6. An Examination of the Relationship between Rover and Honda Motor Company

6.1 Introduction

The increasing occurrence and importance of international cooperation between companies has become synonymous with the 1980's especially through studies like those of Porter and Ohmae (315)(316). This chapter examines the source of the relationship and cooperation between Rover and Honda Motor and compares this with the rest of the automotive industry. It also studies the Rover Cars organisation's view of this collaboration, a view which has a great impact on its present operations, the future capability development of the company and the future of the relationship itself.

For a full understanding of the relationship to be gained it is important to be aware of the organisational structure at Honda, the company's philosophies and the way in which these have developed.

The study also explores the relative dependency of Rover Cars and Land Rover on Honda Motor and the impact this is likely to have on the Rover Group's future capabilities.

6.2 Collaboration in the Automotive Industry

The initial collaboration and subsequent relationship between Rover and Honda Motor may appear to be quite superficial when compared to examples in other industries e.g.: the microelectronics industry in which cooperation is used extensively to offset the very high development costs (317). To show the relative importance and depth of the relationship it is first necessary to study cooperation in the entire industry.

The researcher's own studies into industry collaborations (see the summary table - table 16 - at the end of this chapter and Appendix C for more detail) show that the total picture of the links between automotive companies is quite complex. This complexity is further increased by the recent takeovers of some of the faltering smaller European organisations who were previously involved with the rivals of their new parents (e.g.: Saab/Lotus/GM, and Jaguar/Ford).

The nature of some of the collaborations is such that, particularly in cases where new models are being developed, secrecy may lead to misrepresentative information being published. The risk involved is at least £500m and 3 years development time per model (318) makes the companies very wary of disclosing any information which may show the direction of their developments. This study has tried to avoid considering much of the speculation surrounding collaborations over new models and has

concentrated on confirmed collaborations to ensure that the study is not distorted.

There are many other informal and small scale relationships, which are a result of the limited specialist resources available to the industry which normally reside in external and shared specialist consultation services and test facilities. The informal links are also fuelled by the frequent interchange of experts and managers within the industry. For example an examination of the background of the Rover Board shows that most of the company's senior managers have changed automotive manufacturing company more than twice in their careers and also have little experience from outside of the automotive industry. This study of Rover's board of director's histories is summarised in table 13.

	Number of Automotive Manufacturing Companies Worked For			Number of Other Industries Experienced during Career		
Index	1	2	3	0	1	2
Number of Directors	1	8	4	6	5	3

Table 13. Histories of the Rover Board, Showing the amount of Industry and Cross Industry Experience.

The networks of contacts which result from the moves of executives between companies and the shared use of specialists and various regulatory bodies are supplemented and strengthened by historical links within the industry, e.g.: Rover Cars still manufactures body panels for Renault and Jaguar, following agreements and relationships which existed during the 1960's. Jaguar is now controlled by Ford, one of Rover's competitors in the UK saloon market. This capillary web of links cannot be analyzed or even documented but from informal evidence the researcher found that their importance as a source of some of the more influential collaborations is quite considerable.

Porter developed a model examining why companies enter into collaboration (319). In this he established two primary reasons:

(i) to reduce costs incurred in development or manufacture

(ii) to gain advantage in new markets or to strengthen their stance to existing markets.

Pettigrew et. al. found that these reasons for collaboration can operate in varying degrees and combinations (320). The researcher has visualised the interaction of these factors as shown in figure

14, which also includes, in the form of an overlay, some frequently found types or categories of collaborations. These have been used to help classify some of the many examples of automotive collaborations identified in this study (see table 16/Appendix C). This framework has allowed a comparison to be made between the Rover-Honda relationship and other collaborations in the industry.

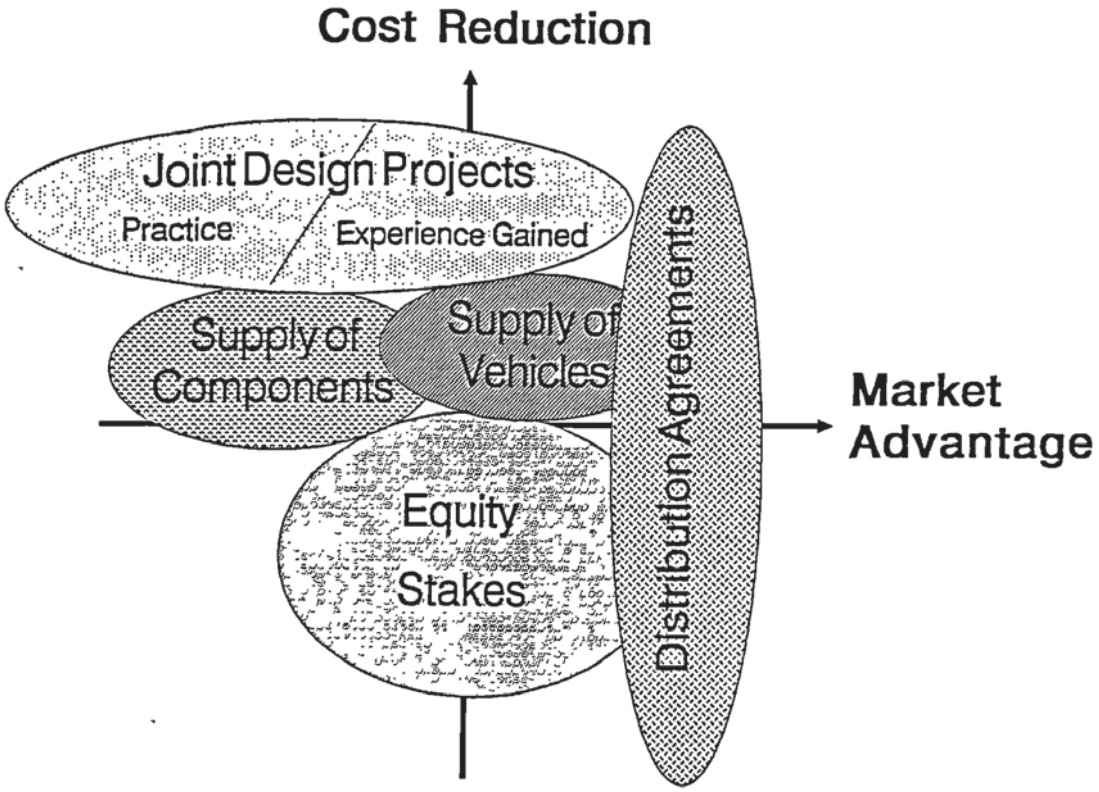

Figure 14. A Framework of Collaborative Relationships.

The researcher's own survey of collaborations identified different approaches and reasons for collaborations adopted by the three major groups of organisations, the European, US multinationals and Japanese companies. The European manufacturers tend to collaborate with other Europeans on cost reduction projects by spreading the funding of new models. An example of this is the recent development of the new large cars of Fiat, Lancia and Saab (realised as the Croma, Dedra and 9000 models respectively) (321).

The American multinationals and Japanese companies are approaching collaboration in a more positive manner, primarily to achieve entry into new markets (new model classes and geographical markets). The Japanese have striven for multinational status by entering new markets but the US companies are using global considerations to protect their positions in the future following the weakening of their home markets (322). Turner partly explains this by the fact that the Japanese see the meaning of collaboration (sangyo kyoryoku is the best translation) as having:

> *'a much wider meaning...The Japanese words convey the ideas of common action and collaboration, but also a sense of cooperation.' (323).*

The Western paradigm concentrates on producing, to one's own advantage, a design or unit and is less likely to contain any long-term strategic considerations concerning future collaborations and the acquisition or development of shared capability.

The level of commitment involved, indicated by the financial risk, in the various types of collaborative venture is a good indicator of the perceived importance of the project to the parties concerned. There are few examples of collaborations having a major effect on the operating scope of the organisations involved, i.e. radically effecting more than one particular market sector or country. For example GM and Toyota have one of the largest cooperations, in production terms, jointly building cars in the shared facility called NUMMI (New United Motor Manufacturers Inc., California). However this collaboration amounts to production of 195,000 vehicles for GM which only represents about 7% of the company's total sales (324).

The only international examples identified by the researcher of companies having significantly limited their strategic options by developing a dependency on other manufacturers for their own production are Rover Cars and Daihatsu. These organisations have the capability to produce only 50% and 60% of their

total respective sales without having to rely on a major competitor. Daihatsu has declared that it is trying to spread the sourcing of its material requirements into the emerging Korean motor industry in order to remove its reliance on Toyota (325). The effect of Rover's dependency on Honda Motor is examined later.

Joint ventures have also been used to gain strategic footholds in relatively inaccessible or risk ridden markets. The establishment of a joint South African operation by Nissan and Fiat has not effected any other facet of their operations but enables them to operate in this sensitive market. An example of a venture spreading the risk in a relatively poor but potentially significant market can be seen in the creation of Autolatina in Brazil by Ford and Volkswagen-Audi. The operation currently makes little profit but is steadily developing the influence of these manufacturers in the potentially massive South American market.

Most takeover type collaborations (i.e. those involving a controlling equity stake) show a company strengthening its position in certain markets or sectors. For example Ford's strategy is to take an influential stake in Mazda to develop its future small cars and has also acquired Jaguar and Aston Martin to strengthen its European derived luxury and sports car ranges. The same is also true of GM who, after fighting Ford for Jaguar, now have interests in Saab and Lotus.

Some collaborations may prove misleading if considered against any of the reasons for relationships expressed above (i.e. those of both Porter and the author) and require closer scrutiny to establish the true reasons behind the collaboration. For example the involvement of Renault with Volvo does not make ready sense in the cars sector where both are direct competitors but on closer examination the collaboration has created the worlds largest and most profitable truck manufacturing group (326).

The automotive industry looks set to be influenced many collaborations, some larger than any previously seen.

There is much current academic argument centreing on the belief that the automotive industry may be on the verge of some alliances between the big US companies Ford, GM and Chrysler (327)(328)(329). Over capacity in the European industry may also be leading the smaller members of the European big six to form alliances in a desperate attempt to cut the costs of their new model introductions (330). There have been many reports of negotiations between Fiat and Peugeot and also suggestions

that Renault may enter an agreement with Toyota or one of the other Japanese companies (331) in order to wean itself from its financial dependence on the French government, a relationship which is being severely criticised by the European Community.

This study of the development of the Rover-Honda relationship may establish some important lessons to help the success of these potential collaborations.

6.3 Profile of Honda, a Maverick Organisation

The Honda organisation is the world's largest producer of motorcycles. Its history, since its formation around 1910 by Soichiro Honda, has constantly shown the company to behave differently from the rest of Japanese industry. The researcher found that this alternative organisational culture of Honda Motor is a quite significant factor in enabling the relationship with Rover to develop and this is examined in this section.

The radical nature of the Honda organisation can be seen to have been present at its start when Mr. Honda refused to be part of the zaibatsu organisations. The major force in Japanese business until the Second World War, the zaibatsu, was a group of four large, and many small, family-controlled holding companies which operated to promote the success of their member organisations (332). The allied forces disbanded the zaibatsu after World War II in order to prevent Japan waging another war. The mobilisation of the zaibatsu was seen by the Americans as a major contribution to the development of the Japanese war effort. However, this disbandment did not weaken the Japanese industrial might which could now also draw upon the resources of the disbanded Imperial Army. The army was originally manned by agricultural workers who, following the war, had moved into the cities and further strengthened the industrial base of the country.

Mr. Honda was not part of the zaibatsu organisation and built his reputation by engineering excellence and innovation in motorcycles which were supplied as part of the Japanese war effort.

Another example of Honda Motor's history as a maverick company can be seen in the events of 1960. The Japanese government in the shape of MITI (Ministry of International Trade and Industry) developed a plan to strengthen the Japanese car industry. This plan involved establishing the 'Three Group System', intended to control and encourage the levels of investment in three sectors:

(i) Mass production cars

(ii) Mini cars

(iii) Special purpose vehicles

by dividing and classifying the existing manufacturers and limiting entry of outside organisations into the sectors. Mr. Honda, who had been planning to start car manufacturing, objected strongly to being excluded and mounted a protest campaign. After having gained support from the rest of the industry Mr. Honda forced the MITI *'to shelve its plans' (333).*

As well as challenging the Japanese establishment Mr. Honda, and his commercial partner Takeo Fujisawa (and their heir Kiyoshi Kawashima), managed the Honda company in a radically different way to the other Japanese automotive manufacturers. Sakiya cites an example:

> *'It was unprecedented that a top corporate executive like Honda would tell his employees that they should work for their own benefit, and not out of loyalty to the company. His reasoning was that in a relationship of strong dependency, it is difficult to enjoy a sense of satisfaction. Rather, one often feels a victim. A sense of satisfaction, thought Honda, would come only when an independent individual meets a challenge without fear of failure and achieves his goal.' (334).*

The Honda company has a corporate culture which tries to focus on constantly questioning established ways in order to develop fresh approaches and solutions to problems. Pascale believes that this adoption of a questioning culture may prevent much of the political activity observed in other organisations, also observed in Rover during this study, by providing a focus for the destructive powers present in the organisation. The Honda organisation emphasises the importance of engineers, called experts within the company, something which is not unusual in Japanese organisations. However Honda Motor differed from the normal Japanese approach by having a team of managers to operate the commercial side of the business, remote from but under the guidance of the Honda engineering departments (335). This reflected the way in which the company was originally organised with Mr. Honda controlling the engineering and Fujisawa the commercial and management side.

This gives the company greater flexibility in responding to changes in the market place but also allows the higher status engineers to concentrate solely on product design and development.

The development of Honda Motor was identified by Sakiya to fall into cycles (336). These are summarised in table 14.

Sakiya's periodisation of the Honda organisation's development use of the key events which occurred in the company's history to describe its strategies. The identification of the cycles represents a longitudinal perspective, similar to that which would be developed using Mintzberg's perspective on strategy development. The identification and existence of the periods in this way has interesting ramifications for the view of Honda's culture found to reside in the Rover Cars organisation. The view from Rover is of Honda Motor progressively pursuing growth as part of a long term, stable strategy which has remained unchanged since the 1950's. From another perspective, the cyclic nature of Sakiya's periods shows that each phase is prompted by a key event and change in company control, and not on a corporate design separated from the individuals in the organisation.

Cycle	Date	Strategy Pursued	Management Style
1	Inception to 1954	Domination of Japanese motorcycle market	Honda and Fujisawa with autocratic control
2	1954 to 1964	Domination of world motorcycle market with Super Cub	Establishment of board and large organisation management style
3	1964 to 1973	Entry into car market with CVCC engine	Honda and Fujisawa retired, collective leadership style developed
4	1973 to today	International strategy for multinational status	Kawashima's presidency and innovative style

Table 14. The Cyclical Development of Honda's Strategies.

This view of Honda Motor is supported in the case study by Pascale concerning the 'Honda effect' (337). This study examined the penetration of Honda into the US motorcycle industry and found that production of the successful Super Cub (a 50cc machine) was not the original intention. The company had originally planned to introduce larger machines to compete against the US and British bikes head-on. However, Honda Motor's employees setting up the US operation used the smaller Super Cubs for their own transport and found that these were very popular with the local people. The company noted this popularity and decided to switch its focus from the larger bikes to the smaller machines. The factor which

enabled Honda Motor to take advantage of this recognition that smaller machines could be successful was the company's ability to switch production rapidly to the smaller machines. This flexibility and realisation of a potential success Pascale attributes to the Honda organisation's distinctive management style.

The researcher understands that this flexibility may also be the result of the existence of three Honda divisions: Honda Research and Development, Honda Engineering and Honda commercial, focusing specifically on the product development, manufacture and sales activities of the company. This tri-focal approach probably also reduces the development of the multi-factional organisation profiles seen at Rover because the company's operation is linear and not a closed system. For example in Rover the factions are constantly demanding alterations to the products to meet their own needs, at Honda these considerations are included in the original designs and so the product does not require altering. Honda Motor have an often-declared policy not to correct any design faults in current models but to focus on preventing these faults occurring in future models.

This management approach and organisation structure is something which has not been examined by existing studies of Japanese organisations (338)(339)(340) and the researcher believes it warrants further investigation to establish the comparative impact on organisation effectiveness.

Pascale's more recent work on Honda emphasises the company's radical move to decentralise its organisation in an attempt to prevent complacency from developing following its recent success. Honda Motor has now established itself as one of the most influential manufacturers in the world, by being part of the Japanese top 3. The Accord is now the best selling model in the US and is built at its plant in Ohio. Honda Motor's overseas car manufacturing operations now produce more vehicles than the Japanese plants. The motorcycle part of the Honda business is also keeping its standing as joint top with Kawasaki and Suzuki (341). The introduction of a decentralised Honda structure should enable Kawashima (the company chairman) to control the expansion of the company and also maintain the organisational culture with its attention to constantly questioning established ways.

The Honda Research and Development organisation has a successful record in the adoption of innovation. The researcher found that this is as a result of its particular management approach which concentrates on innovation. Each expert in the R and D company is asked to register a research subject. This individual is given support in the form of resources and time to enable the study to be developed into a useable

proposition. This research registering and support is supplemented by a policy which involves each expert having a notebook, in which he records notes and calculations, which are always available for everyone in the organisation to examine. This way an individual's work is always acknowledged and a duplication of effort is less likely (342). This approach also prevents the building up of information to be used as a source of power as has been observed by the researcher in Rover and is believed to occur in most western organisations.

The researcher reasons that Honda Motor is likely to maintain its present level of success for these reasons: The company's emphasis on product differentiation through engineering is sufficiently distinctive from those of its competitors to ensure the company's future ability to develop world class products. This should become increasingly important as the industry enters a period of over capacity which is likely to encourage a demand for distinctive vehicles, assuming that the vehicle's costs do not also differentiate it from the competitors. Cost factors, i.e.: the price presented to the customer, are set to become a standard expectation, in much the same way that quality has in the last 10 years (343)(344).

The factors outlined in this section have presented Honda Motor as a successful and distinctive organisation, which still has the engineering ability to maintain its position in the market place and expand into Europe, having already established itself as a major force in the US.

6.4 The Development of the Collaboration between Rover and Honda Motor

The relationship between Rover and Honda Motor was, as explained by Edwardes, instigated purely as a means of revitalising BL's product ranges quickly and cheaply (345). This was needed at the time, 1980, because of the weakening attitude of the British government towards any further support of BL. Indeed Edwardes speculates that if the Metro model had not been an instant success, the cabinet would probably have declined to agree the scheme to provide £990m of capital to support the 1981 and 1982 corporate plans (346).

At the time of Edwardes' appointment, the BL organisation was divided into four hierarchical levels, each having its own political identity and having little control of the levels beneath. The centralised functions were:

> *'at least two steps removed from the 'nuts and bolts' of the business, which was in the Midlands, in Oxfordshire, in the North West of England and in Scotland.' (347).*

The levels of the organisation and its operations had created many factions including:

* Edwardes' Picadilly Headquarters
* Leyland House, the centralised headquarters which Edwardes was in the process of disbanding
* Truck and Bus group
* Cars; which was subdivided into the product groups with their own manufacturing plants and sales operations e.g.: Austin, Morris, Jaguar, Rover, Triumph, Land Rover, MG
* Subsidiary supply companies e.g.: Llaneli Radiators, etc.

The cars group organisation was so complex that, when Edwardes joined the company, a special project was needed to establish its inter-relationships. This COG (Cars Organisation Group) had to be broken down into 15 mini-COG's to make the problem manageable.

Edwardes himself managed the collaboration exercise which involved an analysis of potential partners, which was undertaken by the Picadilly group and involved 5 senior managers (348) without consultation with the other groups.

The analysis of potential partners would probably not have occurred at this time if the company's relationships with other organisations, e.g. Renault and GM, had not been in the state that they were. If BL had an existing partner then they would have been the automatic choice for a collaborative deal to provide Rover Car's stop-gap models.

During the reformation of the board under Edwardes in 1978, the idea of associating with Renault had emerged. This association had many things in its favour, not least the well structured nature of the French company's operations and its advanced model development activities. However the relationship would have been strained by Renault's staunchly nationalistic attitude. Edwardes explored the possibility of a Renault relationship and concluded that it would not be in the interest of BL. He feared that BL was likely to become a satellite assembly organisation restricted to the UK market as a result of the French company's potential dominance in the relationship (349). Had the need for a quick fix been dominant during the early stages of the Renault discussions then perhaps they would have been the natural choice. The same could equally be said of GM who, in 1978, in the person of Vauxhall's MD in Britain, approached the BL board. The potential agreement which emerged was based on the exchange of BL

production capacity for GM engineering resources. However the plan, called Gemini, was not supported by GM executives in Detroit and so was never realised (350).

The two failed relationships with Renault and GM caused the BL executive to think that:

> *'any meaningful collaboration would only be fruitful if the preliminary work was carried through in painstaking detail on a strategic basis. Ad hoc ideas were not likely to bear fruit.' (351).*

It was this thought which had prompted the dropping of a plan codenamed 'Dovetail' which examined the possibility of BL merging with Chrysler UK (which was subsequently sold to Peugeot). Again the driving force behind the idea was to acquire the engineering resources desperately needed by BL to develop new models.

As the analysis of potential partners was instigated several key factors became clear:

> *'There would be problems within Europe because it is difficult to collaborate with a direct competitor in what is one big market. The dangers of a link with a multinational - even if they were interested - would be that BL would become an off shore assembly operation.' (352).*

As a result the study concentrated mainly on Japanese manufacturers and highlighted Honda Motor as a favourite choice. A more detailed investigation of Honda Motor revealed the complementary nature of both organisations' operations, summarised in table 15.

Edwardes states his surprise at the potential synergy between the organisations, even though this may be more through enthusiasm for the idea itself rather than genuine compatibility (353).

Before studying the relationship in detail it is worth examining how the approach was made towards Honda Motor, because the researcher found that this has had a significant effect on the scope of the final relationship.

Edwardes enlisted the help of a former colleague from Chloride, who was then the UK's Ambassador in Tokyo, to approach Honda Motor and open negotiations in a formal manner. It took six days for the Honda president to respond to the invitation, showing the great amount of thought that the approach received from the company. This time for contemplation and level of attention to detail is one which recurs on the Honda Motor side of the relationship and still surprises and unnerves Rover executives who

are used to having to respond to management requests with only a few hours notice.

Table 15. Complementary Facets between Rover and Honda 1979.

(354)(355)

This initial approach was followed a month later by a management meeting on the US West coast. This resulted in a general approval of the deal which saw the Triumph Acclaim being built under licence as BL's desperately needed new model.

The final agreement took many months to formalise and was held up, almost past a deadline imposed by Honda Motor who wanted production to start within a year, by the British government's slow approval of the 1980 corporate plan. This delay led to a last minute signing of the deal which involved Edwardes flying from his Christmas holiday to London and onto Tokyo.

The way in which BL approached Honda Motor as a lifeline for the company, rather than as equals, caused many concessions to be included in the deal which are still causing operational problems today. These concessions are creating operating problems for Rover Cars which are helping to fuel a certain degree of animosity towards Honda Motor and are discussed later.

The Triumph Acclaim project (codenamed Bounty) has been followed by several other collaborative ventures. The next project, which was marketed as the Rover 200, involved more collaboration than the Acclaim's manufacture under license. The Rover 200 was partially designed by BL to make them distinct from Honda Motor's Ballade equivalent. This engineering included the incorporation of Rover's own power-train units (engine, gearbox and axles).

This was followed by an executive car project (termed a large car in the Rover organisation's language), codenamed 'XX' and marketed as the Rover 800 and Honda Legend, which was a joint design project from the start with Honda Motor having a greater input to the design and a veto over all decisions concerning the performance and engineering of the vehicle. The successor to the 200, the R8 project which was recently launched as the Rover 200/400, included joint initial design work, followed by a tailoring of the Rover and Honda derivatives by indigenous engineers. The R8 agreement includes reciprocal manufacturing agreements, with Honda Concerto vehicles being manufactured at Rover's Longbridge plant (356). This agreement on joint manufacture is despite some previous set-backs to this type of deal, e.g. the decision by Honda Motor to reject a large batch of Longbridge-made Ballade vehicles and to subsequently withdraw from an agreement to have Legends assembled in Cowley following quality problems.

The nature of the relationship is not a true partnership because it concerns only certain projects covering the development of specific vehicles. The companies are not sufficiently close in the partnership to develop joint product plans.

The companies develop separate product plans with Rover Cars only incorporating a few Honda Motor models into its own long-range plans when these are offered as a collaboration opportunity by Honda Motor.

Rover currently has one collaborative product under development (with nearly all the design work being performed by Honda Motor except for some cosmetic touches) and has also chosen not to accept other offers to jointly design several replacement and new models. Details cannot be given because of the sensitive nature of this information but the present development activities confirm the researcher's observation, examined later in this chapter, that Rover Cars does not have the capability to design its own replacement models.

6.5 A Successful Partnership ?

The injection of Honda Motor derived models and the resulting joint programmes have almost certainly provided BL/Rover with its survival to the present day. The company's reputation for reliability and quality has been radically improved by the Honda Motor designed models.

Improvements in productivity have also accrued as a result of the Honda Motor relationship through the

adoption and adaptation of Honda Motor manufacturing facilities and practices but this has not been without its problems. The problems resulting from adopting the facilities which have been designed solely by Honda Motor has led to several major planning mistakes and false economies being introduced by Rover Cars. Several of these are discussed later.

Rover Cars has managed these improvements and maintained its survival without losing its own identity. The agreements with Honda Motor are not fully binding and the company could theoretically withdraw if it wanted to. This relative autonomy would probably not have been possible if another company with a takeover plan had been involved in the original agreement e.g.: the potential collaborations with Renault or G.M.

Unfortunately Rover Cars has not learnt enough from Honda Motor to alleviate the problems which led to the collaboration. The stop gap design sourcing has grown into a design and manufacturing dependency, further dissolving the Rover Cars organisation's ability to exist successfully independently. The researcher observed this deepening lack of design capability (both in terms of expertise and resource) in the management of Rover Cars' limited new model programmes. The company is not able to support all the models which it would like, even with the involvement of Honda Motor.

The Rover saloon cars organisation is now dependent on Honda Motor technology and Honda Motor-derived parts for the manufacture of the 800, 200 and 400 models. It can produce the ageing Montego, Maestro and Mini models independently but these models are dated, relatively undesirable and inefficient to manufacture. These factors limit their profitability and so these models alone do not represent any means of securing Rover Car's future. The 1990 Metro, a face-lifted version of the previous model introduced in 1981 but incorporating the new K-series engine is the only car produced by Rover which would see the company achieving a profitable, independent future. Unfortunately this vehicle does not match world-class design and manufacturing efficiency levels and is therefore not profitable enough to offset the company's current financial problems in the 1991 recession which has seen new car sales in the UK down by 30% on the 1990 levels.

Rover Cars has few areas of expertise left intact following the lengthy relationship. These include:

* Very costly small engine development as seen in the new highly acclaimed K-series. This requires large production volumes to recoup investment.

* European based styling studios, something which is desired by the US and Japanese manufacturers.

* The expertise developed from the revolutionary hydrogas suspensions of the 1960's.

In contrast however, Land Rover still exhibits a range of design expertise (if used in a decidedly incremental manner of operation) in all areas of product development, e.g. those featured in the recently introduced Discovery model.

The advantages which Honda Motor have derived from the relationship with Rover have been significant but have not effected the operation of the company to the extent of those experienced by Rover.

Honda Motor may be in a strong position to take-over Rover, having detailed knowledge of the company, its operations and Rover having manufacturing facilities designed to produce Honda models, but it is quite rare for a Japanese company to take over another organisation with which it has established a suppler relationship. The smaller organisation is normally preserved intact under a partnership agreement, involving an exchange in equity. This improves the smaller company's operations by injecting capital and benefits the continued operations of both organisations.

Honda Motor have gained design expertise in the previously European-led quality and executive cars sectors and also in the particular field of suspension technology.

Honda Motor has also been able to enter the European market through an indirect route at a time of highly restrictive import controls. The indirect entry to the European market by having Rover assemble vehicles was a difficult move in the face of heavy opposition from certain EC states.

The most fervent opposition came from the French and Italian governments whose state-linked manufacturers were felt to be at most risk from Japanese imports. The rejection of the Renault proposal for BL also made the deal less popular in France.

The researcher understands that the biggest benefit to Honda Motor of the relationship with Rover has been the company's involvement in manufacturing in Europe. This has helped Honda Motor gain gradual experience of the labour and marketing practices which it will experience when it starts manufacturing its own vehicles for the European market in Swindon. The experience of UK manufacturing and suppliers gained through Rover places Honda Motor and its executives at an advantage compared with the other

Japanese manufacturers currently establishing similar operations in Europe.

The researcher doubts that the recent announcement of the abolition of EC import controls on Japanese cars will alter the strategies adopted by Honda Motor and Toyota in establishing manufacturing plants in the UK. These organisations approached the US markets by building greenfield factories managed by local staff (transplant factories) which started out assembling Japanese parts but now manufacture vehicles with a native content as high as those made in Japan. A similar approach is likely to be adopted in Europe and so the abolition of import controls is unlikely to mean any change in the strategies which have seen Honda Motor acquire expertise through collaborating with Rover, i.e. imports are not the issue behind the collaboration.

The 1989 privatisation of the Rover Group, through the sale to BAe by the British government, adds to the illustration of the nature of the collaboration between Rover and Honda Motor and it is worth brief examination.

The privatisation of the Rover Group, orchestrated by Lord Young and managed in Rover by Sir Graham Day, has caused much speculation in the press. Rover, being the last British volume car manufacturer and a legacy of the industry's past, always warrants great media attention and still supports a large amount of Midlands industry.

Honda Motor, as has been explained above, would not have wanted to take control of Rover but the sale of Rover did not even involve discussions with Honda Motor. The discussions were with the large European and US multinationals, ie: GM, Ford, Renault, etc. Honda Motor were apparently only *'kept informed of developments'* (357) and at first this appears illogical, considering the functioning relationship between the two organisations, the partially aligned model ranges and the high international regard held for Honda. The anomaly of Honda Motor not being involved in the negotiations may be understood by interpreting the sale from the British Government's point of view. It could not allow itself to be seen as selling out Rover's operations and losing the company's UK identity, but also had to generate as much revenue as possible in a public auction. Thus the Honda Motor link must have been seen as a very valuable asset for any prospective purchaser but Honda not as a desirable owner. The Japanese would not have been very interested in taking over the company since they were already gaining all the benefits from the relationship that they wanted.

