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Shadow IT – A Systematic Literature Review

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Shadow IT coexists with mandated information systems. Developed and applied by nonIT domain experts, it is as a rule, but not exclusively, used for resolving nonroutine issues, for which mandated IS does not have appropriate functions. Shadow IT solutions are not supported or controlled by IT departments. The aim of the paper is to show to which extent shadow IT has been researched, as this area has not yet received the necessary attention from both academia and business. A systematic literature review was conducted in order to find the papers covering the topic of shadow IT. The following electronic databases were searched: Web of Science (Thomson Reuters), Scopus (Elsevier), and AIS Electronic Library (The Association for Information Systems (AIS)). More than half of the analysed papers are case studies in one or more organizations. The papers were published mostly in scientific conferences and in scientific journals. Based on the literature review, the reasons for shadow IT occurrence, the possibility of its management are presented. Given the literature review, the author proposes a project called "illuminating" shadow IT, which would comprise three phases. The limitation of a systematic literature review is that only papers published in English are analysed.

KEYWORDS: Shadow IT, feral system, IT workaround, literature review.

1. Introduction

Software solutions created by IT (Information Technology) departments support numerous business processes in organizations, however, these are not exceptions in this type of business. Whether it is due to gaps in the software solutions function or other reasons, organizations provide a fertile ground for system de-

velopment by end users who are not software developers by profession. The following terms are used in the literature for systems developed by end users or used without the knowledge of IT departments: shadow system(s), shadow IT, feral system(s), grey IT, hidden IT, rogue IT, workaround systems, workaround IT, unofficial IT, bolt-on [6, 17, 28, 40, 61, 62, 70, 76, 81, 86, 87]. Huber et al. [28] state that all these terms are used to describe the shadow system phenomenon. However, in the literature there is no clear consensus on these terms, and the attitudes are often opposed.

Huber et al. [28] add end user computing to the list of terms that indicate IT systems developed by end users, although Rentrop and Zimmermann [62] stated in the paper published in 2012 that it is necessary to distinguish shadow IT from end user computing. Similar to Retrop and Zimmerman [62], Tambo et al. [81] emphasize that feral systems (shadow systems) should not be confused with end user development (EUD) because EUD is controlled and rooted in the official IT. Rentrop and Zimmermann [62] point out that EUC is officially launched and supported at the organization level. On the other hand, Sakal et al. [66] and Raković [60] argue that EUC (End User Computing) is the independent development of software solutions used exclusively for carrying out their work and not officially supported in organizations. This view is supported by Panko and Port [58], who emphasize that despite its significance in terms of size and influence, EUC remains invisible to IT departments. Burnett and Scaffidi [10] classify EUC under End User Development, while Chua et al. [11] state that the reason why the phenomenon of shadow IT is rarely analysed is because shadow IT and EUD are considered synonyms, and they further indicate that shadow IT is a wider concept. Furthermore, Chua et al. [11] observe that End user Development with its integrating concept of End user computing is just a part of a wider concept – shadow IT. The most common type of user application development is the development of spreadsheets [68], often associated with errors [67] and which are therefore necessary to be managed [59]. Some authors classify hardware solutions under shadow IT [70]. For instance, Zimmermann et al. [87] emphasize that "Occurrences of Shadow IT are applications, spreadsheet and database solutions, cloud services, mobile devices, hardware, support structures, or a combination thereof". The emergence of portable devices, cloud technologies and subscription-based software significantly change traditional IT management [54] because shadow IT becomes more pervasive than ever [3, 85].

Silic and Back [70] point out that occurrence of shadow IT is a phenomenon insufficiently explored on the one hand, and on the other hand it is often misinterpreted. Therefore, this topic deserves far more attention in both organizations and scientific circles. Shadow IT usually appears as small, ad-hoc solutions for day-to-day practices [40, 81, 86], developed by small teams or individuals with specific IT skills [81]. These solutions over time can become organizational resources [40]. Tambo et al. [81] state that there are usually local (in terms of organizational unit) approvals for the development and use of these solutions, and the approvals usually are not in line with the official IT policy. End users who develop shadow IT in most cases do not have bad intentions [24, 70] and they just want to improve or complete the job [21]. It is important to note that shadow IT is not accepted and supported by IT services in organizations [62]. There is a general view that in some way it is necessary to manage shadow IT systems [30, 61, 90] but there is no silver bullet, i.e. a unique solution to shadow IT [33]. Given the above, one can conclude that shadow IT appears as a problem in an organization and it should be resolved. However, as will be mentioned below, many authors associate positive characteristics with shadow IT beside its problems. When it comes to IT not controlled by IT departments, most of the papers in the literature include the terms such as shadow IT (or shadow systems), feral systems and IT workaround. Therefore, a systematic review of the literature covered these three terms.

At the beginning, a systematic review of the literature is carried out. Based on the collected papers, the reasons for the occurrence of shadow IT, the possibility of its management and the advantages and disadvantages of shadow IT are presented. The most important conclusions and views regarding shadow IT, according to the authors' opinion, are indicated at the end.

