

Using Bricolage to Facilitate Emergent Collectives in SMEs

jan devos

Abstract: Starting a new business is often done in a realm of improvisation if resources are scarce and the business horizon is far from clear. Strategic improvisation occurs when the design of novel activities unite. We conducted an investigation of so called 'emergent collectives' in the context of a small and medium-sized enterprise (SME). Emergent collectives are networks of information nodes with minimal central control and largely controlled by a protocol specification where people can add nodes to the network and have a social incentive to do so. We considered here emergent collectives around an enterprise resources planning (ERP) software and a customer relation management (CRM) software in two open source software (OSS) communities. We investigated how the use of bricolage in the context of a start-up microenterprise can facilitate the adoption of an information system (IS) based on emergent collectives. Bricolage is an improvisational approach that allows learning from concrete experience. In our case study we followed the inception of a new business initiative up to the implementation of an IS, during a period of two years. The case study covers both the usefulness of bricolage for strategic improvisation and for entrepreneurial activity in a knowledge-intensive new business. We adopted an interpretative research strategy and used participatory action research to conduct our inquiry. Our findings lead to the suggestion that emergent collectives can be moulded into a usable set of IS resources applicable in a microenterprise. However the success depends heavily on the ICT managerial and technological capabilities of the CEO and his individual commitment to the process of bricolage. Our findings also show that open ERP and CRM software are not passing delusions. These emergent collectives will not take over proprietary ERP and CRM software all of a sudden, but clearly the rules of the game are slowly changing due to the introduction of new business models. The study contributes to the research of OSS as emergent collectives, bricolage and IS adoption in SMEs.

Keywords: SMEs, Bricolage, Emergent Collectives, Open Software, ERP, CRM, IS adoption

1. Introduction

Starting a new business is often done in a realm of improvisation if resources are scarce and the business horizon is far from clear. Start-ups and small- and medium-sized enterprises (SMEs) often adopt information technology (IT) and information systems (IS) in order to facilitate a start-up. However, adopting IT/IS into an embryonic organizational structure with a lack of rigid business processes is a complex and risky task. Many investments in IT/IS, such as Enterprise Resource Planning (ERP) or Customer Relation Management (CRM), outsourced as well as in-sourced, never fully reach the intended objectives and are therefore considered as not being successful. Despite our knowledge of IT/IS implementation, a lot of IT projects still fail (Avison et al. 2006, Devos et al. 2008, Bharadwaj et al. 2009, Group 2004). Past and recent research has also revealed that SMEs tend to lean strongly on external expertise for IT adoption (Thong et al. 1996, Dibbern and Heinzl 2009). IT outsourcing greatly increases the complexity of governing these endeavours and brings in new risks and burdens for IS success (Aubert et al. 2005). Although SMEs have specific characteristics like organizational flexibility, limited span of control and fast decision-making, the development of internal resources and capabilities for IS adoption is still a critical problem because SMEs are resource constraint (Raymond 1985).

In this work we intend to build on and move beyond existing work to provide conceptual underpinnings for the study of bricolage applied for adopting IT in a start-up enterprise. Bricolage is an improvisational approach that allows learning from concrete experience. We highlight the tension between the dominant view of classical governance models rooted in control theory and the alternative approach of bricolage. We discuss both the concept of bricolage and how a bricolage-based arrangement might be used into the organizational context of an SME. We adopted an interpretative research strategy and used participatory action research (PAR) to carry out our inquiry. We conducted an investigation of emergent collectives in the context of a start-up. Emergent collectives are networks of information nodes with minimal central control and largely controlled by a protocol specification where people can add nodes to the network. Petrie (2011) refers to an emergent collective as an ant colony in which its behaviour, and intelligence is the result of the rather mindless interactions of individual ants following simple protocols of interaction that result in qualitatively different global behaviour (Petrie 2011). The motivation for collectively acting lays within the capacity of the networks to scale and to increase value for the user. We considered here the emergent collectives around an ERP software and a CRM software in two open source software (OSS) communities. We formulated our research question as: how can the use of bricolage facilitate the adoption of emergent collectives in an entrepreneurial setting? In a real life case we followed the inception of a new business initiative up to the implementation of an IS during a period of two years. The case study covers both the usefulness of bricolage for strategic improvisation and for the entrepreneurial activity in a knowledge-intensive new business.