The fact that the sale was eventually made to BAe, the circumstances of which are still shrouded in confusion and will probably never become clear, was heralded as a success for the Government. It kept the company intact, free from predators through being part of a large and prosperous group and wholly UK owned.

Following the sale Rover's relationship with Honda Motor was able to continue undisturbed and was strengthened by the equity swap in 1990. This involved Honda Motor gaining a 20% stake in the Rover Group and Rover 20% of Honda UK, i.e. Honda Motor's UK manufacturing operations in Swindon. The Honda Motor relationship would probably have died, if not been severely restricted, by Rover's passing into the hands of another car manufacturer's control, but the relationship has been strengthened by the added stability and continuing relative independence resulting from the sale to BAe.

6.6 Future Development of the Relationship

The relationship between Rover and Honda Motor, does not preclude dealings with other companies. This is illustrated by Rover Car's licensing agreements with Peugeot over their R65 gear box and Honda Motor's agreement to distribute Chrysler's Jeeps in Japan. The Rover-Honda collaboration contracts also allow either party to withdraw, something of which certain groups within Rover Cars are quite pleased because of their mistrust of Honda Motor and its practices, as discussed later.

The equity exchange has deepened the relationship away from just product design and manufacture but does not constitute a commercial interest in either organisation, Rover's stake being in a minor part of Honda Motor and Honda Motor's share being made symbolic by the much larger interest of BAe in the Rover Group. A commercial interest is not desired by either organisation, Rover desiring to keep its independence (despite this having been made nearly impossible by the organisation's dependency on Honda Motor) and Honda Motor having no real need for Rover in its long term strategies. The two organisations can and do operate in competition but this does not appear to be detrimental to the relationship as a whole. The adoption of the 4 door Rover 400 model, originally developed by Honda Motor without Rover's involvement, to complement the 5 door Rover 200 range, with little objection from Honda Motor (358), shows both organisation's low level of concern about their ability to survive in the same markets. How long this lack of concern for mutual competition will last in the European market is uncertain but the Honda Motor operation at Swindon, which will produce vehicles

to be sold in Europe, is unlikely to be effected by Rover's cars operations with its UK focus. The numbers of vehicles directly competing will be almost insignificant for the first 5 years of the Swindon project (359).

There is always the possibility that when the five year freeze preventing BAe from disposing of Rover Group assets, including the Land Rover, Rover Cars, the land and the supplying companies which make up the group, expires in 1993/4 Honda Motor may wish to take a larger interest in Rover Group. The unlikely approach of Honda Motor towards taking control of Rover has been discussed above and is less likely than a forceful takeover bid from a different multinational, particularly considering the success of Rover's 4x4 operations. The researcher concludes that this will not be influenced by Honda's historical trait of being different to other Japanese motor manufacturers.

This section expands the arguments discovered by the researcher concerning the Rover Cars organisation's perception of the problems caused as a result of the collaboration with Honda Motor. These perceptions have introduced a certain degree of prejudice and fear of Honda Motor into Rover Car's operating organisation's culture (as opposed to the planning and management culture) which is likely to prevent the collaboration form deepening.

The manufacturing based grievances were found to be the easiest to quantify for analysis and so are presented first.

The rejection of many Honda Ballades produced at Longbridge in 1988 was seen as Honda Motor being too exacting on their quality inspections as a result of a down-turn in the market. It was thought by Rover Cars employees that the vehicles may have been hard to sell and so Honda Motor had decided not to take delivery by using the quality levels of the vehicles as an excuse (360). The new Rover Cars facilities used for the R8 models developed by Honda Motor are now able to operate to the same quality standards as those which were imposed in 1985 to reject the Batch of Ballade vehicles. The Honda Motor vehicle quality standards have now been tightened following the introduction of their Concerto (Honda's R8 equivalent), illustrating the company's continuous improvement philosophy. This philosophy, called kaizen, is widespread amongst Japanese manufacturers and intends to prevent the same fault recurring by encouraging it to be corrected in the manufacturing system and not just rectified for a particular piece of a particular vehicle. This almost in-built desire never to make the same mistake twice is very

frightening for the UK manufacturer which, the researcher has observed, now believes will never be able to beat the Japanese.

The sourcing for the collaboration vehicles' parts from Japan, both major and minor parts (e.g.: V6 engines and nuts, bolts and bracketry) has always caused Rover Cars problems, not least because of the extended delivery lead times this imposes. Honda engineers are seen as not eager to approve UK-sourced replacements because of quality issues concerning the manufacturing processes used by indigenous companies and the raw materials they use. This is interpreted by some Rover Cars personnel as an attempt to force Rover to buy parts from Honda Motor at inflated prices. In fact, examination of the extensive Honda Motor quality standards has shown that these exacting standards have been defined and agreed to by Rover (361) and are not met by the locally-sourced parts which have been rejected by Honda's Conformance Engineers.

The use of turn key facilities from Honda Motor, i.e primarily designed and commissioned by Honda engineers and then copied into a Rover factory, is also reported to present problems for Rover which do not appear to arise in Japan. It was even suggested that initial problems concerning the R8 'engine stuff-up' (the point at which the engine is mated to the rest of the vehicle in the assembly process) was a result of the Japanese operators being generally smaller than their Longbridge counterparts and so more able to complete the tasks within the tight cycle time (362). This problem was effectively solved by introducing a small buffer or work queuing area to prevent the frequent problems at this work-station stopping the entire R8 production assembly line.

The manufacturing side of Rover saloon cars organisation does favour Honda Motor's policies of reducing costly inventory and has adopted many of the techniques itself. The same is also true of Honda Motor's quality improvement methods.

Some of these methods have been adopted without much consideration or thought by Rover Cars as to their possible implications. Honda Motor operate with very large production and paint batches (c.150 vehicles) in order to maintain efficiency and quality. Rover Cars' operations however are not managed to maintain these large batches (R8 batches are planned, when introduced to the BIW plant, to consist of c.30 vehicles, but by the time they leave the paintshop these batches are mixed up and the batch integrity reduced to less than 2 vehicles (363). The Honda Motor quality and efficiency benefits are based

on relying on large batches being present in the production systems and these benefits are therefore lost in Rover Cars. Similarly the Rover operation intends to be highly flexible to satisfy specific customer orders. However, Honda Motor do not accept such priority orders and make no effort to respond quickly to specific orders. They have a long lead time on vehicle production which enables the manufacturing process to be operated efficiently. Even this cursory understanding of the significantly different intentions of the Rover and Honda Motor manufacturing operations has been observed to be absent form Rover Cars managers and is a further illustration of the company's inherent lack of intellectual capability. This has a great effect on the company's ability to acquire specific capability. It is difficult to see how an organisation can acquire a capability which it does not have the intellectual subtlety to identify, let alone comprehend.

The commercial operations of Rover are impressed by Honda Motor's corporate image, an area in which Rover is spending much effort (364). However there is much scepticism of the approach which Honda Motor uses towards its retailing activities. Honda's European operation activity of telling dealers which vehicles they are going to be allocated is very alien to Rover Cars who effectively operate on a sale or return basis: the dealer places an order to an exact specification, alters this as the order nears production and, if he has been unable to sell the vehicle after having held it for six months, can send it back to Rover without any financial penalty. The feeling expressed by senior commercial managers within Rover Cars is that the increasingly competitive European marketplace will force Honda to adopt customer orders and sale or return policies. Evidence from various international sales reports shows that Honda Motor is having stock-mix problems (i.e. sufficient vehicles in the market place but not the right derivatives) in the US as a result of this dictation policy and has been forced to start discounting its vehicles (365).

The practice of Honda Motor determining which models a dealer will receive is a consequence of the relatively high priority given to the production schedule. At present the commercial part of Rover Cars controls this function and would not like to see the manufacturing or logistics departments take this away. This practice stems from the belief that the sales operations are closer to the market place and so should drive the company's production (366). This continues despite the heavy fluctuations in demand it generates in the production processes which as a result are not able to manufacture vehicles efficiently.

The manner in which Honda Motor discusses future plans and present problems is equally foreign to Rover Group personnel and generates a degree of caution within Rover's negotiations (367). The Honda approach is to have as many experts involved as possible during meetings and to discuss any proposals at great length within their own organisation before involving Rover. This thoroughness and the long time required for decisions to be made does not occur in most Western organisations. The researcher concludes that this inability of Western companies to delegate confidently, as discussed by Peters (368), is probably a direct consequence of the politics and factional negotiating which surrounds negotiations in the traditional operating environment as observed at Rover. The senior managers are not normally willing, fearing undermining of their position, to delegate the detail of the negotiating to those who are best able to determine the most suitable contracts to enter.

The specification of vehicle design and options presented to the customer is a concern of the product engineering and commercial departments at Rover Cars. In any collaboration there will be compromises between the desires of both parties, and this is very evident in Rover's product development processes where such a lack of central control of the design specification often causes problems. This situation becomes more acute when the product engineering and commercial factions of Rover Cars are having to negotiate with Honda Motor over new model specifications. An example of this is the Rover 800/Honda Legend vehicle which the Japanese needed to be smaller than Rover desired because of Japanese legislation. As a result, certain features desired by the Rover Cars factions were curtailed causing animosity towards the Honda engineers (369).

The Honda approach to redundancy in vehicle components has also been cited as the cause of many operational and design problems for Rover, who have been forced to accept many more different, but essentially similar, parts than they would have liked. The force behind this for Honda Motor is to drive the piece cost of the part down and to improve quality by removing the possibility of assembly errors. The many varieties of Rover 200 harness available is a result of Honda Motor's insistence that unused wires could not be tied back as is the normal western practice to promote flexibility. This provides many scheduling and quality problems for Rover Cars (370). Its tactic of constantly updating schedules to try and match market trends is unable to successfully forecast the specific combinations of the many parts required to build the cars which are ordered.

Despite these feelings that Honda Motor is probably not the ideal partner for Rover Cars, the company is doing little to move away from the collaboration, partly because it does not command the resources to move elsewhere and, as the researcher has established, because the company is incapable of developing its own capabilities to replace those it derives from Honda Motor. This may be because these animosities are found too far down the organisational hierarchy to make an impact on the company's policy.

6.7 Discussion

The mechanisms which led to the collaboration between Rover and Honda are clearly documented to have been orchestrated by Edwardes. The state of the company at the time led him to believe that collaboration was the only suitable means of developing new models quickly enough to fill BL's gap in model line up before the LM10/11 vehicles (Montego/Maestro) and other, subsequently unrealised vehicles, came into production.

The success of the products developed through the venture, the continuing relatively weak position of Rover and the inertia present in the still massive and bureaucratic Rover Cars organisation led to Rover's continued and deepening involvement in the relationship. It is unclear if the strategic and potential long term nature of the cooperation was ever rethought following Edwardes' original analysis (371).

The same lack of strategic thought is also true of the possible entry of Rover Cars into collaborations with other organisations for the vehicles it has not developed with Honda Motor. Rover Cars is very guarded over having control of its new Metro design and the researcher understands that the company never addressed the question of whether the model could have been developed for less cost with the help of some other manufacturer.

The researcher found that Rover believes it can make its own decisions without recourse to anyone else. This mistaken belief of Rover's high standing and unwillingness to concede to its position as an insignificant in an international market, has ensured that Rover has not realised just how dependent on the Honda Motor company it really is.

This lack of thought may have developed from the process of developing the product plan where the future of the relationship itself is not discussed as a strategic choice available to the organisation. Rover Cars' product plan is derived through annual discussions with the many interested internal parties/factions and is heavily influenced by trying to keep the ageing models in production because the company cannot

afford to develop replacements. Honda Motor are then consulted to see if they are willing to offer any models which could then be accommodated into Rover's plans.

The continuation of the collaboration has seen an erosion of Rover Cars' own design capability. This study has identified that the Rover Cars company has several key design capabilities missing from its skill and knowledge base, i.e. the design of gearboxes, axels, larger capacity and specialist (e.g. turbo charged, diesel, etc.) engines, the development of efficient manufacturing facilities, etc.

This problem is not helped by the fact that Rover Cars has insufficient resources and capital to develop new models even if it had the skills required.

The continued erosion of Rover Cars' capability has prevented it from gaining more influence in the collaboration with Honda Motor. As Honda Motor have gained more control over the collaborative models the value of Rover in a possible takeover has also declined.

The erosion of Rover Cars' design capability is in spite of the company being closely connected to one of the world's leading automotive engineering organisations. The researcher finds this to be particularly significant because it shows that Rover Cars is unable to learn or acquire the capability it needs. Because Rover Cars has not acquired capability even when it has been transplanted into its activities, it is unlikely to be able to acquire organisational, intellectual or technological capability from external sources.

Collaboration between automotive manufacturers is likely to increase as their marketplaces become more competitive. It has been noted that the Europeans appear slowest to take up collaborations as a means of reducing development costs or expanding markets. Most notable is the way in which the German 'quality' producers, BMW and Mercedes, have not yet entered any collaborations. This could be a strategic choice or a reflection of the relative stability of their markets which are only now beginning to be challenged by the Japanese manufacturers with products like Lexus, Legend II, President and Infinity. At the other extreme the Japanese producers and the emerging Korean manufacturers are taking advantage of collaboration to extend their operations into new markets. The US giants are also entering alliances but are not being as aggressive as the South East Asian based companies, preferring to use collaboration as a means of extending design skills and cutting development costs.

The major benefit to Honda Motor from the collaboration has been the knowledge and experience gained of British and European manufacturing and supplier operations.

The use of a model development collaboration to camouflage the main strategic intent of Honda Motor represents an interesting form of innovation or knowledge acquisition strategy which the researcher has closely aligned with Clark's 'entrenching innovation' subset (372) and appears to conflict with the established models of innovation diffusion. By introducing technology previously acquired from Western companies like Rover in the 1950's back into the originating organisations and acquiring the resultant developments, Honda may be using a potentially new approach to innovation which is based on synthesis. This method is more intricate than the reverse engineering, described by Cusumano and seen in the rise of the Japanese motor industry, where established technology was re-developed to meet new needs, namely the different demands on vehicles to be used in post-war Japan (373). The effect of the innovation through synthesis process may be masked by the other opportunities represented by the collaboration itself (e.g.: takeover prospects, and European market entry).

The researcher believes that the discovery of these two new innovation processes warrant detailed investigation to see if such tandem innovation and synthesis approaches demands any alteration to the innovation literature framework.

The relationship between Rover and Honda has not formally affected Land Rover. The Solihull site has become exposed to some of the Japanese ideas through its contact with the rest of the Rover Group, particularly following the 1989 re-organisation. No recorded strategy concerning the 4x4 company and Honda Motor has been found despite the possible advantages to all the organisations involved.

Land Rover have world class 4x4 models, with the specialist engineering this involves. This 4x4 expertise represents an area which should interest Honda. Honda Motor's excellence in the field of engine design and manufacture (and manufacturing in general) is also of value to strengthen Land Rover's capabilities but any link to facilitate this advantage would run against the Land Rover company's operating innovation methods of ingesting radical-peripheral ideas. This innovation method is discussed in Chapter 8 of this thesis.

The Rover Group itself appears to have tried to keep Honda Motor and the 4x4 operations apart, possibly because the necessity for new products found in the cars operations has overridden any strategies to introduce Honda Motor technology to Land Rover. It is also possible that such a relationship was originally prevented in order to keep the 4x4 company separate and ready for the sell-off which was a

possibility in the late 1980's. The Government could also have had a role in this, not wanting a significant supplier of military equipment to fall into a dependency on a foreign company.

The researcher understands that the reasons offered above are too subtle for the Rover organisation to comprehend and favours the opinion that Land Rover's new products have not actually required any capability to be derived from outside of the organisation. As a result Honda Motor have never been approached as a source of collaboration for the Land Rover organisation. Also the Rover Cars factions may see Honda Motor as a source of power over their Land Rover opposition and have not wanted to reduce their influence.

6.8 Conclusion

This chapter has examined the source of the strategy which led to the collaboration between Rover and Honda. This was shown to be a result of a key individual's response to problems encountered following his joining the organisation from a different industry.

This is not how the organisation perceives the collaboration, something which has an effect not only on the future of any alliance but also, on the future prosperity of the company. Rover Cars' belief is that the Honda relationship is an established constraint which should be tolerated but cannot be avoided. The continuing relationship with Honda has been accepted by the organisation to be almost as much of its history as the decision to build motor vehicles and so is never questioned.

The data, concerning Rover Cars' design and manufacturing capability, gathered in this study shows that the saloon manufacturing part of the company is incapable of surviving without Honda Motor. Rover Cars requires a massive transfusion of capability to enable it to develop and manufacture its own new vehicles. The company does not have access to sufficient resource to acquire such capability and, because of its inability to learn about these capabilities from its relationship with Honda Motor, is unlikely to be able to do so.

The study has shown by discussing collaboration in the automotive industry that the car manufacturers are heading towards a time of highly influential strategic alliances which will determine the future structure of the industry. These alliances are likely to be centred on the Japanese and US giants, with the Europeans being left behind. This study has identified the need for collaborations concerning new models to involve both partners equally in order to avoid animosity developing over design decisions which may

seriously impede the future of the relationship. The recently announced collaboration between Ford and Volkswagon which involves VW designing the vehicle and Ford the production facility should be investigated to establish if such a relationship can be successfully managed.

The capability of Land Rover to fully develop and manufacture its own new models has been identified as one of the key differences with Rover's saloon manufacturing organisation. This has meant that the 4x4 company has not been involved in a collaboration with Honda Motor.

It is interesting to surmise the way in which the original decision to collaborate with Honda Motor may have solved many of the company's industrial relation problems. This was by turning the emphasis of attention back onto the products and away from the organisation and focusing forward instead of dwelling on the legacy of the British motor industry. However the collaboration appears to have further eroded the company's capabilities and placed it in a position from which it is not able to recover its independence.

Company	Own Equity In	Joint Design with	Supply Vehicles to	Supply Components to	Commercial Agreement with
BMW					
Chrysler	Mitsubushi 12%	Mitsubushi Renault	Mitsubushi (US)	Fiat (Teksid)	Fiat
D-Benz					
Fiat		Ford (CVT)	Nissan (SA) Subaru	Subaru	
Ford	Jaguar 51% Mazda 25%	Mazda (Escort) Nissan (Engine)	VAG (Autolatina)	KIA Korea Mazda	
GM	Suzuki 5% Daewoo 33% Isuzu 39% Saab 50%	Isuzu (Piazza)	Isuzu (Bedford) Toyota (NUMMI)	Isuzu	
Honda	Rover 20%	Rover		Rover	Chrysler
Isuzu		GM	GM Subaru (Indiana)		
Mazda	KIA 8%	Ford	KIA	Ford	Saab
Mitsubushi	Hyundai 15%	Chrysler	Hyundai Chrysler	Hyundai	Volvo D-Benz
Nissan		Ford	Fiat (SA) VAG (Santana)		
PSA		Renault/Volvo (V6)		Rover (R65)	Suzuki
Renault	Volvo 25%	Volvo (Trucks) PSA/Volvo (V6) Chrysler		Volvo Subaru (Engines)	
Rover	Honda UK 20%	Honda	Honda(Concerto)		
Saab					
Subaru					
Toyota	Diahatsu 15%	Daihatsu	GM (NUMMI)	Daihatsu	
VAG	Seat 50%		Ford (Autolatina) Toyota (Hilux)		
Volvo	Renault 20%	Renault/PSA (V6)			

Table 16. A Summary of Automotive Manufacturers' Alliances (Sources: see Appendix C).

Chapter 7. An Impossible Leap

7.1 Introduction

The Rover Group adopted the Breakthrough Technology approach in an attempt to improve its fortunes. Breakthrough is an approach to strategy implementation and organisational change which was developed by various management consultants and introduced to Rover by one particular US based practice. This chapter represents a probe into the use of the Breakthrough method in the Rover Group and is structured to achieve two distinct aims.

Firstly, in common with the other studies of the organisation as part of this thesis, the study represents a construction of a pattern of strategy and establishes the nature of the change and the processes involved in Rover's Breakthrough initiative. This involves discussing the Rover organisation's capability for structural and operational change.

The supplementary element of the probe concerns Breakthrough Technology's intention, namely a step change in performance of the operations of an organisation. A step change represents a rapid and major improvement in an organisation's activities which elevates a firm to another level of competitive advantage in a way that incremental change cannot.

This supplementary analysis assesses the plausibility of the method of generating change in the light of previous studies and the established literature on organisation change, particularly the theories of Miller and Friesen on quantum changes in organisation structure (a quantum being a fixed amount of change which occurs rapidly and not as a result of evolution).

The study also examines the impact of Honda within the Breakthrough Strategy (the term Breakthrough Strategy is used to distinguish Rover's strategies resulting from adopting the Breakthrough Technology approach) and discusses several emergent differences between the Rover Saloon and Land Rover organisations.

7.2 The Nature of Breakthrough

For Breakthrough to be discussed in respect to Rover the author believes it is first necessary to examine the nature of Breakthrough and how the technique relates to the established literature on organisation transition. Management and entrepreneurial writers have expounded that the business environment is set to become increasingly competitive and so it will be more difficult for organisations to achieve and

maintain success. Many theories concerning the practice of creating profitable firms have been developed. Most are characteristic of their belief that a radical change in the company's operations is normally required for it to survive and prosper. These theories have also been accompanied by many examples of how the best companies achieve their startling results. Table 17 shows those best known exponents of what can be termed "company turnaround" theory and shows the authors' main concerns.

One major difference identified between the change methodologies shown in table 17 concerns the differing amplitudes of change prescribed. Some approaches, particularly those which concentrate change on one area or function of the company, normally that perceived by the customer, will, if successful, result in a turnaround in fortune for the organisation. Breakthrough is one of the rarer applications which intends to alter the operations and culture of the organisation permanently. This type of change is termed "rejuvenation" by Stopford and Baden-Fuller (because of its impact on organisation activity rather than just a company's operations) whose work examined six manufacturers in mature industries which have managed to generate and sustain profitable growth.

> *'Turnaround is more concerned with efficiency, whereas rejuvenation includes both efficiency and the building of effective systems and skills needed to create sustainable growth.' (374).*

Name	Type	Focus
Cosby(375)	Turnaround	Quality
Deming(376)	Turnaround	Quality
Drucker (377)(378)(379)	Turnaround	Management
Goldratt (380)	Turnaround	Logistics
Grinyer (381)	Turnaround	Management
Hayes/Wheelwright (382)(383)	Rejuvenation	Organisation
Juran (384)(385)	Turnaround	Quality
Kanter (386)(387)	Rejuvenation	Planning
Mather (388)	Turnaround	Logistics
Ohmae (389)	Turnaround	Organisation
Ohno (390)	Turnaround	Logistics
Pascale (391)	Rejuvenation	Organisation
Peters(392)(393)(394)	Rejuvenation	Organisation
Porter(395)(396)(397)	Rejuvenation	Planning
Schonberger (398)(399)	Turnaround	Operations
Shingo (400)(401)	Turnaround	Manufacture
Skinner (402)(403)	Turnaround	Manufacture
White/Plossl (404)(405)	Turnaround	Logistics

Table 17. Examples of Popular Change Commentators.

The difference between turnaround and rejuvenation is perhaps best described with reference to a review of Peters' 43 original excellent companies which were used in the popular book 'In Search of Excellence' (406). The survey found that only 14 of Peters' "excellents" remained in the top 500 in 1987, only 5 years after the original study (407).

The failing companies fall into the classification of turnaround and not rejuvenation. The companies which have maintained their success may be examples of rejuvenations, or just the result of extended turnarounds.

In summary, rejuvenation should put a firm in a position to adapt to any future crisis whereas a turnaround organisation would normally lose its success during such a crisis.

The Rover Group adopted the relatively new rejuvenation-based Breakthrough Technology approach towards the end of 1989 following the appointment of a new Managing Director, George Simpson. Breakthrough Technology involves generating changes in the organisation's operations which are intended to produce a company capable of claiming world class leadership in <u>all</u> its operating facets (note the similarity to Mintzberg's structural configurations, they being an attempt to explore how organisations can achieve *'getting it <u>all</u> together'* (408)). The Breakthrough approach is marketed by management consultants as a senior management led initiative to achieve step changes in organisational performance. Breakthrough is based upon a belief that organisations become restricted and controlled by the limits of their own self-imposed operating boundaries. These boundaries are termed paradigms or mindsets. Breakthrough theory is based on the belief that these boundaries can be surmounted if they can be clearly identified and addressed. The destruction of a mindset-barrier is known as a "Breakthrough", something which the theory believes leaves the organisation's performance significantly improved.

The methodology adopted in Breakthrough involves discounting all the barriers normally present within the organisation's personnel's view of the organisation's operations and the establishing of multidisciplinary teams concerned with addressing one of a set of corporate goals. These goals are derived from a vision of what the organisation needs to do in the future to become an example of an outstanding firm in its field.

In essence, Breakthrough is about generating radical strategic plans to achieve predetermined aims, developed by the company's leaders, which are outside the normal consideration of the organisation. The

rejuvenation aspect enters the organisation whilst it is striving for these Breakthroughs, i.e. the act of developing the strategies introduces a culture in which the organisation is continually challenging itself to try and generate improvements in performance.

The idea of Breakthrough was developed by various US consultants and is based on the work of Prof. R.T.Pascale at Stanford University (409). The idea was originally adopted by a group called Transformational Technology Inc., a concern offering executive training courses for use by independent management consultancy firms (410). The network of consultants around the Transformational Technology Inc. organisation encouraged the idea of Breakthrough technology to spread and was observed to have had a great influence over certain organisations' strategies.

The operation of the network of consultants, to introduce or diffuse different ideas, is illustrated by the different firms of consultants used in the Breakthrough initiatives of Rover and the UK based oil company B.P. whose Breakthrough initiative is examined later in this chapter. The use of different consultancy firms shows how the same idea can be transmitted through different international routes.

The Breakthrough approach in Rover was adopted at the request of, and under the control of, the Managing Director, George Simpson, and closely followed his appointment in January 1989. This appointment was a result of the sale of Rover to BAe by the Government and followed the elevation of the previous MD, Graham Day, to the position of Rover Group Chairman and a corresponding seat on the BAe Board of Directors. Breakthrough was adopted by Simpson after several approaches to Rover by the US consultancy firm Charles Smith and Associates who have had a long term, but low profile, involvement in the Breakthrough initiative.

The practice of utilising consultants is unlikely to have occurred under Rover's previous leadership. It was the intention of the outgoing MD not to use consultants, believing that any expertise required by Rover should have been available within an organisation of such a size and with the rich legacy of the British automotive industry. It was also the belief of that MD that:

'everything we (Rover) need to do can be achieved through evolution' (411).

Day was quite adamant that Rover should not pursue a step change because he doubted the ability of the organisation to manage the complexity of such a rapid change, particularly at the company's operations levels, i.e. the production and sales areas of the company.

The British Petroleum organisation has also embarked on a Breakthrough approach for the improvement of some of its constituent businesses. The author undertook a limited assessment of the British Petroleum approach to Breakthrough by interviewing some of the company's executives. The British Petroleum executives interviewed included three from the central part of the British Petroleum organisation and one from the British Petroleum Exploration company who had all been involved in introducing the British Petroleum Breakthrough initiative. The Rover company has not been involved in using the British Petroleum example of Breakthrough as a role model and the researcher doubts that senior executives in Rover are aware of examples of successful implementations of Breakthrough in other companies. The researcher learnt of British Petroleum's adoption of Breakthrough through a short television profile of the company (412).

The assessment of British Petroleum's Breakthrough initiative is used to provide a comparison with Rover's own implementation of Breakthrough. The data gathered concerning the British Petroleum company's use of Breakthrough is possibly influenced by the way in which it has been gathered, through interviews with executives rather than through extensive participant observation as in the case of the Rover data. This may mean that the reasearcher has only been able to gain an understanding of the cosmetic, outward facing Breakthrough at British Petroleum and has not penetrated the public relations shield. The researcher feels, primarily because of the same information being furnished by unconnected parts of the organisation, that the data is substantial enough to be included in this study which is not seeking to explore how British Petroleum introduced Breakthrough but how Rover's initiative has developed. The British Petroleum data is used to represent a comparative example of Breakthrough against a successful implementation which could have easily been developed from the accounts of the management consultants. If the British Petroleum data is a reflection of events for public consumption, i.e. how British Petroleum executives would have liked to introduce Breakthrough, the this would not jeopardise the conclusions made in this study.

The techniques used within British Petroleum were reported to be similar to those at Rover but differ in one important respect: that of British Petroleum's Breakthrough not being an attempt at redefining the business, as at Rover, but as a tool to try and improve traditionally poor performing or critical activities within the company.

British Petroleum was reported by one of its executives to have been able (because of its management practices which differ from those found at Rover as a result of British Petroleum's having a higher proportion of professional or graduate employees) to involve not just senior executives and corporate planners but also direct line personnel in its Breakthrough projects (413). This was because of the petrochemical industry's wider use of OD techniques as a result of the more profession orientated personnel strucutres, and the researcher thinks that this approach has led to a more complete consultation, and involvement of, the entire organisation and an improved commitment to the programme.

Because the British Petroleum organisation, in common with other process industries, has a more technical/professional structure, based on its adoption of high technology, long term projects, it ought to show many of the traits found in Mintzberg's Adhocracy (414) and be capable of being more responsive to new initiatives than the Rover organisation. The researcher reasons that the reported widespread adoption of Breakthrough in the oil company's constituent firms confirms this. This can be contrasted to the way that the Breakthrough idea is currently struggling for acceptance in the automotive manufacturer.

The source of Breakthrough within British Petroleum was accredited to the MD of British Petroleum Exploration Ltd. This senior executive, who is also a member of the parent company's board of directors, has an MBA from Stanford University. He uses Pascale, the originator of the Breakthrough technique, and a Professor at Stanford, as a personal mentor. The British Petroleum Exploration MD reportedly supported the transfer of the Breakthrough idea to the parent organisation. This support has subsequently ensured that the use of the Breakthrough approach has been encouraged in most of British Petroleum's constituent organisations.

British Petroleum use JMW as their Breakthrough consultants, in a similar role to Charles Smith at Rover, but JMW appear to have a more visible role, supporting and helping to manage the company's Breakthrough projects. JMW's lack of specialist technological knowledge has probably ensured that they have remained relatively external to the British Petroleum companies' Breakthrough process, leaving the organisations a high degree of ownership of the Breakthrough implementations which have developed.