2. Literature Review Methodology

A systematic review of literature was conducted according to the methodology proposed by Barbara Kitchenham [9, 42, 43, 83]. The following electronic databases were searched: Web of Science (Thomson Reuters), Scopus (Elsevier), and AIS Electronic Library (The Association for Information Systems (AIS)). In addition to the key words such as shadow IT, shadow IT Systems and Shadow Systems, the initial research of the phenomenon of shadow IT identified the terms of Stealth IT and Feral systems, mostly used as synonyms, but search conducted by the terms of Stealth IT and Feral Systems did not provide results. Therefore, the mentioned databases were searched by following keywords: shadow IT (shadow IT systems and Shadow Systems), Feral Systems, and IT workaround.

The total number of hits in all seven bases is 449 (Table 1). In the first phase of the hit analysis, titles, abstracts and key words were reviewed. Inclusion/exclusion criterion in the first phase of the search was whether the paper deals with the topic of shadow IT. Having reviewed the titles, abstracts and key words, 350 papers were excluded from the analysis (Table 1). Out of 99 papers, 57 papers remained after removing duplicate papers. Forward and backward research was then conducted, after which another 20 papers were added. This means that a detailed analysis included 77 papers (Appendix A).

More than half of the analysed papers are case studies in one or more organizations. The papers are mostly published in the proceedings of scientific conferences (59.74%) and scientific journals (32.47%) (Table 2). If the number of papers is analysed by a year and a term (shadow, Feral Systems and IT workaround) primarily used in that paper, it can be concluded that the appearance of these terms is related to the beginning of this century, that shadow IT and feral system have been first introduced and then IT workarounds, and that the term of shadow IT is most often used lately (Figure 1).

Table 1
Search results of electronic databases

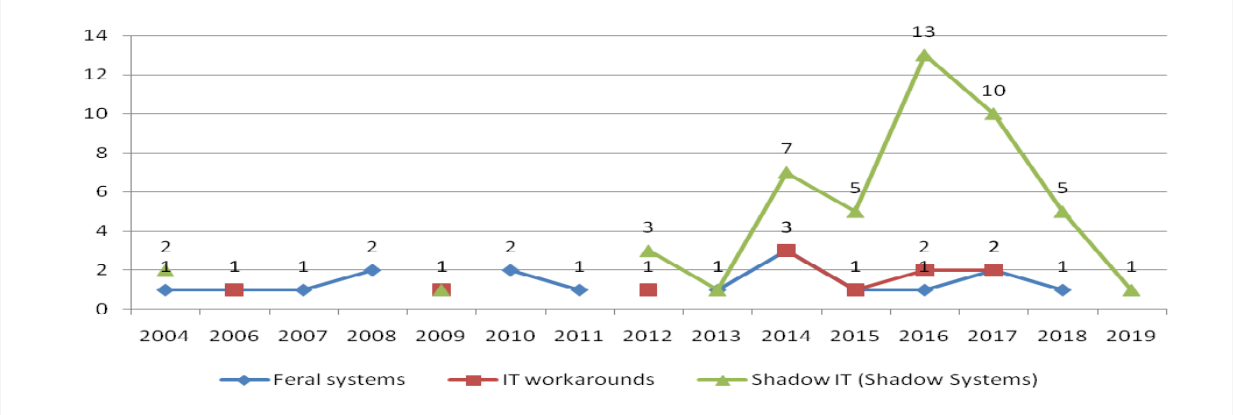
Data source	Descriptors	Number of hits (1st stage)	Number of hits (2nd stage)
Web of Science	"shadow IT"	68	13
Web of Science	"feral system"	2	1
Web of Science	"IT workaround"	1	1
Scopus	"shadow IT"	227	36
Scopus	"feral system"	20	11
Scopus	"IT workaround"	2	1
AIS (The Association for Information Systems)	"shadow IT"	102	26
AIS (The Association for Information Systems)	"feral system"	19	10
AIS (The Association for Information Systems)	"IT workaround"	8	0

Table 2
Papers by type of study and type of source

Type of study	Type of Source			Total
	Conference proceedings	Edited book	Scientific Journal	
Case study	22	3	15	40
Experimental research	1	0	1	2
Exploratory study	1	0	1	2
Literature review	6	0	0	6
Research paper	5	3	5	13
Research-in-progress study	6	0	0	6
Survey research	5	0	3	8
Total	46	6	25	77

Some definitions of the terms shadow IT, Feral Systems and IT workaround will be presented below prior to indicating reasons for shadow IT occurrence.

Figure 1
Number of papers by years and primarily used term



3. Literature Review

Authors generally agree that Shadow IT, Feral Systems, IT workarounds are opposite of IT systems, but their definitions are in some respects different. Several definitions of the mentioned terms are presented below.

