Exploring GSS Negotiation – the use of a GSS Log

Igor Pyrko[1*], Fran Ackermann[2], and Colin Eden [1]

[1] University of Strathclyde, UK
[2] Curtin University, Australia
[*] Corresponding author, e-mail: igor.pyrko@strath.ac.uk

Abstract. Group Decision Support Systems (GSS) have been used extensively to support groups in working together in organizations. This paper focuses on the particular type of GSS, called *Group Explorer,* which during the course of facilitated sessions generates data logs in the form of Excel spreadsheets. Data logs can be of high interest to researchers and GSS facilitators because they may possibly contain rich and valuable data such as about the detailed time of entry and the authorship of all contributions, or the results of voting activities conducted by participants. However, data logs may at first look complicated and difficult to read and follow. Thus the purpose of this paper is to provide a number of instructions and explanations for anyone interested in making good use of data logs, and to popularize similar analysis as a good opportunity to better understand the outcomes of GSS sessions.

Keywords: group decision support systems, data logs analysis, causal mapping.

1 Introduction

At the Warsaw 2015 GDN Conference we presented a paper about Successful Negotiation in 55 Minutes. The research followed from the detailed analysis of the time based log from the GSS workshops. In this paper we present a developed process for the analysis of a GSS log (from *Group Explorer*). The development reported is the result of our seeking to generalize and so systematize the analysis process. The intention of this paper is to broadcast the analysis process (set out in the appendix to this paper) so that other researchers can undertake similar analyses with respect to their own data.

In the analysis reported last year we were constrained by having to work with only two sets of data - real important negotiation settings are not easy to come by. We hope that the publication of the analysis method will encourage i) the analysis of a wider set of data and also ii) the development, by other researchers, of the analysis routines[1].

In particular we see a number of important research avenues that may be explored if other researchers are able to use a routinized data analysis method:

1. Group facilitation, using a GSS, is demanding for the facilitator. This means that the facilitator is forced to make 'on the hoof' analysis judgments. Comparison of

[1] Copies of the software are available from Colin Eden and Fran Ackermann (contact colin.eden@strath.ac.uk) for a nominal fee when used by bona fide researchers and not for commercial gain. Over twelve copies are used by researchers in Europe and the USA, and one copy has been used extensively by a commercial organization under an agreement allowing us to access their data logs.

facilitator judgments with those that can be derived from post-workshop analysis of the log may provide insights that can encourage more effective facilitation. For example, how robust are the themes (clusters) identified, under pressure, by the facilitator during the workshop? (that is, how easy would it have been to identify different themes?)

2. The data log gives the researchers an opportunity to gain a micro perspective of what occurred in a facilitated session. Is it possible on this basis to better understand the role of GSS in this context? In other words, what would NOT have been possible without the use of GSS in the same meeting?

3. What are the useful ways of coding participants' contributions depending on the nature of the session? (such as strategy workshops, risk management workshops etc.). To what extent can such coding approaches be generalized upon between different contexts?

4. The role of the manager/client can be analyzed and data from the log can indicate whether they provide a leadership role. Do leaders contribute to most themes? – is this 'leadership in practice'?

5. Are the agreements reached by a group a function of the edits to the concepts around which agreements are reached?

6. Is influence related to the number of themes (clusters) that someone contributes to?

7. Is there consistently a high degree of consensus (small Standard Deviation) on the actions that are highest rated by the group?

8. What are the various ways in which the data might reveal changing minds, thus extending the analysis used in Ackermann and Eden 2011 [1]? For example, this might be explored with regards to the themes to which participants contribute to across time, or by tracking participants' engagement in preferencing/rating activities.

2 The Nature of the Log

The design of the GSS (Group Explorer) allows the recording of every interaction with system as a function of time. Thus, the activity of each participant, and the facilitator, is known. The GSS can be set to record this data or not. The obvious ethical issues involved and agreement from participants may be required, particularly when real names are used in the records.

The log is delivered in spreadsheet or Access database format and so is amenable to analysis. In the appendix we show analysis approaches using the spreadsheet data. This appendix also provides instruction how to read the log which can be helpful for researchers working with the log for the first time.

The data in the spreadsheet is presented as a series of individual contributions listed in order of their appearance on the map. These contributions are separated by a range of different activities initiated by the facilitator, for example this can be an activity during which participants are asked to focus on entering statements with respect to a given topic, or participants may be invited to evaluate a selection of previously added statements which appear to be of considerable significance to the meeting. This in turn provides a very detailed record of the facilitated activities which may not be possible to obtain through other means (e.g. by hand-written notes and observations).

Consequently, it is clear that the log can be used by researchers to supplement the data from causal maps generated during the facilitated sessions in a valuable way. The log contains the type of data about the session which the causal map is most likely lacking. This refers to the individual authorship of contributions, the detailed results of preferencing activities, the timing and the rate of contributions, as well as summaries of participants' contributions which may not be possible to access in the causal mapping software (such as plotting line diagrams of contributions in terms of the gradual development of the map). This is not to say that from the research perspective the log can replace the use of causal map. However, it offers a richness of data which, it can be argued, researchers cannot afford to take for granted, as it can lead to new and better understanding of the facilitated session under consideration.

References

1. Ackermann, F., Eden, C.: Negotiation in Strategy Making Teams: Group Support Systems and the Process of Cognitive Change. Group Decis Negot. 14, pp. 355-376 (2011)

Appendix 1: Coding and Analyzing Group Explorer Data Logs (GE Log)

The Purpose of Analyzing Group Explorer Data Logs

Group Explorer (GE) sessions generate two types of 'data sets' which can be immediately saved in digital format: causal maps in Decision Explorer (DE) file format and data logs in the form of Excel spreadsheets. Causal maps are central to the GE-facilitated session as they show visual representation of participants' thinking, whilst DE (i.e. the 'causal mapping' software) is equipped with a range of powerful analytical capabilities such as central analysis, loop analysis, or hieset and potent analysis. Therefore causal maps can be seen as 'standalone' sources of data and it is not always necessary to additionally draw on data logs. Having said that, there is a lot of potentially valuable data contained exclusively in data logs such as the individual authorship of links and statements, tracking of contributions over time, or detailed results of preferencing and rating activities. Furthermore, data logs allow to numerically summarize contributions (e.g. the number of a given type of links added by a specific user) and they can be helpful in the process of coding links and statements.

Consequently, both causal maps and data logs bring different perspectives and new insights with regards to what has been achieved in a GE-facilitated session, and in such sense they can be seen as mutually complementary. Whilst the process of analyzing and coding causal maps has been covered extensively by other sources, the following discussion explains how GE data long can be analyzed alongside DE causal maps to make the most of available data.

Reading, Cleaning and Organizing Data Logs

At first the GE data log can seem rather overwhelming as it may not be easy to follow what the different rows and columns mean. It is therefore important to familiarize oneself with how to read data logs and how to organize them into a number of Excel sheets so that it is easy to manage their complexity. Data log consist of a detailed record of each activity undertaken during a GE session over time. This can include the following types of activities:

1. *Gather*: users enter statements and links with respect to a given topic.
2. *Preferencing*: users evaluate a set of statements using a limited number of digital dots. It is important to note down the meaning of the assigned colors during the session as the log may lack this information.
3. *Rating*: users evaluate the importance of statements on a scale from 0 to 100.

More or less mirroring these types of activities, at the start of analysis it is recommended to create the following Excel sheets in the same worksheet where the data log is saved (Figure 1):

1. *Statements*: where all the statements are copy-pasted from gather activities in data log.
2. *Links*: where all the links are copy-pasted from gather activities in data log.
3. *Time-statements*: where time-dependent line diagrams are generated using statements data.
4. *Time-links*: where time-dependent line diagrams are generated using links data.
5. *Preferencing*: where the results of preferencing and rating activities are analyzed.
6. *Data-log*: where the original data log is kept.

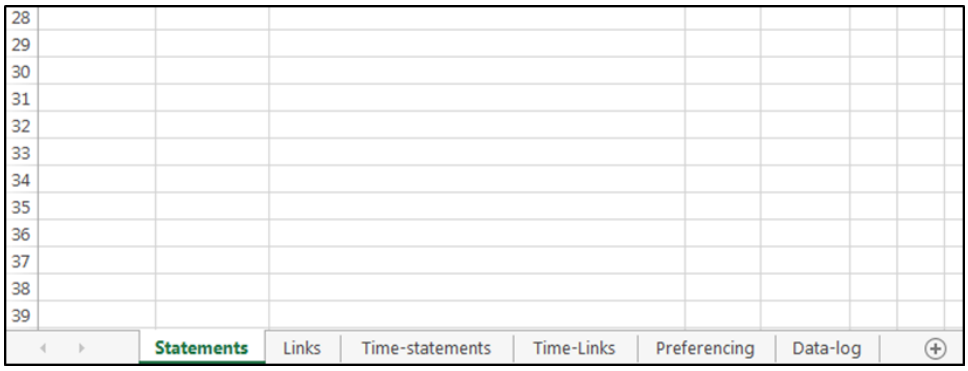


Fig. 1. Organizing the GE log by different Excel sheets.

