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GRAY-AREA PHENOMENON IN INFORMATION SYSTEMS DEVELOPMENT: A CALL FOR RESEARCH

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Abstract

Previous research suggests that Information Systems and Software Development (ISSD) developers may sometimes omit required tests and not deliver on promised software functionality. This raises the question as to how often, and in which manner, software developers or companies act in morally questionable ways. In related research in other disciplines immoral behaviours of individuals and organizations are called the “gray area phenomena”. However, we find little research in Information Systems on such gray area phenomenon. As the first step towards overcoming this situation, we interviewed 15 experienced IT professionals in order to ascertain both the existence of gray area phenomenon in ISSD, and also to explore the typical issues in this phenomenon. We found a number of issues, which can be categorized into three main themes. We offer implications for research and practice based on our findings. For research, this study aims to open up a new research stream, namely the gray area in ISSD, and suggests a research agenda for studying this phenomenon. As for contributions to practice, the results are relevant for both the individuals using the software that is developed, and for the companies developing the software.

Keywords: ISSD, professional ethics, practices
1 INTRODUCTION

Modern society is based on IT. In such a society, information Systems (IS) and software have important roles. The recent trend in IS and software development is towards agile and lean development approaches, which are aimed at cutting down the costs of software development by reducing unnecessary steps in this process (Abrahamsson et al., 2003). Such methods include Agile (Martin, 2003), Internet-speed or short cycle time systems development (Baskerville & Pries-Heje, 2001a; Baskerville & Pries-Heje, 2001b; Baskerville & Pries-Heje, 2002; Baskerville & Pries-Heje, 2004; Baskerville et al., 2003).

But the use of a lean ISSD method is not the only way to cut down the costs of software development. Global competition and “quarter economy” drives software companies to minimize all kinds of costs (Baskerville et al., 2003; Helliwell 2002). Such a trend towards fast development cycles, global competition, emphasises on cost-effective developers with salary bonuses causes critical scholars to ponder how often developers or software companies act in morally questionable ways to further their own interests.

In management science and criminology literature, the questionable ethics or immoral behaviors of individuals and organizations are respectively called the “gray area phenomena” or “corporate crime”. While in IS, unethical use of IT (such as illegal copying of software by users, IS security and computer crime) has been widely studied, we find no research that has explored the gray area phenomena, especially in the Information Systems and software development. Given the critical role of software in our society, it is of utmost importance to study such a phenomenon. For example, it is estimated that inadequate testing of software in the USA alone could cost as high as 60 billion dollars yearly (Ahonen & Junttila, 2003) and dishonesty about the true status of a large project towards the clients may entail to major financial losses (Oz 1994; see also Keil 1995, Keil et al. 2000 on project escalation).

As a step towards remedying this situation in the literature, we interviewed 15 experienced IT professional, in order to show not only the existence of such phenomenon, but also to find out the typical issues within the gray area phenomena in IS. We specifically focus on the domain of software development.

This study is a welcome contribution to research and practice. For research and theory, this study aims to open up new research domain, namely the gray area in ISSD, and suggests a research agenda for studying this phenomenon. As for contributions to practice, the results are relevant for both the individuals using the software that is developed, and for the companies developing the software. Research that attempts to explain how the gray area of ISSD can be minimized, and in that way improve software quality, should be welcomed by ordinary computer users and organizations using and/or developing software. For the software development companies who exercise high moral standards, applied research efforts aimed at minimizing such gray area practices are welcomed.

The rest of the paper is organized as follows. The second section presents related work, while the third section discusses the research method used. The fourth section presents the results of our interviews. The fifth section discusses the results of this study. The sixth section concludes the study.

2 BACKGROUND TO THE STUDY

We define gray area topics in ISSD as situations or behaviours, where developers or software companies act in morally questionable ways to further their own interests. To best of our knowledge, the existing IS research has not examined (i) what exactly are the gray area issues in ISSD and (ii) what explains these issues.
Previous research in IS and software development has recognized a number of problems that belong or relate to the domain of gray area phenomenon in ISSD. With respect to such problems, a number of studies in software engineering have noted that planned tests are often neglected, ignored or bypassed by software developers (Ahonen and Junttila 2003). Similarly, Baskerville and his colleagues noted that, in the case of short cycle time systems development, tests are often omitted in order to release the software more quickly, which ultimately produces negative effects in software quality (Baskerville & Pries-Heje, 2001a; Baskerville & Pries-Heje, 2001b; Baskerville & Pries-Heje, 2002; Baskerville & Pries-Heje, 2004; Baskerville et al., 2003).