Shadow IT:

- "Shadow IT describes the supplement of "official" IT by several, autonomous developed IT systems, processes and organizational units, which are located in the business departments. These systems are generally not known, supported and accepted by the official IT department." [62]
- "We define shadow system usage as individual user's voluntary deployment of one or more systems besides or instead of the mandatory system to perform a task." [24]
- "Shadow Information Technology (IT) occurs when users develop systems outside of the central information technology department." [11]

Feral systems:

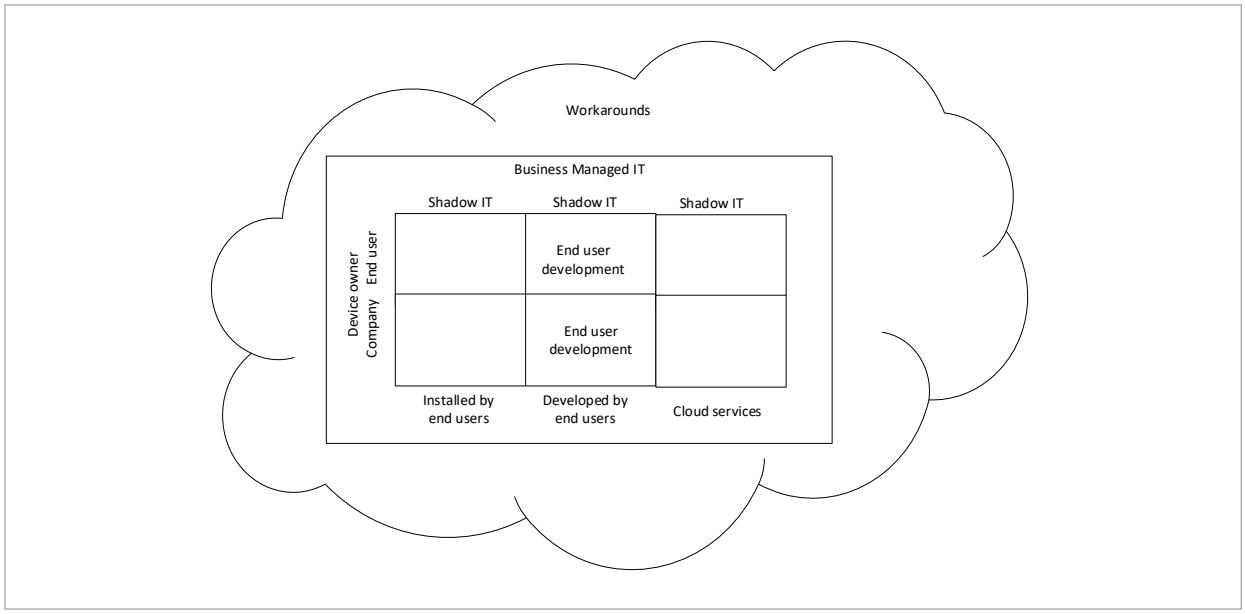
- "Feral systems are argued to be those mechanisms which circumvent regular systemic procedures to the extent that they create alternative means of accessing data." [39]
- "A Feral Information Systems (FIS) is any technological artefact (e.g. spreadsheets) that end users employ instead of the mandated Enterprise System (ES)." [76]
- "Feral systems have largely been regarded as the users' response to discrepancies between official IT software systems and actual business processes." [81]

IT workaround:

- "A workaround is a strategy of using a computer system in a manner that it was not designed to be used for or using alternative methods to accomplish a work task". [1]
- "Computer workarounds are a form of anomalous system use which refers to a variety of sociomaterial actions around IT artefacts. These actions may not be consistent with the designed uses and official rules but nevertheless constitute a form of IT enactment in practice." [5]
- "Where a mismatch occurs between the expectations of technology and actual working practice, employees may implement a 'workaround' by deviating from set procedures". [13]

Notwithstanding certain contradictory points of view expressed in [77], it can be concluded that the terms of shadow IT, feral systems and IT workaround refer to the same phenomenon, i.e. IT that is not controlled by IT department. In general, shadow IT is a workaround where end users increase their efficiency and want to facilitate their day-to-day activities. Mallmann et al. [53] divided the occurrences of shadow IT in accordance with device owner and software/solutions. According to their opinion, applications that represent shadow IT can be installed on devices that are owned

Figure 2
Shadow IT, End user development and Workaround (created on the basis of [13, 28, 48, 52, 53]



by the company or the end users themselves. Furthermore, end users can develop shadow IT on their own or company's devices. This part of shadow IT can be categorized under End user development. Finally, Mallmann et al. [53] also add the category of IT usage through cloud services (Figure 2). Therefore, shadow IT requires much less knowledge and experience in relation to end user development [11].

