

GROUNDED THEORY METHODOLOGY IN INFORMATION SYSTEMS RESEARCH

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Appendix

Sample

Table A1. Classification of GTM Characteristics in the GTM Sample¹

Article	Form of Contribution	GTM Procedures										GTM Context				
		Theoretical Sampling	Role of Prior	Open Coding	Axial Coding	Selective Coding	Theoretical Coding	Constant Compariso	Memoing	Coding Paradigm	GTM Approach	GTM Adaptions	Core Category	Duration (Months)	Citations per Year ^c	Total Citations ^c
Barrett and Walsham 1999	T ^b	○	○	○	○	○	○	○	○	○	S	○	●	34	13.88	222
Maznevski and Chudoba 2000	T ^b	○	○	● ^a	●	● ^a	○	○	○	○	S	●	●	21	97.07	1456
Larsen et al. 2009	T ^b	○	●	●	●	○	○	○	○	○	S	●	●	○	4.5	26
Goulielmos 2004	T	○	●	●	●	○	○	○	○	○	S	○	●	○	4.18	46
Boudreau and Robey 2005	T	●	●	●	●	○	○	○	○	○	S	○	●	15	62.9	629
Volkoff et al. 2007	T	● ^a	●	●	●	○	○	○	○	○	S	●	●	36	28.38	227
Ransbotham and Mitra 2009	T	●	○	●	●	○	○	○	○	○	S	○	●	3-4 ^a	12.17	73
Strong and Volkoff 2010	T	●	○	●	●	○	○	○	○	○	S	○	●	36	31	155
Abraham et al. 2013	T	●	○ ^b	●	●	○	○	○	○	○	S	●	● ^b	20	4	8
Gasson and Waters 2013	T	●	●	●	○	○	○	○	○	○	G	●	●	2.5	5	10
Smolander et al. 2008	M ^b	●	●	●	○	○	○	○	○	○	S	●	● ^a	12	4.71	33
Huff and Munro 1985	M	● ^a	○	● ^a	○	○	○	○	○	○	G ^a	○	○	9 ^a	6.43	193
Orlikowski 1993	M	○	●	●	●	○	○	○	○	○	S	○	○	○	69	1518
Crook and Kumar 1998	M	●	○	●	●	○	○	○	○	○	S	○	○	○	13.12	223
Scott 2000	M	○	○	●	●	○	○	○	○	○	S	○	○	6	22.80	342
Scott and Kaindl 2000	M	○	○	○	○	○	○	○	○	○	S	○	○	18	11.27	169
Lee 2001	M	○	●	●	●	○	○	○	○	○	S	○	○	6	10.5	147
Fabricatore et al. 2002	M	● ^a	○ ^a	●	●	○	○	○	○	○	S	○	○	14 ^a	11.31	147
Levina and Ross 2003	M	●	○	●	●	○	○	○	○	○	S	●	● ^a	40 ^a	53.83	646
Nasirin and Birks 2003	M	●	○	○	○	○	○	○	○	○	GS	○	○	○	2.5	30
Sherif and Vinze 2003	M	●	○	○	○	○	○	○	○	○	S	○	○	○	5.33	64
Smith and Kumar 2004	M	●	○	●	●	○	○	○	○	○	S	○	○	○	11.64	128
Shah 2006	M	○	●	●	●	○	○	○	○	○	S	○	○	○	66.0	594
Espinosa et al. 2007	M	○	○	●	●	○	○	○	○	○	S	○	○	○	30.75	246
Xu and Ramesh 2007	M	○	○	●	●	○	○	○	○	○	S	○	○	○	4.38	35
Day et al. 2009	M	○	○	●	●	○	○	○	○	○	S	○	○	○	10.67	64
Palka et al. 2009	M	●	●	●	●	○	○	○	○	○	S	○	○	15	18.5	111
Chakraborty et al. 2010	M	●	○ ^a	●	●	○	○	○	○	○	S	○	○	40 ^a	14.4	72
Seeley and Targett 1997	D	○	○	●	○	○	○	○	○	○	S	○	○	○	1.17	21
De Vreede et al. 1998	D	○	○	○	○	○	○	○	○	○	S	○	○	24	8.12	138
Seeley and Targett 1999	D	○	○	○	○	○	○	○	○	○	S	○	○	○	3.69	59
Jones and Hughes 2001	D	○	○	○	○	○	○	○	○	○	S	○	○	○	8.86	124
Slack and Rowley 2002	D	○	○	○	○	○	○	○	○	○	S	○	○	2	2.85	37
Debreceny et al. 2003	D	○	○	○	○	○	○	○	○	○	S	○	○	○	3	36
Lander et al. 2004	D	○	○	○	○	○	○	○	○	○	S	○	○	○	14.09	155
Volkoff et al. 2005	D	●	●	●	●	○	○	○	○	○	G ^a	○	○	36	11	110
Zahedi et al. 2006	D	○	○	○	○	○	○	○	○	○	G	○	○	○	4	36
Hackney et al. 2007	D	○	○	○	○	○	○	○	○	○	S	○	○	○	5.13	41
Tschang 2007	D	○	○	○	○	○	○	○	○	○	GS	○	○	36	16.63	133
Kesseler 2008	D	○	○	○	○	○	○	○	○	○	GS	○	○	56	2.86	20
Ribes and Finholt 2009	D	○	○	○	○	○	○	○	○	○	2G	○	○	56	17.83	107
Chang et al. 2011	D	○	○	○	○	○	○	○	○	○	S	○	○	○	3.25	13
Lederman and Johnston 2011	D	○	○	○	○	○	○	○	○	○	S	○	○	○	2.5	10