This paper is structured in five main sections, starting with this introduction. In the following section we review the recent literature on bricolage and IT. In the third section we elaborate on our research methodology based on action research and we introduce the case study. In fourth section we bring the findings of our inquiries. Section five discusses the conclusions and implications of our work for academics and practitioners.

2. Bricolage

The concept of bricolage was introduced by the French anthropologist Lévi-Strauss in his book, *La pensée sauvage* published in 1962 and translated in English to *The Savage Mind* (Lévi-Strauss 1968). Bricolage is Lévi-Strauss's term to describe the mythical thinking of primitive people, who used a fixed set of ideas that they combined and recombined in different ways (Pohn 2003-2007). The word bricolage is French and does not have a precise equivalent in English. It can be translated as tinkering or playing/messing around. Lévi-Strauss uses bricolage as an analogy to spell out the processes underlying mythical thoughts (Duymedjian and Ruling 2010). The bricoleur is the handyman, tinkerer

or do-it-yourselfer. It can be noticed that the words bricolage and bricoleur applies to playing and refers to devious actions. Lévi-Strauss (1968) compares bricolage as 'the science of the concrete' as opposed to logical thinking grounded in (positivistic) science and characterized bricolage as a particular way of acting as 'doing things with whatever is at hand'. The science of the concrete is characterized by a concern for exhaustive observation, systematic inventorying of all elements and relies on a highly developed mode of understanding based on the intimacy with the concrete (Duymedjian and Ruling 2010). The bricoleur is not a craftsman and bricolage does not proceed in a straightforward, linear and rational way. Instead bricolage wander from one thing to another and has a fragmented nature reflecting its affinity with play (Pohn 2003-2007). Being a bricoleur also means being a thinker tinkerer with focus on instant objects and materials at hand to approach solutions for problems faced (Coleman 2006). Bricolage is not very well articulated as a theory. Lévi-Strauss describes the process of bricolage through the role description of the bricoleur. In a dichotomous category the bricoleur is the opposed ideal-type of the engineer. From the seminal work of Lévi-Strauss, three constructs can be inferred to characterize bricolage: 1) *repertoire* or the material and immaterial resources that are collected independently of any particular project or utilization, 2) *dialogue* or the activity of assembling objects and 3) *outcome*, which's refers both to the process and its results (Duymedjian and Ruling 2010). Bricolage is related to improvisation, sensemaking, entrepreneurship and the work of technical systems (Duymedjian and Ruling 2010).

Bricolage was introduced in anthropology and found its way into cognitive sciences, Information Technology (Ferneley and Bell 2006, Johri 2011, DesAutels 2011, Ciborra 2002), Entrepreneurship (Phillips and Tracey 2007, Baker et al. 2003), Innovation Research (Fuglsang and Sorensen 2011, Banerjee and Campbell 2009), Information Sciences (Coleman 2006) and Organization Theory (Duymedjian and Ruling 2010, Weick 1998). In this work we elaborate on bricolage in IT. Pioneer of the research on bricolage and IT is Claudio Ciborra (Ciborra 2002). Ciborra (2002) criticized the way strategic thinking about IT in organizations is often presented as a linear, top-down, rational and cognitive process. When put into use by practitioners strategic planning is a process of disassociation from the theoretical foundations. The trajectory from IT strategy formulation down to implementation is not an intentional process of design, but a chain of evolutionary processes that involve serendipity and muddling through elements of surprise. The analysis of Ciborra (2002) is compliant with the phenomenon of emergent collectives (Petrie 2011). His example of the early launch of the Internet is most compelling: *...[.] ARPANET did not take off as expected and it was far from being an undisputed success. What helped to transform a research network into the full-blown Internet was a myriad of hacks, surprises, and improvisations, mostly stemming from the users' environment, and the benevolent and tolerant ARPA project management practices* (Ciborra 2002). Ciborra (2002) introduces the concept of bricolage as an alternative for the systematic and procedural way of organizing and executing work. Bricolage, as opposed to the pre-planned way of operating can be highly effective since it can fit the contingencies of the moment. Ciborra (2002) poses that information systems have a high degree of flexibility in their use making them ideal for bricolage.