One British Petroleum executive admitted to the researcher that:

'there was a lot of scepticism around the place when these guys arrived, this was

removed in a matter of days when people realised they were educators getting us to see things we don't normally see' (415).

The researcher has identified that perceived ownership of a solution is a major factor in helping the Land Rover organisation successfully adopt externally-sourced innovations, see Chapter 8, and he believes that the emphasis on the British Petroleum personnel's ownership of Breakthrough will have helped in its introduction.

The effect of Breakthrough at British Petroleum as a means of generating success, or rejuvenation, may never be completely clear but there is a feeling within the organisation, reflected upon by one manager, that it has:

'more to do with changing peoples behaviours and relationships to one another, and is orientated towards human factors than pound notes.' (416).

The researcher's limited exposure to Breakthrough in British Petroleum has led him to believe that the approach is seen by much of the organisation as a major success and is widely accepted as a powerful project management and business development tool (417).

In 1988 R.H.Schaffer produced a book expounding the virtue of Breakthrough Strategy (418). The existence of this approach may cause some confusion, as it differs from Pascale's Breakthrough. The guiding principals of Schaffer's method is essentially similar to the Pascale approach:

'The Breakthrough Strategy advises managers to by-pass all the preparations and excuses and to get going directly, at once, toward a short term result, a success.' (419).

but uses an incremental methodology to achieving the Breakthrough.

Schaffer's Breakthrough is based on developing an atmosphere within the organisation which encourages all its employees to make rapid but small advances towards the company's future goal.

Schaffer's Breakthrough intends, if the correct culture has been established, that these small Breakthroughs should equate to a large step change. This is another example of the rejuvenation concept but is intended to be achieved in a fundamentally incremental rather than revolutionary manner (420).

Schaffer argues that the reason that a Breakthrough surge is required is because:

'its hard to see below the surface because defensive behaviours mesh with management practices, organisation habits and company policies and procedures, forming barriers that inhibit, scatter, and dissipate the corporate resources.' (421).

He identifies several fundamental built-in barriers to organisation success which need to be attacked to create a rejuvenation. These barriers include:

* Psychological Myopia
* Wasteful Management Patterns
* Weak Performance Expectations
* Misuse of Work Management Disciplines
* Invisible Conspiracy: The Underside of Corporate Culture (422)

Schaffer advocates a top-down cascade training method as the means of educating the organisation about Breakthrough (423) (this method of education is discussed in some detail in the case study) and much of Schaffer's text explains how to manage this cascade exercise and how the critical activity of goal setting should be carried out.

7.3 Organisation Transition Theory and Breakthrough

Mintzberg's work in establishing a typology of organisational configuration, which discounted the idea of the unique solution for organisational design (424), opened up the opportunity for Miller and Friesen to develop:

'a taxonomy of strategy making in context' (425).

Mintzberg's organisation structure configurations and Miller and Friesen's organisation transition theories are extremely relevant to any study of organisational change, including this one of Pascale's Breakthrough methodology's adoption in the Rover Group, because they can provide an established framework and language for the study to use.

Miller and Friesen's typologies were established following an analysis of the match between environment, strategy and the groups of structures found using the configuration approach. The analysis also included an element of organisational performance and examined 81 companies with the help of 31 measurement variables. The measurement values were calculated using a statistically-tested rating system and were determined from much data gathered from various public sources supplemented with interviews with

company executives. This helped to ensure that the assigned values were consistent and so represented a reliable data base for the study of the organisations' transitions (426).

Miller and Friesen's study found the existence of a small number of very common configurations and interpolated that:

> *'If organisations changed in a piecemeal and disjointed way, altering elements of strategy and structure quite loosely and independently, they would constantly be realigning their profiles, moving from one state to a randomly different one. The number of states would then proliferate to such an extent that chances for predictive, empirically based sets of configurations would be diminished. On the other hand if firms remain with a configuration for a long time, and then concertedly, move to a different configuration, this increases the chances of there being a limited number of common types. This quantum kind of change was indicated by our case for configuration.' (427).*

The quantum states discovered were classified into successful S-type, failing F-type and transient T-types (428):

S1a	Adaptive firm under moderate challenge, simple and undiversified.
S1b	Adaptive firm in a very challenging environment, risky innovations and collaborations.
S2	Dominant firm, centralised strategies adhered to.
S3	Giant under fire, complex and diversified.
S4	Entrepreneurial conglomerate, divisionalised delegation.
S5	Innovator, small, niche market and simple.
F1	Impulsive, insufficient information systems with low delegation from top.
F2	Stagnant bureaucracy, tied into old strategies and traditions, no information of failure.
F3	Headless giant, loosely coupled fiefdoms, lack of leadership.
F4	Aftermath, ineffective management following long period of trouble.
T1	Fragmentation, complex disintegrative phase in corporation.
T2	Entrepreneurial revitalisation, emergent leader creating strategies to break traditions.
T3	Consolidation, cutting losses and moving away from entrepreneurial management.
T4	Toward stagnation, weaker leadership behaves vaguely as organisation drifts.
T5	Centralisation, boldness, entrepreneurial but cautious.
T6	Initiation by fire, trying to deal with great and discontinuous changes.
T7	Maturation, increasing sophistication in administration, decentralisation, more cautious.
T8	Troubleshooting, post major shock with much investigation.
T9	Formalisation and stability, little change, existing procedures become standardised and extended delegation.

The mechanisms which generated the quantum states were determined by Miller and Friesen to follow two processes:

> The configuration approach to change causes delays in the process and so the size of the required change becomes larger resulting in dramatic changes or realignments.
>
> The firms in the process of change loose the complimentary nature present in their starting configurations and so any time of flux occurs rapidly (429).

Miller and Friesen's S-type organisations can be seen as having undergone turnaround transitions. The Adaptive Firms, S1a and S1b types in the Miller and Friesen methodology, resemble rejuvenated organisations or those which have performed Pascale's Breakthrough.

Another reason for the closeness of match between Breakthrough and Miller and Friesen's theory of Quantum Leaps is that they are derived from similar sources and use very similar development techniques.

Miller and Friesen used Mintzberg's configurational approach to examine their 31 organisational parameters in terms of organisation structure. Pascale uses a model, which resembles Mintzberg's 'fives' (five fundamental organisational forces resulting in five pure types of configuration, see Chapter 2), but is based on seven S's: strategy, structure, systems, style, shared values, skills and staff. These S's operate in a very similar way to Mintzberg's forces and result in seven pure configurations, or as Pascale calls them, *'contending opposites'* (430).

The foundation of Pascale's configurations from:

> *'a consulting tool [developed] for the firm McKinsey and Co. in 1979' (431).*

is not as rigorous and defensible as the source of Mintzberg's configurations (432) but has an added value in its attempted assessment of the organisation's capability. It adopts a perspective which accounts for the existing skills and staff of the organisation. Mintzberg does not address the issue of organisational capability, concentrating purely on structural forces. The development of a capability-based perspective to strategy study is one of the aims of this thesis.

Pascale proposes that removing mindsets is the way to creating rejuvenated organisations, though he prefers the term "excellent". Hence much of the activity surrounding Pascale's Breakthrough methodology covers the analyzing and changing of mindsets or management paradigms. It is this activity which the management consultancy firms offer to prospective client organisations.

Pascale's Breakthrough, as adopted at B.P. and Rover, but distinct from Schaffer's teachings, has been shown above to unintentionally mimic the organisation theory of quantum states. Because of this similarity

this study of Rover's Breakthrough project is able to not only probe the organisation's strategy formulation methods and the company's potential capability for transition, as is one of the aims of this thesis, but also discuss the implications of the Breakthrough approach on the organisational transition literature. Particular aspects noted above in the literature are that transition theory lacks capability assessment, context specifity and the identification of change as a process and not just an event to be reconstructed. These are analysed in more detail in the discusion which follows the description of the Rover Breakthrough initiative.

7.4 A Study of Rover's Breakthrough

The following commentary derives its structure from addressing the project in a loose chronological order rather than focusing on the responses of specific parts of the organisation.

The development of Breakthrough within Rover can thus be visualised as:

1. Consultants Gain Conviction of Rover MD
2. The Development of the Breakthrough Aims
3. The Main Breakthrough Projects
4. The Sub-projects
5. Implementation Issues Crossing Organisational Hierarchy Levels
6. Loss of Support.

The first stage was the "selling" of Breakthrough to Rover's C.E.O. by the consultants and included a review of the company's operations and objectives.

The arrival of Simpson in the post of MD can be seen as instrumental in the adoption of Breakthrough in Rover. Day, as has already been discussed, had no inclination towards using consultants and so would have dismissed Charles Smith and Associates' approaches almost immediately. Because Simpson was new to the post, and so new to the responsibility for the company's direction, he would have been trying to identify his own future aims for the Rover Group. This establishment of direction was being undertaken with the help of the then Strategic Planning Director, Bertodo.

The arrival of Charles Smith and Associates offering to help in this "visioneering" (the consultant's term for establishing possible future visions of a company) process, its being the first phase in the Breakthrough consultation, would have encouraged Simpson to pay more attention to the advances of the

consultants concerning the Breakthrough process.

Also at this time, and something which the researcher identified as another significant factor contributing to the decision of Simpson to accept Breakthrough, the Rover company was in financial and operating difficulties. This was despite the profits returned in the then recent run-up towards the company's privatisation. This financial pressure would have made the quantum changes in performance and prosperity promised by Breakthrough look quite appealing to Simpson.

From an initial consultant's review of the company's activities, Simpson developed, with the support of the Strategic Planning Department, a list of aspirations which he wanted the company to achieve:

Number 1 for Customer Service
World Class Quality
World Class Productivity

These aspirations were to be used to direct the company's Breakthrough initiative and are not entirely surprising, stating a desirable position for any company.

However, the above aspirations on their own did not represent tangible sources of strategic intent and required translating into measurable objectives for the Breakthrough initiative to focus on. The process for this measurement development involved the managing director's office developing the business measures from comparative studies of UK automotive competitors performed by the Strategic Planning Department. The final requirements or goals which were established for the company to succeed and ensure its existence (i.e. to achieve a turnaround) were:

* 30% Costs Down.
* Number 1 C.S.I. (Customer Service Index), the National Car Buyers Survey index of customer service quality.
* 50% Sales Overseas.
* 80% of Customers and Dealers see Rover as Service Standard Bearer.
* 6% Return on Sales.

The use of comparative values may have helped quantify the changes required of the company but because the measures were mostly derived against current best industry practice did not include any statement of the future position which the company needed to attain.

This can be a problem because, for example, today's standard of customer satisfaction will appear

obsolete or be uncompetitive in 3 years time. This is particularly true in this example when it is considered that the UK car market is set to become greatly effected by the new manufacturing operations of Honda in Swindon, Toyota in Burnaston, Derby, and Nissan in Washington, on Tyneside. If, this has happened by the time that Rover has achieved these aims, then it is likely that the company would still be behind the major manufacturers in the industry, they having made significant improvements on their present performance.

The value of such comparative benchmarks is discussed at some length in the McKinsey Award winning paper by Hamel and Prahalad who stated that:

> *'Imitation may be the sincerest form of flattery, but it will not lead to competitive realization. Strategies based on imitation are transparent to competitors who have already mastered them. Moreover, successful competitors rarely stand still.' (433).*

Hamel and Prahalad's paper examines a firm's approaches to strategic thinking and presents the hypothesis that all successful organisations, both Western and Japanese, share a company vision with which the whole corporate machinery operates. Hamel and Prahalad call this vision *'strategic intent'* and state that it should encompass more than just an image of the organisation's operations significantly improved in performance but that it should also include an active ingredient of the organisation constantly changing and redefining its aims in order to become rejuvenated. The development of such an active management paradigm is one of the fundamental aims of the Breakthrough approach.

Hamel and Prahalad also criticise the approach, adopted by Rover for its Breakthrough aspirations, of concentrating, if indirectly through an industry wide measure, on the market leaders for comparison.

> *'The lesson is clear: assessing the current tactical advantages of known competitors will not help you understand the resolution, stamina, and inventiveness of potential competitors.' (434).*

The author accepts this criticism of setting numerical targets and finds Rover's vision to be quite unimaginative and restrictive of the nuance of the change involved in the company's Breakthrough.

Rover is different from other automotive manufacturers because of its relatively small size and yet it still believes itself to be a major player in the automotive manufacturing industry. This can be seen in the way that Rover has set itself the aim of being as good as the market leaders and not different from them.

However these leaders are in a different market and operate with fundamentally different constraints. Rover's persistence with this inappropriate vision is probably the legacy of the Ryder era at British Leyland when the company was in the position of trying to remain a global player despite all its internal and economic problems.

Once the Breakthrough aims were established, an executive conference, or to use Rover's own internal language 'a scrum', was held over a weekend to derive the implications of the measures on the operations of the company. From this discussion emerged fourteen projects, the Breakthrough Projects, each being led by a main board director and each with a loosely defined area within which to achieve the improvements demanded by the measures.

The fourteen projects cover many areas which, owing to the specific nature of their objectives, cannot be identified in order to protect the company's future potential sources of competitive advantage. An example which can be divulged, because of its position as an obvious core activity of the company, is that Breakthrough project concerned with the company's finished vehicle distribution network.

Problems were experienced with many of the 14 Breakthrough projects sharing overlapping areas of interest and also with the subsequent growth of the numbers of people involved as many sub-groups were created. This proliferation of activity warranted the introduction of a structured and bureaucratic reporting method to enable the managing director to keep track of the Breakthrough initiative. This reporting structure was developed by Charles Smith and Associates, the project's consultants (435).

The reporting forms which were introduced as part of this reporting procedure also had the effect of introducing rigid working patterns to the Breakthrough initiative with the Breakthrough groups having to follow the structures represented in the forms. The reporting structure also introduced its own language of 'SMAC-goals', 'Breakdowns' and 'Key Thrusts', which excluded those individuals previously not involved in the project groups from contributing. To some extent this new specialised language also excluded the involvement of some members of the groups who were not part of the project management teams.

The language introduced in the reporting system was not easily deciphered (e.g. SMAC-goal to represent a sub-project aim) and, if for some reason an individual failed to learn the definitions as they were introduced, it would be difficult to become sufficiently involved in the form filling process to build a

retrospective understanding of the language.

The reporting system also became an alternative focus of attention away from the 14 Breakthrough projects. One attempt at completing a particular report was observed to take up over three hours of a meeting attended by 16 Rover managers. This meeting failed to make any progress in the matter of the form's completion and was followed with several meetings of the project's management group before any contribution to the form's content was made. This has most likely been repeated at all of the groups, sub-groups and associated projects reporting into any of the 14 Breakthrough projects and, the researcher feels, represents a colossal waste of time and effort which has also alienated many influential individuals from the Breakthrough Initiative and threatened the future success of Breakthrough in Rover.

Individual project champions have also had problems coordinating the activity towards the preparation of estimated financial savings and benefits which have been requested by the Board of Directors. The request for financial estimates led to a further level of reporting in some of the Breakthrough project groups, introducing more exclusive language which further prevented the other groups from understanding the activities being undertaken.

The development of this specialist language and the factionally focused secrecy which has surrounded the project groups has led to an ever building mystique within the rest of the Rover organisation as to the nature of Breakthrough and the company's activities. This is most evident in Rover's middle managers who have heard of Breakthrough but have not been involved. The mystique is strengthened by the lack of any formal communication exercise ahead of the Breakthrough initiative's introduction.

The level of mystery surrounding Breakthrough in Rover was not observed in British Petroleum where company-wide communications had attempted to ensure that the whole organisation was aware of, and contributing towards, the company's Breakthrough (436).

Some of Rover's Breakthrough projects involve whole areas of the company, particularly those personnel employed in the engineering departments where working practices need to be implemented to reflect the new manufacturing and marketing considerations needed for the company to achieve its Breakthrough intentions. With the absence of any formal educational material explaining Breakthrough, ad hoc presentations and training packages have developed. These use the cascade method, as used in the only large-scale training exercise seen before in company, the TQI (Total Quality) initiative, to convey

information to employees.

An H.M. Schools Inspectorate review of the cascade method, used in the G.C.S.E. syllabus introduction, explains that:

> *'The cascade model has been used for many years, particularly in industry and commerce, as a strategy for training large numbers of people within a limited period of time. Like all other methods it cannot in practice ensure a perfect system of delivering training. The gap between theory and practice is largely dependent upon the quality of planning and implementation of the strategy rather than the inherent weaknesses of the model itself.' (437).*

The report continues to explain that cascade training in the GCSE programme:

> *'faltered owing to the lack of expert support and the inadequacy of many department heads to plan, organise and to lead training sessions for their colleagues.' (438).*

These criticisms of cascading are echoed in the researcher's own observations of Rover's T.Q.I. initiative and the company's other cascades. These observations have led the researcher to conclude that there is an inherent weakness in the cascade method in that it does not guarantee that the same information is given to all those involved.

A recent 'Rover Tomorrow' cascade attended by the researcher, who had been involved in developing some of the material contained in the cascade, showed that the senior manager presenting the cascade was not aware of many of the major issues contained in the presentation. Instead of presenting the intended message of the cascade, the presenter improvised with his own thoughts. Some of this cascade presented information which was diametrically opposed to the original cascade material. The cascade approach can also be criticised because of the biases which can result from the top down approach. This is particularly true in a factional organisation like Rover where the senior people in the hierarchy are able to use the cascade to help promote their own strategies.

7.4.1 Example: The Distribution Breakthrough Project

As has already been explained, the Breakthrough idea was pursued at Rover through 14 Breakthrough projects. For a full understanding of the development of Breakthrough in Rover and the process adopted to introduce it the researcher investigated one of these projects more closely. Being involved in the

distribution based project introduced earlier, the author is in a position to record and discuss the operation of this group and its part in the total Breakthrough initiative. This investigation will also provide an insight into the operations of the other groups and detail the project's management processes.

Clearly this area is at the heart of Rover's future plans, and so commercial security prevents the exploration of much of the content of the group's activities. This restriction of presentation of the individual strategies involved does not impinge upon the contextual or process study which was developed from this observed and documented data source.

The original constituents, i.e. the personnel but not the factional representation, of the distribution project have changed over the past year, not least because of the arrival of a new project chairman following some executive level bartering between the company's two Commercial Directors (Land Rover and Rover Cars). Other members of the group have left following changes in their areas of responsibility, altering the balance of departmental, but not factional, representation within the group.

The activities of the distribution group concentrated at first on measuring certain performance factors to determine the company's relative standing compared to its competitors. It is interesting to note that this information was not previously known within the organisation or included in the study that determined the company's initial Breakthrough aims which was used to establish the 14 Breakthrough Projects. The information concerning some of Rover's performance monitors is still unavailable 18 months into the project. This is part of a general lack of progress towards the company's Breakthrough which is discussed later.

The distribution group was quickly pressed to quantify its intended financial savings. Despite the early discussions investigating Breakthrough philosophy as a fresh approach based on discounting established ideas, a familiar approach of taking the organisation's present costs and shaving parts from these was used to establish the financial parameters of the project.

The group's attention was then given, not to how the estimated savings could be enacted but into certain areas of distribution activity which it was felt could realise a saving of the same magnitude as the initial financial estimate. This ensured that the activities which the group were going to take would bear no resemblance to the financial statement provided for the Board of Directors to develop project management decisions and formal corporate plans.

This practice of presenting an external view which bears little resemblance to actual activity reflects that found earlier in the preparation of the Corporate Plan (called affectionately by one of the managers who prepared it as 'The Corporate Novel' (439)). It also shows an entrenched history in the Rover organisation of recording activities and plans knowing full well that they are not likely to be followed. In the case of the distribution project the financial goals were not even used as the basis for activity but rather as a statement for external consumption:

> *'The project milestones are a joint ownership of what we will declare to the outside of the meeting.' (440).*

This enduring characteristic was also observed very recently (9/9/91) when, operating in the 'Rover tomorrow way' introduced by the Product Supply Director, the researcher and his colleagues in the Manufacturing Strategy department have been asked to develop many contributions for the 1992 Corporate Plan. These were not demanded to represent a tangible plan for the company but as a result of the need to lodge a formal corporate plan with BAe's senior management.

The distribution project group then proceeded to examine the areas of real interest to the project, as opposed to those presented for external consumption, and spent many weeks examining various detailed plans which were presented by the group's factions. Most of these 'new' initiatives were observed to have been present in the organisation for many years. The pre-existence of these strategies could be seen from the dates on many of the reports circulated as supporting evidence and the age of the data used in many of the calculations contained in these reports and studies. These pre-existing strategies and initiatives were now effectively given chance to re-enter the company's formal planning activities after having laid dormant in the organisation and its factions. This detracted from the compant's adoption of a "classical" Breakthrough approach which demands the need for new solutions to be used to achieve the intended change in organisational operation.

This extended non-progressive cycle of constantly assessing pre-existing strategies to try and establish if they were now useful was broken when it was realised that certain areas and possible strategies were recurring in the discussions. The resolution of these issues was thought by the project champion to be fundamental to the project making any progress.

These key areas of corporate activity were discussed at a special day long meeting of the distribution

project group before it agreed on a list of 12 areas of attention. This list of project areas had been developed by a small number of project members before the group met and was aired towards the end of the meeting. The researcher found that the whole day's session was orchestrated to ensure the agreement of the group on the pre-prepared list of issues. This finding is supported by the way that a pre-typed list of the project areas was circulated at the end of meeting.

The researcher understands that this hidden agenda, i.e. the use of a discussion not, as was openly declared, to develop the project issues but to confirm a list previously defined by a factionally aligned group of project group members, confirms his observation that Rover's factions even operate within very small groups of individuals. The faction which had developed the issues list was derived from the commercial departments in the project group and excluded the manufacturing and product development representatives.

Following this "consensus" individual sub-groups or working-parties were created to address these 12 issues. The roles of the 12 working parties need not be recorded to explain their nature because again this information could compromise the company's strategic plans. However one example can be given of the sort of area covered and is that which focused on the future development of the PDI (pre-delivery to the customer inspection).

At this point in the project's development it became clear that many of the 12 working-parties coincided with the activities of another of the 14 Breakthrough projects, and so, after some discussion away from the group, the Breakthrough projects were combined. The new project kept the structure already established by the distribution group.

The distribution project's sub-groups then tried to determine how to develop strategies to alter the performance of their own pieces of the new distribution project.

It was at this point that the Breakthrough initiative became too large for the MD to grasp all the activity occurring and so the Charles Smith and Associates' reporting procedure was introduced.

The reporting system was also accompanied by renewed pressure from the Executive Committee for the 14 main project groups to establish more detailed financial estimates, this time broken-down to cover the different sub-projects' activities. This ran contrary to the declared belief of the initiative's chief consultant that predictive measurement of Breakthrough should be avoided because:

'Cost goals limit vision to something nearer today which it is easier to quantify.'

(441).

A great deal of the earlier zest for results at the main project level, i.e. the 14 projects, did not filter down into the sub-groups. The sub-groups were staffed by the individuals in the company who were involved in the daily operational management of the particular activities under scrutiny, e.g. the managers concerned with PDI development were included in the PDI sub-group rather than, in this example, the Quality Strategy Director.

7.4.2 A Failing of Commitment to Rover's Breakthrough

The sub-groups were observed not to be functioning in a Breakthrough style, barrier-less environment and as a result were heavily constrained by the previous activities and operating methods of the company. This lack of a pioneering type of thought was amplified by the imposition of the SMAC Goals reporting structure, which the individual members of the groups interpreted as being a list of wishes from senior management. These wishes were unrealistic in the world represented by the sub-group's members own operational experiences and resulted in a growing doubt about the projects potential for success.

This scepticism and mistrust resurfaced in the main distribution project group with sub-project champions unwilling to start the investment neccessary for the solutions which were being developed. The sub-group's champions did not believe in the ability of the other sub-groups to supply supporting commitments.

There was another factor involved in fuelling these growing doubts which centred on the expectation that those projects concerned with market research would be able to define, in detail, the future demands of the company's customers. This is not the perceived, current role of the market research department who see themselves more as trying to identify the future demographic profile of the car buying public, with some accepted degree of inaccuracy, and are not involved in producing detailed definitions of vehicle specifications. This lack of expected response from the marketing faction to the wishes of the engineering factions in the project caused a large degree of friction in the project and served as an excuse for the product engineering and manufacturing factions to delay any actions with the declaration that they could not develop solutions to undeclared problems.

As the belief that success, at least of the magnitude required for the company's Breakthrough, was

unlikely to occur grew in Rover's senior management other measures were adopted as new, inwardly derived, Breakthrough goals which were more in keeping with the company's traditional performances. One very prolific alternative goal, to detract from saving 30% of the company's costs, has become written as the definition or goal of the distribution Breakthrough. This new statement cannot be disclosed because it not only identifies an area which Rover would like to be a major source of competitive advantage but also because it defines the size of that advantage.

The new goal has proved to be very damaging to the company's potential Breakthrough because it spawned many extensive strategies which sought to develop operating systems for the company which had the singular aim of achieving the new goal, i.e. it led to the erecting of more "barriers". These strategies were normally developed at great expense and represented solutions which would prevent the company from achieving a Breakthrough in many of the 14 other Breakthrough projects. The middle and senior management of the Rover organisation have now latched onto the new goal and believes that this is the intention of the distribution Breakthrough initiative.

The new distribution goal was used as the justification for many unconnected proposals from the company's factions.

The researcher finds that this use of the distribution project, with its implied authority derived from the support of Simpson and the Board of Directors, to develop factional strategies shows how Rover has failed to alter its organisational mechanisms in line with those changes expected of Breakthrough. This failure to change the focus of the organisation stems from its inability to comprehend the Breakthrough approach.

The researcher has observed that Breakthrough is seen by Rover's factions as a way of developing strategies and not as an organisation transition mechanism. As a result the factions are using Breakthrough as an extra forum for their political debates and fights.

The Breakthrough initiative was the first company-wide activity which included the Land Rover, 4x4 manufacturing, part of the Rover Group organisation as an integral part of the organisation. The researcher has observed factions within the Breakthrough projects developing new Cars and 4x4 alliances as well as the traditional engineering and commercial departmental divisions. The two product group factions, 4x4 and Saloon Cars, believe that their own business is inappropriate to the other's operating

methods and that their methods are superior and should be pursued by the other part of the company. This new factional split has hindered the development of Breakthrough strategies by introducing unnecessary discussions which intend to develop a unified approach. The researcher reasons that the two organisations are too different in their intentions and markets to enable such a global plan to be developed which would satisfy the concerns of both.

In contrast to the approach used at British Petroleum, the Rover attempt at Breakthrough has been observed to have a distinct lack of commitment from the top management. Commitment is shown to the other members of the Board but the lack of training and general support available to the sub-projects and the rest of the organisation is a noticeable example of how unwilling the company and its factions are to fund the initiative. The use of JMW at British Petroleum to provide much assistance and training to the groups is contrasted with the distribution Breakthrough sub-projects at Rover having had very little formal contact with Charles Smith and Associates or Simpson. For example the only contact with the 13 other Breakthrough Projects is through the distribution group chairman's role on the board of directors. Information on the status of the other projects in the initiative only occurs when reporting practices are imposed on the group or as a result of specific requests:

> *'I don't see them talking very much. I can't see anything in W's minutes to see any flow of information at all.' (The distribution project secretary's reply when he was challenged about cross-Breakthrough project information availability) (442).*

A lack of progress in the distribution project in general, and in particular in 3 of the sub-groups or working parties, led to the establishment in December 1990 of a Full Time distribution Team of which the researcher was a member. This appointment to the Full Time Team gave the researcher an opportunity to observe the Breakthrough initiative as it was attempted to be introduced, at a relatively late stage, to much of the company's operational staff.

The Full Time Team consisted of eight people from across the company and its factions (e.g. commercial, manufacturing and product development), and also from across both companies in the Group, Land Rover and Rover Saloons. The Full Time Team identified a series of 25 milestones and nearly 300 sub-activities which were required for the distribution project to be implemented. These broadly covered the installation of monitors, achieving consistent performance and finally improving performance in order to move

towards an environment capable of delivering the desired level performance in the company's distribution network. Once this outline plan was agreed by the distribution Breakthrough project group the Full Time Team proceeded to identify and enlist company owners for the sub-activities, i.e. people who were willing to take responsibility for managing the implementation of the sub-activities. The owners were enlisted into supporting the project and encouraged to generate plans for its implementation. These plans were consolidated to create a distribution Breakthrough project plan.

The creation and operation of the Full Time Team comply with the Breakthrough methodology because it represents a means of developing radical strategies and the transferal of paradigm elimination techniques in the operational levels of the company.

The project team took 3 months to generate this plan and covered not only the working parties which were not progressing but also across the entire scope of the distribution project.

During the development of the project plan the Full Time Team identified many factionally based education packages which were supporting the company's factions' different definitions of the aims of the distribution project. One of the most important contributions that the full time team was able to make was the production of a 'Bible' or outline of the desired distribution network's performance. This statement allowed the company to ensure that any proposed activities really did support the distribution project and not just the intentions of their originating factions.

This statement could have jeopardised many activities which had been undertaken in the name of the project but it was evident that little progress had been made in the project during its first 18 months. This lack of progress was possibly a result of the absence of such a statement, a universal understanding of the project's aims, or most likely a near absence of commitment from senior managers in the company.

The current lack of observable progress in the distribution project during the 5 months following the completion of the plan by the Full Time Team, is attributed by the researcher to the newly established Product Supply Organisation (PSO). This lack of general response even prevented progress in some previously unconnected improvement activities in certain areas of the organisation which had become involved in the distribution project as a result of the Full Time Team's discussions.

The PSO represents the amalgamation of all of Rover Group's manufacturing and product engineering departments, under the control of the company's previous Product Engineering Director. The PSO was

created following the appointment of the Rover Group's last Manufacturing Director, Barr who was responsible for the Warwick University collaboration, to a senior post in BAe. This new, very powerful PSO faction is still trying to formulate its structure and determine the scope of its operations.

The researcher found that the change in organisation which created the PSO has been accompanied by a change in the power structure of the Rover Group's executives and has resulted in Breakthrough losing the limited commitment it had received form the senior members of the PSO.