4. Shadow IT – Reasons for Occurrence

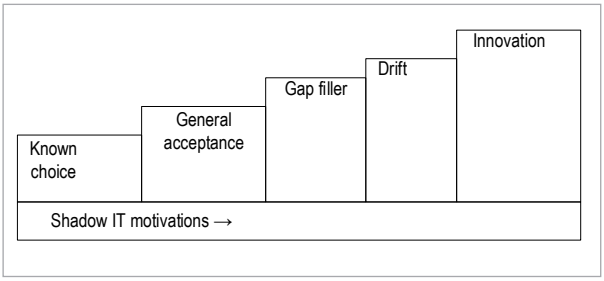
The reasons for the emergence of shadow IT are numerous, but there is always a need for end users to complete their job. Despite an ERP (Enterprise Resource Planning) system implemented to increase standardization and control, end users create workarounds in the form of shadow IT due to Unreliability, Inflexibility, Not Easy to Use, and Lack of coordination [1]. Dissatisfaction of employees with the existing ERP system [79] or dissatisfaction during its implementation according to Kerr, Houghton and Burgess [39] provides a fertile ground for the development of shadow (feral) IT. The mentioned authors claim that although companies consume huge resources for the ERP system implementation that does not guarantee accurate data in the centralized database. As shadow IT often complements or replaces certain ERP system functions, "real data" can be different from the data found in the ERP system [37]. The very systems that should reduce and remove shadow IT become their spawning ground [40]. It is useful to know that even distrust in the ERP system can be the reason for end users to start developing shadow IT [39]. Zimmermann and Rentrop [86] state that in most cases the misaligned situation has built the foundation for shadow IT. As the reasons for shadow IT, users often mention a long response time (fulfilment of user requests) by IT department [20] and low initial (perceived) costs of shadow IT [86]. The growing number of mergers and acquisitions of organizations indicates that the "problem" of shadow IT will continue to occur in the future [39]. However, shadow IT should not only be observed from a negative point of view, and it is also necessary to consider the adaptability and innovative potential of shadow IT [87].

Whether and to what extent shadow IT will appear in a particular organization, in addition to the aforementioned reasons, depend on both corporate policies and management tolerance towards these systems [39].

According to Tambo, Olsen and Bækgaard [81], shadow IT are low-cost solutions that need to fill the gaps in business processes (what ERP systems have failed to cover) and that during their existence they can get an official status. As it fills the gap between the end user requirements and the provided function of the ERP system, shadow IT can be an important source of information necessary for improving business processes [63, 78] and connecting business processes [81], as well as creating new, innovative processes [73]. Users can develop shadow IT out of their curiosity, outside working hours and as part of their work [81].

Tambo et al. [81] define the analytical framework for researching shadow (feral) IT motivations (Figure 3). At the beginning of the shadow IT motivations, authors place Known choice, i.e. information on whether employees are aware of shadow IT, which depends on digital literacy, the level of general education and the perception of IT strategy. The second level of motivation is General acceptance, i.e. the level of acceptance both at the individual level (an individual who develops a shadow IT system will accept it a priori) and at the level of the organizational unit and organization. Shadow IT is in many cases represented by gap fillers. Such systems can in the long run only include a narrow organizational context and sometimes drift into oblivion or they can receive attention and become officially recognized and accepted. Of course, the authors emphasize that the innovative potential of shadow IT should not be ignored.

Figure 3
Shadow IT motivations (adapted from [81])



Therefore, the reasons for the occurrence are undoubtedly numerous and the most common reason is the need to support business processes that are not supported (or not adequately supported) by the organization's information system. As these systems are found in organizations, it is necessary to first identify them and then manage them. Theoretical concepts for identifying and managing shadow IT are identified below.

5. Managing Shadow IT

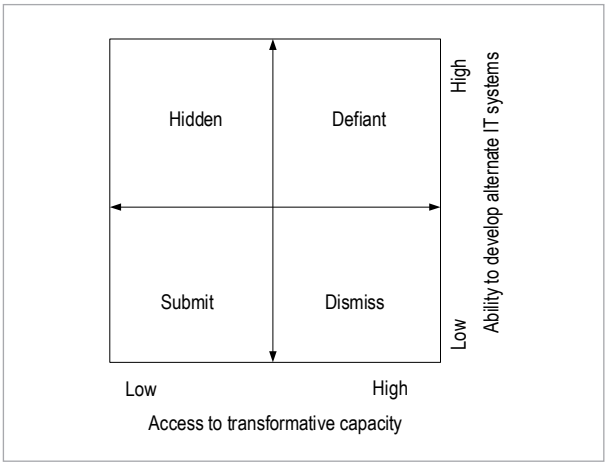
Managing shadow IT is necessary because many shadow ITs support key business processes. Although these systems are mostly developed without the knowledge and support of IT departments, and bring many risks, Haag et al. [24] emphasize that organizations should be careful with sanctioning the shadow IT system development as these systems can be very useful both for the organization and for the performance of individuals in doing their job. Behrens [6] provides advice for a successful organizational use on the basis of a case study conducted: recognize shadow IT, learn from shadow IT, eliminate bias towards shadow IT, do not try to control shadow IT, and encourage good shadow systems. In the same manner, Haag et al. [24] state that it is necessary to recognize and support the development of shadow IT.

Managing shadow IT should start with researching the motivation of shadow IT occurrence [81], then analysing users' abilities to develop shadow IT [76] and once each individual shadow IT instance is identified in individual business processes, it is necessary to evaluate each shadow IT instance and control the shadow IT instances [87].