The resources at hand for IT bricolage are hardware and software artefacts. The IT bricoleur interacts with existing software, by redesigning, modifying and adding new functionality and by doing so, new ways of using the software are explored. Although it is common that bricolage is executed on a operational level, bricolage is also experienced in strategic action. The IT bricolage approach is very similar to the activities that can be observed in the emergent collectives of open source software (OSS) communities (Ferneley and Bell 2006). OSS users as well as developers work intimately together on requirements, try them out with tinkering to the code and in so doing a useful software can emerge. Examples of such OSSs are the communities of OpenERP (www.openerp.com) and MAGENTO (www.magento.org) which were used in the case study.

The instantiation of the concept of bricolage is suggested by seven oxymoron's (Ciborra 2002). These oxymoron's represent a systematic approach for the establishment of a new organizational setting where new systems can be adopted. The paradoxical reflections can provoke new ways of thinking

and consideration. Each of the oxymoron's constitutes a thinking frame that excludes forms of established organizational routines and existing control systems. We developed here the oxymoron's as propositions of the theory of bricolage.

First oxymoron is *value bricolage strategically (VBS)*. The status of bricolage in an organization can balance between a highly competent behaviour and incompetence. The bricoleur operates in a fuzzy work zone that offers liberty and experimenting with the choices of which resources at hand will be used. The solutions that comes out of the process of bricolage need to be embedded in an everyday experience and local knowledge as well as having a strategic impact. The second oxymoron is *design tinkering (DT)*. Prototyping and experimentation must be facilitated through arrangement of activities, settings and systems. Knowledge is generated through design and by creating actions, and actions are evaluated to build knowledge. Third oxymoron is *establish systematic serendipity (ESS)*. A climate for unexpected solutions must be provided through the concurrency of conception, implementation, and execution that intermingle constantly. Fourth oxymoron is *thrive on gradual breakthroughs (TGB)*. The emerging ideas and solutions must lead to managerial routines that helps to bring to new institute to the level of a simple organisational structure (Mintzberg 1993). Fifth oxymoron is *practise unskilled learning (PUL)*. Unlearning the old ways of thinking and challenging incremental learning while incorporating the risks of behaving incompetent. Sixth oxymoron is *strive for failure (SFF)*. Formative evaluation of failures can generate new ideas and designs. Striving for excellence is the summative evaluation of successes and does not lead to innovation or change. Finally the seventh oxymoron is *achieve collaborative inimitability (ACI)*. The activities of bricolage are highly idiosyncratic, often latent and are not easy to imitate. This can be seen as a vital source for competitive advantage for SMEs to remain agile and responsive to the business environment The inimitability should be the key for creating a competitive advantage but collaboration, even with competitors, in developing strategic applications should not be avoided.

3. Research Methodology

This research projects aims at two goals: first we have to give an answer to a research question and second it has to fulfil a business need. Although the last goal is strictly not necessary to acquire scientific knowledge, it is part of our specific setup and research method. Therefore we adopted for our investigations PAR since we were dealing here with a complex social system that cannot be reduced for a meaning study (Baskerville 1999). Action research aims to solve current practical problems while expanding scientific knowledge (Baskerville and Myers 2004). We have worked with practitioners in a well chosen case study to solve an important practical problem: the adoption of an information system based on emergent collectives in an entrepreneurial start-up.