This lack of commitment from the PSO faction has not been helped by the recent reorganisation of the Strategic Planning Department. This small but influential group was aligned with the MD and Finance Director and created a significant and highly influential faction which had been the strongest supporter of Breakthrough. The movement of the Strategic Planning Director to the position of MD, Rover Italy, and the subsequent disbanding of his department has eroded the level of formal support for Breakthrough in Rover's Board of Directors as the sole means of developing improved company performance.

If the Breakthrough project is to be implemented at all it requires a concerted effort on behalf of Rover's senior management to express their commitment to the vision of the company's post-Breakthrough future. This public and formal commitment does not appear to be forthcoming, with senior members, of the PSO in particular, publicly criticising the company's focus on Breakthrough. Such a confirmation of commitment from the company's senior executives would, the researcher concludes, now be too late to progress the distribution project which has already lost most of its impetus following the lack of progress resulting from the inopportune timing of the company's latest re-organisation.

7.5 Discussion

Conjecture on Breakthrough technology, discussed at length earlier in this chapter, shows how the methodology aims to change organisation culture by concentrating on the development of radical strategies. The act of developing these radical strategies is intended to encourage the organisation to develop new operating methods in order to achieve some future ambition. Because of the changes in the operating methods, developed whilst the organisation formulated its new radical strategies, the organisation should develop the capability to readily formulate strategies and operating methods which enable it to overcome future problems.

This method of changing structures by developing radical strategy is a subtle approach to organisational

change and follows Chandler's early writings on strategy formulation. Chandler's theory, which he has since identified as an inadequate oversimplification, states that an organisation's structure is determined by the strategies it adopts (443). Breakthrough, by hiding the underlying aim of developing a rejuvenated organisation able to react to future changes from the people involved in the process of introducing such a change, openly encourages the organisation to develop new strategies believing that rejuvenated structures and operating methods will follow.

The researcher reasons that such an approach, particularly in factionally motivated organisations like Rover, is likely to be unsuccessful because the focus of most of the company's factions is to maintain and promote their own power-bases. The factions may be enlisted to support the development of new strategies but are very difficult to involve in developing changes to the existing balance of power represented by the company's operating methods and structure.

For example, Breakthrough, as Rover has adopted it, has presented a means for the company's factions to prosper through the introduction of new initiatives but has not been able to challenge the fabric of the factions.

Despite an attempted emphasis on boundary-less thought, Rover's Breakthrough initiative has led to an upsurge in the traditional factionally-based strategies, some of which have been in the organisation for many years. These strategies are all vying to fill the empty strategy arena created by the Breakthrough initiative.

Something very similar to this strategy upsurge was experienced in a study by Douglas of change in schools management systems (444). Douglas found that pre-existing strategies and policies flooded the organisations she examined following an initiative to promote increased localised management accountability. This swamped the management of the schools with new strategies and severely hampered the introduction of the new scheme.

The researcher has observed that there still remains an awe of strategic thinking in Rover and a certain degree of doubt as to the company's ability to adopt any strategies developed as a result of Breakthrough. This is not least because of the company's experiences of previous planning activities, typified by the Corporate Plan, which have often been discarded only shortly after gaining the tentative acceptance of the organisation's factions.

The division of the Rover organisation into periods when it can be seen to have been following particular strategies was described in Chapter 2. This periodisation described the current strategy pattern of the company as a period of re-alignment. Mintzberg (445) and Allport (446) hypothesised that such re-alignments may be the cause of cycles in strategies, with old strategies re-emerging in the company in a move to re-create its past success. This was observed in Rover where strategies which seek to make the company a world player once more have been discussed as part of the Breakthrough initiative. Much of the management of the organisation, and the researcher himself, believes that the company's current position and capabilities make this dream virtually unattainable.

As has been explored above the methodology of enrolling the organisation into the Breakthrough project has not given the desired results, seen in a lack of affiliation to the project amongst the company's top management, and is also reflected in the Breakthrough initiative's lack of progress.

As part of a coaching session by a Charles Smith representative for the distribution project members the area concerning the commitment of individuals to the project was discussed. This included a self assessment of commitment to the distribution project for the project members which, since it occurred almost 1 year ago, can be used to illustrate the researcher's own explanation of why the project is failing. The commitment assessment involved a model of differing levels of commitment (447). This represents the theoretical transposition of the driving forces present in a successful project into the commitment declared by the members of a particular project team:

Type of Commitment	Explanation
Source	Stands for the project's success at all times, regardless of the state of play. Is in the Project in word and action. Always a self starter, does not rely on others for his commitment. Without source the Project will cease to live.
Living at Risk	Prepared to commit and promise results and action beyond current capability as a way of bringing forth an extraordinary contribution. Needs the support and sourcing of someone else.
Participating	Has both feet firmly in the Project. Brings everything he has to the Project. Plays safe within his current capability. Will not promise more than he can guarantee.
Enroling Others	Is willing and able to enrol others in the Project. Can be counted upon to speak powerfully in support of the project. Is not willing to fully participate himself.
Keeps Word	Can be counted upon to deliver whatever he promises. He does what he says he will do but no more and no less.
Responsible	Accepts that he is responsible for what is happening around him on the project including the results and the breakdowns, rather than blaming someone else, but cannot be counted on to always keep his word (448).

On questioning, the 20 members of the Distribution project expressed their commitment to be:

Source	0 (0%)
Living at Risk	1 (5%)
Participating Fully	7 (35%)
Enroling Others	9 (45%)
Keeping Word	2 (10%)
Responsible	1 (5%)

This evidence suggests that the distribution project was lacking internal leadership, or the necessary contribution of someone willing, to ensure that the project succeeded. This leadership is not to be found from outside the distribution project group and this implies that the changes needed to stretch the organisation and so generate its rejuvenation or Breakthrough are unlikely to occur.

The researcher doubts that any of the 14 Breakthrough projects have sufficient commitment to ensure their success and will be instrumental in preventing the organisation from attaining its Breakthrough.

The way in which Pascale's ideas were transferred, through the network of management consultants, and into Rover and British Petroleum is a significant finding of this study. The study has identified the previously apparently undocumented, powerful impact of management consultants on innovation diffusion.

At the same time as the advent of Breakthrough in Rover, approaches were made by a few senior manufacturing personnel, including Barr, to Professor Dan Jones at Cardiff University, the US based manufacturing gurus Bill Conway and Hal Mather and the European motor industry analysts Ludwigson and Associates for information and consultancy advice. Another illustration of this discovery that Rover shared things in common with other organisations was the way in which a sizeable proportion of Rover's managers in planning related positions took, almost fervently, to reading certain relevant texts. A particular example of this concerns the book 'The Machine that Changed the World', a report of the IMVP (International Motor Vehicle Program, based at MIT in America) study of automotive manufacturing (449). A pre-publication copy of this text, which reports the operation of the Japanese manufacturers and their lean production systems, was sent to the MD for his approval. Because of the book's relevance to several of the Breakthrough projects, and the way that the book presented the lean production methodology as a possible strategy for the company to adopt and achieve its Breakthrough, the MD and several other Directors of the company believed that the book should serve essentially as a company handbook. As a result copies of the book now reside with every senior manager in the company. Unfortunately very few of these senior managers have read or, more importantly, understood the principles expressed in the IMVP book. This lack of comprehension of the contents of this, much talked about in Rover, text became evident to the researcher in his contact with many of the company's managers in connection with other issues.

This thirst for information and external knowledge in Rover appears to have been short lived. There are no longer the memorandums circulating in the company or the instances of managers recommending interesting texts that there was whilst the IMVP book was being promoted in the organisation.

The Pascale book concerning Benchmarking and deriving its information from studies of Toyota and Honda which was published only shortly after the IMVP study is, in contrast to the IMVP book, unknown within the Rover organisation (450).

The researcher understands that this example, and the company's recent exploits with a benchmarking styled approach to process improvement, shows that the Rover organisation has returned to its long-time belief that it is in some way a special case which operates by a different set of rules to other manufacturing companies.

The Benchmarking programme was instigated into the company by the Quality Strategy Director following widespread publicity of the method by several of the larger management consultancy firms. Benchmarking is a structured way of identifying weak manufacturing processes in a company, studying the operations of other selected organisations who have a proven world class record in that particular process and learning, but not exactly copying, their approach to improve the effectiveness of the company's manufacturing processes. This method, expounded by the Xerox company, is an easily-applied tool which has been proven capable of generating improved performance in many areas of a company's operations (451). Despite the efforts of the company's Quality Strategy and Manufacturing Strategy departments Rover has not pursued its benchmarking activity in an intellectual or logically considered manner. Rover's factions have preferred to circulate vast numbers of measures of the company's competitors, either unsupported or with incomplete explanations of how the performance levels are achieved. The figures are not accompanied by any understanding of the processes or management practices used in the competitors and has led to several decisions being made, primarily on a factional basis, intended to improve the organisation but which could seriously jeopardised its future.

An example of this is the decision to try and reduce the proportion of company staff to the same proportional levels found in the world class Honda and Toyota organisations without considering introducing the Japanese companies' working practices which enable them to operate with proportionally fewer staff, e.g. the Japanese practice of relying on supplier companies to undertake the majority of the design and development work for new models.

The trigger which led to the adoption of Breakthrough at Rover has been identified as the appointment of a new M.D. This follows the pattern of the successful rejuvenations examined by Stopford and Baden-Fuller who noted that four of the six organisations analyzed in their studies had received a new C.E.O. at the start of the rejuvenating changes. The two other organisations examined in Stopford and Baden-Fuller's study exhibited a significant change in view of the existing C.E.O., away from financial pressures and onto a longer time horizon (452), resulting in the same effective change in the company's strategic intent as seen in the other rejuvenated organisations.

It is of some concern to the researcher for the success of the Rover Breakthrough that its introduction was not due to, or has not resulted in, such a change of intent in the Rover organisation. This is illustrated

by the repeated requests for financial evaluation information by the executive committee from the Breakthrough projects.

Rover's Breakthrough approach also fails to follow Stopford and Baden-Fuller's rejuvenation model in that it was introduced after being 'sold' to the chief executive. Stopford and Baden-Fuller were unable to determine the exact cause of the changes in their rejuvenated organisations but they are clear that those external pressures and changes in markets which generated the rejuvenations were very pressing and were experienced by the whole organisation. It is Stopford and Baden-Fuller's belief that the appreciation of the pressures by the entire organisation cause the rejuvenation to occur under the guidance of the C.E.O. (453). This process mimics the radical peripheral model of Land Rover innovation which enlists a deep and internal understanding of a problem, and the adopted solutions, to facilitate lasting and effective change (see Chapter 8 for a more detailed explanation of the Land Rover innovation process).

In Rover's case the pressures leading to the adoption of Breakthrough were not perceived by the organisation as a whole but only by a few individuals.

Rover's modest success up to the privatisation, following new model introductions and a relatively fair financial performance in comparison to its competitors, had generated a false impression that the company had already made a turnaround. This was perceived in:

* Lengthy waiting lists for Rover 200 models and Land Rover Discovery.
* Buoyant sales of the ageing Montego and Maestro models.
* Insufficient capacity for the high demand of the new 'K' series engine.
* Excellent reviews of Rover 400 and new Metro models.
* Profit for first half 1990 at £33m (454).
* Increasing sales volumes despite 10% drop in T.I.V. (Total Industry Volume).

The researcher feels that these false success indicators, false because they indicated a snap-shot picture of success rather than representing the true health and long term future of the company, have inhibited the organisation's adoption of the Breakthrough initiative because the company as a whole did not feel the urgency of the situation which prompted Simpson to search for a solution which promised a radical change in performance.

The company's well-publicised successes of 1990 can now be seen to be short-lived or even misleading.

The recession has hit Rover just as hard as the rest of the UK motor industry with new car sales for the first 6 months of 1991 up to 30% below those of 1990. Rover has worked alternate week production on its Rover 800 model, extended the summer shutdown by an extra third and drastically reduced the production of most of its models in order to reduce its losses.

These sort of pressures would have improved Rover's adoption of Breakthrough by emphasising the need for a radical change in performance. The researcher concludes that the failing state of Breakthrough in Rover is too acute to be rescued by these new pressures on the company. These pressures, instead of promoting strategic thought in the company and the renewed support of Breakthrough, are making its executives embark on major cost reduction exercises to try and avert disaster, e.g. the closure of the company's Sterling subsidiary in the USA.

An academic intention of this chapter was to perform a comparison between Breakthrough and the Quantum Theory of Organisations. The Breakthrough rejuvenation at Rover has not yet begun to happen (and the evidence presented above indicates to the researcher that it is unlikely to happen), and as a result it can only be in a subjective manner that quantum theory can be commented upon after this study of Breakthrough.

If the Rover organisation achieves only a turnaround as a result of Breakthrough, or fails to change itself in any significant way, then the implications for successful change processes developed through consideration of quantum theory will require reassessment.

The additions to organisation transition theory which can be derived from this study, apart from that Breakthrough technology exists as a specific mechanism which intends to introduce quantum style changes to organisations, concern the inadequacy of organisation transition theory in respect to context specificty and its lack of texture (i.e. the ability to describe complex events like the interaction of Rover's factions), the traditional methodologies'inability to penetrate the public face of organisations (see Chapter 1 and 2's discussion of the value of a participant observation based study approach), the problems incurred by treating transition as an event rather than as a process of change (this steralizes future studies' ability to develop specific theories) and the lack of capability assessment.

The study of Breakthrough highlights the distinction between turnaround and rejuvenation as measures of organisational success. Miller and Friesen term their S-type organisations as successful but do not

differentiate how successful they are. The Quantum Theory would be much more valuable in helping organisations develop organisational transition strategies if it included a consideration of the possible resultant organisation's ability to maintain its success. Pascale's method of developing a configurational perspective, the seven S's as opposed to Mintzberg's Fives, has supported the researcher's own finding that Mintzberg's theories require enhancing by including an element of capability assessment.

The approach to capability assessment developed in this thesis, being a development of Mintzberg's longitudinal investigation methodology, is able to offer a more suitable approach to including capability assessment than that used by Pascale because of the established and widespread understanding of Mintzberg's methods.

Organisation transition has been shown to be a process undertaken by the organisation in question, is never repeatable and is effected greatly by any past events or changes in organisation structure. The researcher thinks that the literature requires to develop a process perspective in order to incorporate the above aspects into a suitable framework of understanding.

The Rover Group's approach to its relationship with Honda, and the design and manufacturing capability dependency of Rover on Honda which this relationship has generated (described elsewhere in this thesis), have not been addressed by the company's Breakthrough initiative. Honda have been involved in Rover's attempted Breakthrough but only because of their role as one of Rover's most important material suppliers and not because of their status as the source of most of Rover's manufacturing and product technology. The source of the Breakthrough initiative reflects the desire for Rover to survive as an automotive manufacturer by attempting to generate an organisation capable of funding its own technological developments and new products. Whether this strategy was identified specifically to remove Rover's dependency on Honda is unclear.

The introduction of the Breakthrough initiative, several recent projects which indicate the company's view of the Honda relationship as unavoidable, e.g. project Synchro, the details of which will become public shortly, and several conversations with the now departed Strategic Planning Director suggest to the author that Rover's Breakthrough may have originally been intended as a means of escaping from Honda. However this has become a lost intention as the Breakthrough project has developed and grown.

7.6 Conclusion: The Impossible Leap

This chapter has analyzed Rover's adoption of Breakthrough Technology, a means intended to induce rejuvenating transitions in an organisation's cultural and operational performance.

The study has identified, through a comparison of Pascale's approach and the configurational theories of Mintzberg and Miller and Friesen, three significant factors to be incorporated into some of the established literature concerning organisational transition. First is Mintzberg's lack of capability assessment, as explained in Chapter 2 of this thesis. Second is the lack of differentiation between turnaround and the more permanently successful rejuvenation type of organisation transitions. By focusing on rejuvenation the organisation transition theories could be extended to provide greater help for organisation's trying to achieve and maintain success. Third is the need to develop an approach which adds more texture or context specifity to organisation transition studies. The researcher concludes that the issues raised above would be provided for by the development of a process theory of organisational transition.

Breakthrough was introduced to Rover following the appointment of a new MD who was persuaded to adopt the Breakthrough idea by a firm of US management consultants.

This study has identified networks of such consultants as a previously uninvestigated but demonstrably powerful means of innovation diffusion.

Rover's Breakthrough has been analyzed and found to be failing, particularly when compared to the relatively successful implementation of Breakthrough by the British Petroleum organisation. The researcher found this failure of Breakthrough in Rover to be as a result of a lack of support from some of the most influential factions in the company and also because of the organisation's incapability to change its operating practices. Breakthrough was successful in developing strategies which demanded new operating practices but these have not been adopted by the organisation.

This lack of capability of the Rover organisation to undertake transitions is a further indication that Rover is unlikely to be able to develop the capabilities it needs to ensure its future prosperity.

The researcher concludes that Rover's Breakthrough, which represents the only real opportunity the company currently has to alter its operating methods, represents the impossible leap, a vision of a step that the company needs to make but is incapable of achieving.

Chapter 8. Operational Innovation in the Rover Group.

8.1 Introduction

The study of MRPII at Land Rover produced a view of the company as an acquirer of external technology whilst believing itself to be an innovator: an organisation developing unique solutions to its own problems. This observation was tested with a study of operational innovation which forms part of the discussion below.

The study was performed using the researcher's observations of instances of innovation in the Land Rover company supplemented by examples which arose following discussions with many members of the company's technical and managerial staff. The researcher concludes that this combination of operational, planning and his own relatively impartial views (see Chapters 1 and 2) of the Land Rover company ensured that the study was able to capture a balanced, though admittedly not exhaustive, picture of technological development in the company.

When the significance of the differences between Land Rover and Rover cars became evident, a similar study of innovation was performed in the saloon car manufacturing part of the organisation to provide a direct comparison with the processes found in the Solihull-based Land Rover organisation.

The results of both of these studies (Land Rover and Rover Cars) are summarised in this chapter, the details of the individual innovations examined are contained in Appendix B of this thesis.

This chapter outlines the findings of these studies using a contextual framework derived from the literature concerning innovation and innovation diffusion. This framework is used to discuss the sources and development of the Rover Group innovations. As such the chapter is not a direct study of organisational innovation processes, rather it uses the key innovation process differences between Land Rover and Rover to contrast the two organisations directly and assesses their potential for the development of future capabilities.

8.2 The Development of a Context for Rover's Innovation Processes

There have been many studies of what makes successful innovation and how the resulting ideas are related to other organisations for their subsequent development and usage. Much of this work can be seen as producing a contingency view of innovation, i.e. innovation being dependent on many factors which precludes the suitability of a pure innovation processes theory.

Freeman (455) identified ten characteristics of successful innovating firms as:

1. Strong in-house professional R and D.
2. Performance of basic research or close connections with those conducting such research.
3. The use of patents to gain protection and to bargain with competitors.
4. Large enough size to finance heavy R and D expenditure over long periods.
5. Shorter lead times than competitors.
6. Readiness to take high risks.
7. Early and imaginative identification of potential markets.
8. Careful attention to the potential market and substantial efforts to involve, educate and assist users.
9. Entrepreneurship strong enough effectively to coordinate R and D, production and marketing.
10. Good communications with the outside scientific world as well as customers.

The debate covering innovation contingency has developed for several decades following its identification as a key process of technology development in the early and influential studies of Schumpter (456), Jewkes (457), etc. which were supplemented by the further studies by March and Simon (458), Woodward (459), Burns and Stalker (460), etc.

This body of literature has developed into an orthodoxy- a mainstream theory of innovation, which tends to treat innovation as a *'black box'* (461) or linear process following a predictable course:

1. Problem Definition and Idea Generation
2. Invention
3. Research and Development
4. Application or first use
5. Diffusion (462).

This linear model generated sectional specific theories e.g.: Rogers model of diffusion (463), and encouraged empirical studies of innovation success (464).

Rogers developed a now widely-established model of innovation diffusion. This diffusion process is important because it determines how innovations emerge, become transmitted and subsequently developed.

> *'We can define diffusion as the process by which (1) an innovation (2) is communicated through certain channels (3) over time (4) among the members of a social system.' (465).*

The identification of this diffusion process enabled the investigation of the organisation diffusion processes (466)(467).

The value of such a diffusion process to this study, not as a theoretical basis, an aspect in which the diffusion model is attracting a certain degree of criticism (468), but as a context and language which

represent a means of explaining some of the operational differences between Land Rover and Rover Saloons.

The subject of innovation received renewed attention as a result of examinations like that of Abernathy into the rapid Japanese penetration of US markets. This penetration was primarily with the sale of cars and electrical goods (469). The success of the Japanese firms was first attributed to low labour costs but further study showed it to be based largely on two factors:

1. Japanese Manufacturing Strength (470).
2. Japanese Investment in US Patents (471).

The key factor linking these was found to be the Japanese organisations' innovation capabilities which enabled them to use existing technology and develop highly efficient manufacturing systems.

The Japanese companies were found able to achieve re-invention, or the tailoring of innovation to meet specific needs (472). The introduction of these rejuvenated products to the US was able to rejuvenate established market sectors by shifting the technological focus of the sector.

This rejuvenation was represented in Abernathy and Utterbeck's technology life-cycle model as a shift away from incremental production development backwards to a focus on product development and technological (or as Abernathy and Utterback termed it major) innovation (473).

This significant linkage of innovation to the market Abernathy, Clark and Kantrow termed innovation transilience (474), or:

'a capacity to influence production systems and their linkages to the market.' (475)

This enabled innovation theorists to formulate a dynamic configurational type of understanding of innovation and contingency specificity. The observed differences between Land Rover and Rover illustrate the existence of this contingent specificity, i.e.: each organisation having a unique way of configuring itself for innovation. The researcher finds that his observations of the Rover Cars and Land Rover organisations show that the 4x4 company's innovation configuration is more successful than the saloon car manufacturing part of the organisation's structure. It is this contingency specifity which enables this study of Rover to utilise innovation not only as a measure of organisational capability (and the development of that capability) but also as a means of identifying different operational cultures.

8.3 Innovation Processes in the Rover Group

The innovations examined in this study are described in Appendix B. This gives a brief description of the innovation, why it is thought to be worthy of inclusion and states which other organisations were involved in its introduction. The innovations studied were:

Innovation at Land Rover

AGV's (Automated Guided Vehicles) for V8 Engine Test/Assembly
Flexible Manufacturing Cells for Cylinder Heads
CNC (Computer Numerically Controlled) Pulley Machining
CNC Flywheel Machining Incorporating Robot Loading
Spot Welding Robot in BIW
Engine Test Facilities
Automated Stores
Chassis Sub-assembly Robot Welding Cell
Chassis Robot Line
The LAN (Local Area Network)
Paint Shop Electronic Tagging System
Service Parts Processing Capabilities
Rolling Road
VETS (Vehicle Electrical Testing System)
Range Rover Mini Paint
Final Inspection Data Collection System
E-Mail (Electronic mail system)
Hydraulic Ride Simulator
CAPP (Computer Aided Process Planning)
TARDIS System
QUAD/MESA System
EDI (electronic data interchange)
MRPII Production Control Systems
Electrostatic Paint Systems
Automated Paint Spraying
SCOPE System
PROSPECTS Bill of Materials
Hot Melt Adhesive Spray
Laser Door Open Detection
Facilities Design on CAD System
Robot Chassis Spot Welding
CNC Hobbing of Gears

Innovation at Rover Cars

Robotics for Rover 800 BIW
Order File
Cell Management
TQI (Total Quality Initiative)
Laser Body Measurement at Cowley
Engine 'Stuff'
VETS (Vehicle Electrical Testing System)
Robotic Leak Testing
Glazing Cells
CAD System Input from Clay Models
FMS Introduction in Rover Power Train

The data was examined using two criteria:

1. The source of the innovation's introduction to the respective company.
2. The originality of the innovation.

The criteria were chosen because of the researcher's observation that much of what the Rover Group's management believed to be innovative (i.e. developed solely for Rover's use) was in fact already being used elsewhere, and normally in other UK automotive manufacturers.

The classification into novel applications of existing technology or usage similar to other examples in the same industry, did not intend to cover the relative significance of the changes as introduced to the company itself. The significance to the company was inherent in the inclusion of the innovation in the original study.

The initial identification of the innovations had led the researcher to conclude that the examples given (particularly those for the Land Rover organisation) had been developed by the company itself. Closer investigation showed that the majority of the innovations had actually been introduced into the company by external organisations and equipment suppliers.

The results of the studies into innovation within the Rover Group are summarised in table 18.

	Land Rover	**Rover Cars**
Internal Source	3	0
External Source	29	11
Innovative	4	2
Non-Original	28	9

Table 18. Results of the Study into Innovation in the Rover Group.

The study identified more examples of innovation in the much smaller Land Rover part of the organisation, tending to confirm the researcher the previously made observation that Land Rover was somehow more receptive to innovations than the Cars part of the group.

These comparisons resemble closely a study performed by Pavitt (476) which analyzed 30 industrial sectors to find where and how innovations were generated. The study identified four clusters, or possibly organisation structure configurations, of the firms:

1. Supplier-dominated firms which rely on external sources.
2. Specialist suppliers of their own design and development.
3. Productive intensive, generally driven by a standardisation of processes.
4. Science based, the locus for innovations is within the research and development activities of the firm.

Pavitt's study concluded that:

> *'a high proportion of the knowledge base which underpinned success was actually located inside the firm in forms which were highly tacit and therefore often difficult to transmit to other firms.' (477)*

The Rover Group study, having found that nearly all the innovations were transplants of technology from external suppliers or used techniques generally available in the public domain, represented an example of Pavitt's supplier-dominated firms or corresponded with the simple diffusion processes explored by Rogers (478).

However there were differences within the Group in the perceptions of innovation: the Land Rover organisation's management and staff wrongly believed that the ideas it had adopted were innovative and unique whereas the Cars organisation's management and staff rightly identified their innovations to be stolen from other companies. The researcher believes that this is a result of the respective adoption processes, with Land Rover's ideas being developed into real propositions by Land Rover itself whilst the middle management and staff of the Saloon part of the organisation is not generally involved in the changes until after they have been implemented. The introduction of new facilities and practices is traditionally the concern of senior managers and directors in the saloon manufacturing part of the organisation.

This involvement of the adopting organisation, in developing and so understanding the innovation or technology, appeared to the researcher to be a key factor in determining how successfully the change was adopted by the company. It also illustrates the Rover Group organisations' (Land Rover and Rover Cars) future abilities to adopt or learn new technologies, techniques or capabilities.

8.4 Discussion

The difference the researcher has identified between the two Rover Group organisations' innovation methods is based on the discovery that the ideas have been more successful at Solihull, having been pursued to a conclusion rather than just petering out as at Rover Cars where the ideas are quickly dropped

from the organisation's focus without being fully implemented. This failure to adopt innovations fully in the Rover Saloon organisation is believed by the researcher to be a direct result of the ideas not having been successfully incorporated into the organisation. Grinyer and Spender's recipe process of strategy incorporation emphasise this process (479).

Grinyer and Spender use the term "recipe" to describe an organisation-wide view, either formally or informally maintained, of the organisation's strategies. For a company to progress Grinyer and Spender argue that appropriate strategies have to become part of the recipe. Similarly for innovations to be successfully adopted the Rover data suggests that they have to be accepted by the organisation, i.e. register in the recipes.

Land Rover's ability to ingest ideas and generate the feeling of their belonging to the organisation, irrespective of where they have originated, has been shown in the MRPII introduction which involved much tailoring of IBM systems to match Land Rover's aspirations (see Chapter 4). The MRPII ideas were used and enhanced by the Land Rover organisation, i.e. incorporated into the company's recipes.

However, Rover Car's innovations are generally acquired from external sources and are normally superimposed onto the organisation by senior management and not further developed or enhanced by the management and staff of the organisation.

The ideas are introduced at Rover Cars by practitioners who are not part of the operational or support staff, e.g.: Warwick University for the leak testing cell, cell management and VETS equipment, Honda for much of the R8 and Rover 800 manufacturing facilities, contracting engineers from equipment suppliers like Kuka and ASEA for robots and PA Consultants for TQI and ISTEL for most of Rover Cars system and communications development. This does not occur at Land Rover where the company itself is in charge of the technical decisions and the management of the project which may involve the sub-contracting of activity to other suppliers like ISTEL and Puma under close supervision. The Saloon Car's approach has alienated much of that organisation from change processes, and past failures, as a result of poor understanding at management level, have degraded the viability of future projects by eroding the organisation's trust in these external suppliers e.g. the observed general scepticism concerning Warwick University staff by production managers as a result of developments like the leak testing cell and more recently the inappropriate and costly introduction of FMS (flexible manufacturing systems) to the power

train manufacturing division. This caution is likely to have further restricted the Rover Cars company's ability to develop new capabilities which are required for it to survive and prosper.

Another result of the process at Rover is found in the company's inability to exnovate or cast off unacceptable or unsuitable technologies or operating paradigms. The value of exnovation is that it allows an organisation to change its focus and not become entrenched in one mode of operation (480).

Land Rover have been shown to do this by their rejection of unsuitable, previously established production control systems in favour of the MRPII approach. The Rover Saloon organisation however is not so free to exnovate. Gardiner noted this in his study of Austin Rover's lean designs which showed the now Rover Cars organisation unable to discard the hydrogas suspension or transverse engine in favour of more robust alternatives (481). Similarly the present saloon manufacturing company is unwilling to discard its existing operating methods, i.e. its management practices and marketing stances, particularly the belief that Rover cars have to compete head-on against the likes of Ford and GM.

This study has identified innovation as a means of acquiring or developing organisational capability and supports the belief that Rover Cars, having lost part of its product design capability, is unlikely to be able to acquire or develop a fresh capability. The data shows that this has not only occurred with respect to Rover Cars product design capability but also in the area of manufacturing capability. Land Rover however has been found to have kept and maintained the ability to innovate, through using external ideas. It has managed to develop a process which allows it to acquire the belief that it generates the ideas itself. This was observed as the researcher gathered the data for this study. Land Rover's managers and staff who had been involved in the introduction, and subsequent operation of the innovations identified, exhibited a high degree of enthusiasm for the innovations. These personnel only admitted to the existence of similar techniques or technology elsewhere when challenged. This admission was accompanied with uncorroborated explanations of why the other examples of the innovation were significantly different to Land Rover's. These personnel expressed the opinion that Land Rover's implementation of the technology was unique and represented a major advance, e.g. the adoption of the widely available CNC technology to control hobbing machines to manufacture Land Rover's unique gear designs (hobbing is a metal removal technique which forms a gear shape by rotating both the work piece and cutting tool on different spindles).