A phenomenon that is related to gray phenomenon area is computer abuse, employees’ compliance with IS security policies and computer crime (e.g., hacking). The studies on computer abuse (e.g., Straub 1991) and employees’ compliance with policies (e.g., Siponen & Vance 2010), while extremely important, typically adopt the perspective of end-users as abusers of organizational norms, thereby ignoring the role of ISSD developers in this phenomenon.

Another related phenomenon is project escalation, which occurs when a troubled project is continued instead of being abandoned or redirected. A study on project escalation suggests that between 30% and 40% of all IS projects exhibit some degree of escalation (Keil et al. 2000). Escalation occurs when there is a presence of negative project status information that fails to be processed. As a reason for this failure, there is so called “mum effect”, i.e., the individuals conceal negative information from their superiors, or “deaf effect”, i.e., negative information is ignored by the superiors, or some kind of combination of both of these. Projects that escalated had worse outcomes in terms of implementation performance and budget/schedule performance when compared to projects that did not escalate. While studies on project escalation (Keil et al. 2000) take the view of IT professional, the focus of these studies is more on project management than in specific ISSD practices as such.

The perspective inherent within the gray area phenomenon on the software developer highlights the key difference with the extent research on computer abuse, computer crime and employee compliance. Essentially the gray phenomenon adopts the perspective of the software developer or organization as the abuser. While the extent literature focuses on the role of the end-user as a rule breaker. The current focus on the end-user has created a blind spot in regards to developers or companies that are actively engaging such unethical or immoral behaviors for their own benefit. It is possible that such behaviors are in compliance with the silent norms of the organization. Current IS literature is silent on this issue.

In comparison to the computer crime literature, the gray area phenomenon focuses on internal actions, while computer crime is typically focused externally, with some exceptions (Willison & Siponen 2009). However, extant literature in computer crime that has adopted the insider perspective has focused on crimes where employees have used computers to perform criminal acts (e.g., engage in espionage, develop and spread viruses, sabotage and extortion) (Parker, 1998; Willison, 2006). These behaviors are also viewed as rule breaking in the eyes of their organizations; however the gray area phenomenon is more inclusive as it also covers behaviors that receive silent acceptance by the employer (e.g., skipping required tests in order to hit the market earlier) despite the unethical nature of the behaviors (Baskerville & Pries-Heje, 2004).

To summarize to findings of the literature review, we find no research that explicitly examines gray area phenomena in IS. Extant research does not explore the existence of such a phenomenon in IS software development, nor how such behaviour could be explained. As the first step towards overcoming this gap in research, we carry out interviews of 15 IT professionals involved in ISSD. The objective of these interviews is to show not only the existence of such a phenomenon, but also to identify the main gray phenomenon issues in ISSD, and how these issues come about. The research design is described in the next section.
3 RESEARCH DESIGN

Fifteen experienced IT professionals in Finland were interviewed. Subjects’ age and gender are as follows (F=female, M=male; na=not available): M/na, F/42, F/46, F/48, M/49, F/40, M/63, M/57, M/63, M/45, F/47, and M/50 (coded 1…15).

Each professional has considerable work experience in IT field ranging from 10 to 30 years. They were given the following task: “Describe the ways of working that could be perceived questionable or dubious in software and information systems development.” The respondents were further asked about the potential reasons or motivations for such dubious practices, and why someone does not engage in such behaviors. Specifically, they were asked, “What reasons or motivations lead to these types of behaviors? Why does someone act or not act in such way?” In addition, the interviewer probed the interviewee to give arguments or explanations as to why an activity was questionable or dubious (i.e., “What makes this questionable or dubious?”). The interviews typically lasted from one hour to two hours.

The transcripts were analyzed with the phenomenographical method. In a phenomenographical study, the aim is to identify and describe qualitative variation in individuals' experiences of their reality (Marton, 1986). The phenomenographic researcher seeks to attain a holistic view of a selected phenomenon, which—according to Marton (1995; 1992)—is possible, because there are a limited number of qualitatively different ways of experiencing it. Therefore, it is possible to obtain a holistic view of individuals' conceptions of any phenomenon under study. Such conceptualizations, which are typically gathered in interviews, are then categorized (Francis, 1993, 69).