Since PAR was chosen as our research method, this involves that we are taking an interpretive stance of the research enquiry and that we are not aiming to a broad generalization of the results. According to Baskerville (1999) action research implies the adoption of an idiographic viewpoint. Also the interpretative perspective of the research process, is aiming at making sense of the phenomenon's under investigation. In the quest for an answer to our research question we brought the theory of bricolage to a deeper stage of development and understanding. The use of theory in our research is threefold: 1) as a guide to design, 2) as an iterative process of data collection and analysis, and 3) as a final product (Walsham 2006). The setting up and carrying out of fieldwork is the fundamental basis of any interpretative study (Walsham 2006, Klein and Myers 1999). All actions of the researchers and the CEO were documented into logbooks. The findings of our actions were coded out of our descriptions in the logbooks. We used axial coding to relate the concepts in the descriptions with the theoretical proposition of the bricolage theory (Corbin and Strauss 2008).

For our research plan we drew on the action research process proposed by Baskerville (1999) and on the PAR used in the work of Street and Meister (2004). However we also differentiated our research plan slightly according to the specific situation we dealt with. Action research consist of a cyclic form of five phases. Figure 1 illustrates the action research cycle. The action research cycle can be performed

as many times as needed for achieving a solution to the problem. We discussed within the research team on the number of cycles and decided to conduct only two cycles: a baseline analysis and an implementation cycle. The Client-System Infrastructure constitutes the agreement of our research environment. The structural action research cycle starts with the diagnosing phase which identifies the primary problems and leads to the theoretical assumptions of newly organization. In this phase the researchers interviewed the CEO during several session to understand the past, present, and future use of IT and how the CEO thinks IT could be beneficial for the organization.

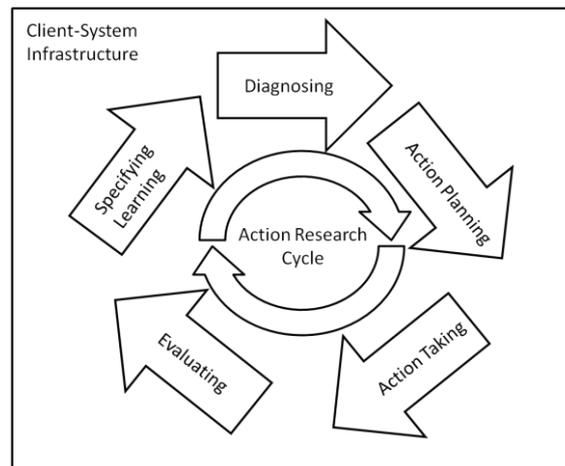


Figure 1 The Action Research Cycle

The action planning phase contains the organizational actions that deal with the problems defined in the previous phase. The next stage is action taking and implements the planned actions. The intervention of the researchers is non-directive. The change is sought indirectly in process of cut-and-try. The test of the theoretical assumptions was done in the evaluating phase. The last phase is the specific learning phase in which lessons learned are derived.

Case Study Endoxa

Endoxa is a Greek word and was used by Aristotle to acknowledge the tested beliefs of a community. The CEO of Endoxa discovered a business opportunity which is similar to its existing operations. It is obvious that new e-business initiatives, but also existing ones, suffer largely from a shortage of logistic capabilities. In this new venture, Endoxa is aiming at becoming more than a drop shipping agent, but rather as an network orchestrator of the complete cross chain supply of delivering products to customers. To build the necessary supporting and enabling business processes for this new attempt, Endoxa adopts the vision of emergent collectives of OSS and will combine existing technologies into a new strategic information system. Although Endoxa is a very small entrepreneurial enterprise it is compliant with the five criteria defined by Mintzberg, to constitute a minimal organization (Mintzberg 1983). There is direct supervision, little formalized behaviour, an organic structure, a strategy planning and the CEO formulate plans intuitively as an extension of his own personality.