This acceptance of ideas as its own has been found to ensure that Land Rover's chosen innovations are successfully adopted into the company.

Rover Cars however believes that it does not have sufficient innovative capability, or resources to fund the little remaining capability sufficiently, and so does not often attempt to innovate and as a result fails to successfully adopt even those innovations it has decided it desperately needs.

This supports Pavitt's findings that most successful innovation (by which Pavitt meant the introduction of something which has a radical effect on the organisation) is located within the organisation. The Land Rover operating model allows the subtlety to be introduced that the innovation can be acquired externally provided there is an internal capability to ensure its successful adoption.

Abernathy's market linkage (482) suggests that Land Rover's innovation capability could be a direct result of its being located in a slow moving market with a dominant position. The company has defended its position through the adoption of a regular incremental approach to improving its products and manufacturing facilities. By being the first into a small and limited capacity market Land Rover's position has previously excluded the competition from gaining a foothold. The size of the 4 wheel drive off-road market has, following Land Rover's entry, limited the profit potential for late entries significantly enough to deter competition. It is only recently that 4x4 leisure vehicles have started to be widely manufactured. Land Rover's response, the Discovery, has stemmed this competition by utilising the specialist knowledge acquired by Land Rover's innovation capability throughout its history. This was applied to the lower edge of the market in a successful attempt to restrict the competition from entering the market.

Cyert and March proposed that the conflicting results of several studies concerning the optimal size of organisation to innovate was as a result of relative organisational slack (483), i.e. the freedom from other pressures which allows the organisation, whatever its size, time to innovate. This argument away from size and onto slack is supported by Abernathy's notion of capability linked to the market (484). Land Rover for many years has not had any direct competition and this has enabled the organisation time to develop its products and the corresponding innovation methods. The alternative situation is seen at Rover Cars which has constantly had to operate in a highly competitive market and has had little or no slack time to innovate or develop an innovation method.

The imposition of a mass production-orientated culture by Wilkes onto the predominantly craft-based

working methods of the 1920's Rover organisation (i.e. the manufacturing of each vehicle by skilled people who use their skills to make each part of the product fit correctly, as opposed to mass production which uses low skilled personnel to assemble parts designed and manufactured using systems which ensure that they should fit together without the need for skilled fitters) was identified in Whipp and Clark's study of the SD1 project as the key reason for the company's failure in the 1981 saloon car market (485). The researcher concluded that the slower moving 4x4 market has proved a better match to this combination of mass production with a craft based culture. Land Rover is able to maintain its innovation capability, as related to the crafting of products, and also to use modern methods to ensure the quality and productivity of its manufacturing operations.

The findings of this study of innovation processes coupled to the external sourcing of design capability, i.e. the development of Rover Car's models from what are essentially Honda designs, has much in common with Cusumano's examination of the Japanese car industry. Cusumano analyzed the absorption of western ideas into the, then struggling, embryonic Toyota and Nissan organisations and showed that the organisation's absorption of these ideas was based on:

1. A depth of engineering ability
2. The re-development of techniques to match the Japanese context (486).

Rover Cars have had a similar opportunity to acquire Honda's design capabilities but have not managed this acquisition successfully. At the time of the company's entry into the collaboration with Honda Rover had the engineering ability to match Cusumano's Toyota and Nissan but Rover has not shown the re-invention aspect of Cusumano's process.

That the technology which Rover wished to acquire from Honda was closer to that which the company already had should have meant that it was easier for Rover to learn, but, because Rover did not have to re-develop this technology to apply it to its vehicles, the company has not had to generate a detailed understanding of the technology. This would have helped the ideas to be properly absorbed by the company.

This identification of re-invention as a powerful force in technology acquisition is closely allied to the successful innovation activities observed in Land Rover which has to apply the technology to the special needs of the 4x4 products and market.

8.5 Conclusion

This study has identified a fundamental and significant difference between Rover Cars and Land Rover concerning the companies' capability for innovation. This identification was made by examining various examples of technology acquisition in the Rover Group.

Rover's past development as a highly innovative car manufacturer should have enabled it to keep this reputation but its failure in the 1970's led to a capital starvation process which severely curtailed the company's saloon car design capabilities. By injecting Honda's capabilities the company gained its survival but it is evident that it has not re-learnt or re-acquired this ability.

The re-invention process seen at the heart of the emergence of the Japanese manufacturers was found to be a key aspect in the approach found in the Land Rover part of the organisation. This was identified as a successful innovator.

For the Rover Group to have a viable independent future it needs to be able to generate its own new models. Presently Land Rover is able to manage this renewal. However, Rover Cars is heavily dependent on Honda for its developments in this area and also for its manufacturing capabilities and, as has been shown throughout this thesis, is incapable of developing the appropriate capabilities.

This study has identified the significance of an organisation's accepting ideas, either internally or externally sourced, in maintaining a successful innovation process. This has tied together several previously isolated or non-mainstream orthodoxy theories of innovation and innovation diffusion, i.e. slack, re-invention and incorporation into recipes. A further analysis is required to determine the potential impact these influential adoption factors on current innovation theory and its future development.

Part IV - Interpretation

Chapter 9. Discussion

9.1 Introduction

This thesis has described a study into strategy formulation in the Rover Group. The main points arising from this thesis will now be discussed using a structure which focuses on five key concerns:

1. The investigative methodology, including an assessment of how successfully the biases associated with participant observation have been countered.
2. The development of a capability based future-forward perspective. This section will include a discussion of Rover's future and the capabilities it will require.
3. The periodisation of Rover's strategies and the generalisations which have been possible through the adoption of an alternative approach to that proposed by Mintzberg.
4. The development of a link between the main bodies of strategic management literature: the management science-processual and behaviourist-structural perspectives.
5. Specific considerations concerning US/European and Japanese operating contingencies which were established during the operational level investigation of strategy formulation in Rover.

9.2 The Method of Investigation

This thesis has adopted an observing participant approach to develop a longitudinal perspective of Rover. The general observation of the company was supplemented with probes of specific strategies in the organisation. The author has been aware of the problems generally associated with participant observations, introduced in the literature review, and has tried to prevent their influencing the research. The influence of the problems normally associated with participant observation have been reduced in this study because of the researcher's activities as a participating observer but will be reviewed here to determine how successful the study has been at removing associated distortions.

The major problem associated with the participant observation approach is that bias can be introduced because of the researcher's relationship to the subject under investigation. The main biases were identified as:

1. the control effect
2. data access limitation
3. problems with impartiality to the subject.

The first source of distortion to be identified was termed the control effect (487). This is when the organisation and its operations change because of the presence of the researcher. The entry of one researcher, of a relatively low status compared to where the decisions are made, into an organisation of the size and factional focus of Rover is unlikely to singly lead to a change in the company's operations. It is hoped however that the work performed for the company whilst the researcher has been employed has contributed to an increase in the organisation's effectiveness but this is not a direct result of the participating observer approach and does not represent a distortion introduced because of the study.

Rover is used to having internal academic investigations carried out on itself as a result of the close links with Warwick University. These links have seen the advent of many IGDS MSc projects over the past 6 years. Observation of some of these MSc projects has convinced the researcher that the organisation has not reacted differently to his research focus than is normal towards the MSc projects. The project observation has also indicated that the IGDS projects (and this PhD study) are not subjected to any alteration in the organisation's behaviour because of their presence.

The second form of bias identified which can be associated with participant observation concerns the researcher having access to all the data which is relevant to the study.

The high level of acceptance and familiarity which the organisation shows for self-study projects and the identification of the researcher as an employee performing a study for Rover will have removed possible inhibitions in communication between the researcher and Rover personnel. These inhibitions if present would have seen information being withheld or communicated in a manner which made it more acceptable for consumption outside of the organisation.

The researcher was more concerned that information had been distorted by Rover personnel not because of his research interest but because of his position in the company hierarchy. This represents the apparently common occurrence of the factional focus of the company interfering with the organisation's internal communication processes.

The researcher has discussed aspects of this project with various Rover managers and nothing has emerged which suggests that significant developments in Rover have been missed by this study, suggesting that the relevant data has been fully examined. The role of the researcher's department, Manufacturing Strategy, Group Engineering, is founded on the interpretation of the company's strategies

as they effect the design, manufacture and supply of vehicles. This location has helped ensured that a total picture of the company's strategies was collected.

In some respects the researcher feels more informed about some of Rover's developments than many of his colleagues because he has been investing time and energy in keeping aware of the company's various initiatives and developments.

The third bias associated with participant observation results from a distortion of the impartiality of the researcher because of his involvement in the organisation. There is a danger that the researcher acquires interests which are for other than pure academic curiosity and becomes obliged to distort the findings of the research to support these erroneous interests.

The researcher feels that a suitable degree of impartiality has been maintained during the research because it has been approached in an exploratory manner, attempting to gain an understanding of the events occurring in the organisation. The primary motivation has been to learn from the organisation and apply this to the research. This academic approach has protected the research from acquiring any prejudicial stance on the issues examined.

The high degree of precedence that the research has been given by the researcher over his role in the organisation serves to illustrate the limited opportunity available for the research to loose its impartiality. This attention to the research was helped early in the project by the commitment shown by Rover towards the project. However later on, when the research focus was moved from Land Rover to Rover Group, the researcher had to strongly defend his academic time. This shows Rover's general lack of appreciation for academic work, something which has not been allowed to prejudice this research. The lack of academic appreciation will have effects on the projects of sponsored degree and IGDS students where the academic integrity of their work may suffer because of the low value placed on it by much of the Rover organisation.

The way in which the researcher's opinions have changed concerning the organisation and its performance shows how a high level of impartiality has been maintained during the study. Originally the Land Rover organisation was seen as being very wasteful lacking a consistent purpose and being in a relatively weak position, constantly being challenged by competitors. However, after comparison with Rover Cars it is now felt by the researcher that Land Rover is able to operate more effectively than Rover

Cars. The 4x4 company is also in a position of dominance in its market. This change in view cannot be fully attributed to the researcher's relative inexperience.

The change in view of the Land Rover organisation suggests that the research and its findings have not been influenced by the relationship between the researcher and the organisation. The role of the project supervision team comprising 5 academics and 7 Rover managers over the duration of the project, has also helped ensure that the data which has been gathered has been interpreted in an impartial manner with many of the ideas incorporated into this thesis having been openly explored with the multidisciplinary academic and industrial supervisors.

The researcher's awareness of the potential problems inherent in participant observation enabled the probes to be structured whilst bearing in mind the necessity to remove possible bias. The bias has also effectively been countered because of the detailed investigation used in the study. This depth in the data has reduced the need for assumptions to be used in completing the picture presented by each probe and indicates that the potential source of bias has been sucessfully countered.

The structure and cultural segregation of Rover into SLR and BARS enabled the research to contain an element of comparative analysis which also challenged the validity of the data. The development of the project has shown the great value which is to be gained from a comparative element in studies of organisations.

The data concerning Land Rover would not, on its own, have generated the leverage in the thesis that has been achieved through Land Rover's comparison to Rover cars. An example of this leverage can be seen in the comparison of the location and source of the companies's design capabilities. This comparison showed the Land Rover innovation process to be more successful than Rover Cars' despite being fuelled by externally sourced ideas which are used in incrementally developed vehicles. When the data was studied in isolation it suggested that Land Rover was an organisation which had no internal innovative capability and so, when compared to accepted innovation models, should have very little influence on its market. This was later found not to be the case.

As well as presenting contextual considerations, gained through comparing like organisations, the juxtaposition at the heart of comparison is able to highlight unique sources of competitive advantage. These advantages can be found no matter how diverse their location in the organisations under scrutiny.

This process of comparative assessment represents a configuration specific identification of capability and has proved very valuable in determining an organisation's future potential.

9.3 A Future Perspective

The adoption and development of a future-forward perspective has enabled this thesis to begin to assess the future capability of the Rover organisation. This approach has only been implied in the literature before now and was found to be supported by the IDOM/WORC perspectives which were developed from Abernathy's theories (488).

One intention of this thesis, expressed earlier in the literature review, has been to identify hidden assumptions in WORC/IDOM and assess the perspective's fidelity. This thesis has identified four points for discussion concerning the capability perspective:

1. Design capability location and control.
2. Organisation rigidity.
3. Lean and robust design, manufacture and organisational success.
4. Capital and the funding of capability acquisition.

The first concerns the emphasis of Whipp and Clark on the location of design capability. They imply that for success an organisation should have its own design capability (489). This assumption requires modification to stress that the significant aspect for success is that the organisation has control of its design capability be it located internally or externally.

The data has shown, by extending Whipp and Clark's Rover study into the collaborative relationship with Honda, that externally acquired design capability can produce competitive products. The concern over this source of capability at Rover has resulted from the company having little leverage over Honda in determining the technology and products which have been developed.

The design capability perspective has highlighted a major weakness in the Rover Cars organisation, namely its inability to learn. Despite having had every opportunity Rover has does not appear to have been able to acquire any technological ability of its own from Honda and has even lost some of its traditional strengths because of a growing reliance on the Japanese company.

The second aspect of the WORC/Abernathy perspective requiring discussion is that of organisation rigidity. Both Whipp and Clark and Abernathy have found that organisations were not able to adjust to

new methods of work organisation. If Whipp and Clark had been able to examine Rover saloon's sister organisation Land Rover they might have developed an alternative perspective addressing the 4x4 organisation's capabilities. The Land Rover element of this study may suggest that the cosmetic introduction of mass production methods (i.e. mass production methods introduced without changing the existing craft-based skills) is beneficial for certain niche market, luxury products. This aside the Land Rover organisation has been found to be as rigid as Rover Saloon's but because of its market placing this has not been as significant a factor in limiting the company's performance. The rigidity may even have helped the prosperity of the organisation by forcing the continued stretching of the organisation's robust designs.

The current study of Rover (Rover II) has not only identified an inherent rigidity in Rover but also, through considerations of organisational transitions, investigated some of the reasons behind this rigidity. This represents a processual focus which needs adding to the structuralist theories to explain how organisations change and not just what they change into.

The third item in the assessment of the WORC/IDOM perspective concerns IDOM's lean and robust designs (490). The IDOM approach has identified robustness in design as a very, and increasingly, significant source of competitive advantage. The spiralling increase in development costs is ensuring that a robust implementation of design practices is vital to a company's future performance. The identification and comparison of the lean products at BARS and the extremely robust SLR products has provided an opportunity to assess the role of design traits in organisational prosperity.

One aspect which was investigated concerns design traits at SLR and is based on understanding whether the company was successful because of its robust products or if the robust products result from some organisation-wide behaviour which tends to encourage success. The data from BARS, where lean designs were present even when the company was successful, suggests that the robust design trait exhibited in SLR stems from the organisation's normal operations rather than its prosperity. Indeed the present study indicates that the presence of robust design may be a useful indicator of the presence of potentially inherent success in an organisation.

Honda has an approach to vehicle development which encourages robustness in the design but insists on having no redundancy in the assembled vehicles. Redundancy involves having unused parts in the vehicle

and generally results from attempts to improve the responsiveness of material stocks to individual order configurations. An example of the effect of Honda's zero redundancy policy on Rover is seen in the removal of excess harness components from the Rover 200/400 model. Rover would normally have chosen to carry redundant electric window cabling as part of the harness in standard vehicles despite the take up rate of electric windows being only 30% of production. This, it would be argued, would minimise complexity without limiting the customer's choice. Honda's design decision not to have this redundant wiring has doubled the number of harness types which have to be produced for the model. For Honda's long production schedules this represents little problem in logistical terms and provides for substantial material cost savings but Rover, trying to operate in a more responsive manner, has faced many problems resulting from production part shortages.

It is necessary here to make the distinction between lean designs and lean manufacture. A lean design is one which has a very limited future potential where as lean production represents the use of JIT techniques to operate responsively with minimal stocks. The Honda products are robust in their design but lean in their manufacture. This makes the company's design activities contribute significantly, not only to the products and their sales, but also to the efficiency and profitability of the company's manufacturing activities. Robust design accommodates future design overheads whilst lean manufacture designs are cheaper to produce. Some people at Rover have been guilty of confusing lean manufacture with lean designs but the above has shown that they can be independent of each other.

The fourth and final point noted about the WORC/IDOM perspective concerns capital investment. Whipp and Clark noted the high significance of the large amounts of capital required in product development programmes. The Rover II data has shown how the availability of capital has serious implications for the company's future capability, which needs to be developed through funding the necessary acquisition of future technology. The study has identified that design costs are spiralling and so funding is becoming even more important to the application of any of the organisation's capabilities.

9.4 Rover's Future

The future of the Rover Group can be assessed solely on its capability and would be by certain models of analysis, but the influence of BAe in deciding the future ownership of the company is very significant and needs incorporating into the discussion of the company's future.

The future-capability based approach developed in this thesis ensures that the BAe-Rover ownership issue is an obvious consideration. For other diachronic study methods it would not be incorporated because it is a future prospect and not reconstructable. The management science approach would not be addressing the problem except at the BAe level and so would not normally appreciate the ownership issues' great bearing on the strategies of the Rover Group itself.

The role of BAe will increase in significance, particularly when the "no sale" clause in the purchase agreement with the government lapses in 1993. The researcher's own conclusions are that there are two alternative possibilities for Rover's future as viewed from the BAe perspective.

1. Sale of Land Rover (SLR) to the highest bidder (which could be Honda) and Rover Saloons (BARS) to Honda.
2. Revival of the company into an independent manufacturer.

The SLR organisation has long been profitable and has the technological ability to continue introducing innovative product developments. Its specialisation in the 4x4 market and its prestigious company image make it very attractive to a takeover by any of the World's large automotive manufacturers.

The BARS organisation however does not have as much to offer a prospective purchaser. Its production capacity which was able to attract attention from bidders in the 1980's has shrunk to 500,000 units/year. When this is coupled to the current economic climate in the industry and a general capacity excess it makes Rover's production capacity appear virtually unsaleable.

BARS extensive sales and distribution networks would have some value to an organisation trying to gain a presence in Europe and the UK in particular.

The above analysis has illustrated the researcher's views that, by world class standards, BARS is virtually worthless. It is felt likely that Honda will be offered a chance to increase its stake in Rover and so remove BAe of its responsibility. This could be seen to represent a take over by stealth for the Japanese firm which would also be able to inject some European expertise into its global operations. Honda may well be interested in acquiring Rover's product development facilities to establish a European design centre along similar lines to its own in Ohio and Nissan's in Cranfield. Honda would also welcome Rover's European sales network to enhance its position in this influential market.

The revivalism vision, shared within the company as an undeclared objective, sees Rover as an

independent and profitable organisation developing its own products. These products may be developed with or without cooperation from Honda. In the revived Rover its products are aimed at high value, niche sectors of the European market with a strong bias towards the UK.

This study has assessed Rover and found it to have gaps in the capability portfolio which would be needed to support the revival vision. These missing capabilities will now be explored and are classified as covering product design, manufacturing, organisation learning and organisational factors in capability development.

The lack of design capability in Rover is the most significant gap in the portfolio and is the hardest to rectify. The earlier discussion of the IDOM/WORC perspective has identified the significance of organisations having control of, if not owning their design capability.

This weakness in the company's capabilities could be addressed by Rover acquiring its own capability or having more influence over the collaborative ventures with Honda.

It is unlikely that Honda will share any of its most advanced products with Rover without gaining anything in return. Examples of this have been seen in the past with the isolated development of specialist products like the Honda NSX sports car and in Honda's technological innovations like the VTEC engine or four-wheel steering system. The VTEC development represents a means of improving engine performance by actively altering the characteristics of the cylinder head. Four-wheel steering is a means of improving handling and reducing turning circles by steering using all four wheels and not just those at the front of the car. Even if Honda were willing to share their technological advances Rover does not have sufficient finances or design ability to gain an even footing with the Japanese company.

Rover is currently a capital rich company but the amount of money available is only sufficient to maintain loss making operations for a short period of time (491) and not enough to manage the levels of investment required to fund technological development.

The factors above restrict Rover to having a subordinate role in any collaboration with Honda. This has led the researcher to assess how Rover might try and develop its own design capability independent of Honda.

Despite having been very close to one of the world's best engineering companies, Honda, Rover has not yet been able to learn enough to regenerate its own design capability. This does not present an

encouraging view of Rover's ability to overcome its design capability problem. The argument presented in this thesis may be able to persuade individuals in the Rover organisation to focus on the regeneration of the company's design capabilities by learning from Honda. The researcher does not believe that the Rover organisation is able to acquire and maintain such a radical focus. The factions within the organisation have been shown to be too rigid to achieve any major transitions over the past 20 years and is unlikely to achieve this particular change in operations. Rover also has insufficient resource or time to make this transition, even if it could overcome the problem of rigidity which is currently preventing it from changing.

Rover's manufacturing capabilities are currently strong in comparison to other European companies but a long way short of the world class standards of the Japanese manufacturers (492). Rover's manufacturing strengths have developed primarily as a result of its use of Honda designed facilities. Again Rover needs to be able to acquire manufacturing technology to achieve the revivalist vision but the study of operational innovation contained in this thesis has shown that BARS historically has not been able to develop its own manufacturing technology and has a very poor record of adopting other people's advances.

This study of Rover has identified hidden strategies within the company's manufacturing factions aiming to acquire independence from Honda for the development of the company's manufacturing capabilities. These strategies included a partnership with Warwick University's Manufacturing Group, the employment of various IMVP consultants and an involvement in establishing a logistics institute at Cambridge University. The author believes that these strategies were the result of the last manufacturing director in the company and are now losing their dominant positions in the manufacturing based factions of the organisation following the director's move to another organisation.

These various initiatives represented an opportunity for Rover to develop its own manufacturing capability but have not been successful. Their adoption was found by the researcher to have been restricted by the rigidity of the organisation as a whole, not just the particular factions, and also because of the lack of available resources in the company. The resource problem was discussed above in relation to the acquisition of design capability.

The author believes that the ability of the organisation to overcome rigidity has been prevented by the

factions and hampered by the constant reorganisations of the company. These reorganisations have prevented management personnel from making any lasting changes in the operations of the company. There have been many cosmetic changes as a result of the reorganisations, so termed because of their ineffectual nature despite appearing to be very significant, but none of them has effected the basic operations of the company.

The use of copies of the Honda facilities and manufacturing systems is likely to present problems for Rover if it tries to pursue a time-based approach to manufacturing. Honda has a radically different production management philosophy to that of the world's leading time based automobile manufacturers, Toyota. Honda's manufacturing systems are designed to be very efficient through the production of large batches of identical vehicles. Toyota however are able to configure their build programme to match customer orders at very short notice (currently the Toyota schedules are only fixed 4 days ahead of production). Internationally there has already been a significant move towards time-based companies, recorded by numerous articles and studies of Japanese manufacturers and Rover is likely to find itself at a distinct disadvantage in migrating towards a time-based approach because of the Honda influences in its production control systems. These will force the company to continue operating with large batches when others are gaining competitive advantage through a time-based approach.

A major contributing factor to the rigidity of the organisation is Rover's inability to learn. This factor has been mentioned above in the discussion of the lack of design and manufacturing capabilities but will now be discussed here as an organisation-wide issue. The type of learning which Rover needs to acquire is not only that concerned with preventing the mistakes of the past being repeated, i.e. historical learning, but also being able to learn from external organisations.

Despite being linked to Warwick University Rover has only a very limited appreciation of operational advances elsewhere in the industry. For Rover to become a learning organisation the author believes that the company needs to develop, possibly with Warwick University, an atmosphere of constant awareness of developments in the automotive and other manufacturing industries.

An example of the isolated nature of Rover was seen in the identification by the researcher during interviews with senior manufacturing managers at Rover's Swindon site, a body panel pressings plant, of many who had not heard of the SMED (Single Minute Exchange of Dies) techniques (493).

SMED covers the development by Toyota of simple techniques which radically transform the operations of pressing plants to virtually eliminate inter-process stocks and reduce waste to a fraction. Similar examples were also found in Rover of managers and staff who were not aware of any of the techniques or developments used by any of the world's best manufacturers.

The generation of an external awareness may be achieved by Rover's current adoption of a benchmarking process of continuous improvement (494). This technique involves generating process improvements by following a structured comparison of one's own facilities and those of external organisations. Once the comparison has been made the techniques of the benchmark organisation can be incorporated into the existing operations but only if the cultural changes accompanying the manufacturing process changes are also considered.

Once Rover is able to see the wealth of easily available information which describes in great detail many techniques used elsewhere it should try and start acquiring an intellectual capability. The acquisition of intellect in the organisation involves encouraging all employees (both at management levels and on the shop floor) to think about their roles and activities. Many of the techniques which would be observed in other organisations exhibit this trait and it should be a natural step for the organisation to acquire these simple approaches.

An example of an industry which has been able to generate such organisational learning is thought to be the petrochemical processing industry. These organisations exhibit a valuing of research and analysis at their operations level and not just in the business development functions. By generating an intellectual capability in Rover the company will probably have overcome much of its rigidity and be able to develop its capabilities to a world class level. However, as has already been explained above, there is probably insufficient time for this transition to occur before the company is absorbed by another organisation. The company is unlikely to be able to stand alone without having undergone said transition. It remains to be seen if the rigidity of the organisation extends into the intellectual base of the company. This may prevent it from learning how to learn for itself.

The Rover Group's Breakthrough initiative, although being seen as a means of introducing a salvational step change in performance improvement, represents an intended rejuvenation transition in the organisation and operations of the company.

This thesis has performed a study of breakthrough technology and compared the different adoptions found in BP and Rover. The data gathered from the published sources and from BP shows that the technique is able to instill quantum leaps in organisation performance but only if it is properly adopted (495).

If the proper adoption of Rover's Breakthrough initiative is achieved then it is likely to leave the company in a position where it could develop its capabilities sufficiently to support the revivalist vision. Unfortunately the way that the Rover organisation is reacting to the initiative is severely limiting and delaying the intended quantum transition.

The researcher feels that the company has made little or no progress towards its Breakthrough in the first 18 months of the initiative and believes that the technique is rapidly losing support, particularly in the product supply part of the organisation. One reason found for this failing of Breakthrough in Rover is a lack of appreciation of what Breakthrough technology is and how it could be used within Rover. This is a reflection of the lack of intellectual ability exhibited by the organisation which is fuelled by an almost total ignorance of developments in general management techniques.

The same factors identified as preventing organisational development in the assessment of Rover's design and manufacturing capabilities have also become evident in the halting of the Breakthrough initiative. The intended breakthrough can be seen as representing an impossible leap for Rover, something which it needs to ensure its future but which it is virtually incapable of achieving. The initiative may be saved if it receives a new boost from the board. This would reemphasise the company's commitment now that the turbulance of the recent reorganisations has subsided. Rover may be able to generate sufficient improvement in performance with the breakthrough to delay the decision to sell the company. This would only be achieved if the company generated sufficient improvement to create a turnaround style transition, i.e. one which generates temporary success. This looks unlikely given the factors outlined above concerning the company's rigidity problem. A delay in the sale, or effects of such a move if Rover were left untouched by the new buyer because of potential performance improvements, may provide a further opportunity for Rover to rejuvenate itself and so achieve its revival. This is unlikely because the decision to sell is largely outside BAe's control, being forced by that company's economic situation.

9.5 Periodisation

The adoption of a longitudinal perspective for this study of Rover presented the researcher with certain

problems concerning the periodisation activity in the classical longitudinal method. These problems were identified in the literature review and centre on the classical methodology's inability to identify the significant strategies in Rover which had already been identified from the participant observations.

The historical-reconstruction focus of Mintzberg's methodology (496) leads the periodisation to produce discontinuous phases in the organisations activities. This represents the organisation as following strategies for a period of time before adopting alternative strategies. It was found that the Rover organisation (and so presumably most other organisations, particularly when Mintzberg's emergence of strategy theory is considered) did not follow this tidy model of strategy adoption but had a portfolio of many strategies favoured by the different factions. These strategies were found to be in various states of development which could be visualised using a life-cycle type model. The life-cycle states of the strategies identified in Rover could be classified as fading, dominant, emerging and dormant.

The periodisation performed in the longitudinal study of Rover differs from the classical approach by using a detailed understanding of certain key actions in the company, the investigative probes, to add to a set of general observations. The data gathered from the study (both from the probes and observations) was used to determine recurrent factors which had greatly influenced the company's strategy portfolio. An advantage of this approach is that these factors are then available for generalisations to be made concerning other companies and industry sectors. The new method reduces the subjective nature of the classical reconstruction focused methodology by relying on the induction of emerging strategies. The alternative method uses a more detailed understanding, derived from the participant observation method, for the inference process and has been helped by the triangulation available from the interview process. Mintzberg's methodology also fails to capture or assess the nuance or magnitude and scope of change involved in the strategies which it has identified in the organisation. This lack of appreciation for nuance can be explained by the classical methodology's intentions of prescribing strategies to represent the past actions of the organisation over a period of time. The significance of the nuance attached to an emerging strategy was found to influence its adoption or implementation by maintaining a sustained dominance. Miller and Friesen's (497) and Stopford and Baden-Fuller's (498) theories have been used in this thesis to explain that rejuvenation strategies, representing major organisational transitions, are more likely to be successfully implemented than incremental strategies.

The study of Rover found that the company had changed its strategies many times over its recent history. The researcher concludes that Rover's recent success (or continued survival) has been as a result of the company flexing by changing its strategies and not by altering its operating methods. This inability to change the way the company operates despite altering its strategies has been attributed to the nuance of the strategies adopted. This inflexibility in the strategy and the organisation has forced the company towards improving current performance and not developing new ways of operating.

The factors used to develop the periods for the Rover study are shown below:

1. Government influence.
2. Asset valuation.
3. CEO and the nuance of the strategies adopted.
4. Honda and collaborative strategies.
5. Shifts in design capability.

These factors and the identification of how their influence has developed should be used to assess the past and future performance of other organisations and industry sectors. This is possible as a result of this method's ability to clearly identify the factors. This application of the influential factors is possible becuase because all companies will be subjected to the same influences on strategy development as the Rover organisation.

The role of the state, particularly in its legislative and economic influences can be carried over into other organisations to help assess their performance relative to other firms in similar situations and predict the potential success of future strategies which have already been adopted elsewhere.

The ownership issue, which still has a very significant impact on Rover's strategies, will not be of such a concern to all industries. The newly privatised UK utility companies provides one sector where the ownership issue should be equally relevant because they both have been subjected to the same political influences concerning their future status as Rover.