A phenomenographic researcher seeks qualitatively different ways of experiencing the phenomena regardless of whether the differences are between or within individuals. The outcome of a phenomenographic research project is the researcher’s interpretation of the subjects’ understanding of how the subjects experience, understand or perceive the studied phenomenon (Berglund, 2005, 37). The variation lies in the interpretation made by the researcher (Berglund 2005, 38).

Phenomenography is used in the following three main areas (Uljens, 1991, 98): 1) research on general aspects of learning (e.g., approaches, strategies), 2) content-oriented studies on learning (i.e., focusing on educational effects), and 3) studies on peoples’ conceptions of everyday-life phenomena (e.g., taxes, death). Phenomenography is suitable research method for the objectives of this study as the aim is to understand the variety of issues and reasons in the gray area phenomenon in ISSD. With this kind of approach we expect that the interviewees’ descriptions would eventually start to repeat themselves, this is to say, the themes would start to saturate.

The analysis proceeded as follows: the authors used Atlas.ti (Muhr 1997) to code the interview transcripts. After organizing codes to different pools, the author recognized major themes, issues and reasons in the data. The analysis was iterative in nature, as we had to go back and forth between the categories and the data several times. Next, the major themes resulting from a phenomenographical analysis are presented.

4 RESULTS

Our analysis of the data resulted in three general themes. Each of these main themes will briefly be presented. We then present a few themes that emerged, that did not fall into the three general themes.

1 We decided not to use the phrase “gray area” due to the indefinite definition of the word for our interviewees. Instead we used terms “questionable” and “dubious” as definition of these terms is universally known and understood. Wagner and Benham (1995) used the same approach in their study on ethical attitudes; we adopt this approach.
These themes are then summarized into a general model with antecedents for each theme, as described by the interviewees.

4.1 Deficient ISSD practices and end-results (18 occurrences, 13 interviewees)

Practices (e.g., carelessness, shortcuts, inexperienced developers, and the use of out-dated technology, etc.) leading to lower quality solutions were considered questionable or dubious. These practices represent a lack of intention, ability or motivation to implement high-quality and/or long-term results for the client. These practices can emerge in all phases of ISSD (e.g., requirements analysis, testing, and implementation).

In more detail, the following behaviors were described and categorized as deficient ISSD practices: demonstrating a carelessness concerning software standards, taking shortcuts during the ISSD processes, using inexperienced project workers without client knowledge, making short term solutions (e.g., fix the problem at hand, but not taking care of the apparent long-term problem), and basing a solution on old technology despite assurances to the client of a newer technology.

The most cited issue that emerged from the subjects’ descriptions was that of inadequate testing. In addition, some subjects described that in the testing phase real-life data was used although it was prohibited. The real life data means the use of existing databases on customers and patients, for example, and the use of such data in the testing phase is in some cases prohibited due to the fear that the data might drift outside from the testing environment and therefore possibly violate the privacy of customers or patients, for example. The following extracts offer examples of the issues described in this section:

S4: “Well, perhaps something like that you do not tell client about so-called quick fixes, you produce something very quickly and the continuity is not therefore guaranteed. You produce solutions that the client is not able to understand at all and it has long-term effects”

S10: “...one is clearly such that one goes short of testing. It easily occurs that you test the agreed functionality. It is defined that I implement the software, which should function in certain way. You test it, you test a part of it, okay, everything is okay ... but everything else is left untested. You definitely produce other kinds of functionalities along the work, in addition to the wanted functionality, and it is not documented.”

The subjects offered the following reasons for these behaviors: costs, knowledge and know-how, bad working environment (e.g., wanting to get the work done and go home), laziness, schedule, low standards of quality, tiredness, distractions from outside the workplace (e.g., domestic problems), turnover of staff, inexperienced workers, wages based on the amount of results (not quality), norms of working or culture of organization, and no understanding of the effects of low quality software.