Before the research project took off, the CEO of Endoxa was already involved in another research project on the nature of emergent collectives. As a serial entrepreneur the CEO was in search for assistance to see how OSS could be of use to start a new company. As researchers we had the chance to observe the take off of a new enterprise and this offered an excellent opportunity to enlarge our understanding of how IT/IS can be of critical importance in organisations. An agreement for a research partnership was formalized that stipulated the rights and obligations of the researchers and the CEO and his collaborators. The actions of the researchers were performed in an open way and were aiming at a beneficial impact on the organization. All actions were done in close harmony with the CEO. The CEO provides the necessary knowledge to the researchers for being harvested in an academic inquiry. However both parties had their objectives. It was clear from the beginning that the

CEO was aiming at a fruitful start-up for his enterprise. The objectives of the researchers were spelled out in the research question. The design of the artefact is for the researchers is only a means to an end. The theory or concept of bricolage was explained to the CEO, however the concept of emergent collectives was very well known to the CEO.

4. Findings

First it was noticed that the stages of the action cycles do not always proceed in linear and straight forward way. The appearance of the organisational actions is concurrent and not always synchronised. It was the task of the researchers to shed light on the different actions and make an appropriate analysis of the findings. We summarized our findings in table 1, showing the findings during the baseline analysis cycle and in table 2, showing the findings during the Implementation cycle.

During the first team meetings with the CEO ten actions were identified, starting from an overall company mission that was spelled out in a proposal (BRIDEE) and submitted to a business school. The overall company mission was detailed in a competitors analysis, a market research plan, a business and a financial model. Two specific actions, e-AirwayBill and polling quotes Fedex were defined as nice-to-haves but it was in no way sure that the implementation was feasible within Endoxa. The choice for OpenERP and Magento was fixed and the organisational modelling was done with these two products as mission critical systems. OpenERP was suggested as the back-office solution and Magento as the front-office solution. Finally a project was set up for the acquirement of government subsidies for a new start-up initiative.

For the action planning an agenda was set up to work on each of the actions during two days a week. The researchers got mingled with the CEO and the collaborators of Endoxa and for each action a planning was made. The action planning and action taking are also shown in table 1. The theory building is mainly inferred from the evaluating and learning phases. For the bottom line we found five actions that were classified as Value Bricolage Strategically (VBS). These fives actions, the Mission Statement, the Competitors Analysis, the Market Research Plan, the Business and the Financial Model can be seen as the transformed stakeholders needs into an enterprise's actionable strategy. However the down-top translation is not feasible into specific goals at every area of the enterprise. The actions were considered as strategic but still subject to modifications and adaptations.

Two specific actions, e-AirwayBill and Polling Quotes Fedex were classified as Design Tinkering (DT) and Practise Unskillful Learning (PUL). It was designing something that was already in use. The lesson learned was that it is better to use what is already build and proven than to make something new. This is actually compliant with the resource constrains in SMEs.

The actions OpenERP and Magento where of major importance for Endoxa and there was a tense force coming from the CEO to strive for a breakthrough. This illustrates that an ERP system is mission critical in SMEs and perceived as such by the CEO. The basic business processes like invoicing, general ledger, accounts receivable and payable as well as the more strategic processes like tendering, sales, order entry and bidding need to come together in one integrated system. Proprietary ERP software was not an option for Endoxa, because of the costs. The actions were considered to be a match with the oxymoron of Thrive for Gradual Breakthroughs (TGB). The strive for subsidies was already considered by the CEO as not feasible due to a shortage of manpower and administrative agility. Still the action was kept open in the hope that a file could be submitted for a positive evaluation. This action was classified as a Thrive for Failure (TFF). The end of the first cycle and the start of the second cycle did not follow a linear trajectory. During the baseline cycle, already actions were defined for the implementation cycle. The implementation cycle was characterised by much more diagnosed actions as can seen in table 2. The actions OpenERP and Magento were considered as the most imported actions of the cycle and were matched with five oxymoron's of bricolage: VBS, DT, ACI, SFF and PUL.