In the GE log, gather activity always starts with Option: Set Gathering topic and it is followed by rows with values ‘insert concept’ or ‘insert link’ (Figure 2). Gather activity lists links and statements added by each user on the one-by-one basis and it continuous until the next activity begins.

As seen in Figure 2, the data from gather is saved under a number of columns, although the order of columns can differ between data logs. After copy-pasting the entire gather data under separate Excel sheets with statements and links respectively, some of these columns need to be retained while others can be deleted so that the data becomes easier to read:

Column A: the order in which the contributions were added. Depending on prior settings, this may be instead saved by Group Explorer (GE) as the exact time of the session (which is more useful for this analysis). Always keep this column.

Column B: the assigned number to each GE activity. This column can be deleted.

Column C: at what time the activity was set by facilitator on the chauffer console (Option), when the statement was entered (insert concept), and when the link was entered (insert link). This column is required for separating statements and links from into separate Excel sheets, but after doing so this column is no longer needed.

Column D: the user number. If the data log also has user name then this column is probably not needed.

Column E: the user name. Always keep this column.

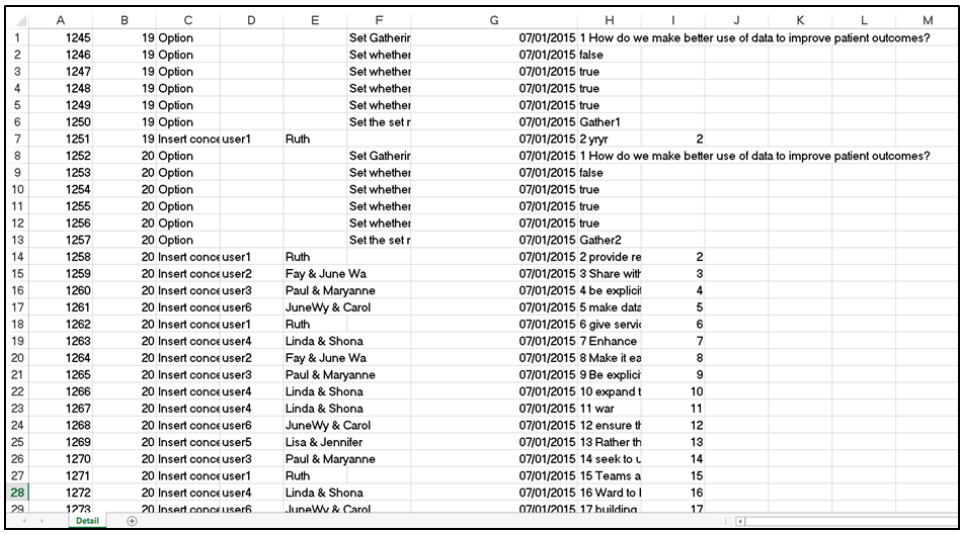
Column F: it shows when gather activity starts, but after organizing the data into different Excel sheets it is no longer needed.

Column G: the date when the session took place. It is worth taking a note of this information, but afterwards this column can be deleted.

Column H: it contains the topic of gather (e.g. row 8), the content of statements (rows 14-29), or the linked statements (e.g. 5+48 which stands for ‘statement 5 is linked to statement 48’). Always keep this column.

Column I: the number of each statement. It can be deleted because column H also contains this data.

As it can be seen in Figure 3, after cleaning the data and organizing it under a respective Excel sheet (in this case it is the sheet with statements), the data log becomes much easier to follow.



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	1245	19	Option			Set Gatherir	07/01/2015	1 How do we make better use of data to improve patient outcomes?					
2	1246	19	Option			Set whether	07/01/2015	false					
3	1247	19	Option			Set whether	07/01/2015	true					
4	1248	19	Option			Set whether	07/01/2015	true					
5	1249	19	Option			Set whether	07/01/2015	true					
6	1250	19	Option			Set the set r	07/01/2015	Gather1					
7	1251	19	Insert conce	user1	Ruth		07/01/2015	2 yryr	2				
8	1252	20	Option			Set Gatherir	07/01/2015	1 How do we make better use of data to improve patient outcomes?					
9	1253	20	Option			Set whether	07/01/2015	false					
10	1254	20	Option			Set whether	07/01/2015	true					
11	1255	20	Option			Set whether	07/01/2015	true					
12	1256	20	Option			Set whether	07/01/2015	true					
13	1257	20	Option			Set the set r	07/01/2015	Gather2					
14	1258	20	Insert conce	user1	Ruth		07/01/2015	2 provide re	2				
15	1259	20	Insert conce	user2	Fay & June Wa		07/01/2015	3 Share with	3				
16	1260	20	Insert conce	user3	Paul & Maryanne		07/01/2015	4 be explicit	4				
17	1261	20	Insert conce	user6	JuneWy & Carol		07/01/2015	5 make data	5				
18	1262	20	Insert conce	user1	Ruth		07/01/2015	6 give servi	6				
19	1263	20	Insert conce	user4	Linda & Shona		07/01/2015	7 Enhance	7				
20	1264	20	Insert conce	user2	Fay & June Wa		07/01/2015	8 Make it ea	8				
21	1265	20	Insert conce	user3	Paul & Maryanne		07/01/2015	9 Be explici	9				
22	1266	20	Insert conce	user4	Linda & Shona		07/01/2015	10 expand t	10				
23	1267	20	Insert conce	user4	Linda & Shona		07/01/2015	11 war	11				
24	1268	20	Insert conce	user6	JuneWy & Carol		07/01/2015	12 ensure th	12				
25	1269	20	Insert conce	user5	Lisa & Jennifer		07/01/2015	13 Rather th	13				
26	1270	20	Insert conce	user3	Paul & Maryanne		07/01/2015	14 seek to u	14				
27	1271	20	Insert conce	user1	Ruth		07/01/2015	15 Teams a	15				
28	1272	20	Insert conce	user4	Linda & Shona		07/01/2015	16 Ward to l	16				
29	1273	20	Insert conce	user6	JuneWy & Carol		07/01/2015	17 building	17				

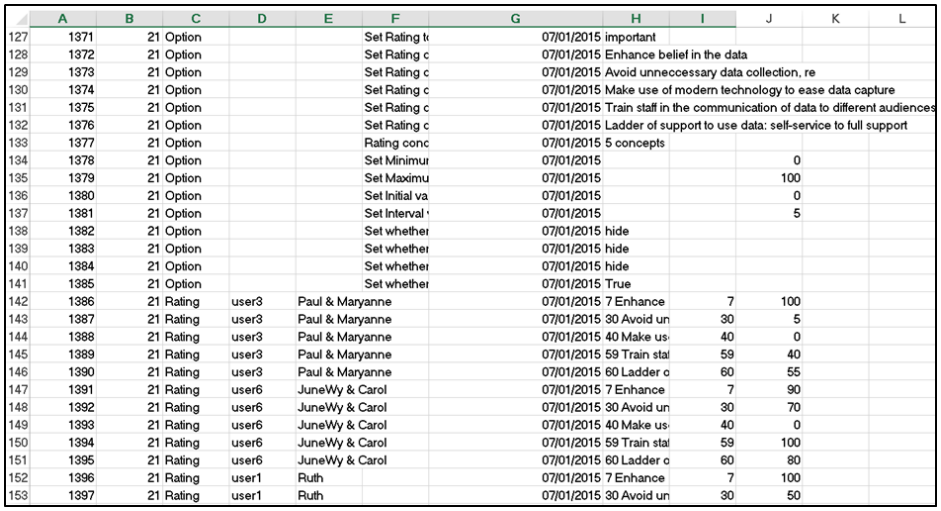
Detail

Fig. 2. Gather activity.