Reasons to avoid these deficient behaviors were as follows: know-how and awareness that low quality solutions could be disclosed later, aim to invest in long relations with clients, perceived importance of taking users into account during ISSD, adherence to rules, good business in the long run, maintainability of solutions, good image, high standard of quality, personal experiences with low quality products, culture of organization, and education level.

4.2 Not adhering to proper business practices (14 occurrences, 9 interviewees)

Not adhering to proper business practices when doing business was considered questionable or dubious. According to the respondents, in business there are certain practices that should be followed, and if those practices are not followed, trust vanishes. In more detail, the subjects described the following as proper business practices: clear and consistent invoicing, upholding promises to clients

2 Information systems or software lacking desired functionality, or critical bugs/flaws.
whether in contract or not, making business decisions on the basis of good business—not because your personal relationship with the client, honest reporting on the status of the project, and not hiding the fact that sub-contracting is used.

In addition, during ISSD, the IS is developed for the client and it is perceived wrong that the client is not taken into account. The vendor should take the perspective of the client when developing the IS. Similarly, the client is not taken into account when the provider claims that the client needs a certain solution, although that is not the case. In the next extract, the subject describes the difficulty to plan the project when the vendor does not openly and honestly describe the real situation of the project:

S14: “When we buy the information system, the vendor refrains from reporting everything, they do not lie, but by withholding they gives us very vague description of the schedule. Okay, if we have a deadline at the end of September, then at the beginning of September they pretend that, yes, it will be completed at the end of the month, although they know that it will not be realized. Then, at the middle of September they say that ‘it is not ready yet, but we are completing it with full force’. Then, at the end of October they say that ‘well, we are just two months behind the schedule.’ ... They do not honestly tell us about the schedule.”

In the following extract the subject describes how the provider considers the client only as a source of financial rewards and how it emerges when dealing with contracts:

S13: “Lack of openness from the side of provider is questionable, this is to say that providers try to modify the contracts to benefit themselves or they treat the client well. The client is dependent on the software provider or the provider of the service, and they (the provider) treat the client purely as a source of money. Well, I guess this is a typical, and, this is dependent on the culture of the provider and what kinds of people they are. It is possible that the same company acts differently depending on the manager.”

A variety of reasons for these activities were given: getting monetary benefit; receiving respect from one’s colleagues, and a good image among them; displaying a lack of professional skills, an incompetence (in the areas of ISSD, project management, or business) and inadequate education on these issues; aiming to decrease dissatisfaction of the client; scheduling purposes; aiming to use one’s resources as little as possible; and having unrealistic expectations of the ISSD process.

The following reasons emerged regarding how one is able to act according to proper business activities: high competency in business practices, project management and change management practices; processes are well developed, the ability to take the client into account, quality people, and an aim to keep client relations positive in the long-term.

4.3 Violation of intellectual property rights (IPR) or confidentiality (6 occurrences; 5 interviewees)

Violation of IPR or confidentiality means that in producing a solution (e.g., a software program) such things that one is not authorized to use are used. Such instances might be the reuse of software code, procedures or confidential knowledge that are clearly owned by some organization or individual. These kinds of unauthorized violations may occur consciously or without awareness. In fact, such violations may be illegal, or at least an undesirable or unethical act by the rightful owners of the information. The next extract exemplifies this problem related to staff turnover and the transference of knowledge to other employers:

S11: “...When we work for a company, how much does the employer or the sub-contractors take with them to another company? What I mean is that either solutions, or even program code, or other material is taken...”

As it became clear from the subjects’ descriptions that violations of IPR and confidentiality occurs occasionally. However, this issue is not always clear. It may be impossible to separate particular solutions for a client and knowledge developed by a professional in the long run.
S2: “...a person who has been working ten or twenty years in coding, or coding and planning. It is very hard to say what is his or her own capital-knowledge.... When we are talking about loops, we code them, and then the coder leaves, and we use them [again] because they function very well, so where is the borderline here—is it allowed to take workable codes to another work place? In principle the answer is no, of course. But if the code bears no significance concerning the particular product, like it is a general thing like a library; so how wrong is it then? To my mind, this is not a simple question.”

The subjects described the following reasons for violation of IPR or confidentiality: costs, busy schedule, benefits, sabotaging the former employer, easier business, testing new things and a misconception that if you write the code you own it.