5. Conclusions

In this paper we present the findings from a participatory action research describing how bricolage can facilitate the adoption of emergent collectives in the form of OSS in a microenterprise. The use of the PAR helped us to make our research more relevant to practice. We argue that our work differs with that of consultants. Our theoretical perspective of bricolage was made clear in advance and before any action was taken in the organization. We mapped the practical actions with the propositions of the theory of bricolage, operationalized by the oxymoron's. The relationships between the elements of created artefact are made more visible than previously during the actions. Our understanding of the constructs of bricolage has been increased.

Our research has revealed the pivotal roles of the CEO in which IT/IS is adopted and implemented. A positive attitude of the CEO towards IT/IS was noticeable during the entire investigation period. This is compliant with previous research on the role of the CEO and the adoption of IT/IS (Cragg and King 1993, Thong et al. 1996). However different roles of the CEO could be observed: first of all the role of the owner-manager which always kept a sharp look on the profitability of the endeavour and the strategic focus. Secondly the role of an individual high-end user who was intimately involved into the daily use of the software in all the implemented business processes. Thirdly the role of CIO and IT manager who steered the project of bricolage and utilized the mechanism of IT project management like organizing steering committees meetings, communications session for the users, and documenting the actions and realizations of the project members.

From our findings it could be noticed that the process of bricolage was sometimes getting in the way of the daily business operations. Since Endoxa is a start-up this was not so important but this indicates that the process of bricolage need to come to a moderate intensity to reduce the organisational turbulence and to refocus on organisational efficiency. It was already noticed by Ferneley et al. (2006) that IS bricolage is not without its dangers: "*the entropy of the IS can increase as changes are made, rendering the IS architecture unmanageable and inefficient*". Bricoleurs and certainly entrepreneurial bricoleurs have to keep in mind that the process of bricolage should take place within the boundaries of a minimal organisational structure (Weick 1993). Also at a certain point after the change process is established, a phase of entropy-reducing is needed to allow the new systems to take off and to fade away the organisational turbulence.

It has been shown that OSS in ERP and CRM type application domains, where conventional wisdom says it is impossible to design from an open software perspective, holds a valuable promise. Many software project leaders would not dare to choose for OSS in an entrepreneurial setting and would prefer propriety software stating that the quality of the latter one is far more superior than open source. Although we did not investigate that statement, in our empirical findings we found evidence that the development of an information system with OSS is certainly not a straightforward process, nor that the development process is free from errors and flaws, but this is no way other than for propriety software. By choosing for OSS the SMEs has avoided the vendor lock inn that comes all too often with the adoption of propriety software and has reduced the total cost of ownership of the information system. A rough estimate has revealed that the costs of implementation of OpenERP comes to the same high as a feasibility study for a mainstream propriety ERP vendor.

	Diagnosing	Action Planning	Action Taking	Evaluating	Specifying Learning
1	BRIDEE	Spelling out the mission statement?	Submitting for a business school competition.	VBS	Mission statement needs refinement but is not mandatory for a bottom up 'bricolage' approach.
2	Competitors Analysis	List of three direct competitors was edited (big 3): Shipwire, Shipworks and Easyshipping.	Investigation of the support of the web shop platforms of each the 'big 3'.	VBS	The obtained information was used as a benchmark for the own realizations.
3	Market Research Plan	What are the questions that web shops have considering their logistic processes.	Offering a platform for the support of the logistic processes of web shops	VBS	To fuzzy to be of real value
4	Business Model	A sound business model	Refining and adapting the business model to current insights and developments	VBS	To fuzzy to be of real value
5	Financial Model	Calculating financial flows, cash flows, OPEX and CAPEX.	Comparing the figures with partners and competitors	VBS	To fuzzy to be of real value
6	e-AirwayBill	Visualize the XML-structure of the transport documents.	Testing	DT, PUL	Never build what is already build by others.
7	polling quotes Fedex	How to use Web Services in logistic processes	Test account with Fedex	DT, PUL	Never build what is already build by others.
8	OpenERP	All business processes should be implemented in OpenERP	Adopting the full set of functions of OpenERP	TGB	The CEO had a strong belief in open software products and the use of OpenErp was mandatory.
9	Magento	All logistics processes of the web shops should be implemented in Magento.	Adopting the full set of functions of Magento	TGB	The CEO had a strong belief in open software products and the use of Magento was mandatory.
10	Strive for Subsidies	Research on three levels: Regional, National and European.	Try to work through the rigor government procedures for subsidies	SFF	Subsidies programs are not easy accessible for SMEs. The bureaucratic burden is to heavy.