	A	B	C	D	E	F	G	H	I	J
1	1251	Ruth		2 yryr						
2	1252		Set Gatherir	1 How do we make better use of data to improve patient outcomes?						
3	1257		Set the set r	Gather2						
4	1258	Ruth		2 provide relevant data in an accessible format to front line staff						
5	1259	Fay & June Wa		3 Share with local teams						
6	1260	Paul & Maryanne		4 be explicit about theories we are testing						
7	1261	JuneWy & Carol		5 make data accessible and relevant to users						
8	1262	Ruth		6 give service users access to data						
9	1263	Linda & Shona		7 Enhance belief in the data						
10	1264	Fay & June Wa		8 Make it easy for staff to understand						
11	1265	Paul & Maryanne		9 Be explicit about when intuition is being used rather than evidence						
12	1266	Linda & Shona		10 expand the range of people who are able to use data						
13	1267	Linda & Shona		11 war						
14	1268	JuneWy & Carol		12 ensure that systems are user friendly and easy for clinical staff to use						
15	1269	Lisa & Jennifer		13 Rather than training staff on collecting data, we train staff on interpreting the data.						
16	1270	Paul & Maryanne		14 seek to use to understand rather than judge						
17	1271	Ruth		15 Teams agree a limited set of data that will inform their work						
18	1272	Linda & Shona		16 Ward to board and board to ward data						
19	1273	JuneWy & Carol		17 building confidence and competence of staff to make effective use of data						

Fig. 3. Cleaning the data from the gather activity.

Rating activity data is presented in a similar way to how it looks in gather activity (Figure 4). In the log, rating activity starts with Set Rating topic (column F, row 127) and with statements that are to be rated numerically (in this case five statements in column H, rows 128-32). Furthermore, the maximum and minimum values, and the intervals between values, are included. The processes of saving and deleting columns after adding them to the respective Excel sheet is also similar to how it works for gather activity. However, for rating activity it is essential to retain column J with the respective user's score allocated to that statement.



	A	B	C	D	E	F	G	H	I	J	K	L
127	1371	21	Option			Set Rating t	07/01/2015	important				
128	1372	21	Option			Set Rating c	07/01/2015	Enhance belief in the data				
129	1373	21	Option			Set Rating c	07/01/2015	Avoid unnecessary data collection, re				
130	1374	21	Option			Set Rating c	07/01/2015	Make use of modern technology to ease data capture				
131	1375	21	Option			Set Rating c	07/01/2015	Train staff in the communication of data to different audiences				
132	1376	21	Option			Set Rating c	07/01/2015	Ladder of support to use data: self-service to full support				
133	1377	21	Option			Rating conc	07/01/2015	5 concepts				
134	1378	21	Option			Set Minimur	07/01/2015			0		
135	1379	21	Option			Set Maximu	07/01/2015			100		
136	1380	21	Option			Set Initial va	07/01/2015			0		
137	1381	21	Option			Set Interval	07/01/2015			5		
138	1382	21	Option			Set whether	07/01/2015	hide				
139	1383	21	Option			Set whether	07/01/2015	hide				
140	1384	21	Option			Set whether	07/01/2015	hide				
141	1385	21	Option			Set whether	07/01/2015	True				
142	1386	21	Rating	user3	Paul & Maryanne		07/01/2015	7 Enhance	7	100		
143	1387	21	Rating	user3	Paul & Maryanne		07/01/2015	30 Avoid un	30	5		
144	1388	21	Rating	user3	Paul & Maryanne		07/01/2015	40 Make us	40	0		
145	1389	21	Rating	user3	Paul & Maryanne		07/01/2015	59 Train stal	59	40		
146	1390	21	Rating	user3	Paul & Maryanne		07/01/2015	60 Ladder o	60	55		
147	1391	21	Rating	user6	JuneWy & Carol		07/01/2015	7 Enhance	7	90		
148	1392	21	Rating	user6	JuneWy & Carol		07/01/2015	30 Avoid un	30	70		
149	1393	21	Rating	user6	JuneWy & Carol		07/01/2015	40 Make us	40	0		
150	1394	21	Rating	user6	JuneWy & Carol		07/01/2015	59 Train stal	59	100		
151	1395	21	Rating	user6	JuneWy & Carol		07/01/2015	60 Ladder o	60	80		
152	1396	21	Rating	user1	Ruth		07/01/2015	7 Enhance	7	100		
153	1397	21	Rating	user1	Ruth		07/01/2015	30 Avoid un	30	50		

Fig. 4. Rating activity.

After cleaning the data in the columns as previously suggested, the results of rating activity can be summarized as seen in Figure 5, with five statements under consideration listed in row 11, and the scores allocated by each user listed in rows 12-17. On this basis an average of the results can be calculated.

	A	B	C	D	E	F	G	H	I
2	**Rating 1**								
3	Set Minimum value			0					
4	Set Maximum value			100					
5	Set Initial value			0					
6	Set Interval value			5					
7	Set whether to show or hide actual	hide							
8	Set whether to show or hide averag	hide							
9	Set whether to show or hide overall	hide							
10									
11		7 (2,4,5,8)& Enl	30 (2,6,9)& Avoid	40 Make use of	59 (1-2,4)@ Tr	60 (8) Ladder of	support to use data: self-service to full support		
12	Paul & Maryanne	100	5	0	40	55			
13	JuneWy & Carol	90	70	0	100	80			
14	Ruth	100	50	0	30	100			
15	Fay & June Wa	100	40	0	75	50			
16	Lisa & Jennifer	0	80	50	100	40			
17	Linda & Shona	100	40	40	0	40			
18	Total	490	285	90	345	365			
19	Average	81.7	47.5	15.0	57.5	60.8			
20	St Dev	40.2	26.4	23.5	40.7	24.2			

Fig. 5. Summarizing the results of rating activity.

Preferencing is the third type of activity that can appear in GE data log, and it is a more laborious to analyze than rating activity because each user's digital dots need to be added up one-by-one. As it can be seen in Figure 6, preferencing activity starts with value Set Preferencing topic, followed by the statements that are to be evaluated, the number of statements (here: 7 concepts), the color of digital dots to be assigned (in this example Blue and Red), and the number of dots of each color available to individual users. However, GE data log typically does not save the meaning behind

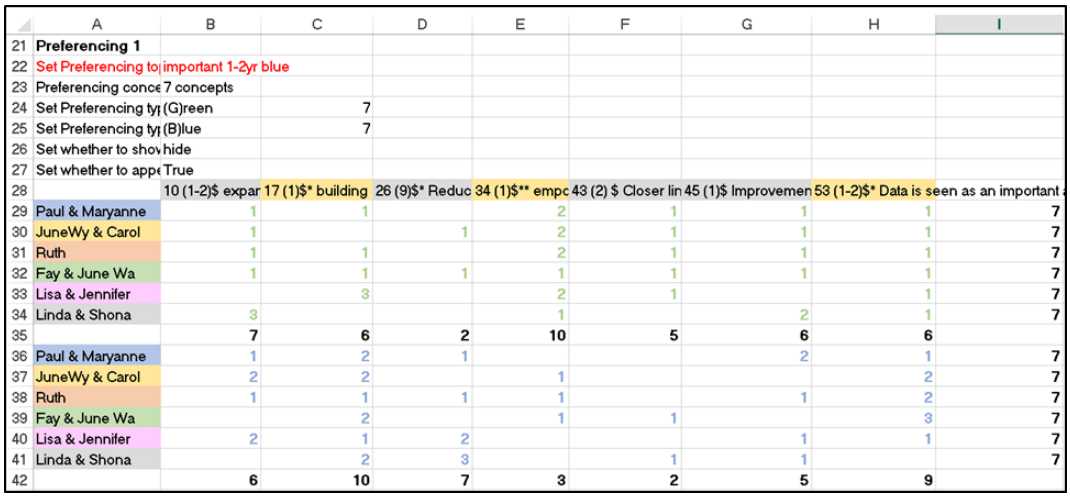
these colors and therefore it is something that must be taken note of during the session.

In Figure 6 the statements under consideration appear in column F, while the digital dots are assigned in columns G and H. As in this example there are blue and red dots (listed one under another in the log), column G stands for blue dots and column H stands for red dots – this can be double checked by comparing the results with the number of dots assigned to statements in the causal mapping software – Decision Explorer (DE). Moreover, '-1' means that a dot is removed from a statement (the user changes their mind).