The respondents described the following reasons for not taking part in such activities:: it is a sort of a merit towards clients that you have not revealed to have used unlicensed products, basic values about using the work of others, the belief that breaching IPR is stealing, fear of being caught in the act, and contracts that specify that the vendor is marked as responsible if this problem occurs, and thus liable.

4.4 Miscellaneous practices (6 occurrences, 5 interviewees)

Other behaviors emerged from the interview transcripts, which do not fall in the previous categories. Some examples include: honesty about one’s capabilities when applying for a job, modifying a program for one’s own benefit, overbooking hours, violation of data security, and collecting data without the user’s knowledge. In addition, work welfare was raised in the form that unfinished tasks might produce unhealthy burdens for ISSD professionals. The following extract exemplifies these issues:

S7: “It is not always the case that the foreman provides stress, but we can say that the tasks provide the stress. This is to say, that a certain task has to be completed in accordance with the timetable, and then you work during the night, for example. This is not good for any one’s health, and for future development.

4.5 Summary of reasons for and against the questionable and dubious ways of action

The reasons for and against questionable and/or dubious behaviors are summarized so that only reasons that received a minimum of two occurrences were included into the summary (See Figures 1 and 2). Figure 1 summarizes the reasons for the questionable and dubious behaviors while Figure 2 summarizes the reasons against such actions. Next, each reason is briefly described.

Costs and resources refer to the use of financial resources, getting financial benefits (as much as possible), and in some cases they refer to personnel as resources and to the cost of their labor. An example of this is shown in the excerpt below:

Researcher: “... You mentioned about the use of non-licensed products”

S15: “Yeah. In the development tasks you can work with many tools. It is generally accepted that you are authorized to use them.”

Researcher: “Why does someone use non-licensed products? What is the underlying reason?”

S15: “Saving money, of course, and then we have these propeller heads who want to test programs and such things.”

Knowledge refers to the know-how, competencies, and skills of project personnel in the area of concern. It also refers to awareness of critical issues in the area of concern. In the next example, the subject had already described that many times in ISSD, the client is not taken into account enough. The developer assigns additional costs to the customer due to a lack of professional:
Researcher: “And again the same question. What is the reason for this? I wonder if you already gave the answer”

S2: “Well, you just do not have the abilities. Well, and one is that, of course, that you have no abilities, but in addition there is this fact that it is expensive. It is expensive to do it with the client, and it is expensive to take into account, in great detail, the opinions of client. So, if you are busy in doing something, you do not have very much time to work with the client. And busy here means low expenses, at least lower expenses than the competitor. Well, to my mind, regardless of this, it is a lack of professional skills.

*Schedule* refers to the lack of time, and aims to get the work done before deadlines. In the next example, the subject describes a reason for not adequately testing the software, namely the schedule pressures and results-based wages:

S14: “And on the vendor side, there are these quartile objectives, this kind of a threshold that you dispatch something for the client to be tested so that they are able to tick a box that this job is done. And they get results-based wages there, and probably also to guarantee that the project keeps the schedule. From the client viewpoint, this is awkward as the client is forced to test it many times…”

*Laziness* and *carelessness* mean motivational and commitment concerns and a lack of responsibility in implementing work tasks. In the next example, the subject describes reasons for inadequate testing and connects laziness to this issue:

S10: “Then there is clear incapability; I would like to say laziness, but also incapability, that you do not understand what you are doing and what should be tested…”

*Long-term relations and quality objectives* mean an attitude that one should emphasize lasting relations with clients, and it is achieved by producing high quality products. An example follows:

S5: “…well, if you intend to collaborate in the long-term, in that case you cannot lure your client in that way [produce a short term low quality solution for the client]. If you think that you are going to have business with this client, and the client is satisfied and so on, you just cannot do it that way. But there are such firms, those that try to conquer the markets, they want to proceed quickly, so they do not give a thought to the fact that this is a long path…”

![Figure 1](http://aisel.aisnet.org/pacis2011/198)
Figure 2. Summary of reasons against questionable and dubious practices in ISSD. The numbers refer to the occurrences of the reasons in the data.

5 DISCUSSION

Based on our results, we next highlight four major findings. First, the results show that the gray area phenomenon in ISSD exists and it consists of three forms of practices: i) deficient ISSD practices and end-results, ii) not adhering to proper business practices, and iii) violation of IPR or confidentiality. Deficient ISSD practices relate to lack of intent to produce high-quality and long-term solutions for clients. This kind of intent is realized in taking shortcuts and exercising a careless attitude in ISSD phases.