5.1. End Users' Ability to Develop Shadow IT

According to Spierings et al. [76], the behaviour of end users in terms of shadow IT can be observed through two dimensions: the dimension of the ability to develop an alternative IT system and access to transformative capacity. Based on the above dimensions, the authors identify four quadrants for the modes of operation: submit, dismiss, hidden and defiant (Figure 4). The lower left quadrant represents Submit mode in which the end user has low access to changes as well as insufficient IT knowledge to build alternative IT solutions and therefore has to use the existing solutions. The end users in the lower right quadrant have insufficient IT knowledge for the development of alternative systems, and a high access to the transaction system, so they can refuse (dismiss)

Figure 4
End user Modes of Operation [76]



to use an officially installed IT system. Hidden mode is represented by the upper left quadrant where end users have an adequate level of IT skills for the development of shadow IT but low access to the transformative capacity. These users develop shadow IT, but without the IT department's knowledge. The fourth mode that represents users with adequate IT skills to develop shadow IT and high access to transformative capacity is named Defiant by Spierings et al. [76]. The users placed by the authors in this group openly, without hiding, develop and use shadow IT systems often with the support of their closest executives.

Once the abilities to develop shadow IT are identified, as well as individual shadow IT instances, it is necessary to evaluate them.

5.2. Shadow IT Evaluation

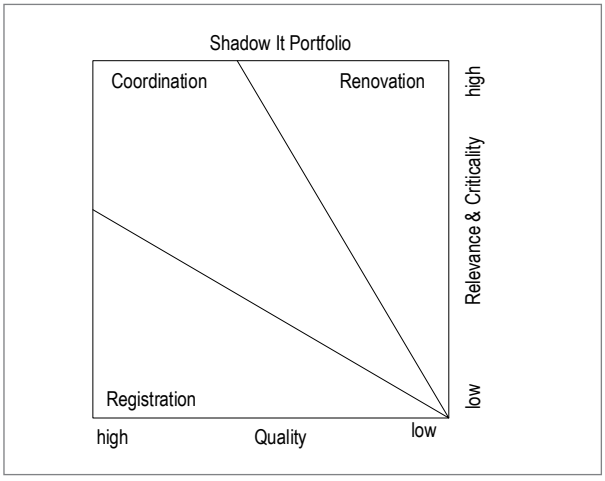
Evaluation of shadow IT instances is necessary once they are identified. Rentrop and Zimmermann [62] define the following criteria for shadow IT evaluation: Relevance, Quality, Size, Innovative potential and Parallelism (Table 3). Within Relevance, the authors argue that it is first necessary to determine how shadow IT affects the organization's strategy and strategic decisions on the IT infrastructure. The second sub-criterion of Relevance is Criticality which includes criticality from the aspect of business process, IT security, compliance and IT service management. The following criterion for the shadow system evaluation is Quality. It is necessary to carry out a quality assessment both from the technical aspect (hardware/software) and from the perspective related to the method of making shadow IT. Furthermore, quality is measured from the aspect of service (support) quality offered for shadow IT, and then from the aspect of information quality that implies the integrity and consistency of data generated by the shadow IT. Quality for business processing is defined as the last sub-criterion in the quality evaluation. The third criterion refers to the size that represents the necessary resources for the use of shadow IT and the professionalism of using these systems. This is followed by determining the number of users, the components included in shadow IT and all services connected to shadow IT. In addition to the above-mentioned three shadow IT criteria, it is necessary to consider their innovative potential and whether shadow IT works in parallel with the ERP or some other system provided by the IT department.

Table 3
Shadow IT Evaluation Criteria [62]

Shadow IT evaluation criteria		
Mayor criteria	Sub-criteria level I	Sub-criteria level II
Relevance	Strategic relevance	
	Criticality	Business process
		IT security
		Compliance
		IT service management
Quality	System quality	Hard-/Software
		Engineering process
	Service quality	
	Information quality	
	Quality of business processing	
Size	Use of resources and professionalism	
	Number of users	
	Shadow IT components	
	Shadow IT service processes	
Innovative potential		
Parallelism		

In order to control or manage shadow IT, Zimmermann et al. [87] evaluate shadow IT through two dimensions - Relevance and Criticality (y-axis), and Quality (x-axis) (Figure 5), and they determine the possible action in accordance with the position of the shadow IT instance.

Figure 5
Evaluation and Control of Shadow IT Instances [87]



The size of shadow IT instance depends on the number of users and resources engaged. Shadow IT instances in the upper right corner are the most problematic, so Zimmermann et al. [87] suggest a mechanism of renovation, which may indicate the rebuilding of these instances with IT support, consolidation of similar solutions or integration into the official system. For shadow IT instances with a relatively high level of quality and a high level of relevance, the authors suggest coordination between the business unit and IT department in terms of which functions should remain within the business unit and which should be transferred to the IT department. Shadow IT instances in the lower right corner have high quality and low relevance and criticality. These are mostly small shadow IT solutions and the authors suggest that these applications are to be registered by IT departments and further monitored. Therefore, it is necessary to first identify the shadow IT instances and then classify them in accordance with the above dimensions and finally apply the appropriate control mechanism.