The government's significant role in determining Rover's strategies and their success is an aspect which would be neglected in most of the strategic management literature. An identification and exploration of the state's role should have been made as part of the many behaviouralist studies where it would certainly have had a major effect on the actions of the companies examined.

The management science school has also missed the impact of the government. This is believed to be due to its being a factor concerned with strategy realisation rather than their formulation. This is exemplified by the way that the consideration of the state is not included in any of the six steps found in Schendel and Hofer's linear strategy development process (499).

The changes in asset value as experienced by Rover will have similarly influenced the strategies of other organisations. Increased asset values lead to organisations showing increasingly healthy balance sheets. These organisations are then able to generate funding and investment because of that improved financial strength. The recent failure of several expansion driven organisations, e.g. Next and Coloroll, can be attributed to a slowing down of the asset increases. This has forced these organisations' excessive loans to be called in by the lenders because the companies' balance sheets do not generate the same confidence in their continued profitability.

Rover's future is not helped by the disproportionately increasing costs of model development compared to its asset levels. This has occurred even though the costs have been reduced because products are now developed as part of a collaborative venture.

The capital starvation of the early 1970's may be about to be repeated in the 1990's and it is unlikely that Rover would be able to survive, no longer having the government as a convenient source of massive injections of capital. The economic climate of 1991 has seen high borrowing costs whilst a general lack of business confidence is limiting the amount of money available. These factors and the decline in vehicle sales have already seen Rover changing its strategies with regard to investment and market development and has led to a stream of cost reduction exercises. These actions are also happening in other organisations and industries.

The changes in CEO and the nuance of the strategies which they introduce has already been discussed. This factor is most closely allied to the strategies identified by classical longitudinal studies and has already led to generalised findings. Because the normal first action of a new CEO on his appointment is to reorganise his executives and the organisation's structure the classical method has generated generalisations which primarily concern strategy formulation as applied to organisational configurations, e.g.: those developed by Mintzberg and the McGill school and other configurational theorists.

The collaborations which Rover have been forced into because of increased product development costs

have also been identified as a factor in the periodisation of the company. Where these pressures exist on other organisations recommendations can be made concerning how collaborations should best be managed. Estimates of collaboration's relative value in comparison to other forms of new product introduction methods can also be made as a result of the Rover findings.

Rover has been placed in a compromising position with Honda because of the way that the relationship was initiated and developed. As such this study has emphasised the need for collaborators to have an equal involvement to prevent the dominance of one organisation over the needs of the other. It will be interesting to judge the relative success of the new type of collaboration being developed by VW and Ford in Portugal (500). This collaboration relies on VW developing the product with Ford providing the manufacturing expertise and facilities. The parties may have an equal status in the collaboration but they are contributing to different phases of the project. This may lead to friction in the relationship with decisions being made for parochial reasons without the consent of the other party.

The relationship between Rover and Warwick University has shown that the potential wealth of knowledge and skills contained in academic institutions can be made available for commercial organisations to utilise. The development of a working relationship able to capture that knowledge has been shown to be particularly hard to achieve, requiring commitment to a combined future from each participant. This type of relationship appears more appropriate for small organisations where the inter-factional differences tend to be less evident. Suitability for small organisations is also aided by the fact that the impetus for the relationship normally resides with two key individuals, one in each collaborator. This focus for the collaboration can become clouded and even lost if the strategies of other factions become more dominant as is most likely to occur in larger organisations. This has happened in the case study where the individual championing the Rover half of the relationship with Warwick moved to another company, leaving the collaboration to flounder.

9.6 Towards a Unified Strategy Process Theory

This thesis has developed a means of moving towards a unified common theory of strategic management through the adoption of a behavioural-processual perspective from the behavioural-structural diachronic study method.

The incorporation of a process element in behavioural theories of strategy formulation and organisational

change leads the behavioural approach to share much in common with the management science-processual theories. It is through this that the researcher can see a way of combining the behavioural and management science approaches. This possible linkage will enable the many disaggregated theories of each school of thought to be jointly used to explain strategy formulation and develop a model of formulation which will encompass the behavioural capabilities of the organisation into a processual-prescriptive perspective.

9.7 US/European and Japanese Operating Contingencies

The value of having a direct comparison between JIT and MRP adoptions in the same organisation and the comparison of the approaches of Honda and Toyota to those of Rover, allows a discussion to be included in this thesis of the differences concerning European/US and Japanese operating contingencies and approaches.

MRP was developed by IBM in 1960's America and is based upon planning, forecasting and scheduling. JIT, developed by Toyota is founded on responsiveness and efficiency. Abernathy showed how this low inventory approach was able to redefine US production paradigms and subsequently re-vitalise the US car industry (501). Rover is currently trying to catch up with these new operating methods but is restricted by its organisation and the company's history, as represented by the costly adaptation of its present facilities. This is restricting Rover's ability to change as quickly as the industry is demanding of successful organisations.

This example illustrates a significant difference between both Western and Japanese manufacturing operations first observed by Abernathy. An explanation for this recurrent difference was developed from the analysis of the MRP and collaboration probes.

The US/European approach relies on linearity, the development of plans which become rigid and are then implemented before a new phase is developed. This is the basis of the management science strategy formulation approach and shares much with Mintzberg's discontinuous periodisation. The Japanese planning method relies more heavily on a contingency style approach. This is an approach similar to that observed by Mintzberg in his studies of successful organisations and has more recently been confirmed to be the approach adopted by the Japanese manufacturers by studies like that of Pascale (502).

The Japanese operating contingency approach involves constantly refining the organisation's strategies.

This is possible because of a higher degree of organisational flexibility than normally observed in the West. It should be stressed that this flexibility is located in the intent or long term plans and is not part of the operational plans themselves. Honda have build schedules which are rigid for 6 month periods and cover batches of 30 vehicles or more. However the organisation is itself constantly challenging and developing new ways of achieving these stable plans. This view of a highly flexible organisation is not easy to record because the operating plans are very regimented and obscure the changes invoked by flexing the company's contingencies.

Toyota have a very similar organisational approach to Honda except that their operational plans have been designed to carry very large degrees of late configuration and so are very responsive to customer demands in a controlled manner (503). It is how these operating rules are developed and the supporting facilities changed which reflect the Toyota organisation's contingency flexibility, not the changes in the schedules.

Rover does not yet appear to have acquired this key contingency flexibility factor from Honda and has adopted Breakthrough as a possible means of generating it in its own organisation. The subtlety represented in understanding this organisational shift, found in Pascale's breakthrough writings (504) has not managed to make the transition into the Rover organisation's recipe concerning Breakthrough. This is a further result of the organisation's rigidity.

9.8 Conclusion

The relative success of this thesis in maintaining a balanced view has been assessed in this chapter.

The development of a promissory link between the behavioural and management science theories has been introduced through the forward-future perspective which resulted from the assessment of the WORC/IDOM developments of Abernathy's theories.

The alternative diachronic study periodisation process was also developed to show how generalisations can be translated from the periodisation factors into the study of other organisations and industries.

Chapter 10. Conclusions

10.1 Introduction

This chapter concludes this thesis by describing the contributions made to strategic management and organisation development theory during the course of the study and also attempts to tie together some of the threads which have run throughout the thesis. The potential future of Rover is reviewed and some of the areas which the researcher feels require further work will be described.

10.2 Organisations and Strategy

The researcher has examined the strategy formulation and organisational operations of the Rover Group through an analysis of its two main sub-organisations, Land Rover and Rover Saloons. He has had a rarely available opportunity to develop a detailed exploratory assessment of the company, its strategies and future potential.

The approach used in the study was diachronic in its approach and based on the longitudinal methodology developed by Mintzberg. The existing investigative methodology required enhancing during this particular study because it was unable to account for several observed situations. These were the different cultures found within the Rover Group as illustrated by the researcher's separation of the Land Rover and Rover Saloon organisations, and the high profile of collaborations, particularly that involving Honda, in the company's design and manufacturing activities. Mintzberg's method has been enhanced by adopting an internally located perspective, a participant observation based approach supplemented with detailed studies, or probes. The probes concern specific areas of the organisation and its strategic activities:

1. Corporate planning actions in the Group.
2. Logistical developments at Land Rover.
3. The development of the collaboration with Honda.
4. The relationship with Warwick University.
5. The attempted adoption of Breakthrough technology.
6. Operational innovation.

The use of probes was developed as part of the methodology not only to provide sufficient detail for the study but also to reduce the assessed risk of bias being introduced due to the use of participant observation. The apparently successful countering of these biases by using probes should aid the future

value of participant observation based study, which is particularly suited to studying processes within organisations.

The exploratory way in which this methodology has been developed leads the researcher to believe that it requires some form of testing. This would not only assess its fidelity but also its practicality. Many of the developments in this thesis have been possible because the researcher has had relatively free and complete access to the Rover organisation. The researcher feels that this could be hard to successfully recreate in other organisations.

The adoption of an observation method in this study was soon able to establish the significant strategies of the Rover Group organisation and also those having a possible future significance. Thus the study was able to focus on determining which factors had led to the formulation and dominance of these strategies. The depth of data gathered and the observation of events in the organisation identified Mintzberg's longitudinal study method's periodisation phase as being of little value to this type of investigation. Periodisation is used in the classical Mintzbergian method to establish distinct phases of the organisation's activities and infer strategies which may have been responsible for those periods. The weakness identified here is a result of the imposition of titles for periods of the organisation's history to represent its strategies rather than identifying the strategies themselves.

The analysis of the factors which have shaped the organisation's strategies is put forward in this thesis as a means of resolving the strategy identification problem in the periodisation of longitudinal studies. The factors themselves are available to comparatively assess the performance of organisations and their strategies during similar periods of time.

The type of generalisations which result from classical periodisations have been criticised for being too case specific. Mintzberg's conclusions for example generally focus on structural issues resulting from the effects of different strategies on specific organisations.

The factor-based approach used in this thesis is able to develop widely applicable generalisations from longitudinal studies by examining the dominant internal and external factors and their changes. For example this study of Rover has identified changes in asset value as a major impact on the organisation's ability to fund specific strategies. The same factor is also applicable to many other U.K. based organisations in the private and public sectors which have been forced to re-consider strategies and

decisions following questions concerning funding within the organisation.

The increased value of this type of generalisation, over those derived from the traditional longitudinal approach, will extend the scope and importance of diachronic study methods.

The periodisation approach used in this study, the historical tracking of influencial factors and the study of their future impact, needs to be reproduceable in other organisations to consolidate its value as a strategy analysis method. The exploratory nature of this study, primarily in developing the methodology, has not been able to fully assess the fidelity of the method and the full value of the factors identified. For the approach to be widely applied to diachronic studies it requires further testing. The author feels that non-profit making bodies and small companies should be used to test the method. This would not only assess its repeateability but also examine its applicability and value in these types of organisation, it already having been used to study a large profit motivated manufacturing organisation.

The influence of the factors identified in the study of Rover (Government influence, changes in asset value, the different approaches of the CEO's, design capability and the Honda relationship) were identified by studying changes in the organisation and its strategies. The identification of varying intent behind the strategies in the company and the different organisational change magnitudes incorporated into the strategies has led the researcher to believe that strategy literature requires updating to include nuance and intention. The identification of two theoretically different nuances of success strategies, termed rejuvenation and turnaround by Stopford and Baden-Fuller, has been supported in this thesis. Turnaround represents a temporary period of success for the organisation where as rejuvenation includes the company being able to constantly re-new the turnaround success.

The nuance of the strategies was noted to be particularly absent from the Configuration school's literature. Miller and Friesen's data should be re-examined to incorporate turnaround and rejuvenation into the theory of organisation structure transitions. This may provide a contingency view of rejuvenation transitions, i.e. a means of generating rejuvenated organisations by introducing certain pre-described transitions in configurational structure.

The discovery of multiple configurations and cultures in the one organisation, initially noted following the study's separation of Land Rover and Rover Saloons, adds a new dimension to configuration theory. The researcher reasons that a factional basis for decision making and organisational development is

widespread in other organisations and represents one of the most powerful forces possible in generating and controlling organisational transition. As such both these factors (mutliple configurations and a factional focus) require incorporating into the literature and investigating in more detail to establish their occurance and extent of influence.

Mintzberg's *'political'* or *'competition'* force comes closest to the factional activities of Rover but does not contain sufficient subtlety to cover the many layers possible in the factions and their continually changing alliances.

The researcher has noted the recent debate concerning the existance of such complex structures and cultural diversity in the sociology literature. It has not been possible to assess this body of literature sufficiently to extract any useful perspectives concerning this factional aspect. The researcher finds that it may be able to contribute significantly to a more detailed theory of the influence and mechanics of factional and cultural diversity in organisations and their strategies.

10.3 A Future Perspective

This thesis has seen the development of a future-forward perspective which intends to assess, from a longitudinal-historical basis, the potential ability of an organisation to achieve its strategies and objectives. The future perspective contained in this study was developed as part of an assessment of the organisation's ability to rectify gaps in its current capabilities. The gaps result from the demands for capability made by the organisation's declared intentions and its intended future operations. The possibility of the company acquiring these required capabilities was assessed by examining the organisation's historical innovativeness.

Rover Cars' main capability gaps were identified as being a lack of design skills and resources. The Honda relationship was initially conceived as providing the Cars company with new models for immediate production whilst Rover developed its own replacements. However the reliance on Honda has seen the continued erosion of the design and technology base of the company to a level where it can barely command sufficient resources to constantly adapt establish Honda designs to make 'Rover' vehicles. It has been argued in this thesis that Rover's lack of design capability and resource will severly limit the organisation's future potential by restricting its independent ability to develop the products which it needs. The repeated, historically observed rigidity of the Rover organisation, represented in its inability to

change its operations and acquire design capability, has been identified in this study as the primary reason for the gaps in Rover's capability portfolio. Recommendations have been made, from the basis of the researcher's limited experiences, which may be able to free the Rover organisation of its operational rigidity.

Rover's future depends not only on its capabilities and their development but also on the actions, regarding Rover's future ownership, of its present owner BAe. The role of BAe would probably have been neglected by other, non-participant observation based strategy analysis methods, primarily because BAe is not a direct source of strategies in the Rover organisation. BAe's importance concerns its effect and influence on Rover's strategies.

The management science approach, because of its prescriptive nature, has a very limited value in trying to investigate strategies in organisations, tending to focus on developing new strategies. The inclusion of BAe in these new strategies would only occur if it in some way effected the resources or current operations of the Rover organisation.

A typical behavioural study would reconstruct Rover's strategies and, by focusing on their effect, concentrate on how these were introduced. BAe would be picked up only if the performance of the organisation was directly influenced by the actions of the parent organisation, this is unlikely to occur with BAe being organised divisionally.

The strategies adopted by Rover have inherent references to BAe and its strategies. The method introduced in this thesis encourages the research to be aware of this from very early in the study.

The researcher feels that when both the BAe ownership and capability development issues are considered the future continued existence of the current Rover Group organisation looks uncertain.

The researcher's findings indicate that Rover's strong and profitable 4x4 activities are likely to be separated from the troubled saloon car manufacturing operations, with the latter likely to become part of Honda's European manufacturing operations. This would represent an interesting conclusion to a 50 year story which started with the Japanese companies Nissan and Toyota acquiring Austin and Morris' production technology in 1948. Events have now turned a full circle, seeing the UK's last mass car manufacturer acquiring technology from Honda and possibly being consumed by the internationally successful Japanese firm.

The promised removal in 1999 of E.C. import regulations concerning the Japanese car manufacturers (505) is unlikley to effect Honda's intentions towards Rover. This study has shown the limited value of Rover's production facilities to Honda. Honda have used transplant production facilities in the past not as a means of combating import restrictions but of cutting costs and have also always used green-field sites. The researcher reasons that any interest Honda has in Rover is because of its styling skills, K-series engine and distribution network.

The advent of Japanese manufacturers being able to trade freely in Europe after 1999, the researcher believes, will have a highly significant impact on the European market, similar to that which has already been seen in the U.S. This led to a rejuvenation of the U.S. market. Such a rejuvenation will be yet another obstacle for Rover to overcome if it manages to survive until 1999.

The development of a future-forward perspective, being a behaviour-process rather than -structure based approach to strategy formulation, promises a link between the two main schools of strategic management thought.

A process focus has been lacking from previous structure based behavioural investigations. The adoption of process considerations enables the behavioural approach to move closer to compatability with the prescriptive, process based management science approach. It is this commonality which creates a link through which the author can see the development of a unified strategy process theory. This would incorporate both a capability focus from the Behaviour school and the prescribing, analytical aspects of the Management Science school.

This unification is still a distant vision but the contributions contained in this thesis represent a move forward.

10.4 Conclusions

The strategies and organisational activities of the Rover Group have been examined in this thesis using a behavioural-longitudinal approach. This approach was developed to generate a future-forward perspective which has been shown capable of assessing the future capabilities of organisations.

The adoption of a capability based perspective has shown Rover to be precariously placed on the brink of falling into a position from which it will not be able to achieve the independent success it once had and to which it now aspires.

The researcher feels that the most worrying aspect of the finding that Rover's future performance is destined to be unsuccessful, apart from its effect on his own future career with the company, is the apparent lack of the concerted strategic focus in the company's senior management needed to address the issue of the company's future health. He also feels that this short sightedness may be the final, and ultimately self-destructive, act which the company's factions will undertake.

The academic developments made during the course of this study may be able to contribute to the promised future development of a more sophisticated process capable of creating more subtle strategies. Unfortunately the Rover Group is unlikely to be in a position to benefit from this new understanding of the strategy process.

An immediate contribution which this thesis has made is that it has placed the issue of the periodisation process in longitudinal studies, and the subsequent identification of strategies, onto the research agenda. The existing periodisation method has been shown to fail in its identification of strategies which have been significant to an organisation and also those which will determine its future. The approach developed in this thesis has proved successful for exploring the Rover Group and its strategies and will be valuable in future studies of other organisations.

Chapter 11. References and Notes

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Appendix A. The Development of Land Rover Systems

A.1 Introduction

This is an examination into the historical development of the various systems present at Land Rover, their relationship to the MRP initiative and how and why these various systems evolved. It also enables the reader to understand the complexity involved in the MRP introduction process.

Some of the major influences, primarily external to the company, have also been examined. The development of the various systems have been shown through the use of rough block diagrams. These are not true flow diagrams, merely representations of the factors which have effected the development of the systems.

It was found that the systems could be convieniently classified, and their development tracked, under the following headings:-

Personnel

K.D. (Knock Down Vehicles)

Communications

Product Definition

Purchase Orders

Finance

Service/Warranty

Inventory

Sales Orders

Manufacturing Control

The exception to this classification was the MAS system and it's effect of removing part of the OSCAR function (inventory) and placing it in the finance field. This is covered under both sections.

The following is an account of the developments of the systems. It does not dwell upon the many and varied interfaces between the systems but does note the key aspects.

The interaction of these systems and the adaptation required for the MRP initiative is examined in the conclusion.

A.2 Personnel

These systems (see figure 15) are based on the UNIPAY payroll system developed by B.L. in 1978 (1). An addition of the HARP (Hourly Paid Attendance Reporting) function was added in 1980 to act as a semi automated input to the UNIPAY system (1). This was replaced in 1983 by the TARDIS system from ISTEL for time and attendance of personnel and their location for management information (2). This system is an advance on the preceeding manual clocking-in system. Special cards are used for clocking and the entry is automatically recorded against the payroll system. The main benefit to this system was to be the availability of information for managers to determine the location of their line staff (3), however this was rarely used.

A small car parking system (CPS) was introduced in 1984 to allocate car parking passes. This system is essentially a microcomputer operated data base. The personnel records function was partially automated in 1984 with the introduction of PIMS (Personnel Information Management System) (4). The Staff Overtime & Absenteeism Procedure System (SOAP) was introduced in 1987 to encompass the none direct (mainly staff) functions not covered by the TARDIS systems (5).

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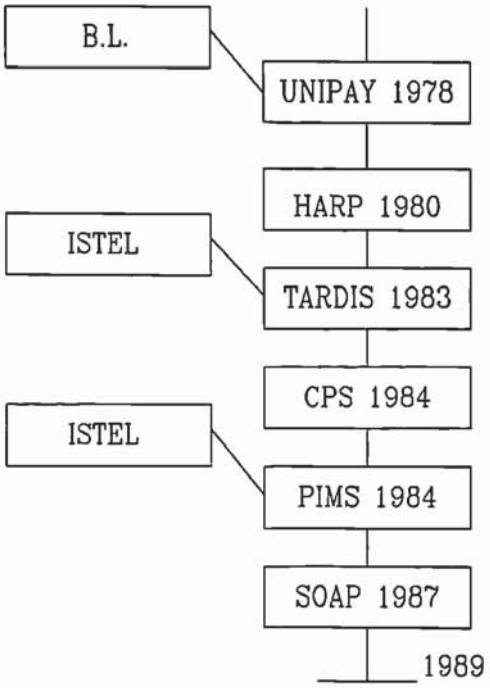

Figure 15. Personnel Systems.

A.3 K.D. Systems

The original manual KD (knock-down vehicle kits for assembly abroad) system was partially automated in 1975. This system was dropped in 1979 owing to it's data structures being based upon K.D. phantoms (1). These phantoms are collections of parts which cannot physically be assembled without including others or which would not be a single unit. The new system was able to draw upon the stock records of other systems (notably the OSCAR systems whose operations and developments are examined later). This K.D. OSCAR system was enhanced with an accounting addition in 1980 (2). Recently attempts have been made to integrate the KD function back into the rest of the Land Rover commercial systems (3). This has yet to be fully defined but could be achieved through the removal of the K.D. systems and the addition of certain modules and routines into the other systems to enable them to cope with the unusual and conflicting parts structures found in KD operations.

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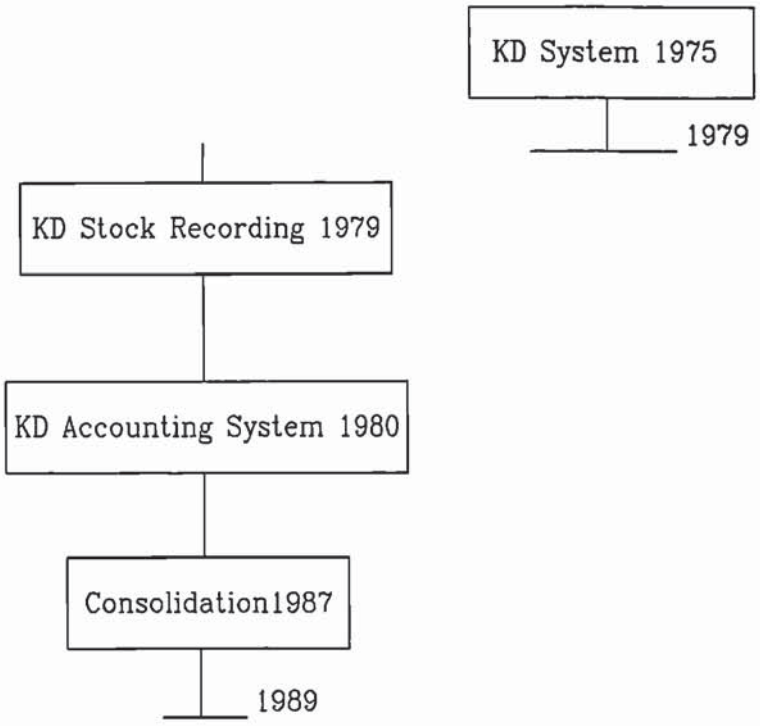

Figure 16. KD Systems.

A.4 Communication

The communications systems at Land Rover (see figure 17) have their history in the telephone networks used when the site was a Rover Cars division. These were updated in 1970 and enhanced with the microwave link in 1975. This was an ARG (Austin Rover Group) development allowing the main plants in the group to communicate more cheaply than via the Post Office exchanges of the time. These internal Solihull telephone networks were replaced when the L.A.N. was introduced in 1980.

The communications systems at Land Rover are now based upon the broadband network which was implemented in two halves by Ferranti (1). These were united in 1982 under the control of B.L. Systems who also produced a strategy (2) for future communications in 1983 which was manifested in a network reconfiguration in 1984 due to problems in the operation of the key communications routings within the OSCAR (inventory) and North Works Automated Sores systems. The reconfiguration was carried out following investigations by Mesh Data (1) at the request of the systems department.

The addition of the electronic mail system has probably had little effect on the operation of the company with the exception of reducing the amount of internal mail in the order control and system departments. This system replaced the COMET system which was a B.L. Systems package developed in the 1970's and had very limited facilities and was designed and most suited to the needs of network operators and systems specialists.

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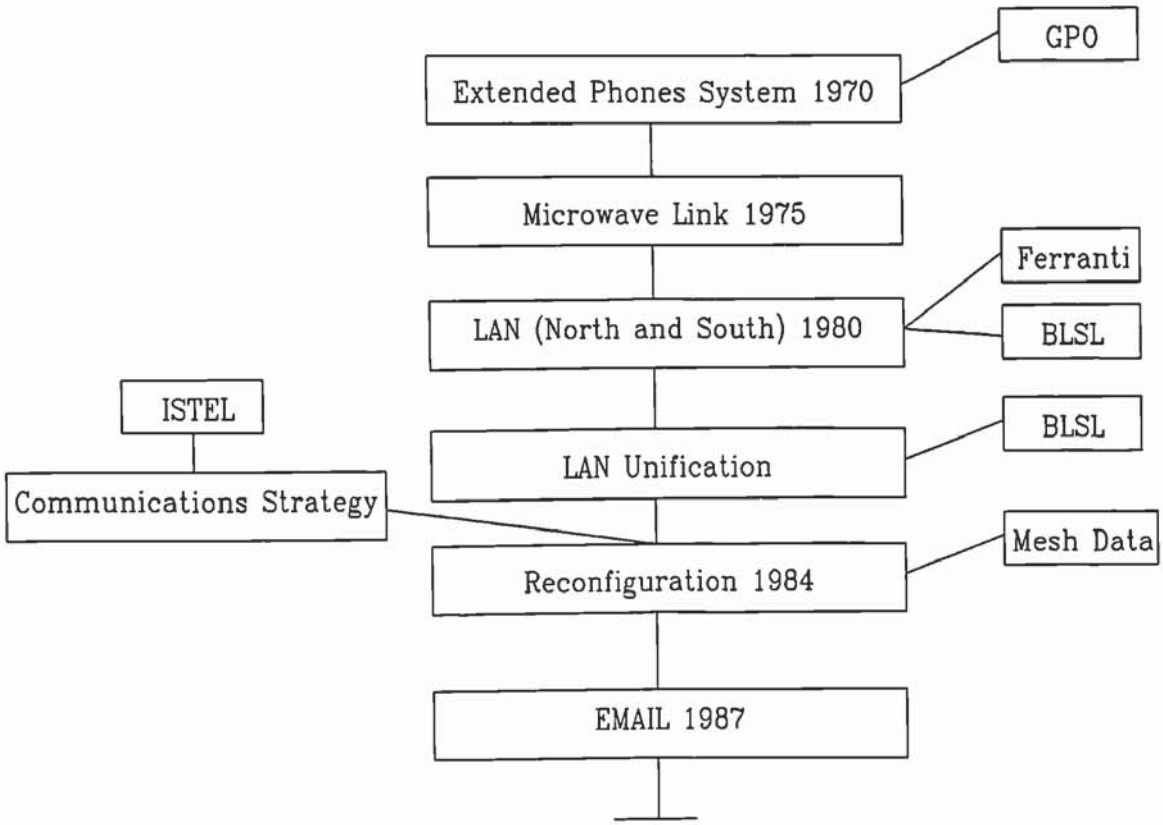

Figure 17. Communications Systems.

A.5 Product Specification Systems

Until 1978 product specification was handled by the manual compilation of a specification book for each project (1). This was replaced by a computer system PPTC (Preliminary Parts and Timing Control System) at the request and specification of the product engineering department. This had a number of short comings:

. No authorisation system for modifications

. Derivatives limited to only 13 per project

. The need for a new schedule section parts file for each project leading to:

- massive duplication of part data

- a file structure independent of schedule

.Poor enquiry handling (one project at a time) (4)

and as such:

'The system was originally developed specifically for parts timing, but was subsequently developed into a complicated system consisting of a mixture of parts timing, engineering specification and KD information' (4).

These problems prompted the adoption of a short term solution, the migration of data into the LRPS (Land Rover Parts System) as part of the COSMIC system (7). This system (designed as the core computing data transaction system of the time) had no less than 34 separate data bases which required replacement when the system was closed in 1987 (6 years after it was introduced (6)).

When the LRPS had been introduced in 1982 a committee, the Common Coding Committee (CCC) was set up to examine the need for a company wide specification. The proposed system became known as the ISS (integrated specification system). This has a checkered history with many major changes in specification (modular format introduced in 1983 (3)) and was cancelled in 1984 by ISTEL with the COPICS/PROSPECS introduction decision (2) which represented the first step towards MRP and is examined later.

The PRISM system now controls the timing of new parts into the other systems and was introduced in 1988 as part of the MRP system (5).