Furthermore, not adhering to proper business practices relates to inconsistent invoicing, dishonesty in general, reporting and selling a client something that they do not need, and not taking the viewpoint of client into account during the ISSD process. These activities relate to lax professional standards identified by Oz (1994) in a case study of a travel industry reservation system. The system was a failed project due to the dishonest practice of hiding the true status of the project from the client, which caused a major financial loss for the client. These activities also relate to the phenomenon of project escalation in which negative project status information fails to be processed (Keil et al. 2000).

The third form of practice, namely violation of IPR or confidentiality, relates to the use of unauthorized code or information in the production of a solution for a client.

Second, our results show a variety of reasons for explaining the emergence of gray area phenomenon in ISSD, why practitioners do and do not engage in these practices. The reasons for the gray area behaviors relate to cost, knowledge, and schedule. Business ethics recognizes profitability as a major responsibility of business (Carroll 1999). Therefore, it is no surprise that decreasing costs and increasing revenues emerges as major reason for gray area practices. In addition, the hypercompetitive and chaotic nature of IT business (Kloppenborg and Petrick 1999; Yeo 2002) make schedules and bargaining overly strict.

Third, there were also reasons why practices relating to gray area phenomenon were avoided. Such reasons relate to the goal of a long-term relationship with the clients by producing high quality products, which require the knowledge and know-how to do it. However, our results show that there are IT professionals who have long-term intentions to develop their business by upholding honesty and high quality standards. This means that there are clear goals among some IT professionals to avoid gray area practices.

3 Violation of IPR or confidentiality did not receive any occurrences.
The fourth finding gives different reasons explaining different types of grey are phenomena. To our knowledge, this is a new finding in IS. As to the deficient ISD practices and end-results and to not adhering to proper business practices, the common reasons for both were costs, schedule and knowledge. However, laziness and carelessness emerged as a reason for deficient ISD practices, and it did not come up with respect to “adhering to proper business practices”. This finding implies that laziness and carelessness related more to implementing ISSD practices than to taking care of business practices. In addition, cost and schedule have influence on the practice of violation of IPR, while knowledge and laziness seem not to affect this practice. This finding suggests that some IT professionals aim to get work done quickly and without cost and therefore they violate IPRs. Pertaining to the reasons against grey area practices our findings suggest that some IT professionals aim to uphold long term relations with their clients by seriously taking into account all the ISD practices.

To summarize the contributions of our study, we introduced the grey area phenomenon into ISSD, and we described how it exists in ISSD (the issues and reasons). In our approach, we took a wider viewpoint to ISSD than studies on project escalation (e.g., Keil et al. 2000), which stresses the project management viewpoint. We took the whole ISSD and its processes and practices including business and IPR practices into account. Our results confirm the earlier finding that needed information is not transferred to the decision-makers (Oz 1994, Keil et al. 2000), and dishonesty prevails in ISSD. Furthermore, our results provide understanding on the reasons as to why these practices are implemented, and why some IT professionals aim to avoid such practices. In addition, our findings suggest that different reasons explain different types of grey area phenomena. We do not find similar information from IS literature.

5.1 Implication for research

We would like to highlight a number of implications for research based on our study.

The first research direction is to find out the reasons as to why software developers engage in gray area phenomena. This research direction continues the objectives of this paper. For this purpose, we call for interpretive, qualitative and inductive studies to explore these issues. In these studies, scholars might ask developers to report through interviews the reasons as to why they engage in gray area phenomenon. While our paper carried out this research stream by interviewing 15 people, although this could be seen as adequate for a qualitative study, we believe that future research should interview larger and wider population. To be more precise, these interviews should be carried out in different countries, different industries, and with interviews occupying different organizational positions.

The interviews in different countries and industries are needed, because the situations regarding gray area behaviors may be country- and industry-related. For example, previous research on corporate crime suggests that employees were more willing to engage in corporate crime, if that was done in order to save the company against a foreign competitor (Paternoster & Simpson 1996). This also suggests that the type of customer may play a role in the software developers’ decisions regarding gray area phenomenon. The organizational position is important, given that different employees at the different level may have different levels of power to act or order others to act.