	A	B	C	D	E	F	G	H
817	2064	Option			Set Preferencing topi	17 * build confidence and competence of staff to make effective use of data		
818	2065	Option			Set Preferencing con	2 provide relevant data in an accessible format to front line staff		
819	2066	Option			Set Preferencing con	8 Make it easy for staff to understand		
820	2067	Option			Set Preferencing con	13 Rather than training staff on collecting data, we train staff on interpreting the data		
821	2068	Option			Set Preferencing con	21 make strong connections between the data and the impact of actions generated through use of data		
822	2069	Option			Set Preferencing con	31 Create protected time for clinical/care teams to discuss data		
823	2070	Option			Set Preferencing con	60 Ladder of support to use data: self-service to full support		
824	2071	Option			Set Preferencing con	82 use coaching approaches		
825	2072	Option			Preferencing concept	7 concepts		
826	2073	Option			Set Preferencing type	(B)lue	5	
827	2074	Option			Set Preferencing type	(R)ed	5	
828	2075	Option			Set whether to show	hide		
829	2076	Option			Set whether to apper	True		
830	2077	Preferencing	user1	Ruth		2 provide relevant data in an accessible format to front line staff	1	
831	2078	Preferencing	user1	Ruth		82 use coaching approaches	1	
832	2079	Preferencing	user6	JuneWy & Carol		60 Ladder of support to use data: self-service to full support	1	
833	2080	Preferencing	user5	Lisa & Jennifer		31 Create protected time for clinical/care teams to discuss data	1	
834	2081	Preferencing	user6	JuneWy & Carol		8 Make it easy for staff to understand	1	
835	2082	Preferencing	user1	Ruth		31 Create protected time for clinical/care teams to discuss data	1	
836	2083	Preferencing	user3	Paul & Maryanne		8 Make it easy for staff to understand	1	
837	2084	Preferencing	user5	Lisa & Jennifer		8 Make it easy for staff to understand	1	
838	2085	Preferencing	user6	JuneWy & Carol		21 make strong connections between the data and the impact of actions ge	1	
839	2086	Preferencing	user3	Paul & Maryanne		21 make strong connections between the data and the impact of actions ge	1	
840	2087	Preferencing	user6	JuneWy & Carol		31 Create protected time for clinical/care teams to discuss data	1	
841	2088	Preferencing	user5	Lisa & Jennifer		21 make strong connections between the data and the impact of actions ge	1	
842	2089	Preferencing	user1	Ruth		31 Create protected time for clinical/care teams to discuss data	1	
843	2090	Preferencing	user3	Paul & Maryanne		60 Ladder of support to use data: self-service to full support	1	
844	2091	Preferencing	user5	Lisa & Jennifer		21 make strong connections between the data and the impact of actions ge	1	
845	2092	Preferencing	user1	Ruth		82 use coaching approaches	1	
846	2093	Preferencing	user6	JuneWy & Carol		82 use coaching approaches	1	
847	2094	Preferencing	user1	Ruth		2 provide relevant data in an accessible format to front line staff		1
848	2095	Preferencing	user3	Paul & Maryanne		31 Create protected time for clinical/care teams to discuss data	1	
849	2096	Preferencing	user6	JuneWy & Carol		82 use coaching approaches		1
850	2097	Preferencing	user3	Paul & Maryanne		82 use coaching approaches	1	
851	2098	Preferencing	user3	Paul & Maryanne		60 Ladder of support to use data: self-service to full support	-1	

Fig. 6. Preferencing activity.

After adding up each user's digital dots (a separate temporary sheet can be used for this) the results of preferencing activity can be summarized in a table (Figure 7). In rows 35 and 42 are the totals of green and blue dots allocated to each statement respectively, and in column I there is a sum function for each user to ensure that no mistake has been made during adding up the dots (although it is possible that the user finished the activity early without allocating all of their dots therefore if needed this can be double checked for errors in the data log).



	A	B	C	D	E	F	G	H	I
21	**Preferencing 1**								
22	Set Preferencing to	important 1-2yr	blue						
23	Preferencing conce	7 concepts							
24	Set Preferencing ty	(G)reen	7						
25	Set Preferencing ty	(B)lue	7						
26	Set whether to sho	hide							
27	Set whether to appe	True							
28		10 (1-2)$ expar	17 (1)$* building	26 (9)$* Reduc	34 (1)$** empc	43 (2) $ Closer lin	45 (1)$ Improvemen	53 (1-2)$* Data is seen as an important	
29	Paul & Maryanne	1	1		2	1	1	1	7
30	JuneWy & Carol	1		1	2	1	1	1	7
31	Ruth	1	1		2	1	1	1	7
32	Fay & June Wa	1	1	1	1	1	1	1	7
33	Lisa & Jennifer		3		2	1		1	7
34	Linda & Shona	3			1		2	1	7
35		**7**	**6**	**2**	**10**	**5**	**6**	**6**	
36	Paul & Maryanne	1	2	1			2	1	7
37	JuneWy & Carol	2	2		1			2	7
38	Ruth	1	1	1	1		1	2	7
39	Fay & June Wa		2		1	1		3	7
40	Lisa & Jennifer	2	1	2			1	1	7
41	Linda & Shona		2	3		1	1		7
42		**6**	**10**	**7**	**3**	**2**	**5**	**9**	

Fig. 7. Summarizing the results of preferencing activity.

Analyzing the Data

Once the data has been cleaned and organized into separate sheets, the analysis can be continued.

Determining the themes. An important part of the analysis is to find the main themes as stemming from the GE session. These themes are typically already saved as separate views in DE. However, due to time constraints sometimes not all key themes may have been explored during the actual session and therefore the remaining possible key themes need to be identified at this stage. For this purpose it is needed to use a range of available analytical functions of DE such as cluster analysis or central analysis. A key theme will most likely be organized around some significant statements, with other meaningful statements for that theme saved in the same view. Typically at least 10-15 key themes can be identified in a GE session – for the subsequent stages of analysis it is useful to generate list views of those different themes in DE.

Analysis of the statements sheet. In Figure 8 is presented the analysis of the statements sheet. The meaning of each column is as follows:

Column A: the time of the session.
Column B: the user name – it is very useful to color code the users.
Column C: the text of statements (in this example coded by symbols standing for different categories). Statements should be color coded according to their authorship.
Column D: the statement type as assigned in the causal map, e.g. standard, issue, goal. In this example a range of symbols is used to represent different types of statements.

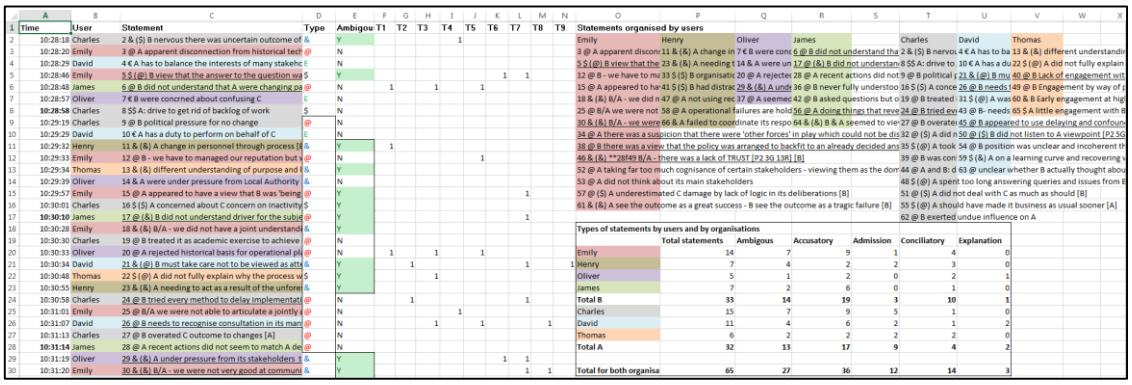
Column E: whether the statements is ambiguous (Yes or No) – this is a column that is specific to a particular coding approach and it will not be typically used in most examples.

Columns F-N: the different themes under which fall the respective statements. The number '1' means that a given statement does fall under that theme.

In columns *O-V* the statements are organized by the users rather than in the order in which they were added on the map.

In the table (columns O-U, rows 18-30) the number of statements and the types of statements are summarized by each user and by each organization. Note that the types of statements are specific to the given research as they depend on the coding approach.

The underlined statements are the statements with high centrality scores.