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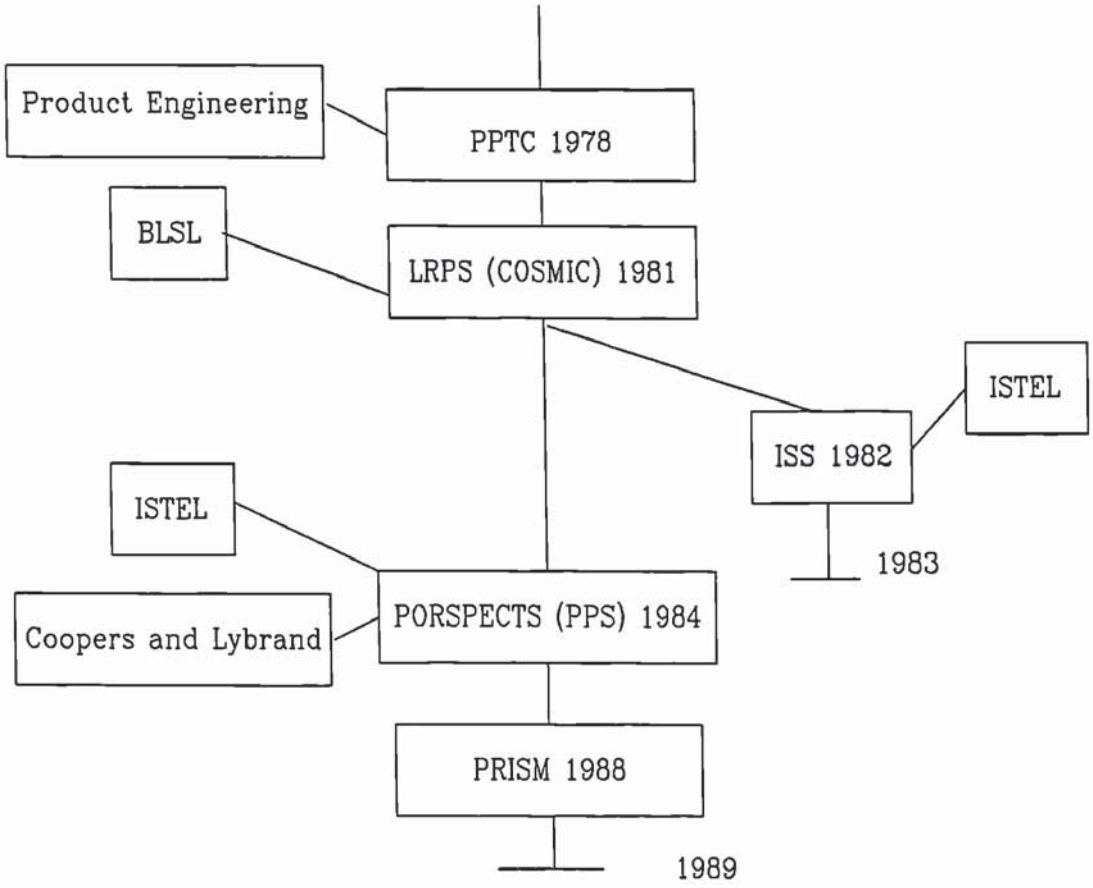

Figure 18. Product Specification.

A.6 Purchase Systems

The purchasing function of Land Rover was manual until 1983 (1). The replacement system was introduced (see figure 19) to alleviate operating problems based on too many derivatives and suppliers and consists of two parallel parts using a common Master Supplier File data base:

1. F&GS (Facility and General Services)
2. Production Parts

These are collectively know, along with later enhancements as POARS (Purchase Order Accounting and Recording Systems). The original POARS modules were developed by BLSL for Longbridge and latter used at Cowley before being adopted by Land Rover. Another module dealing with Research & Analysis of purchasing decisions was developed, again by BLSL for ARG and added in 1983/4 (3).

The systems were extended with the introduction in 1984 of the finance aspect under the name PACS (Purchase Accounting Control System), which interfaces with the finance systems (4). This system coordinates the ordering and payment of supplier accounts.

The F & GS part of the system was re-written in 1987 due to increased pressure and to help facilitate integration into the COPICS/PROSPECTS systems (2).

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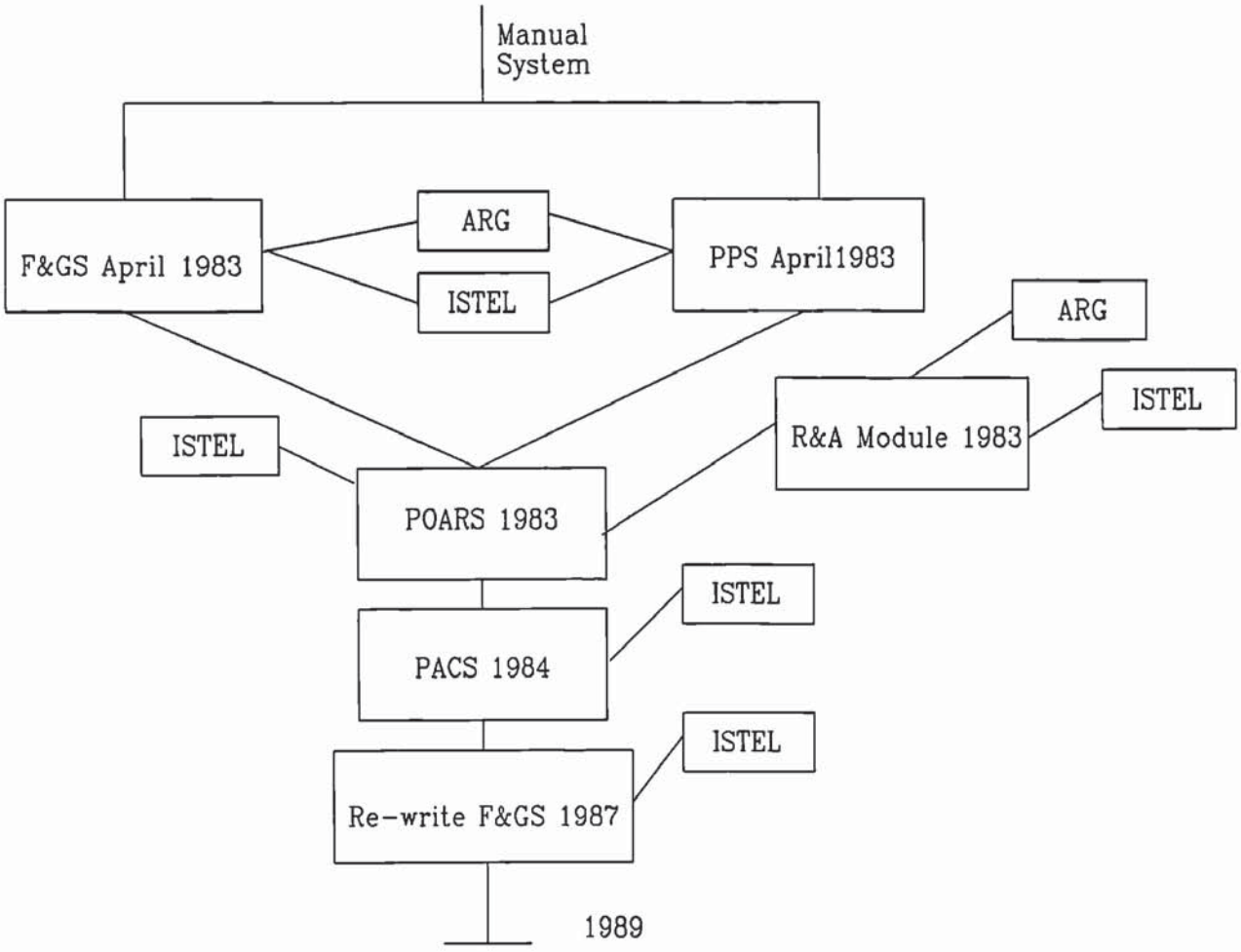

Figure 19. Purchase Systems.

A.7 Finance Systems

The development of these systems is represented in figure 20. The finance systems at Land Rover are based on the FVF System (Finished Vehicle Finance) developed by ARG. The basic modules are listed bellow (table 19) and the major interfaces are shown in figure 21 (3):

FVF1 - Finished Vehicles Finance 1 - off assembly to dispatch. (7)

FVF2 - Dispatch to archive (7) (added 1979) (7).

VISA - Vehicle Inventory & Sales Analysis (1) Sec.3.6.2.

CADS - Debiting & Crediting System (1) Sec. 3.6.1. (Interfaces to BACS (Bank Automated Clearing System) (1)).

HOPICS/EPICS - Home/Export Pricing & Invoice Control (2) Sec. 3.6

CJ/440 - Cost to Sales Systems -
CJ - Cost Pricing
440 - Variants Tracking (2)

MMS Accounts/General Ledger - (2) Sec. 3.1

Export Sales Ledger *} (1)Sec. 3.6.1
Home Sales Ledger *}

HT9 - S & M Sales Ledger

ARI - Sundry Sales Ledger

LRIS - Euro. Sales Ledger [(3)Sec. 1].

* All Ledgers provided by Package Programmes Ltd

Table 19. Land Rover Finance Modules.

No provision was made for CKD (Complete K.D.) Sales Finance due to the lack of VIN (Vehicle Identification) number in CKD operations causing anomolies [(1) 3.7].

These systems were operated by ARG until 1979 when they were separated for Land Rover operation following the reorganisation of the company with Freight Rover as the sister organisation. The physical relocation of the systems did not occur until 1982 (from Cowley).

The LRIS (Land Rover International Sales) system was introduced in 1982 [(3) Sec.1.2] to help with difficulties experienced with currency transactions.

The MSA (Manufacturing Stock Accounting) system was introduced in 1983 and took over from the limited accounting functions offered with OSCAR (5) which now fell under finance operations. These systems are examined latter under the heading of inventory.

Pressure on the 440 (Purchase Variance) system caused this to be expanded and integrated with the CJ (cost justification) system in 1984 to create a unified cost to sales system (4).

Pressures on the Sales Ledgers including:

1. Poor Currency Handling
2. Poor reporting
3. Closure of LRIS office [(3) Sec.1.2]

This caused the development of a bespoke Sales Ledger by ISTEL in 1985, which did not include any links with the MRP systems being developed simultaneously but aimed to correct the faults of the existing ledgers.

Current considerations from ISTEL were being prepared to examine the role of finance systems in the MRP initiative however this was stopped following the reorganisation of 1989.

<u>Sources</u>

(1) 'Financial Development Strategy - Land Rover', BLSL, August 1983.

(2) 'Land Rover Accounting Systems Review', L.R.Sys., September 1982.

(3) 'Sales Ledger Functional Requirements Specification', ISTEL, May 1985.

(4) 'Proposal to update 440 Purchase Variance System', ISTEL, October 1984.

(5) 'Functional Specification MSA', ISTEL, March 1985.

(6) 'Finished Vehicle Finance Interfaces', Sales and Marketing, September 1980.

(7) 'FVF Project Proposal - development of FVF2', BLSL, December 1979.

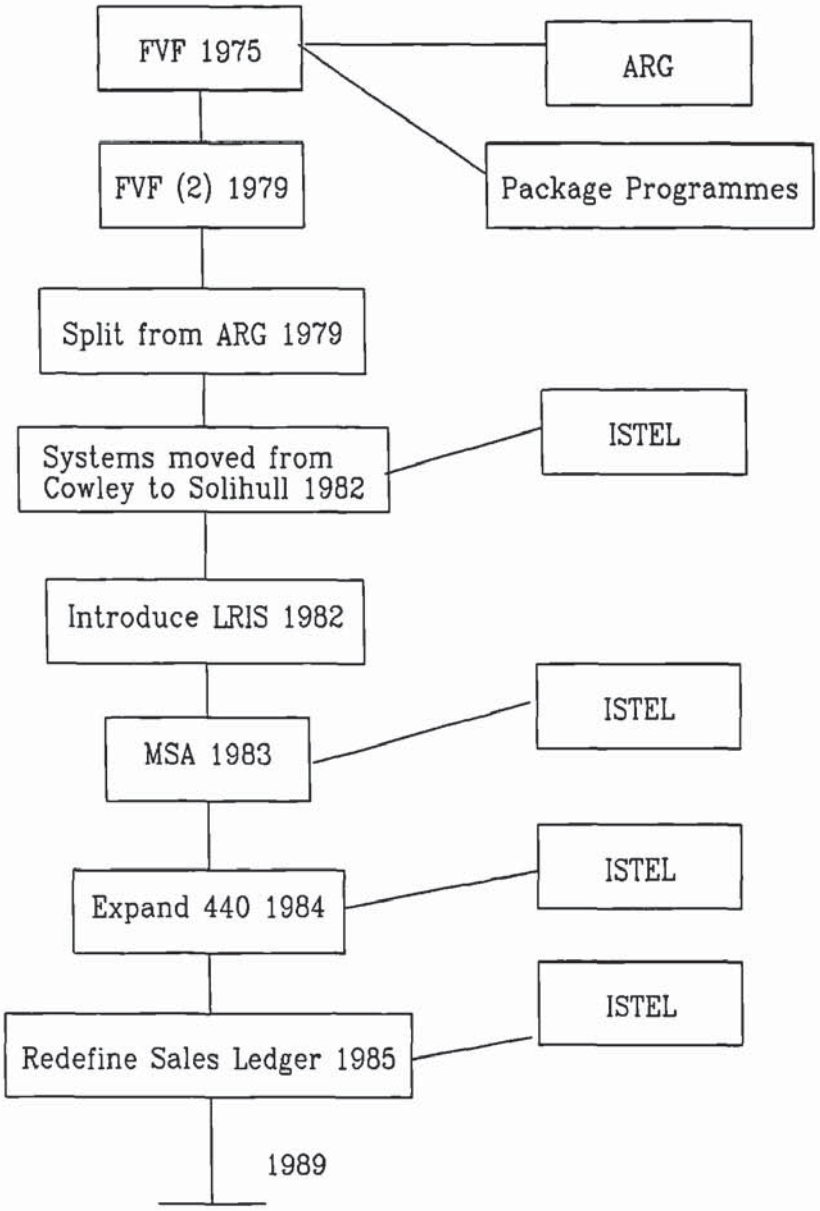

Figure 20. Finance Systems.

Figure 21. Finance System Operation (3)..

A.8 Service and Warranty Systems

The CAVIAR (Customer and Vehicle Information Access and Retrieval) system was a B.L. operated warranty and parts support system (1).

This was operated in parallel to the SUPERCOVER (5) systems operated by ARG for all it's cars operations (see figure 22). In 1983 the setting up of the Land Rover and Freight Rover as a joint venture caused this part of the system to be broken off (2), and the dropping of the Super Cover systemsfor 4x4. The CAVIAR system was still operated by ARG at Cowley.

In 1985 a new system SWAP (Service Warranty and Parts) was developed for service and warranty claims (3) and LRPE (Land Rover Parts and Equipment Ltd) was put in control of the receiving end of the system in line with this organisation's increasing autonomy from Land Rover manufacturing operations. This was a customised version of the ARG system and operated by ISTEL.

In 1987 a new parts core business system was proposed . This was called POPIMS and is based on the LS3 programmes shown in figure 23 (4). It is intended to emulate the operations of the LRPE business as closely as possible.

Sources

(1) 'Financial Development Strategy', BLSL, 1983.

(2) 'Commercial Systems Strategy', ISTEL, 1986.

(3) 'Feasibility Study for Land Rover Service Departments Systems Requirements SWAP', ISTEL, 1984.

(4) 'LRPE Core System Replacement' Fincap 1 (No. EP 286), October 1987 (the request for finance document).

(5) 'Sales & Marketing Systems Strategy', BLSL, 1984.

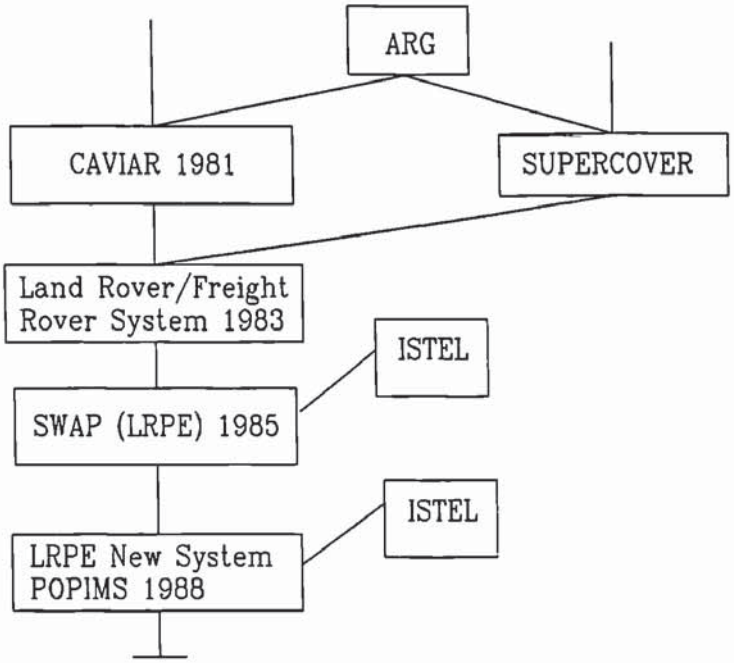

Figure 22. Service and Warranty Systems.

Figure 23. POPIMS System (4)..

A.9 Inventory Control Systems

The original systems were ARG based (see figure 24). SAMS was a high level stock analysis and monitoring system dealing with major units and interfacing largely to the FVF finance systems (1). The LSR system (Land Rover Stock Recording) was a means of recording and ordering stocks (2). The system's limitations were in it's poor links to other systems, the level of detail held and the poor reporting from these systems.

The OSCAR system (On-line Stock Control and Recording) was introduced in 1981 as modules for all ARG activities (8). Land Rover had 5 OSCAR systems covering:

Body & Assembly Solihull

Engines & Transmissions North Works

Engines & Transmissions Acocks Green

Tyseley (Axels)

Components.

The OSCAR system consists of 5 core modules:

Goods Receiving

Store Processing

Internal Movements

W.I.P

Defective Materials (6)

The operation of the OSCAR system is shown in figure 25 (3).

In 1982 audit facilities were added to the basic systems and a degree of accounts reporting for inventory tracking (6). This function was replaced in 1983 by the MSA Manufacturing Stock Accounting system (see the earlier section concerning finance systems) (7). This system contained basic accounting functions to allow simple calculations and analysis of the stocks being held by the company and included methods

of determining stock turnover rates (5).

In 1986, as part of the COPICS plan, the separate OSCAR systems were effectively integrated. Capacity pressures on the system caused VICTOR to be introduced in 1988 to cover none production stock. This has similar operations to the now integrated OSCAR packages but is structured to handle the excess turnover rates and obscure stocking and order profiles of none production materials (6).

Sources

(1) 'Stock Analyst Monitoring System Manual', BLSL, 1981.

(2) 'Business Specification SAM', BLSL, 1981.

(3) 'OSCAR - a strategic review', L.R.Sys., 1982.

(4) 'OSCAR Business Proposal - Land Rover Components', BLSL, 1983.

(5) 'OSCAR Stock Auditing functional specification', BLSL, 1983.

(6) 'Business Proposal for non production stock control system', ISTEL, 1989.

(7) 'Financial Development Strategy', BLSL, 1983.

(8) 'Land Rover Systems Strategy - conclusions on phase 1', BLSL, 1981.

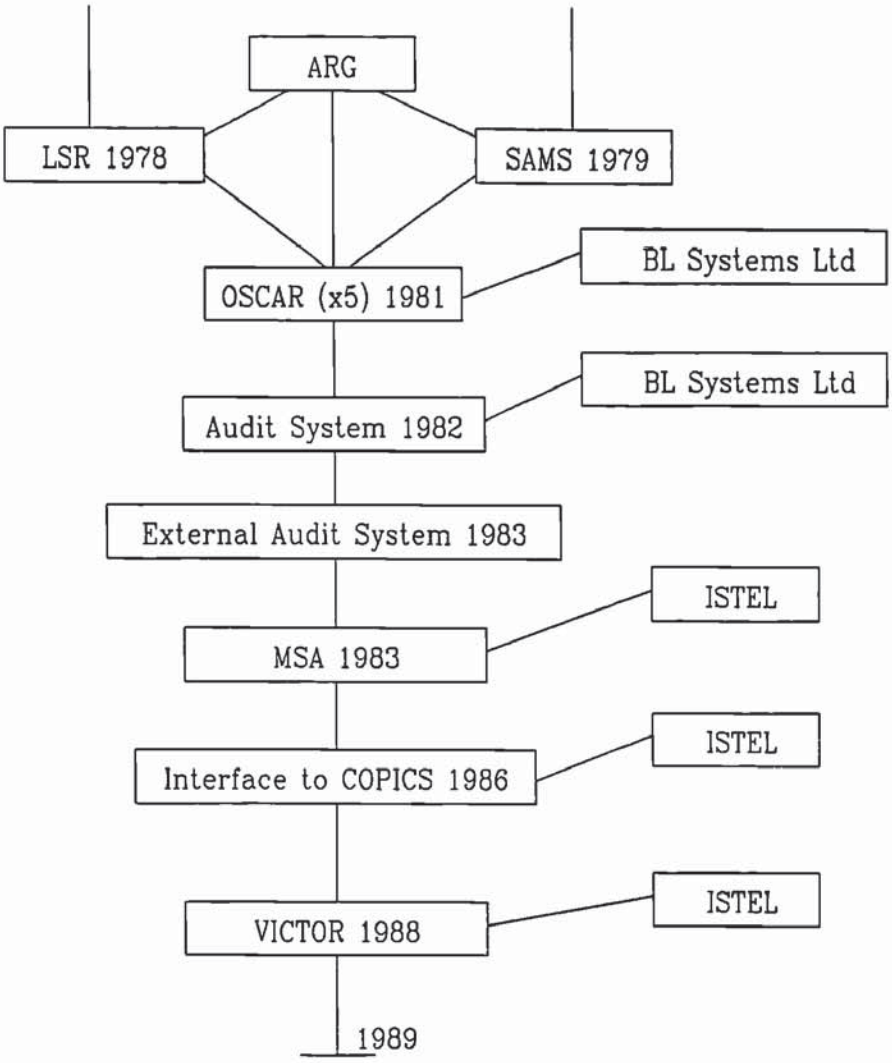

Figure 24. Inventory Control Systems.

Figure 25. OSCAR Inerfaces (3)..

A.10 Order Control Systems

The order control systems at Land Rover were originally operated by ARG as part of a centralised service (see figure 26). These systems were based upon SPAR (Sales Performance & Reporting) and FCD (Factory Controlled Delivery) (1).

The SPAR system was developed in house and operated on behalf of all four BL product companies by Centre File Ltd. It was dropped by Land Rover due to it's age and the development of different market areas for Land Rover, distinct from those used by ARG (3).

These systems were adapted and enhanced in 1983 by the ORAC system (Order Receipt and Control) from B.L. Systems. This is basically a data bank of orders and a specification file which interacts with the manufacturing control systems (3). The system also makes use of the PROSPECTOR (direct mail based on ARG's SUPERLINK) and view data systems to communicate with dealers on the receipt and processing of orders (3).

In 1984 the SHANDIS system was introduced to track vehicles between sales and dealer acceptance. This did not integrate with the other control systems but relies on bar coded labels being processed at key points in manufacture (3).

1985 saw the introduction of the bespoke SAFFRON system (Sales Forecasting), based upon the Land Rover market and region definitions (2). This replaced a spreadsheet package previously run on a microcomputer and creates a framework into which ORAC slots orders to create the MPS (master production schedule) for the MRP system.

Sources

(1) 'Functional Specification of ORAC', BLSL, 1982.

(2) 'Saffron - Proposal', ISTEL, 1985.

(3) 'Sales & Marketing Systems Strategy', ISTEL, 1984.

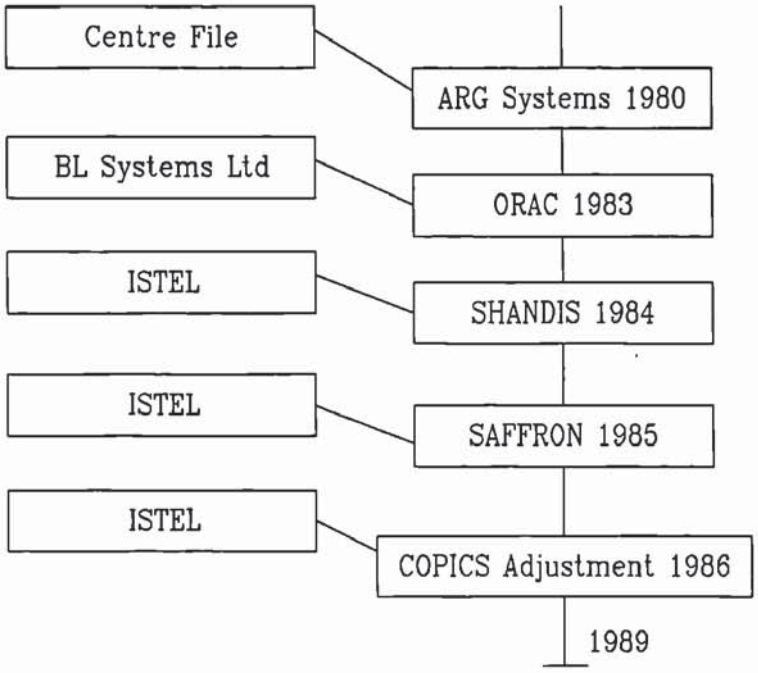

Figure 26. Order Control Systems.

A.11 Manufacturing Control

The manufacturing control system at Land Rover was 100% manual until 1971 with the introduction of the MSC (Master Supply Contract) (see figure 27) which aimed at solving the then control problems including incorrect broadcasting and no scheduling or coordination of major units (1). This system established monthly programmes, 6 months ahead, and was based on capacities and sales forecasts at it's top level. These monthly schedules were then passed to each production unit to achieve in a parochial fashion. The assembly area had a manually derived list of daily major units (1 schedule across 5 production lines) and the computer system was used purely as a data store and for information broadcasting and label printing (see the production control system figure 28 (1)).

In 1979 pressures of:

. growing number of derivatives & options

. sales issuing none standard vehicles

. V8 Land Rover introduction (2)

caused this system to be updated to give a sequence down each line (5 Land Rover & 1 Range Rover) however limitations in the broadcasting module only allowed for 3 Land Rover sequences split across the 5 lines.

The updated system also allowed an explosion of parts to be sent daily to each line (only 4 lines from the 6 as explained above) to help schedule parts (3).

In 1980 the same system was updated at a higher level to enable information to be loaded from military sales and to allow a breakdown into territorial sections as required for procurement by manufacturing P&MC (Parts and Material Control) (4). The IVF (Issued Vehicle File) (Manufacturing's version of finance's FVF) was introduced as the basis for these modifications.

The improvement of technology and the pressures being placed on the MSC through increased volumes and derivatives caused the introduction of MOCS (Manufacturing Order Control System) in 1982 (5). The quoted reasons for it's introduction were:

. Improve Efficiency

. Reduce Inventory

. Reduce WIP & Rectification

. Improve Quality

Basically the system matches orders against the MSC (updating quicker and more often than from ORAC, the system installed when MOCS was operating). It still only handled the B & A (body and assembly including Paint and BIW (Body in White)) areas with limited links into the E & T (engines and transmissions) areas. The major units of the system will be examined:

A.11.1 Manpower Planning

Uses DERMACH (industrial engineering system) to plan man assignments. However there was no checking of the plant capacity involved in the plan.

A.11.2 Material Planning

Based on supplier scheduling and not order planning due to the longer lead times for suppliers than that of the current order book.

A.11.3 Production Control

(1) Build Documentation (VIN allocation)

(2) Line Broadcasting & Vehicle Tracking across the three sites (B & A, BIW, Paint) covered by the system and not into the supporting supply sites (maninly E and T) (7).

1983 Saw an improvement in the major unit identification system and the site rationalisation also effected the hardware location of the systems (6).

Further developments are encompassed in the following section concerning the MRP systems themselves.

Sources

(1) 'Vehicle Scheduling - Land Rover/Range Rover', L.R.Sys., 1973.

(2) 'System Proposal for Land Rover & Range Rover Production Control Systems Review', L.R.Sys., 1979.

(3) 'Land Rover Programme Forecasting system', BLSL, 1980.

(4) 'Functional Specification of vehicle programming and forecasting system', BLSL, 1980.

(5) 'Manufacturing Control Business Proposal', BLSL, 1982.

(6) 'Land Rover Major Unit Identification System User Manual', BLSL, 1983.

(7) 'Functional Specification of Build Documentation Module of MOCS', ISTEL, 1983.

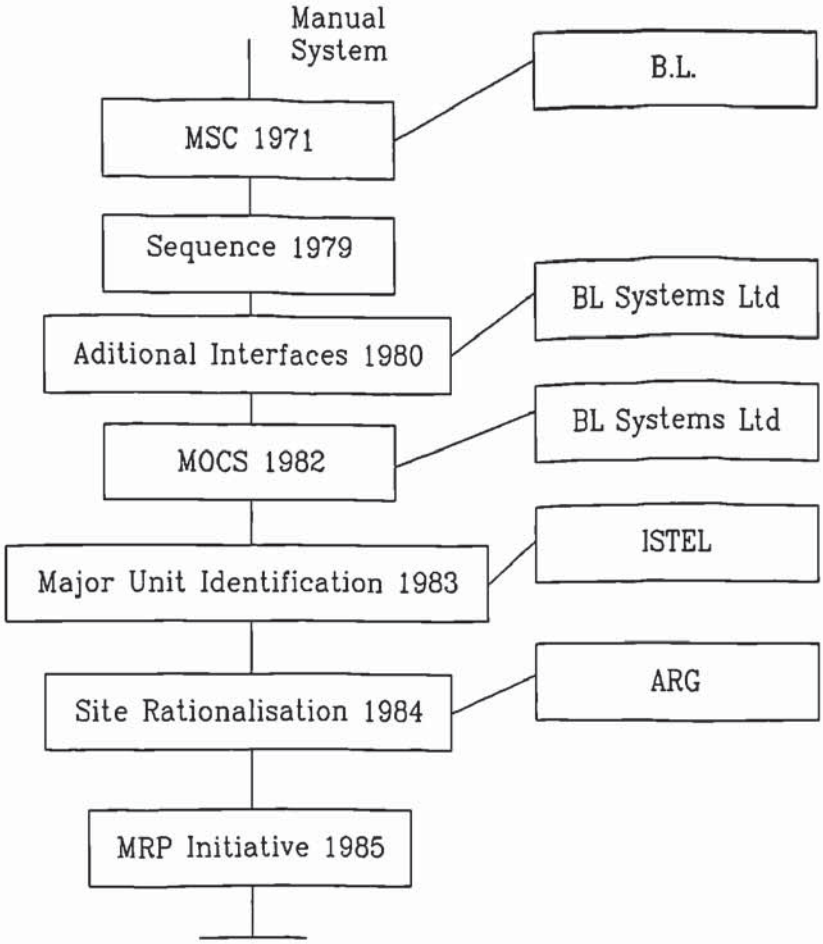

Figure 27. Manufacturing Control Systems.

Figure 28. Production Control System Areas (1)..

A.12 The Current MRP System

The introduction of MRP at Land Rover is seen by many people within the organisation as a company wide introduction of production control systems. However, closer examination shows that the actual systems are largely based on those present before the MRP project with a large degree of tailoring to interface with the new core modules of adopted IBM COPICS modules.