- Does apply
- Does apply partially/indicated
- ⊕ Other
- Not reported
- ^a Change after contacting the authors based on additional information
- ^b Change after contacting the authors based on false coding
- ^c Citations from Google Scholar as of Spring 2015
- ^d Reverse coding
- T Theory
- M Model
- D Description
- GS Glaser and Strauss 1967
- S Straussian
- G Glaserian
- 2G Second generation (e.g., Clarke)

¹The articles analyzed in this dataset are limited to the years 1985 to 2013. A more comprehensive list of classified articles that is continuously updated can be accessed at www.grounded-theory.com.

Table A2. Analysis of GTM Articles per Journal

Journal	Abbreviation	Number of GTM	Description	Model	Theory	Average Duration (Months) ¹	Average GTM Procedures	Average Citations of GTM Articles	No. of GTM Articles Cited < 50% of All	No. of GTM Articles Cited ≥ 50% of All	Year of First GTM Article	Year of Last GTM Article
European Journal of Information Systems	EJIS	8	5	1	2	17.6	6.3	5.6	2	6	2001	2013
Information and Management	I&M	8	2	6	0	12.0	4.8	9.0	3	5	1998	2004
Journal of Management Information Systems	JMIS	5	2	3	0	15.0	3.6	26.4	2	3	2000	2007
Information Systems Journal	ISJ	4	2	0	2	56.0	2.9	3.2	4	0	1997	2009
MIS Quarterly	MISQ	4	0	3	1	28.3	5.8	40.1	0	4	1985	2010
Organization Science	OS	4	1	0	3	27.0	5.3	51.2	0	4	2000	2007
Journal of the Association of Information Systems	JAIS	3	1	2	0	48.0	6.0	14.3	0	3	2009	2010
Information Systems Research	ISR	2	0	0	2	18.8	3.8	13.0	1	1	1999	2009
Decision Support Systems	DSS	1	1	0	0	-	2.0	3.0	1	0	2003	2003
Human-Computer Interaction	HCI	1	0	1	0	14.0	8.0	11.3	0	1	2002	2002
International Journal of Information Management	IJIM	1	1	0	0	2.0	0.5	2.8	0	1	2002	2002
Journal of Information Technology	JIT	1	0	1	0	15.0	5.0	18.5	0	1	2009	2009
Management Science	MS	1	0	1	0	-	3.0	4.0	0	1	2006	2006

¹As reported in the article or by the authors in their responses.

Analysis

Boxplot analysis. We conducted a boxplot analysis to examine the number of citations of a GTM article in relation to other articles published in the same journal in the same year. We compiled a boxplot for each GTM article with those in the same journal in the same year. For example, the citations for the 2003 Levina and Ross article (646) are compared with the citations for the other articles in Volume 27 of *MIS Quarterly*.

In each boxplot, the vertical bar represents the median of the citations per article. The box represents the interquartile range, from the 25th to 75th percentile. The ends of the whiskers (the lines extending vertically from the boxes) represent the highest value within the 1.5 interquartile range from the upper quartile and the lowest value within the 1.5 interquartile range from the lower quartile. The position of each GTM paper is marked in its respective boxplot.