Time	User	Statement	Type	Ambiguous	T1	T2	T3	T4	T5	T6	T7	T8	T9
10:28:18	Charles	2 & ($) B nervous there was uncertain outcome of	&	Y					1				
10:28:20	Emily	3 @ A apparent disconnection from historical tech	@	N									
10:28:29	David	4 € A has to balance the interests of many stakeho	€	N									
10:28:46	Emily	5 $ (@) B view that the answer to the question wa	$	Y						1	1		
10:28:48	James	6 @ B did not understand that A were changing pa	@	N		1		1		1			
10:28:57	Oliver	7 € B were concrned about confusing C	€	N									
10:28:58	Charles	8 $$ A: drive to get rid of backlog of work	$	N									
10:29:19	Charles	9 @ B political pressure for no change	@	N									
10:29:29	David	10 € A has a duty to perform on behalf of C	€	N									
10:29:32	Henry	11 & (&) A change in personnel through process [&	&	Y		1							
10:29:33	Emily	12 @ B - we have to managed our reputation but &	@	N						1			
10:29:34	Thomas	13 & (&) different understanding of purpose and	&	Y									
10:29:39	Oliver	14 & A were under pressure from Local Authority	&	N									
10:29:57	Emily	15 @ A appeared to have a view that B was 'being	@	Y							1		
10:30:01	Charles	16 $ (S) A concerned about C concern on inactivity	$	Y									
10:30:10	James	17 @ (&) B did not understand driver for the subje	@	Y							1		
10:30:28	Emily	18 & (&) B/A - we did not have a joint understandi	&	Y									
10:30:30	Charles	19 @ B treated it as academic exercise to achieve	@	N									
10:30:33	Oliver	20 @ A rejected historical basis for operational pl	@	N	1		1		1				
10:30:34	David	21 & (@) B must take care not to be viewed as attr	&	Y		1					1		1
10:30:48	Thomas	22 $ (@) A did not fully explain why the process w	$	Y			1						
10:30:55	Henry	23 & (&) A needing to act as a result of the unfore	&	Y									
10:30:58	Charles	24 @ B tried every method to delay implementati	@	N		1					1		
10:31:01	Emily	25 @ B/A we were not able to articulate a jointly	@	N				1					
10:31:07	David	26 @ B needs to recognise consultation in its mar	@	N			1		1				1
10:31:13	Charles	27 @ B overated C outcome to changes [A]	@	N									
10:31:14	James	28 @ A recent actions did not seem to match A de	@	N									
10:31:19	Oliver	29 & (&) A under pressure from its stakeholders $	&	Y						1	1		
10:31:20	Emily	30 & (&) B/A - we were not very good at communi	&	Y							1	1	

Statements organised by users						
Emily	Henry	Oliver	James	Charles	David	Thomas
3 @ A apparent discon	11 & (&) A change in	7 € B were conc	6 @ B did not understand tha	2 & ($) B nervou	4 € A has to ba	13 & (&) different understandir
3 $ (@) B view that the	23 & (&) A needing t	14 & A were un	17 @ (&) B did not understan	8 $$ A: drive to	10 € A has a du	22 $ (@) A did not fully explain
12 @ B - we have to ma	33 $ ($) B organisatio	20 @ A rejectec	28 @ A recent actions did not	9 @ B political p	21 & (@) B mu	40 @ B Lack of engagement wit
15 @ A appeared to ha	41 $ ($) B had distrac	29 & (&) A unde	36 @ B never fully understoo	16 $ ($) A conce	26 @ B needs t	49 @ B Engagement by way of p
18 & (&) B/A - we did n	47 @ A not using rec	37 @ A seemed	42 @ B asked questions but o	19 @ B treated i	31 $ (@) A was	60 & B Early engagement at hig
25 @ B/A we were not	58 @ A operational failures are hold	56 @ A doing things that reve	24 @ B tried eve	43 @ B- needs	65 $ A little engagement with B	
30 & (&) B/A - we were	66 & A failed to coordinate its respo	64 & (&) B & A seemed to vie	27 @ B overate	45 @ B appeared to use delaying and confoun		
34 @ A there was a suspicion that there were 'other forces' in play which could not be dis				32 @ ($) A did n	50 @ ($) B did not listen to A viewpoint [P2 SG	
38 @ B there was a view that the policy was arranged to backfit to an already decided ans				35 $ (@) A took	54 @ B position was unclear and incoherent th	
46 & (&) **2849 B/A - there was a lack of TRUST [P2 3G 13B] [B]				39 @ B was con	59 $ (&) A on a learning curve and recovering t	
52 @ A taking far too much cognisance of certain stakeholders - viewing them as the dom				44 @ A and B: d	63 @ unclear whether B actually thought abou	
53 @ A did not think about its main stakeholders				48 $ (@) A spent too long answering queries and issues from B		
57 @ ($) A underestimated C damage by lack of logic in its deliberations [B]				51 @ ($) A did not deal with C as much as should [B]		
61 & (&) A see the outcome as a great success - B see the outcome as a tragic failure [B]				55 $ (@) A should have made it business as usual sooner [A]		
				62 @ B exerted	undue influence on A	

Types of statements by users and by organisations	Total statements	Ambigous	Accusatory	Admission	Conciliatory	Explanation
Emily	14	7	9	1	4	0
Henry	7	4	2	2	3	0
Oliver	5	1	2	0	2	1
James	7	2	6	0	1	0
Total B	**33**	**14**	**19**	**3**	**10**	**1**
Charles	15	7	9	5	1	0
David	11	4	6	2	1	2
Thomas	6	2	2	2	2	0
Total A	**32**	**13**	**17**	**9**	**4**	**2**
Total for both organisa	**65**	**27**	**36**	**12**	**14**	**3**

Fig. 8. Analyzing the statements sheet – part 1.

The remaining part of analysis of statements is depicted in Figure 9:

Columns O-W, rows 32-47: the statements are listed under the respective themes. One statement can belong to more than one theme at the same time. This way also the authorship of statements can be tracked with respect to the themes as statements should ideally be color coded by their authorship.

Columns O-U, rows 49-59: the coded types of statements are summarized with respect to the identified themes.

Columns O-Y, rows 61-70: a summary of users/organizations' contributions by themes.

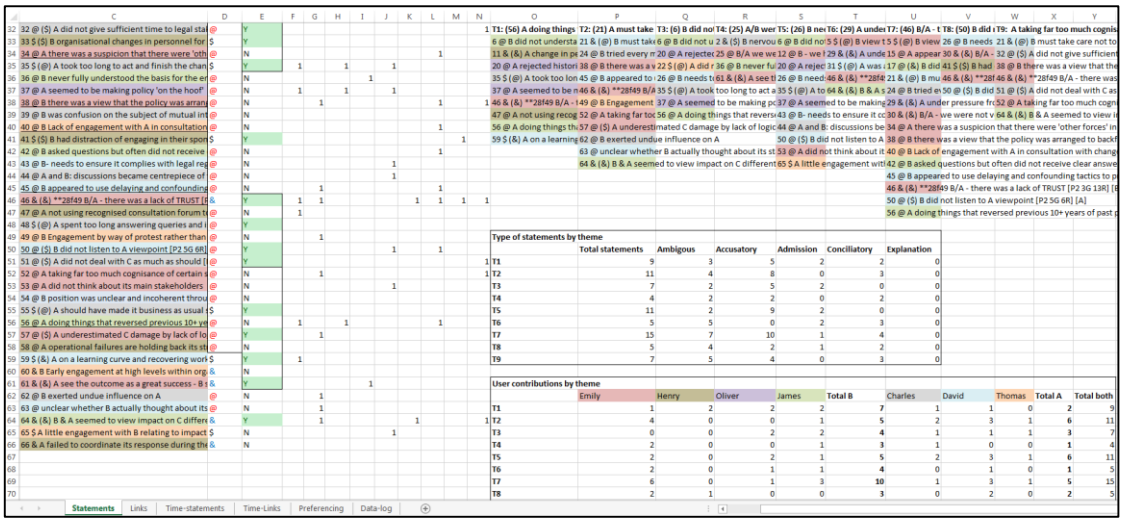


Fig. 9. Analyzing the statements sheet – part 2.

Analysis of the links sheet. In Figure 10 is presented the analysis of the links sheet:

Column A: the name of the author of the link (color coded).

Column B: the link as copy-pasted from the original data log (e.g. 5+48) – it is not necessary to keep this column once Columns A, C and D are in place.

Column C: from which statement the links starts (color coded by the author of that statement and not by the author of the link).

Column D: to which statement the links leads to (again, color coded by the author of that statement and not by the author of the link).

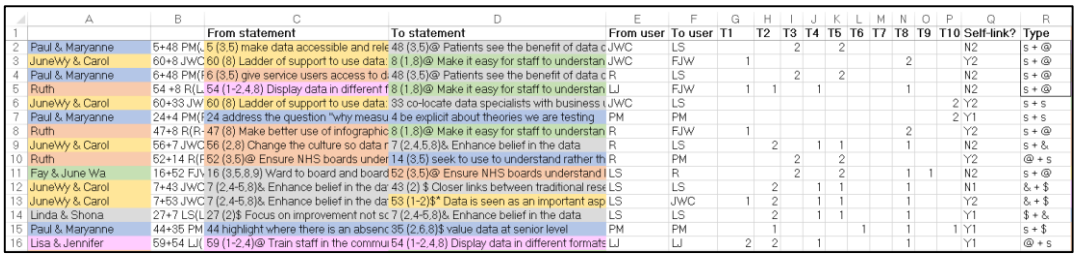
Column E: the author of the 'from' statement (the same author as in column C).