The nature of the COPICS package shown in figure 29 (and detailed in (2)) does not appear to contain any of the features expected in MRPII (including finance links and feedback to allow correction or simulation of the MPS) and has only a limited capacity planning (CRP) function necessary for closed loop MRP operation.

The modules which have been bought (or are envisaged to be acquired in the near future) from IBM by Land Rover are summarised:

(1) AF/MRP - the MRP calculation module. Implemented July 1987 (1).

(2) PPS (PROSPECS) - the BOM which has been much altered to suit the company's particular product definition structures. Implemented 1987 (1).

(3) MPS - Master Production Scheduling implemented 1987 (1).

There is no major CRP processing within the systems, this is presently being roughly achieved by the MPS module which contains fixed constraints against which orders are matched. This is only a very loose form of closing the loop and is not at all reactive as recommended by Orlicky and Wight (4)(5) but heavily planned and even used as a set of goals for the MPS to optimise.

The present control systems are outlined in the believed systems figure 30 (1). This in itself does not represent the closed-loop MRP believed to be present with the company. Closer examination shows the actual production control system to be at a very high level with most of the lower modules missing and most not even defined. This is represented in the actual systems figure 31.

The operation of the modules and the effect of the MRP initiative has been to introduce a degree of planning not at the sub vehicle level but still at the major unit stage and a more effective form of stock and inventory recording system greatly aided by the new product definition modules which rely on

modular information.

Sources

(1) 'Guide to Land Rover Manufacturing Systems', L.R.Sys., November 1988.

(2) 'COPICS - Manufacturing Applications Overview', IBM, 1984.

(3) 'COPICS - CRP General Information Manual', IBM, 1987.

(4) J.A.Orlicky, Material Requirements Planning, McGraw Hill, 1975.

(5) O.Wight, MRPII Unlocking America's Productivity Potential, O.Wight Publications, 1981.

Figure 29. COPICS Modules (2)..

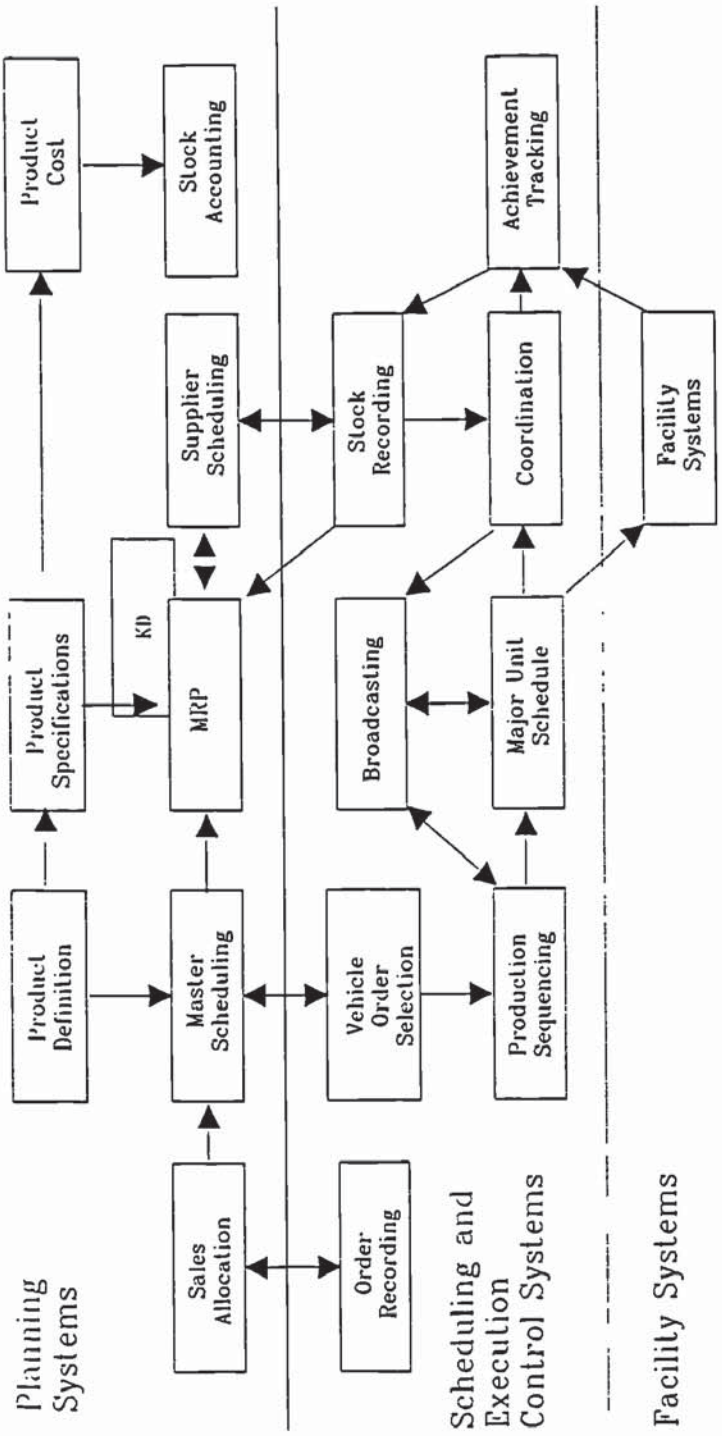

Figure 30. Believed Manufacturing Systems.

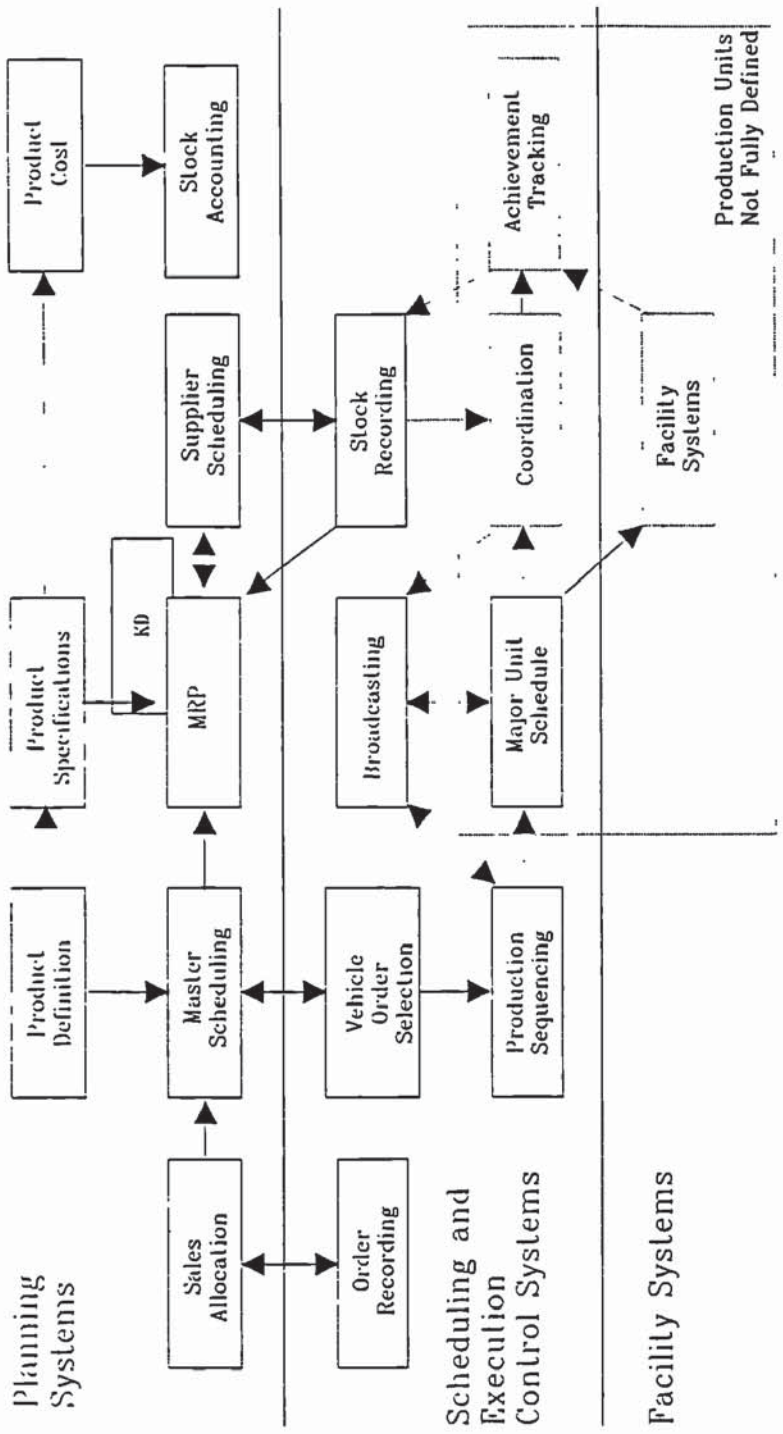

Figure 31. Actual Manufacturing Systems.

A.13 Conclusion

The aim of this paper was to analyse the historical development of the systems present at Land Rover and to examine the operations of the present systems as supporting information for the case study concerning MRP introduction . This has been achieved through much investigative work and it has also investigated the problems which lead to the introduction of MRP.

The effect of the MRP initiative has been to introduce a greater degree of planning at the sub vehicle level, an attempt at achieving a consolidated MPS, an improved form of product definition and a more effective form of stock and inventory monitoring system.

Future work to improve the systems is aimed at developing the lower level systems to handle more effectively the broadcasting of build information and the tracking of parts (though only major units) in an incremental way as first outlined with the introduction of MOCS in 1982.

It is believed that any benefits and improvements can be identified and allocated to the introduction of the PPS, MPS and MRP modules (and the increasing open access to data bases) and does not represent the synergy expected from true closed-loop MRP or MRPII which this analysis has shown to be absent from the organisation, despite the beliefs of Land Rover and ISTEL personnel.

It appears that the MRP initiative has developed, after a few radical steps of addition to the existing systems, into the base for an incremental development as seen with the previous systems before MRP's conception in the company.

Appendix B. The Data Gathered as part of the Study of Operational Innovation in Rover Group

The following is a description of the innovations found in the Rover Group and used as the basis for the analysis of innovation found in Chapter 8. The innovations are divided into those found at Land Rover and Rover Cars.
The study is by no means exhaustive but represents the innovations which members of the company's staff and management believe have a considerable element of originality or have significantly effected the company's operations.

B.1 Innovations at Land Rover

AGV's (Automated Guided Vehicles) for V8 Engine Test/Assembly 1986

An automated guided vehicle system for the assembly of V8 engines. The introduction of AGV's has radically changed working practices, allowing a longer operating cycle time giving the operator longer (5 minutes) and more interesting cycle of operations to perform. The AGV line can easily be contrast to the traditional 4 cylinder fixed-track nearby where the cycle time is 1 minute.
The system is fed manually from a stock of engine blocks. The AGV project resulted following a facilities update to solve product-mix generated production-bottleneck problems at the Acocks Green plant. The technology was acquired through an engineering consultancy firm as part of a project managed by the Manufacturing Engineering Department. Information: Manufacturing Engineer (RG).

Flexible Manufacturing Cells for Cylinder Heads 1988

The cells consist of manually loaded machining centres (Cincinnati T10/HPMC) which are dedicated to cylinder head machining. The machines were originally introduced on a loan basis whilst other ageing machines were replaced. The cells represent the introduction of new machining technology for the company and was used to train operators and engineers on the use of FMS (flexible manufacturing technology) techniques. Information: Manufacturing Engineer (VF), Operator (IC).

CNC (Computer Numerically Controlled) Pulley Machining 1984

A facility for machining 50 variations of pulley for use in Land Rover's 4 cylinder and V8 engines. The CNC technology was introduced to replace ageing machines and provide improved flexibility and quality, coupled with cost savings over replacement with non-CNC equipment. The originality of this facility arises from its ability to produce the 50 variants that it does through the use of bespoke jigs and fixtures attached to standard CNC machines. Information: Manufacturing Engineer (VF).

CNC Flywheel Machining Incorporating Robot Loading 1988

A stand alone cell combining two machining operations with part transfer by a robot arm. This represents a process innovation because it incorporates robotics material handling technology combined with CNC machines which were purchased from different manufacturers. The two types of equipment were combined in collaboration with their respective manufacturers. The cell resulted from a material handling problem which followed the introduction of CNC machines to replace an ageing dedicated flywheel manufacturing facility. Information: Manufacturing Engineer (VF).

Spot Welding Robot in BIW

A development machine to gain experience to be used in the introduction of automation into the BIW area and was developed following a study to develop a strategy for the body manufacturing facilities. Existing solutions combining robotics and welding were available but Land Rover decided to adopt its own combination, primarily because of difficulties experienced in the use of spot welds with aluminium. Information: Manufacturing Engineer (RG).

Engine Test Facilities 1981

An automated engine test facility which performs a predetermined test sequence for each Land Rover engine manufactured. The cells were developed with the help of BL Systems Ltd from existing non-automated facilities at a time when, with predicted increases in volume, the highly skilled labour required to perform manual tests was in short supply. Information: Manufacturing Engineer (JT).

Automated Stores 1980

Computer controlled placement/retrieval system for the North Works (engine and Range Rover assembly). The stores were developed because of space constraints and in plant congestion problems. The stores were developed by Ingersoll Consulting Engineers and represented a then innovative use of a constrained space to adopt a newly available technology. Information: Manufacturing Engineer (DY).

Chassis Sub-assembly Robot Welding Cell 1981/2

A two work station cell allowing one robot to work continually whilst chassis sub-assembly parts are loaded/unloaded at the other station. This was an opportunity taken by Manufacturing Engineering to use a spare robot from the Chassis Robot line (see below) in a more efficient manner than found elsewhere in the industry. Information: Manufacturing Engineer (DS).

Chassis Robot Line 1980

A line producing 70% of the gas-welds on the 110" chassis. It combines 12 robots and a turn station. This facility was developed with the help of the Puma robot manufacturers when the chassis facilities were re-laid following the move onto the Solihull site and utilised existing technology and robot control techniques. It was originally intended that the 90" chassis should also use the facility but this lengthened the cycle time to an unacceptable degree and so only the 110" chassis is produced. Information: Manufacturing Engineer (DS).

The LAN (Local Area Network) 1982

This is reputed to be the longest broadband LAN in Europe at 36 miles. It was developed by the Systems Department's purchasing and interconnection of certain network elements from Ferranti and other companies with the help of BL Systems. It represents part of the Systems Department's plans to link the emerging business and control systems, and was a prerequisite of the MRPII systems' introduction. Information: Systems Engineer (DS).

Paint Shop Electronic Tagging System 19887

This is part of the paint shop facility monitoring system and was introduced at the insistence of the Material Control Department by the Systems Department, with the help of ISTEL and the tag manufacturers, to help with the management of the automated spraying facilities. Information: Manufacturing Engineer (JT).

Service Parts Processing Capabilities 1989

This is a computer based parts-distribution system which enables the delivery of any Land Rover part to the mainland UK the next day. It is based on a proprietary software package tailored to the particular business by the suppliers LS3 and was introduced as an opportunity taken whilst reforming land Rover Parts Ltd.'s business systems. Information: LRP Ltd. Systems Manager (IF).

Rolling Road 1981

A test apparatus for vehicles as they leave the assembly track. Two of Land Rover's three rolling roads include innovative technology to cope with the effects of trying to monitor the combined effect of 4 wheel

drive and 4 wheel anti-lock brakes. They were introduced as part of the ABS (anti-lock brakes) project with the help of the road suppliers and the ABS unit manufacturers. Information: Manufacturing Engineer (SW).

VETS (Vehicle Electrical Testing System) 1981

This system utilises a current sensitive probe and computer control to test the operation of the vehicle's various electrical circuits. The advantage of the system is that it reduces the time of the tests by eliminating the visual confirmation previously used and time consuming tests e.g. waiting for heated rear windscreens to warm up before they can be detected. The system was originally developed by Warwick University for Freight Rover and introduced following the appointment of a senior Freight Rover engineer to Land Rover who proposed the adoption of a similar system. The basic VETS equipment has been extensively re-designed by Land Rover, with the help of an electrical contractor, to suit the complex 4x4 vehicle electrical systems. Information: Manufacturing Engineer (JT).

Range Rover Mini Paint 1981

A complete spray booth and oven suite for paint rectification, post-assembly, which was purchased from a group of specialist equipment suppliers. The level of quality required by the facility is very high and the development of equipment capable of such quality levels is seen by Land Rover managers as something of an innovation. The facility is required because of damage which occurs as the vehicle is assembled. Information: Manufacturing Engineer (JT).

Final Inspection Data Collection System 1988

This system represents the automation of the data collection operation as part of the final vehicle inspection. A hand held unit, pre-programmed with the inspection routine, is used to guide and capture the responses of the inspector. The information is then transferred into a PC system for analysis and the production of reports. The system was originated through the recommendations of a consultancy firm and subsequently developed by ISTEL. The technology is widely available and has been used in the automotive industry before but Land Rover see its use in vehicle inspection as an innovative application of the technology. Information: Manufacturing Engineer (RM).

E-Mail (Electronic mail system) 1988

A system developed from the ISTEL COMET system and implemented as part of the LAN by ISTEL and the Networks consultancy firm. The system is not widely used because of its limited number of users or mailboxes. Information: Systems Engineer (PC).

Hydraulic Ride Simulator 1988

A "four-poster" machine which uses hydraulic rams supporting each wheel of a test vehicle which is capable of simulating the rides of different road surfaces. The equipment is used in testing vehicle suspension designs. The facility is an update of an existing piece of equipment and was introduced with the help of Gaydon Technology, Rover Group's engineering development arm until 1990. Information: Chassis Engineer (AP).

CAPP (Computer Aided Process Planning) 1985

A central data-base of industrial engineering information which was developed from the DERMAC system by ISTEL (see Appendix A). It contains the process information for the assembly operations and is used to generate process sheets and perform simple line balance calculation. Information: Industrial Engineer (DH).

TARDIS 1979

The time and attendance monitoring system which was developed by ISTEL (then BL Systems). The TARDIS system consists of 80 clocks, feeds the payroll system and has limited facilities to help locate supervisory staff. This was the first implementation of a system which ISTEL later introduced to Rover Cars and has also marketed to external customers. Information: System Engineer (LM).

QUAD/MESA 1989

A computerised point of order system which allows the direct entry of customer order details into the sales order processing system and subsequently into the MRPII systems. It was developed by ISTEL and IBM at the request of the Sales and Marketing Department and is seen as innovative by the Land Rover management because of the way it provides a service not available on the original COPICS system, the linking of a vehicle back to the customer. Information: Manufacturing Systems Engineer (DH).

EDI (electronic data interchange) 1989

An electronic data exchange system which communicates with suppliers to provide engineering change information in a more reliable manner. The original system was developed by ISTEL, and Prime Computer Vision the makers of Land Rover's CADDS 4X CAD (Computer-Aided Design/Drawing) system, and is an application of communication technology to engineering data. Information: Manufacturing Engineer (DH).

MRPII Production Control Systems 1985

Explained in detail in Chapter 4, these are based on IBM COPICS MRPII systems, tailored by ISTEL to interface with the existing Land Rover systems. The originality of the final system rests with specific aspects related to Land Rover, its products and previous systems. Information: MRP Team Leader (VS).

Electrostatic Paint Systems 1985

A technique developed by Ford in the US which utilises charged paint particles to be attracted to the body parts being painted. It is seen by many Land Rover managers as quite an innovation in Land Rover, despite the technology being widespread throughout the industry, because of the way it was introduced as a "clever" solution with the help of the paint technology consultants. Information: ISTEL's Land Rover Paint Shop Systems Manager (KW).

Automated Paint Spraying 1985

The hardware part of Land Rover's paint shop systems which utilise the electronic vehicle tags to instruct the automated equipment which spraying cycle and colour is to be used. This equipment was instigated as part of a refurbishment of the paint shop with the help of the various equipment suppliers and ISTEL. Information: Manufacturing Engineer (JT).

SCOPE System 1989

This system allows the sequencing of major units, e.g. body, engine, gearbox, etc., in line with production requirements. The system was developed by ISTEL for Land Rover's PMC department and represents a novel use of the LAN and MRPII systems. Information: PMC Manager (PB).

PROSPECTS Bill of Materials (BOM) 1985

This is a central BOM which replaced about 8 others. It is believed to be innovative by Land Rover's production control and engineering specification managers because of its changes in specification handling techniques from the standard COPICS PROSPECTS system, including the introduction of a modular rather than part level structure. It was introduced as part of the MRPII introduction by ISTEL and IBM.

Information: Manufacturing Engineers (JT and DH).

Hot Melt Adhesive Spray 1987

A new process which involves the spraying of adhesives and is used to fasten carpeting to Range Rover wheel arches. The equipment was supplied by Nardson UK Ltd. in response to an existing quality problem of fastening carpet onto inaccessible places. Information: Manufacturing Engineer (DC).

Laser Door Open Detection 1985

A laser beam based system which is used to detect open doors in the paint shop and prevent collision damage. If the beam is broken, i.e. a door is left open as the body-shell is about to pass a narrow part of the track, the production line is automatically stopped and an alarm sounds. This was an isolated adoption of laser technology for Land Rover which was introduced as part of the paint shop refurbishment with the help of Gaydon Technology. Several Land Rover managers believed that the use of laser technology to create a detecting envelope from one source was innovative at the time of its introduction. Information: Manufacturing Engineer (AW).

Facilities Design on CAD (Computer-Aided Design/Drafting) System 1984

This was a utilisation by the manufacturing engineering department of the CAD system to help the facility design process. It involved an in house tailoring of the CADDS 4X system, which was intended for mechanical design work, to work as an architect's CAD system. This type of facility has been available for many years but it is new to Land Rover and has not previously been developed for the popular CADDS 4X system. Information: CAD Systems Manager (JT).

Robot Chassis Spot Welding 1986

A cell similar to that featured earlier which was commissioned following the lessons learnt from its predecessor. It utilises several advances from the earlier cell, mainly incremental developments to further improve machine efficiency, and is seen as innovative by several manufacturing engineering managers as a result. Information: Manufacturing Engineer (DS).

CNC Hobbing of Gears 1988

The hobbing of gears using CNC technology was introduced to replace ageing machines. The development of CNC techniques in gear manufacture was not new but was introduced at the company as such and has radically transformed the efficiency of Land Rover's gear box manufacturing facilities. Information: Manufacturing Engineer (VF).

B.2 Innovation at Rover Cars

Robotics for Rover 800 BIW (body-in-white) 1983

The robotics technology used is a near copy of those found in Honda in Japan but are viewed as highly innovative by Rover's Cowley engineers who have previously only been involved in manually operated equipment unlike their Longbridge colleagues. The robots were commissioned by the manufacturing Kuka and ASEA engineers. Information: Cowley Manufacturing Manager (RS).

Order File 1985

This is a sales system which enables Rover Cars to operate with orders instead of through a wholesaling process which is the industry norm. The system was developed by ISTEL. Information: Commercial Manager (PB).

Cell Management 1987

A philosophy which encourages Rover's production-line managers to operate as a mini managing director, by having direct control over manning, maintenance and material supply in their particular production area (cell). The idea was developed by AB at Rover with KB at Warwick University following their observations from several visits to Honda in Japan. Information: Manufacturing Executive (AB).

TQI (Total Quality Initiative) 1986

Rover's implementation of the popular total quality techniques which involves training all the company's employees in order to introduce certain management and problem solving tools, e.g.: brainstorming, fish-bone diagrams, SPC (statistical process control), etc. TQI was implemented by PA Consultants using the cascade training method. TQ is a widespread idea but is seen by many of Rover's senior managers as a radical departure from previous management styles in the company. Information: TQ Facilitator (TH).

Laser Body Measurement at Cowley 1985

An in process gauging cell which measures all the critical dimensions for assembled Montego and Maestro bodies. It was bought as a stand alone inspection cell from the Automatics company following the involvement of Warwick University and is believed by Rover managers to be the first application of existing laser measurement technology as part of a production line. Similar cells existed before but were not used for inspecting 100% of a line's production. Information: Manufacturing Engineer (BG).

Engine 'Stuff' 1989

This technique, adopted as part of the Honda R8 assembly facilities, is seen as innovative by Rover managers because of the practice of fitting the engine into the body from beneath. The traditional approach is to drop the body onto the engine. The advantages of the new approach stem from the fact that the installation process is easier, allowing for shorter cycle-times, etc. Information: Manufacturing Manager (RP).

VETS (Vehicle Electrical Testing System) 1983

A similar system to that at Land Rover but developed for Longbridge by a Warwick University teaching company. The Cowley version (with its novel voice recognition interface by IBM) was made by Ferranti. The VETS systems in Rover Cars are, as explained above, not innovative having been first developed for Freight Rover, but are viewed by many Rover managers as a unique solution to the company's quality inspection problems. Information: Manufacturing Engineer (BG).

Robotic Water-Leak Testing Cell 1983

A Warwick University project which involved injecting gas into the enclosed sections of an unfinished LM10/11 Maestro/Montego body and using a 'sniffing' robot to detect leaks. These leaks were believed to represent possible areas of water ingress and corrosion. The equipment has since been removed because of problems with the gas escaping from the many drainage and other types of holes in the body before the true leaks were detected. Information: Manufacturing Engineer (RS).

Glazing Cells 1985

This, now common, application of robotics was first introduced at Cowley and was supplied by Kawasaki (the glass fitting robot) and supplemented by Puma (the sealant application robot). Information: Manufacturing Manager (RS).

CAD System Input from Clay Models 1988

A 3D-CMM (three dimensional coordinate measuring machine) coupled to the CADDS 4X system which

probes the shape of the body panels on the clay models. This generates a computer model which accurately represents the clay's vehicle form from which press tools, used to manufacture the body panels, can be made. The system was developed with Computer Vision, now part of Prime Computers, the CADDS 4X suppliers and uses technology previously available (i.e. CADDS 4X and 3D-CMM) but in a new combination. Information: Design Manager (NS).

FMS Adoption in Rover Power Train 1988

Warwick University, and KB in particular, convinced the Manufacturing Director AB to adopt a large FMS (Flexible Manufacturing System) for much of Rover Car's power train machining activities. Use of this equipment, which was supplied as turn-key cells by the machine manufacturers, is not innovative but Rover's middle management and staff had never seen such automation in a machine shop before. Unfortunately the costly flexibility purchased in these systems and its inclusion had caused many problems and inefficiencies in the production activities. Information: Manufacturing Strategy Manager (RB).

Appendix C. Collaboration in the Automotive Industry

C.1 Introduction

This appendix is the supporting information to the table of collaborations. It will give the major instances of collaboration by major motor manufacturers and is compiled from various sources: (1)(2)(3)(4)(5)(6)(7).

C.2 Examples of Collaboration

Chrysler

Mitsubushi: Chrysler owns 12.1% of Mitsubushi and both companies share many components. There are also supply agreements of vehicles between the organisations including some light trucks. They have also embarked on establishing the Diamond Star Corporation in the US which is planned to assemble 250,000 Japanese designed vehicles for both marques.

Renault: Chrysler sells a Renault built compact car and both organisations are involved in designing a sports vehicle to be manufactured in an unused Spanish Renault factory.

Fiat: Chrysler's US dealer network has an agreement to sell the Alfa 164. A Fiat subsidiary also supplies Chrysler with cylinder heads.

Daihatsu

see Toyota.

Fiat

Ford: are cooperating over the design of a CVT (continuously variable transmission) unit for the Fiesta and Uno models.

Nissan: have a joint stake in a South African plant.

Subaru: are supplying 40,000 4x4 units for Fiat.

Ford

Jaguar: Ford have a controlling interest in Jaguar and are already planning to introduce a low cost Jaguar saloon.

Mazda: Ford has a share in Mazda and both organisations cooperate on small cars. They also share many components, particularly on the US Escort and 323 models.

Nissan: are cooperating over the development of a new engine for the European market and have closely

matched operations in Australia.

VAG: have a joint interest in the Brazilian manufacturer Autolatina.

Kia: Ford have a agreement which involves the Korean firm supplying a small number of mini sized vehicles for the US market based on Fiesta parts.

G.M.

Suzuki: GM hold a 5% stake in Suzuki and there is talk of a future joint manufacturing facility being established in Canada.

Daewoo: GM owns 33% of the Korean company as part of a deal which supplies GM with 60,000 small vehicles for the US market.

Isuzu: GM has 39% of the equity in Isuzu and the organisations have a joint design and supply agreement. The deal also includes Isuzu supplying GM with vehicles through its light truck operation, Bedford.

Saab: GM owns a controlling stake in Saab and plans to use it as the basis for its European luxury vehicles.

Toyota: are involved in the NUMMI organisation which will produce vehicles for both organisations.

Honda

Rover: see case study.

Chrysler: Honda distribute Jeeps in Japan for Chrysler.

Isuzu

G.M.: see G.M.

Subaru: have a joint assembly plant in Indiana producing Subaru cars and Isuzu light trucks.

Mazda

Kia: Mazda own 8% of Kia and provides technical support.

Ford: see Ford.

Saab: have a reciprocal agreement over distribution. It will be interesting to see how GM's involvement in Saab effects Ford's interest in Mazda.

Mitsubushi

Hyundai: Mitsubushi owns 15% of Hyundai and offers technical support in exchange for a badged vehicle

for the US market.

Chrysler: see Chrysler.

Daimler-Benz: are distributed in Japan by Mitsubushi.

Nissan

Ford: see Ford.

Fiat: see Fiat.

VAG: Nissan builds the VW Santana in Japan.

PSA

Renault/Volvo/PSA: are cooperating on a new V6 engine.

Rover: have a license to build the PSA design based R65 gearbox.

Suzuki: PSA vehicles are supplied through the Suzuki network in Japan.

Renault

Volvo: Renault own 25% of Volvo and Volvo own 20% of Renault. The agreement is likely to bring both organisations into supply deals based on economies of scale.

Renault/Volvo/PSA: are cooperating on a new V6 engine.

Chrysler: see Chrysler.

Rover

see the study.

Toyota

Daihatsu: Toyota owns 15% and the collaboration includes joint design and manufacturing agreements.

G.M.: see GM (NUMMI).

VAG: Toyota use spare VAG capacity to manufacture light trucks.

VAG

Seat: VAG owns the majority of Seat.

Ford: see Ford.

Toyota: see Toyota.

Volvo

Renault: see Renault.

Renault/Volvo/PSA: are cooperating on a new V6 engine.

C.3 References to Collaboration Examples

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