Table A3. Overview of Boxplot Analysis of GTM Articles

GTM Article	Journal	Total Citations	Quartile Position	Boxplot of Citations of Articles Published in the Same Journal in the Same Year
Huff and Munro 1985	MISQ	193	Upper Quartile	
Orlikowski 1993	MISQ	1518	Outlier	
Seeley and Targett 1997	ISJ	21	Lower Quartile	
Crook and Kumar 1998	I&M	223	Outlier	
De Vreede et al. 1998	JMIS	138	Upper Quartile	
Barrett and Walsham 1999	ISR	222	Upper Quartile	
Seeley and Targett 1999	I&M	59	Upper Quartile	
Maznevski and Chudoba 2000	OS	1456	Outlier	
Scott 2000	JMIS	342	Upper Quartile	
Scott and Kaindl 2000	I&M	169	Upper Quartile	
Jones and Hughes 2001	EJIS	124	Upper Quartile	
Lee 2001	I&M	147	Upper Quartile	
Fabricatore et al. 2002	HCI	147	Median	
Slack and Rowley 2002	IJIM	37	Median	
Debreceeny et al. 2003	DSS	36	Lower Quartile	
Levina and Ross 2003	MISQ	646	Upper Quartile	
Nasirin and Birks 2003	I&M	30	Lower Quartile	
Sherif and Vinze 2003	I&M	64	Lower Quartile	

Table A3. Overview of Boxplot Analysis of GTM Articles (Continued)

GTM Article	Journal	Total citations	Quartile position	Boxplot of Citations of Articles Published in the Same Journal in the Same Year
Goulielmos 2004	ISJ	46	Lower Quartile	
Lander et al. 2004	I&M	155	Upper Quartile	
Smith and Kumar 2004	I&M	128	Lower Quartile	
Boudreau and Robey 2005	OS	629	Outlier	
Volkoff et al. 2005	EJIS	110	Upper Quartile	
Shah 2006	MS	594	Outlier	
Zahedi et al. 2006	JMIS	36	Lower Quartile	
Espinosa et al. 2007	JMIS	246	Upper Quartile	
Hackney et al. 2007	EJIS	41	Upper Quartile	
Tschang 2007	OS	133	Upper Quartile	
Volkoff et al. 2007	OS	227	Upper Quartile	
Xu and Ramesh 2007	JMIS	35	Lower Quartile	
Kessler 2008	ISJ	20	Lower Quartile	
Smolander et al. 2008	EJIS	33	Upper Quartile	
Day et al. 2009	JAIS	64	Upper Quartile	
Larsen et al. 2009	ISJ	26	Lower Quartile	
Palka et al. 2009	JIT	111	Upper Quartile	
Ransbotham and Mitra 2009	ISR	73	Lower Quartile	

GTM Article	Journal	Total citations	Quartile position	Boxplot of Citations of Articles Published in the Same Journal in the Same Year
Ribes and Finholt 2009	J AIS	107	Upper Quartile	
Chakraborty et al. 2010	J AIS	72	Upper Quartile	
Strong and Volkoff 2010	MISQ	155	Upper Quartile	
Chang et al. 2011	EJIS	13	Lower Quartile	
Lederman and Johnston 2011	EJIS	10	Lower Quartile	
Abraham et al. 2013	EJIS	8	Median	
Gasson and Waters 2013	EJIS	10	Upper Quartile	

^a Outliers are not marked in the boxplot.

Sensitivity Analysis Theory and Description^a				
Type of Result	Mean	Median	W	p-value
Theory	4.4	4.5	119	0.007
Description	2.2	2		
Sensitivity Analysis Model and Description^a				
Type of Result	Mean	Median	W	p-value
Model	3.5	4	191.5	0.019
Description	2.2	2		
Sensitivity Analysis Theory and Model^a				
Type of Result	Mean	Median	W	p-value
Theory	4.4	4.5	126.5	0.035
Model	3.5	4		

^a A one-sided Wilcoxon signed-rank test is reported; because of the direction of the relationship, for example, the number of procedures adopted by studies that develop theory is hypothesized to be higher than the number of procedures adopted by studies that develop models.

Additional Analysis

Responses from Authors

We contacted the authors to check our classification of their articles. We received responses from the authors of 23 articles. The authors confirm 86% of our classification. Sixteen responses (70%) report a discrepancy between our classification and the actual analysis in their study. Nine responders indicate that not all applied procedures are reported in the final article. Of these unreported procedures, the coding paradigm and constant comparison are most frequently omitted from the published article.

Other responses included discrepancies about the form of contribution and the presence of a core category. Each discrepancy was discussed by the research team and was changed when the authors' comments were convincing. For 9 of the 51 suggested changes, we decided against changing our classification. With regard to the form of contribution, the authors had a different understanding of our definitions or did not provide additional arguments. Here, we recoded the paper to revise our classification.

In addition to checking the classification, the authors commented broadly on their experiences with GTM in IS research. Several themes emerged from these open answers.² The authors provided various reasons why they omitted or altered GTM procedures, ranging from IS culture to personal preferences. Table A5 reports representative quotations from the authors' responses, our classification, and the emerging themes.