Column F: the author of the 'to' statement (the same author as in column D).

Columns G-P: in these columns the contribution to themes is summarized the same way as it is done in the statements sheet. However, the use of themes for statements tends to be sufficient for the needs of analysis and therefore time can be saved by omitting the themes in links Excel sheet.

Column Q: answers whether the link is a self-link, in other words whether the author of the link used their own statement while creating that link. The possible answers are: Y1 – the author used only their own statements, Y2 – the author used their own statement plus another user's statement, N1 – the author did not use their own statement but both statements came from the same user, N2 – the author did not use their own statement and both statements came from the same user. In the bottom of this column use the 'count if' function in Excel to summarize the results.

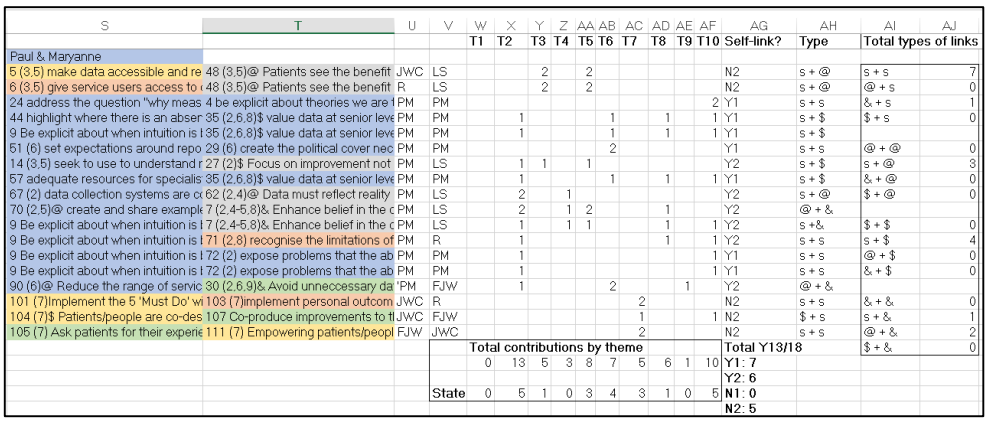
Column R: the type of links, for example 'issue + goal'. However if the coding of links does not play a very big role in the given research then this column can be omitted.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1			From statement	To statement	From user	To user	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	Self-link?	Type
2	Paul & Maryanne	5+48 PM(.	5 (3,5) make data accessible and rele	48 (3,5)@ Patients see the benefit of data c	JWC	LS			2		2						N2	s + @
3	JuneWy & Carol	60+8 JWC	60 (8) Ladder of support to use data:	8 (1,8)@ Make it easy for staff to understan	JWC	FJW	1							2			Y2	s + @
4	Paul & Maryanne	6+48 PM(f	6 (3,5) give service users access to d	48 (3,5)@ Patients see the benefit of data c	R	LS			2		2						N2	s + @
5	Ruth	54 +8 R(L.	54 (1-2,4,8) Display data in different f	8 (1,8)@ Make it easy for staff to understan	LJ	FJW	1	1		1				1			N2	s + @
6	JuneWy & Carol	60+33 JW	60 (8) Ladder of support to use data:	33 co-locate data specialists with business u	JWC	LS										2	Y2	s + s
7	Paul & Maryanne	24+4 PM(f	24 address the question "why measu	4 be explicit about theories we are testing	PM	PM		1								2	Y1	s + s
8	Ruth	47+8 R(R-	47 (8) Make better use of infographic	8 (1,8)@ Make it easy for staff to understan	R	FJW	1							2			Y2	s + @
9	JuneWy & Carol	56+7 JWC	56 (2,8) Change the culture so data r	7 (2,4,5,8)& Enhance belief in the data	R	LS		2		1	1			1			N2	s + &
10	Ruth	52+14 R(F	52 (3,5)@ Ensure NHS boards under	14 (3,5) seek to use to understand rather th	R	PM			2		2						Y2	@ + s
11	Fay & June Wa	16+52 FJV	16 (3,5,8,9) Ward to board and board	52 (3,5)@ Ensure NHS boards understand I	LS	R			2		2			1	1		N2	s + @
12	JuneWy & Carol	7+43 JWC	7 (2,4-5,8)& Enhance belief in the da	43 (2) $ Closer links between traditional rese	LS	LS		2		1	1			1			N1	& + $
13	JuneWy & Carol	7+53 JWC	7 (2,4-5,8)& Enhance belief in the da	53 (1-2)$* Data is seen as an important asp	LS	JWC	1	2		1	1			1			Y2	& + $
14	Linda & Shona	27+7 LS(L	27 (2)$ Focus on improvement not sc	7 (2,4-5,8)& Enhance belief in the data	LS	LS		2		1	1			1			Y1	$ + &
15	Paul & Maryanne	44+35 PM	44 highlight where there is an absenc	35 (2,6,8)$ value data at senior level	PM	PM		1				1		1		1	Y1	s + $
16	Lisa & Jennifer	59+54 LJ(	59 (1-2,4)@ Train staff in the commu	54 (1-2,4,8) Display data in different formats	LJ	LJ	2	2		1				1			Y1	@ + s

Fig. 10. Analyzing the links sheet – part 1.

Furthermore, as seen in Figure 11, it can be also be recommended to organize the links by individual users (i.e. authors of links). This way both the numbers and the color-coding assist researcher in better understanding whose statements the given user linked most frequently during the session. Perhaps the main information are: the list of links color coded by the users, the number of links from each user, and the self-link column. As a result the analysis in Figure 11 can be considerably simplified and much easier to complete if only those information are summarized; for most research these can be sufficient - other options are presented for illustration.



	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
					T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	Self-link?	Type	Total types of links	
	Paul & Maryanne																	
5	(3,5) make data accessible and re	48 (3,5)@ Patients see the benefit	JWC	LS			2		2						N2	s + @	s + s	7
6	(3,5) give service users access to	48 (3,5)@ Patients see the benefit		LS			2		2						N2	s + @	@ + s	0
24	address the question "why meas	4 be explicit about theories we are t	PM	PM										2	Y1	s + s	& + s	1
44	highlight where there is an abser	35 (2,6,8)$ value data at senior leve	PM	PM		1				1		1		1	Y1	s + $	$ + s	0
9	Be explicit about when intuition is t	35 (2,6,8)$ value data at senior leve	PM	PM		1				1		1		1	Y1	s + $		
61	(6) set expectations around repo	29 (6) create the political cover nec	PM	PM						2					Y1	s + s	@ + @	0
14	(3,5) seek to use to understand r	27 (2)$ Focus on improvement not	PM	LS		1	1		1						Y2	s + $	s + @	3
57	adequate resources for specialis	35 (2,6,8)$ value data at senior leve	PM	PM		1				1		1		1	Y1	s + $	& + @	0
67	(2) data collection systems are c	62 (2,4)@ Data must reflect reality	PM	LS		2		1							Y2	s + @	$ + @	0
70	(2,5)@ create and share exampl	7 (2,4-5,8)& Enhance belief in the d	PM	LS		2		1	2			1			Y2	@ + &		
9	Be explicit about when intuition is t	7 (2,4-5,8)& Enhance belief in the d	PM	LS		1		1	1			1		1	Y2	s +&	$ + $	0
9	Be explicit about when intuition is t	71 (2,8) recognise the limitations of	PM	R		1						1		1	Y2	s + s	s + $	4
9	Be explicit about when intuition is t	72 (2) expose problems that the ab	PM	PM		1								1	Y1	s + s	@ + $	0
9	Be explicit about when intuition is t	72 (2) expose problems that the ab	PM	PM		1								1	Y1	s + s	& + $	0
90	(6)@ Reduce the range of servic	30 (2,6,9)& Avoid unneccessary da	'PM	FJW		1				2			1		Y2	@ + &		
101	(7)Implement the 5 'Must Do' wi	103 (7)implement personal outcom	JWC	R							2				N2	s + s	& + &	0
104	(7)$ Patients/people are co-des	107 Co-produce improvements to t	JWC	FJW							1			1	N2	$ + s	s + &	1
105	(7) Ask patients for their experie	111 (7) Empowering patients/peopl	FJW	JWC							2				N2	s + s	@ + &	2
				Total contributions by theme											Total Y13/18		$ + &	0
					0	13	5	3	8	7	5	6	1	10	Y1: 7			
															Y2: 6			
				State	0	5	1	0	3	4	3	1	0	5	N1: 0			
															N2: 5			

Fig. 11. Analyzing the links sheet – part 2.