Table 1 – The Baseline Analysis cycle

	Diagnosing	Action Planning	Action Taking	Evaluating	Specifying Learning
1	OpenERP	Scheduling of Mailers Version upgrading Geotags EBay module, Inventory Management, Warehousing Extract Transfer Load User and access rights The company 'OpenERP'	Feasible solution found in OpenERP Upgrade v.6.0.3 to v.6.1 was successfully implemented Module is available, however not stable Module is available, deployment is put on hold Implement Follow up of the company 'OpenERP': company visits.	DT ACI SFF PUL DT VBS	OpenERP offers a solution The upgrade to the latest version is a pioneering activity and is not yet followed by most competitors Not all fancy tools are needed and useful Resources are constraint Design up to a workable system The SME organisation is still dependent of the evolution of the opener OSS.
2	Magento	MagentoERPConnect (connection with OpenERP) Dropshipping scenario	Installing, configuring and testing	DT	Assurance that Magento is of use
3	polling quotes Fedex	Feasibility study	Obtain shipping quotes from Fedex	DT, VBS	Connection to Fedex is of strategic importance
4	Operations	Daily routines & procedures for backup and recovery	Deploy	DT	Operations can be implemented in a OSS environment
5	IceCAT	Feasibility study	Installing and testing	SFF	A lot of offerings in a OSS are of no use
6	Bista Solutions	Alternative for the module of drop shipping in OpenERP	Investigate the feasibility	DT, VBS	Multiple sourcing for the acquisition of IT
7	Wiki	Documentation tool for the tools in the repertoire Not for the business processes: The documentation for the business processes should be into OpenERP	Structuring is needed to create real value	PUL	Documentation is real problem for IS implementation projects.
8	Competition	ShipWire ShipEasy ShipWorks	Constant focus on their activities	VBS	Keep up with the pace of the competitors