Theme	Code	Representative Quotations from the Authors' Answers
Situational context	Limitations of studying organizational phenomena	"The only technique I wouldn't use is theoretical sampling, and that is because I usually study topics that are somewhat sensitive and I need to accept interviews when available rather than when I would like. I would add that there are many shortcomings of traditional GTM that can be overcome by using other techniques drawn from other methods; mentioning these in a paper only opens one up to another onslaught of idiotic criticism." <i>Author Lisa</i>
	Uniqueness of the case	"So we had this excellent opportunity to collect this data The case was unique and we [would have] had to wait a long time for the next [occurrence]. Of course, you can hardly replicate that, but still, this is interesting for the community. I study emerging technologies as well, different perspective, but again you can easily provide interesting parts." <i>Author Betty</i>
	Fit of GTM to research task	"Between rounds two and three, we completely re-analyzed our data and only then were we able to recognize and describe the complexity of what happened in straightforward terms, especially the insights around CORE CATEGORY. We were fortunate to receive constructive reviews [that] provided guidance and encouragement so we could find the theory in our data." <i>Author Jo</i>
GTM strategy	Purpose of the study	"A study of an emerging phenomenon may not require theoretical sampling to produce interesting and useful insights to the academic community. Providing 'some' insight in a timely manner is preferable to gathering enough data over an extended period of time to provide a 'final answer.'" <i>Author Ann</i>
	Mixing GTM strategies	"We did use Glaser and Strauss. So after talking with GTM EXPERT he said you can mix these. So we did Straussian because that is what the reviewers knew and so if you start with it open and selective coding, but then do axial coding. . . . So what we tried with this mix is we tried to take the best of both to take some structure from Strauss. But the openness to the data, that comes from Glaser." <i>Author Chloe</i>
	Experience allows tailoring	"GTM in complete form is beneficial to novice researchers because it specifies the set of activities which, if followed, promises to result in a contribution. Its rigor provides a defense against criticism often directed toward qualitative research (i.e., that it is not rigorous). In later studies, the authors have adopted basic tenets of GTM depending on the research task. These tenets are just as valuable when taken individually as when taken as a whole. In fact, the procedures existed before GTM was formalized." <i>Author Stacy</i>
Incomplete documentation of GTM procedures	Lacking knowledge	"The only indication of us using a Straussian approach was the word 'axial coding,' but this was mostly because at the time, we did not fully understand the difference. . . . Now, with deeper understanding of GTM, I can say that we used the Glaserian approach. . . . we applied selective coding and identification of core category. This was not explained in the paper because I (and my co-author) were not versed enough in GTM terminology to properly explain what we did." <i>Author Mary</i>
	Authors did not report all GTM procedures	"We should clarify that during the review process, the manuscript included procedural details, which illustrated/demonstrated the analysis carried out by this study and helped satisfy expectations of rigor of the review team. The material was omitted from the published manuscript since the details were likely to detract attention from the main purpose of the study." <i>Author Jane</i>

²The names of the authors, journals, and research topics discussed here have been changed to protect the anonymity of our respondents.

Table A5. Themes, Codes, and Representative Quotations on Experiences of Using GTM (Continued)

Theme	Code	Representative Quotations from the Authors' Answers
Review process influence	Reviewers did not allow GTM adaption	"Interestingly, I now discourage students from using the term grounded theory when they publish because I feel that some reviewers are very critical if it isn't applied in a purely Straussian way or whatever way they prefer. ... I am currently writing another paper using this data and am not certain if I will refer to GTM." <i>Author Lisa</i>
	Fashion trends	"So essentially we had some problems with the reviewers on getting our paper published. In [the early 2000s] Glaser was out. We just kind of left our approach and took out what they said. We didn't take the methods out, we just at first had a strong claim in here that we're doing a Glaserian approach and the reviewers hammered on us for that. ... Whatever I sent in the reviewers said why aren't you using PROCEDURE? And I said to my colleague who did all the data analysis—just switch it to PROCEDURE. Because there are subtle differences between them but it doesn't change the basic story." <i>Author Chloe</i>
	Low number of high-quality GTM reviewers	"It has also been our experience that while the increased acceptance of GTM has increased expertise within the discipline, increasing the number of well-informed reviewers, there still remains a considerable variance. We have encountered reviewers who have raised poorly conceived objections to our approach based on an incomplete understanding of GTM. Such reviews may, in our opinion, bias an editor who does not have expertise on the methodology." <i>Author Jane</i>

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