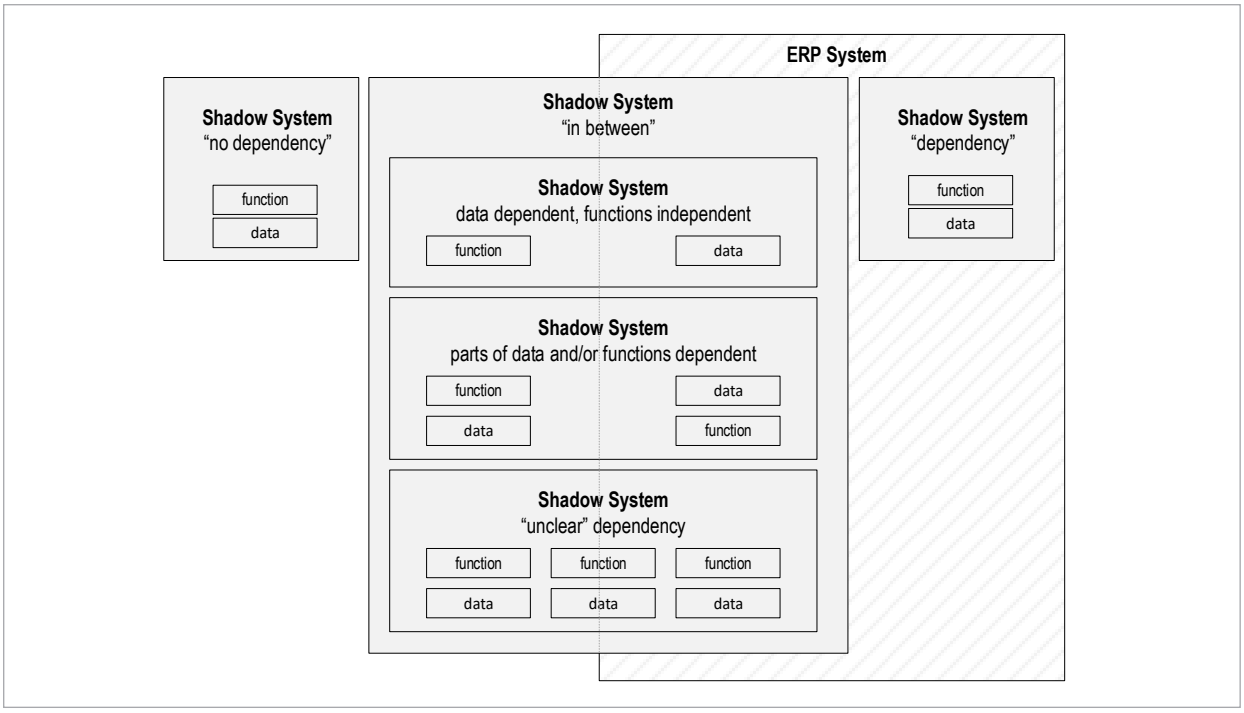
Naturally, the ultimate goal of shadow IT management would be to get everything back within IT department, although that goal is probably unattainable. Therefore, at least a part of critical shadow IT, from the aspect of risk, needs to be integrated with the existing system.

5.3. Integration of Shadow IT and ERP Systems

Huber et al. [28] point out that although shadow systems support business processes, they hinder the organization's high integration and in accordance with the level of dependence of shadow IT from the implemented ERP system they provide recommendations for their integration. The mentioned authors (28) point out that in terms of data (source) there are three types of dependences between ERP and shadow IT system, but they emphasize that it is not easy to classify every case. In the first type, the data needed for shadow IT are completely dependent on (generated from) the ERP system. In the second type of dependency, part of the data and functions is common both for ERP and for shadow IT systems. The authors clearly distinguish between the first two types, while as the third type they indicate the dependence between data and function that cannot be clearly categorized. Based on dependence, the authors classify Shadow IT (Figure 6). The first group includes "dependency" shadow IT systems where function and data depend on the ERP system. The second group includes "no dependency" shadow IT that are completely independent both in terms of function and data. The third category of shadow IT are "in between" shadow IT systems. The authors define this group as Grey Zone with three subcategories: a) data dependent, function independent, b) parts of data and/or functions dependent, and c) unclear dependency.

The possibility of integrating Shadow and ERP systems depends in many ways on the established dependence between these two systems [28]. In the conducted research, Huber et al. [28] identified that slightly less than a third (28%) of identified shadow IT instances depend on the ERP system. Such systems could easily be integrated into an existing ERP system, but it is very worrying that these systems replace ERP systems. The authors classified slightly more than a third of the identified shadow IT instances (36.36%) in the second group, the partial dependency group. The first and second groups of identified shadow IT instances indicate weaknesses in ERP sys-

Figure 6
Dependence between ERP and Shadow system (adapted from [28])



tems. Similar to the second group, the third group has the same number of instances, but this group does not share data and functions with the ERP system. The authors state that the integration of this type of shadow IT systems is not possible without great effort.