Plotting line diagrams over time. Another stage of the analysis is to plot line diagrams for links and statements. Line diagrams allow to track the evolution of causal map over time. Both for links and diagrams the procedure is similar. As seen in Figure 12, in order to generate line diagrams, copy-paste the data that will be used from statements/links sheet, such as: time (column A), type of links/statement (only in specific cases; column E), or themes (columns E-N). Moreover, create a column labelled as 'count' (column C) – under this column make a note for each user of the total of their links/statements at the given stage in time, for example in row 8 it was Charles' 3rd statement in the session. Subsequently, set milestones which will be used as points of reference for the line diagram, for example every 7th statement added by the group. Then summarize how many statements each user had entered by the given milestone (columns O-V, rows 2-10) – see the line diagram in Figure 13. Similarly, a researcher may decide to look at the evolution of key themes in the session (columns O-V, rows 12-21) - see the line diagram in Figure 14.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	Time	User	Count	Ambigous?	Type	T1	T2	T3	T4	T5	T6	T7	T8	T9	Stages-tin	Emily	Henry	Oliver	James	Charles	David	Thomas		
2	10:28:18	Charles	1	Y	&				1						**10:28:58**	2	0	1	1	2	1	0		
3	10:28:20	Emily	1	N	@										10:29:57	4	1	2	1	3	2	1		
4	10:28:29	David	1	N	£										10:30:48	5	1	3	2	5	3	2		
5	10:28:46	Emily	2	Y	$						1	1			10:31:19	6	2	4	3	7	4	2		
6	10:28:48	James	1	N	@	1		1		1					**10:32:07**	8	3	5	4	9	5	2		
7	10:28:57	Oliver	1	N	£										10:32:43	9	4	5	5	10	6	3		
8	**10:28:58**	Charles	2	N	$										10:34:02	10	5	5	5	12	8	4		
9	10:29:19	Charles	3	N	@										10:35:21	13	6	5	6	14	9	4		
10	10:29:29	David	2	N	£										**10:36:17**	14	7	5	7	15	11	6		
11	10:29:32	Henry	1	Y	&	2																		
12	10:29:33	Emily	3	N	@					2					Stages-tin	T1	T2	T3	T4	T5	T6	T7	T8	T9
13	10:29:34	Thomas	1	Y	&										**10:28:58**	1	0	1	1	1	1	1	0	0
14	10:29:39	Oliver	2	N	&										10:29:57	2	0	1	1	2	1	2	0	0
15	10:29:57	Emily	4	Y	@							2			10:30:48	3	1	3	1	3	1	4	0	1
16	10:30:01	Charles	4	Y	$										10:31:19	3	2	4	2	4	2	6	1	1
17	**10:30:10**	James	2	Y	@							3			**10:32:07**	4	2	5	3	5	3	8	2	2
18	10:30:28	Emily	5	Y	&										10:32:43	5	3	6	3	7	3	11	3	3
19	10:30:30	Charles	5	N	@										10:34:02	7	6	6	3	9	4	14	4	4
20	10:30:33	Oliver	3	N	@	3		2		3					10:35:21	8	8	7	3	10	4	15	4	6
21	10:30:34	David	3	Y	&		1					4		1	**10:36:17**	9	11	7	4	11	5	15	4	7

Fig. 12. Plotting line diagrams.

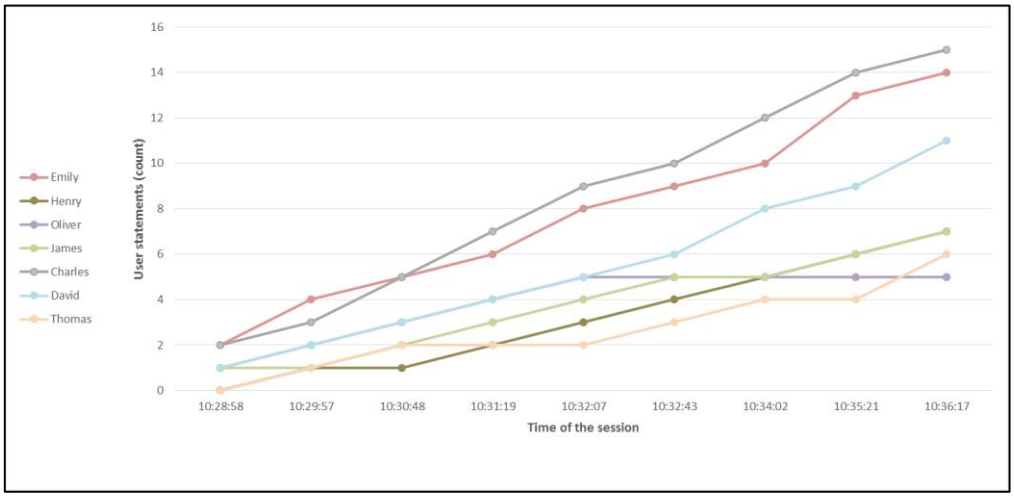


Fig. 13. Line diagram – a number of users' contributions over time.

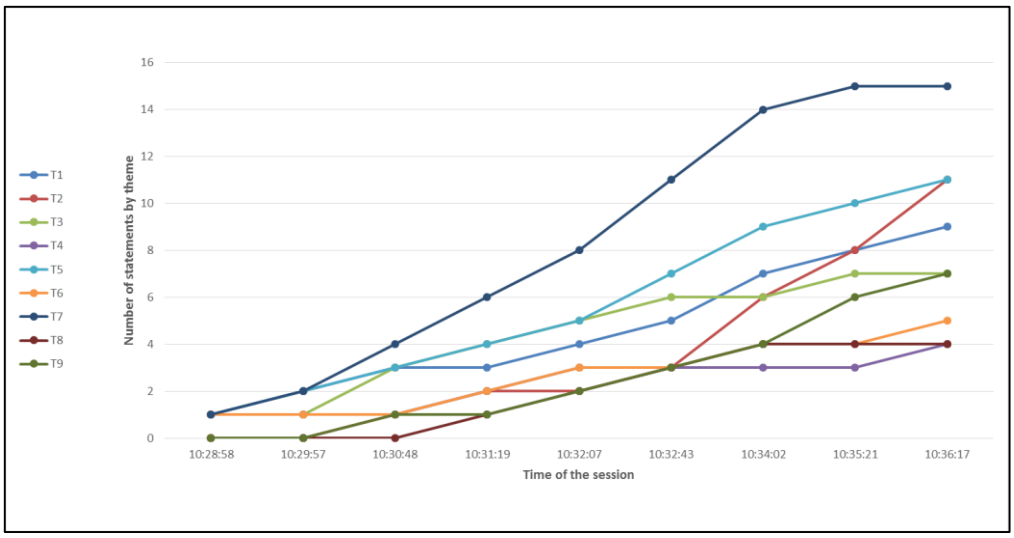


Fig. 14. The development of themes over time (T1 = 'theme 1', T2 = 'theme 2'…).

Coding links and statements using the example of conflict sessions

Another use of GE data logs is to code links and statements, which is something that needs to be done alongside the inspection of causal maps. In strategy making sessions the researcher may follow the usual coding convention from SODA methodology, for example: issues, (negative) goals, constraints, potent actions – in those cases 'additional' coding of data log may not be needed. However, it can still be useful to compare a causal map with the DE log to double check whether the coding from the session 'makes sense' and if any corrections might be required.

Furthermore, researcher may decide to follow a 'custom' coding approach that can be conducted in the data log. For example this can be a good idea when working on non-strategy-making sessions such as systemic risk assessment or resolution of conflict. In this section an approach to coding conflict sessions is presented and explained, and building on this approach other coding methods can also be considered.

Coding statements in a conflict resolution data set. The process of coding GE data needs to be informed by the experiences of attending/facilitating the session, and by careful inspection of the map's context. It therefore must be stressed that if the person working on the data log has not attended the session in question then they particularly need to closely discuss the coding with the facilitators of that session.

For conflict resolution sessions the following coding categories for statements have been identified:

Admission – coded with $ symbol. Admitting to a given state of affairs with regards to the discussed question. Examples:

16 $ ($) party A concerned about party C concern on inactivity on the subject of mutual interest [said by party A].

41 $ ($) party B had distraction of engaging in their sponsorship activities [said by party B].

55 $ (@) party A should have made it business as usual sooner [said by party A].

* *Note that the symbols in brackets* mean that it might not have been easy for the group to tell which party originally said it (i.e. their own party or the other party participating in the meeting). At the same time, the perceived meaning of the statement could change depending on which party is assumed to have said it. Hence the symbol in brackets signifies an alternative meaning.

Accusation – coded with @ symbol. Blaming either or both of the parties (possibly also their own party). Examples:

3 @ party A apparent disconnection from historical technical basis for deciding [said by party B].