Table 2 – The Implementation cycle

References

- Aubert, B. A., Patry, M. and Rivard, S. (2005) 'A Framework for Information Technology Outsourcing Risk Management', *The DATA BASE for Advances in Information Systems*, 36(4), 9-28.
- Avison, D., Gregor, S. and Wilson, D. (2006) 'Managerial IT unconsciousness', *Communications of the Acm*, 49(7), 89-93.
- Baker, T., Miner, A. S. and Eesley, D. T. (2003) 'Improvising firms: bricolage, account giving and improvisational competencies in the founding process', *Research Policy*, 32(2), 255-276.
- Banerjee, P. M. and Campbell, B. A. (2009) 'Inventor bricolage and firm technology research and development', *R & D Management*, 39(5), 473-487.
- Baskerville, R. (1999) 'Investigating Information Systems with Action Research', *Communications of the Association for Information Systems*, 2(1), 32.
- Baskerville, R. and Myers, M. D. (2004) 'Special Issue on Action Research in Information Systems: Making is Research Relevant to Practice - Foreword', *Mis Quarterly*, 28(3), 329-335.
- Bharadwaj, A., Keil, M. and Mahrng, M. (2009) 'Effects of information technology failures on the market value of firms', *Journal of Strategic Information Systems*, 18(2), 66-79.
- Ciborra, C. (2002) *The Labyrinths of Information: Challenging the Wisdom of Systems*, Oxford University Press, USA.
- Coleman, A. S. (2006) 'William Stetson Merrill and bricolage for information studies', *Journal of Documentation*, 62(4), 462-481.
- Corbin, J. and Strauss, A. (2008) *Basics of Qualitative Research 3e*, Thousand Oaks, California: Sage Publications.
- Cragg, P. B. and King, M. (1993) 'SMALL-FIRM COMPUTING - MOTIVATORS AND INHIBITORS', *Mis Quarterly*, 17(1), 47-60.
- DesAutels, P. (2011) 'UGIS: Understanding the nature of user-generated information systems', *Business Horizons*, 54(3), 185-192.
- Devos, J., Van Landeghem, H. and Deschoolmeester, D. (2008) 'Outsourced Information Systems Failures in SMEs: a Multiple Case Study', *Electronic Journal of Information Systems Evaluation*, 11(2), 73-84.
- Dibbern, J. and Heinzl, A. (2009) 'Outsourcing of Information Systems Functions in Small and Medium Sized Enterprises: A Test of a Multi-Theoretical Model', *Business & Information Systems Engineering*, 1(1), 101-110.
- Duymedjian, R. and Ruling, C. C. (2010) 'Towards a Foundation of Bricolage in Organization and Management Theory', *Organization Studies*, 31(2), 133-151.
- Ferneley, E. and Bell, F. (2006) 'Using bricolage to integrate business and information technology innovation in SMEs', *Technovation*, 26(2), 232-241.
- Fuglsang, L. and Sorensen, F. (2011) 'The balance between bricolage and innovation: management dilemmas in sustainable public innovation', *Service Industries Journal*, 31(4), 581-595.
- Group, S. (2004) *Third Quarter Research Report*, The Standish Group International.
- Johri, A. (2011) 'Sociomaterial bricolage: The creation of location-spanning work practices by global software developers', *Information and Software Technology*, 53(9), 955-968.
- Klein, H. K. and Myers, M. D. (1999) 'A set of principles for conducting and evaluating interpretive field studies in information systems', *Mis Quarterly*, 23(1), 67-93.
- Lévi-Strauss, C. (1968) *The Savage Mind*, University Of Chicago Press (September 15, 1968).
- Mintzberg, H. (1983) *Structure in Fives: Designing Effective Organizations*, Englewood Cliffs, NJ: Prentice Hall.
- Mintzberg, H. (1993) *Structure in Fives: Designing Effective Organizations*, Prentice Hall.
- Petrie, C. (2011) 'Emergent Collectives', *Ieee Internet Computing*, 15(5), 99-102.
- Phillips, N. and Tracey, P. (2007) 'Opportunity recognition, entrepreneurial capabilities and bricolage: connecting institutional theory and entrepreneurship in strategic organization', *Strategic Organization*, 5(3), 313-320.
- Pohn, K. (2003-2007) 'Cosmicplay.net', [online], available: <http://www.cosmicplay.net> [accessed Raymond, L. (1985) 'ORGANIZATIONAL CHARACTERISTICS AND MIS SUCCESS IN THE CONTEXT OF SMALL BUSINESS', *Mis Quarterly*, 9(1), 37-52.
- Thong, J. Y. L., Yap, C. S. and Raman, K. S. (1996) 'Top management support, external expertise and information systems implementation in small businesses', *Information Systems Research*, 7(2), 248-267.
- Walsham, G. (2006) 'Doing interpretive research', *European Journal of Information Systems*, 15(3), 320-330.

- Weick, K. E. (1993) 'THE COLLAPSE OF SENSEMAKING IN ORGANIZATIONS - THE MANN GULCH DISASTER', *Administrative Science Quarterly*, 38(4), 628-652.
- Weick, K. E. (1998) 'Improvisation as a mindset for organizational analysis', *Organization Science*, 9(5), 543-555.