6. Final Considerations

Connecting and networking between organizations is one of the goals of digital transformation of organizations. Shadow IT as solutions operating under the IT department's radar may hinder digital transformation. However, in some cases, they may indicate weaknesses in business processes, which, when overcome, can improve the functioning of the organization. It is necessary to illuminate shadow IT, i.e. raise the collective awareness of both common users and IT departments and the organization's management. Given the literature review, the author proposes a project called "illuminating" shadow IT, which would comprise three phases. The first phase would cover identifying shadow IT instances. In this phase, the project manager would first arrange a meeting with key stakeholders, which would include top management, department managers and IT management. The stakeholders would be presented with a project plan and goal, which is to identify and manage shadow IT and, if possible, to ban a part of shadow IT (caution should be exercised regarding the ban), to convert it into an official IT solution or simply to raise the transparency of these systems. Support is needed from the aforementioned stakeholders to perform the next step. IT department can help identify shadow IT by scanning computers and identifying applications/files not supported by them. The next step would be to interview a number of end users with the support of their management. End users should be reminded that they will not be disciplined and that the project aims to improve support to their work. Once shadow IT currently used are identified, the second phase of the project can start. The second phase of the project would cover the evaluation of individual instances. The project manager and possibly his/her team (depending on the size of the organization) would prepare the evaluation map of individually identified shadow IT instances by

departments. One or both of the approaches set by Rentrop and Zimmermann [62] and Zimmerman et al. [87] may be used for the evaluation criteria. The evaluation map needs to be reviewed and possibly revised with department managers and end users. The next step in this phase would be to develop a proposal for managing individual groups of shadow IT instances. Managing could include: banning shadow IT instances, integration into official IT, or monitoring. In any case, the proposals should be discussed and possibly corrected with the stakeholders involved in the first phase. The third phase would cover implementing the decisions from the last step of the previous phase. At first, most of shadow IT is likely to remain in the group that should be monitored. The organization is here advised to implement (if not already implemented) some collaboration tools like Yammer, Teams, and SharePoint. Yammer covers a social network within an organization that all employees should have access to and where they can find the solution they need. If certain shadow IT instances do not need to be accessible to all employees it is possible to organize special groups of employees and distribute them through such software (e.g. Microsoft Teams). It is also recommended to maintain an internal portal with sorted user shadow IT solutions. End users will thus have a place before building their shadow IT where they can search the already existing solutions. On the one hand, the latest version of shadow IT solutions will always be available, while on the other hand, IT department will be able to monitor and possibly assist end users who developed such solutions.

Although it is almost impossible to completely eliminate shadow IT solutions, various collaborative software solutions, which are getting closer to end users (since most end users use some form of social networking privately), enable their management and thus minimize their disadvantages but promote their advantages. The aim of the paper is to inspire future research in this field. Some possible lines of research would be: examining end users' and IT experts' attitudes on shadow IT strengths and weaknesses; developing a detailed shadow IT management plan through the three phases mentioned; examining the Generation Z's attitudes and behaviours regarding shadow IT.

Appendix A - Papers Meeting the Literature Review Criteria

Type of paper
CS - Case study
ER - Experimental research
ES - Exploratory study
LR - Literature review
RP - Research paper
RinP - Research-in-progress
SR - Survey research

Primarily used term
FS - Feral systems
FS/SIT/ITW - Feral systems/Shadow IT (Shadow Systems)/IT workarounds
ITW - IT workarounds
SIT - Shadow IT (Shadow Systems)

Empirical/theoretical
T - Theoretical
E - Empirical

Type of Source
CP - Conference proceedings
EB - Edited Book
SJ - Scientific Journal