24 @ B tried every method to delay implementation [said by party A].

28 @ party A recent actions did not seem to match their desire to impose changes on the subject of mutual interest [said by party B].

Conciliation – coded with & symbol. Creating space for agreement between the parties. Examples:

14 & party A were under pressure from Local Authority [said by party B].

21 & (@) party B must take care not to be viewed as attempting to 'bully' A [said by party A].

46 & (&) there was a lack of TRUST.

Explanation - coded with € symbol. Explaining why the organization does things the way it does. Examples:

18 € party B control scope growth when carrying out remedial work [said by party B].

2 € party A uses case conference to gain agreed and shared view [said by party A].

9 € B continues to re-examine existing safety cases using modern techniques [said by party B].

Coding links in a conflict resolution data set. After the statements have been coded, the next stage in the analysis is to code the links. In order to do so first open the previously created links sheet where two new columns need to be included in addition to the columns already described in section 2: 'type of links' and 'behavior' (Figure 15).

Time	Author	Link from	Link to	Self-link?	Type of links	Behaviour
10:51:56	Henry (Henry + Oliver)	66 & A failed to coordinate its res	14 & A were under pressure fro	Y2	contocon	blame to reason
10:52:01	Emily (Emily + Emily)	46 & (&) **28f49 B/A - there was a	30 & (&) B/A - we were not very	Y1	contocon	conciliatory
10:52:26	Emily (Emily + David)	46 & (&) **28f49 B/A - there was a	45 @ B appeared to use delayin	Y2	contoacc	defensed
10:52:46	Emily (Emily + David)	46 & (&) **28f49 B/A - there was a	50 @ ($) B did not listen to A vie	Y2	contoacc	defensed
10:52:49	Oliver (Henry + Oliver)	23 & (&) A needing to act as a resu	20 @ A rejected historical basis	Y2	contoacc	blame to reason
10:52:59	Henry (Henry + Charles)	66 & A failed to coordinate its res	9 @ B political pressure for no c	Y2	contoacc	defensed

Fig. 15. Coding links in a conflict resolution data set – example 1.

Under the column 'type of links' all of the links are categorized based on the types of statements that are being linked, for example: 'conciliatory (statement) to conciliatory (statement)', 'conciliatory to accusatory', or 'accusatory to accusatory'. Although these are broad categories of links with possibly different meanings, they can be described by some characteristic behaviors (e.g. 'conciliatory to accusatory' being characterized by users taking a defenced position). In order to identify these characteristic behaviors, the meaning of individual links with regards to participants' behaviors needs to be investigated so that it can be determined whether the given link is accusatory, conciliatory, defenced etc. This stage of analysis is sensitive to researcher's judgment and therefore it is recommended to carefully follow these rules in order to ensure sufficient rigor:

a) The behavioral categories are induced by very carefully reading the full text of the link, that is STATEMENT 1 leads to STATEMENT 2.
b) Pay attention to which participant and which team generated the link – prior color coding of statements by authorship is very helpful in that respect.
c) Actively draw on relevant maps in DE because they provide the context for the links (i.e. the surrounding links and statements).
d) Based on the link's text, authorship of the link (i.e. which user, which party), and by inspecting the relevant fragments of causal map, try to explore the meaning of each link.
e) Building on the meanings of individual links try to induce behavioral categories for the different types of links.
f) Once the induced categories have been generated, repeat the whole process again in order to look for possible mistakes.

This process is illustrated on a number of examples. The used data comes from a real case in which two large organizations are in conflict and they try to find an agreement. Team A has more power over team B, and team B is not happy about some significant changes which team A are in the course of implementing and which are going to affect team B's operations.

A number of behaviors have been identified in this data set with regards to the meaning of links:

Accusatory link: criticizes/accuses either or both of the parties. For example two accusatory statements can be linked to each other, or a party's own admission can be used by another party to reinforce its accusatory statement.
Defenced link: protects a party from an accusation by giving an explanation to that accusation. For example a conciliatory statement is linked to an accusation to defend the accused party.
Conciliatory link: builds new paths for agreement. For example two conciliatory statements are linked to create an argument for conciliation.
'Blame to reason' link: one party defends the other party from their own prior accusations.

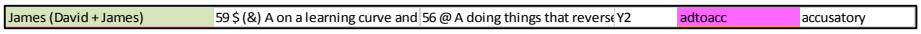


Fig. 16. Coding behavioral categories - example 1.

In this example (Figure 16) James (from team B) linked statement 59 (authored by David from team A) to statement 56 (authored by James from team B, i.e. the author of this link). By the symbols in their text these statement 59 can be identified as an admission ($) and statement 56 can be seen as an accusation (@), thus the type of this link is 'admission to accusation'.

The full text of this link says: 59 $ (&) team A on a learning curve and recovering work backlog [LEADS TO] 56 @ team A doing things that reversed previous 10+ years of past policy.

In other words, James (team B) used David's (team A) admission that team A were on a learning curve in order to support team B's accusation that team A were doing things that reversed previous 10+ years of past policy. In fact James might have believed that statement 59 had been said by someone from his own team, and hence statement 59 is identified as being ambiguous by the use of brackets (ambiguous statements are explained on the previous page in this document). As a result, this link is an 'admission to accusation' type of link which is of accusatory nature. In this workshop 3/4 of 'admission to accusations' links have been identified as accusatory, which in this data set can therefore be seen as a characteristic type of link.

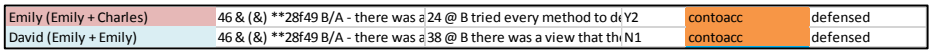


Fig. 17. Coding behavioral categories - example 2.

In the second example (Figure 17) are presented two links which draw on the same statement in a similar way. The mentioned statement is a conciliatory statement 46 'there was a lack of trust' which was said by team B and which addressed both parties by equal measure.

Firstly, Emily (team B) linked statement 46 'teams B/A - there was a lack of TRUST' to team A's accusation '24 @ team B tried every method to delay implementation'. This way Emily tried to defend her party from this accusation by providing a justification for it.

Similarly, David (team A) linked statement 46 to team B's accusation against team A that '38 @ there was a view that the policy was arranged to backfit to an already decided answer'. This way David also tried to defend his party from this accusation.

Consequently, both links were classified as defenced.

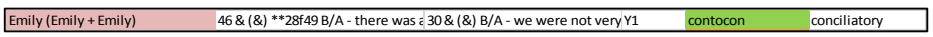


Fig. 18. Coding behavioral categories - example 3.

In this example (Figure 18) Emily (team B) linked her two conciliatory statements. The full text of this link is:

46 & (&) teams B/A - there was a lack of TRUST [LEADS TO] 30 & (&) teams B/A - we were not very good at communicating clearly.

This is clearly a link of conciliatory nature because it tries to constructively find new opportunities for improvement for both parties in a rather non-judgmental way.

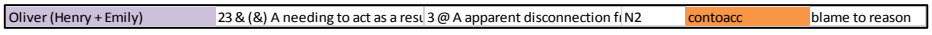


Fig. 19. Coding behavioral categories - example 4.

In the last example (Figure 19) Oliver (team B) linked a statement made by Henry (team B) to a statement made by Emily (team B). This links a conciliatory statement to an accusation ('conciliatory to accusatory' type of link). The full text of this link is:

23 & (&) team A needing to act as a result of the unforeseen circumstances [LEADS TO] 3 @ team A apparent disconnection from historical technical basis for deciding.

This is an interesting situation because statement 23 is a conciliatory statement in which team B justifies team A's undesirable behavior by saying that it had been caused by unforeseen circumstances. This statement is then used by team B to protect team A from team B's own accusation. Thus, this link is classified as blame to reason in order to emphasize that team B's possible change of mind – it no longer wants to merely accuse team B for its actions, but it also wishes to justify the sources of conflict and search for suitable solutions.

Summary: making sense of GE data logs

Data logs are a source of valuable data which are worth exploring alongside causal maps generated during GE sessions. However, researchers without previous experience of using GE data logs may at first feel discouraged because the logs may at first appear complicated and not easy to follow. This document has intended to make the experience of analyzing GE data logs easier, thereby allowing more people to access potentially very valuable data which otherwise they might not want or be able to draw upon. Indeed, GE data logs provide researchers with an opportunity to gain a better understanding of GE session and its evolution over time, they can give an insight into preferencing activities and individual contributions, and they can be an important tool for coding and analyzing links and statements. Consequently, by aiming to make the analysis of GE data logs more approachable, the hereby set of instructions and illustrations is expected to help in popularizing the use of GE data logs as a standard practice for facilitators and researchers holding interest in GE and other types of Group Decision Support Systems.