While initial research could focus on theory-building based on qualitative data, future research should also begin to perform theory-verification. In this type of research, scholars could test the generalizability of the theories, which are assumed to explain or predict the gray area behavior. These theories may be developed in the first research stream, or they may be derived from other disciplines. For example, one might use Rational Choice Model (Paternoster & Simpson 1996) to see if it explains or predicts gray area behavior. In this case, the dependent variable would be “intention to behave” or “actual behavior”. While actual behavior is preferred, the use of scenarios offers an interesting way to measure intention (see Siponen & Vance 2010). While these studies typically use self-reports to measure the dependent variable, the use of objective data should be preferred.
A third research direction could adopt a corporate crime perspective, which is widely studied in criminology, but has received no attention in ISSD context. According to the corporate crime perspective, employees commit deviant actions on the behalf of the company (Paternoster & Simpson, 1996). Applying this idea to the software development, the scenarios could be designed in a way that the scenario character is helping the company. That is, the employees do not skip tests to help themselves or to improve their standing in comparison to others, but rather they want to maximize the interest of their company.

A fourth stream of research could investigate whether employees who are involved in gray area behaviors in ISSD can be induced to stop through training or campaigning intervention. This stream of research is important, so that we can move beyond merely explaining or predicting a phenomenon, but also changing it in practice. We recommend the use of experimental research settings for this purpose.

5.2 Implications for practice

Inadequate knowledge of ISSD practices and business practices emerged as major reasons for engaging in gray area behaviors in ISSD. Educators should take these results into account and increase their efforts to improve students’ knowledge of such issues, so as to avoid the lack of knowledge in the future ISSD workers.

5.3 Limitations

This study is subject to typical limitations inherent in qualitative interview studies. Despite the fact that the number interviewees may be seen relatively small (n=15), but normal in qualitative interviews (Myers & Newman 2007), the themes clearly started to saturate. Therefore, the three forms of practices and their underlying reasons can be considered to reflect the gray area phenomenon in ISSD, at least in the Finnish context. Given the use of interviewing as a method, it is possible that its inherent dangers (i.e., rationalization, lack of awareness, and the fear of being shown up (Fielding, 1993)) might be significant due to the questions regarding questionable and dubious practices. To minimize these effects, we did not ask the interviewees to describe their own practices, but instead the interview question was phrased to consider practices generally in the field (i.e., meaning those practices they have witnessed).

Finally, like in any qualitative study, care should be exercised when generalizing our finding to all ISSD settings. As previously mentioned, future research is needed to examine if our findings hold in different ISSD contexts and cultures.

6 CONCLUSION

The current trend in ISSD is towards fast development cycles, global competition and a heightened emphasis on cost-effective developers with salary bonuses. Previous research suggests that such trends may sometimes leads developers to omit required software development tests and not deliver on promised software functionality. This raises the question as to how often and in which manners software developers or companies act in morally questionable ways to further their own interests. Further, what motivations or provocations lead to such acts. In related research in management science and criminology literature questionable ethics or immoral behaviors of individuals and organizations are respectively called the “gray area phenomena” or “corporate crime”. However, we find little research in Information Systems on such gray area phenomenon.

Given the critical role of software in our society, it is of utmost importance to study such a phenomenon in ISSD. As the first step towards overcoming this situation, we interview 15 experienced IT professionals, in order to ascertain both the existence of gray area phenomenon in ISSD, but also to explore the typical issues in this phenomena. We reported a number of issues, which can be categorized into three main themes. Based on our interviews, we also found a number of reasons for the occurrence of these gray area themes in ISSD. Interestingly, different reasons explains different types of gray area phenomena.
We offered a number of implications for research and practice based on our findings. For future research, our results opened up a new research stream - the gray area in ISSD - which has attracted a little research so far. Based on our findings, we put forward a research agenda for studying this phenomenon. As for contributions to practice, the results are relevant for not only for the individuals using the software that is developed, but also for the companies developing the software. To be more precise, research aimed at explaining how the gray area of ISSD can be minimized, and in that way improve software quality, should be welcomed by ordinary computer users and organizations using and/or developing software. For the software development companies who exercise high moral standards in ISSD, applied research efforts aimed at minimizing such gray area practices should be welcome.

References
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