ID	Author(s) and year	Type of Source	Type of paper	Primarily used term	Empirical/theoretical
1	Alojairi (2017)	SJ	CS	ITW	E
2	Alter (2014)	SJ	RP	ITW	T
3	Andriole (2015)	SJ	RP	ITW	E
4	Arduin & Vieru (2017)	CP	RinP	ITW	T
5	Azad & King (2012)	SJ	CS	ITW	E
6	Behrens & Sedera (2004)	CP	CS	SIT	E
7	Behrens, S. (2009)	SJ	CS	SIT	E
8	Born & Krönung (2016)	CP	SR	SIT	E
9	Chua (2014)	CP	CS	SIT	E
10	Davison & Ou (2018)	SJ	CS	FS	E
11	Ferneley & Sobreperez (2006)	SJ	CS	ITW	E
12	Franchi, Poggi, & Tomaiuolo (2014)	EB	RP	FS	T
13	Fries & Wiesche (2016)	CP	RinP	ITW	T
14	Fuerstenau & Rothe (2014)	CP	CS	SIT	E
15	Furstenau, Rothe, Sandner, & Anapliotis (2016)	CP	CS	SIT	E
16	Fürstenau, Sandner, & Anapliotis (2016)	CP	CS	SIT	E
17	Gozman & Willcocks (2015)	CP	SR	SIT	E
18	Györy, Cleven, Uebernickel, & Brenner (2012)	CP	CS	SIT	E
19	Haag & Eckhardt (2017)	SJ	RP	SIT	T
20	Haag & Eckhardt (2015)	CP	RinP	SIT	T
21	Haag & Eckhardt (2014)	CP	RinP	SIT	T
22	Haag, Eckhardt, & Bozoyan (2015)	CP	ER	SIT	E
23	Houghton & Kerr (2004)	CP	CS	FS	E
24	Houghton & Kerr (2006)	SJ	CS	FS	E
25	Houghton & Mackrell (2014)	EB	RP	FS	T
26	Huber, Zimmermann, Rentrop, & Felden (2018)	CP	RinP	SIT	T
27	Huber, Zimmermann, Rentrop, & Felden (2017b)	CP	LR	SIT	T
28	Huber, Zimmermann, Rentrop, & Felden (2017a)	CP	LR	SIT	T
29	Huber, Zimmermann, Rentrop, & Felden (2016)	SJ	CS	SIT	E
30	Ignatiadis & Nandhakumar (2009)	SJ	CS	ITW	E
31	Jones, Behrens, Jamieson, & Tansley (2004)	CP	CS	SIT	E
32	Kerr (2008)	EB	RP	FS	T
33	Kerr & Houghton (2008)	CP	CS	FS	E
34	Kerr & Houghton (2010)	SJ	CS	FS	E
35	Kerr, Houghton, & Burgess (2007)	SJ	CS	FS	E
36	King & Azad (2017)	EB	CS	FS	E
37	Koch & Peters (2017)	CP	CS	SIT	E
38	Kopper (2017)	CP	SR	SIT	E
39	Kopper & Westner (2016a)	CP	LR	SIT	T
40	Kopper & Westner (2016b)	CP	RP	SIT	T
41	Kopper et al. (2018)	CP	CS	SIT	E

ID	Author(s) and year	Type of Source	Type of paper	Primarily used term	Empirical/theoretical
42	Kretzer & Maedche (2014)	CP	LR	SIT	T
43	Magunduni & Chigona (2018)	CP	LR	SIT	T
44	Mallmann & Maçada (2017)	CP	SR	SIT	E
45	Mallmann & Maçada (2016)	CP	RinP	SIT	T
46	Mallmann, Maçada, & Eckhardt (2018)	CP	SR	SIT	E
47	Mallmann, Maçada, & Oliveira (2016)	CP	ES	SIT	E
48	Mallmann, Maçada, & Oliveira (2018)	SJ	ES	SIT	E
49	Myers, Starliper, Summers, & Wood (2016)	SJ	ER	SIT	E
50	Rentrop & Zimmermann (2012b)	CP	RP	SIT	T
51	Rentrop & Zimmermann (2012a)	CP	RP	SIT	T
52	Röder, Wiesche, & Schermann (2014)	CP	CS	ITW	E
53	Röder, Wiesche, Schermann, & Krcmar (2016)	CP	LR	ITW	E
54	Röder, Wiesche, Schermann, & Krcmar (2014)	CP	CS	ITW	E
55	Silic (2015)	SJ	SR	SIT	E
56	Silic & Back (2014)	SJ	CS	SIT	E
57	Silic, Barlow, & Back (2017)	SJ	SR	SIT	E
58	Silic, Silic, & Oblakovic (2016b)	CP	CS	SIT	E
59	Silic, Silic, & Oblakovic (2016a)	SJ	CS	SIT	E
60	Sillic (2019)	SJ	SR	SIT	E
61	Singh (2015)	CP	CS	SIT	E
62	Spierings, Kerr, & Houghton (2016)	CP	RP	FS/ SIT/ ITW	T
63	Spierings, Kerr, & Houghton (2017)	SJ	CS	FS	E
64	Spierings, Kerr, & Houghton (2014)	EB	CS	FS	E
65	Steinhueser, Waizenegger, Vodanovich, & Richter (2017)	CP	CS	SIT	E
66	Tajul & Molla (2016)	CP	CS	FS	E
67	Tambo & Baekgaard (2013)	CP	CS	FS	E
68	Tambo, Olsen, & Bækgaard (2016)	EB	CS	FS	E
69	Thatte & Grainger (2010)	CP	RP	FS	T
70	Urus, Molla, & Teoh (2011)	SJ	CS	FS	E
71	Walterbusch, Fietz, & Teuteberg (2017)	SJ	RP	SIT	E
72	Walters (2013)	SJ	RP	SIT	T
73	Zimmermann & Rentrop (2014)	CP	CS	SIT	E
74	Zimmermann, Rentrop, & Felden (2017)	SJ	CS	SIT	E
75	Zimmermann, Rentrop, & Felden (2016a)	CP	CS	SIT	E
76	Zimmermann, Rentrop, & Felden (2014)	CP	CS	SIT	E
77	Zimmermann, Rentrop, & Felden (2016b)	CP	CS	SIT	E

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