2009

Research Framework of Integrative Action

Rauno Pirenen
Laurea University of Applied Sciences, rauno.pirinen@laurea.fi

Research Framework of Integrative Action

Rauno Pirinen
Laurea University of Applied Sciences
rauno.pirinen@laurea.fi

ABSTRACT

Higher education institutions are traditionally seen as producers of new knowledge and technology. However, a change is taking place as cooperation in value networks, co-created service innovations, the contributions of lead innovations and regional development that impacts on social and global improvements have become more important for the development of new knowledge and technology. The objective of integrative action is to continuously integrate the three statutory tasks of the universities of the applied sciences: education; research and development; and regional development (third task). The objective of this *design research* study is to utilize research within integrative action from the perspectives of design science, design science research, action research, service design, and foster a proactive approach that supports creativity and innovations that have relevance and rigor in knowledge creation and action. The paper's main presentation is the use of conceptual and physical creations and value-based design in IS research and practice.

Keywords

Innovation, integrative learning, action research, design science research, service design.

INTRODUCTION

The new task of influencing regional development is now understood to be one of the main tasks of the Finnish universities of the applied sciences (Rauhala, 2008). In education and research, a new "third task" was added that involved providing services to the community. That broad description includes regional development, the outreach co-creation of innovative activities, knowledge transformation, and bringing the concepts of science and innovation closer to citizens. A knowledge society creates shares and uses knowledge for the well-being of its people (Laine, Van der Sijde, Lähdeniemi and Tarkkanen, 2008). Creating competence and learning takes place by using a body of knowledge in action (Nunamaker, Chen and Purdin, 1990-91). Networked expertise (Hakkarainen, Palonen, Paavola and Lehtinen, 2004) refers to competences that arise from social interaction, knowledge sharing, and collective problem solving, and it is embedded in the shared competence of communities and organized groups of experts and professionals. Thus, universities of applied sciences face new challenges but have also gained new opportunities from networked expertise and the knowledge society. This is because; 1) action primarily bridges competence in the first place and is a way of using rigor and the relevant knowledge in action; 2) competition is growing between higher education institutions and global actors for the recruitment of students and talented people; 3) higher education institutions have different emphases; 4) higher education institutions contribute to the innovation system; 5) higher education institutions keep co-creation and innovation processes alive at the regional, national and global levels; and 6) higher education institutions are incubators for entrepreneurship and are the value makers of new competences. Also new and small enterprises, particularly knowledge and service intensive ones are considered to be important actors in the innovation system. Universities of applied sciences are seen as significant producers of new knowledge and competences, and users of the latest findings and bodies of knowledge in action, which naturally grants them a role in the thematic center of the innovation system. A body of knowledge is co-created with other organizations to contribute to the innovation of industry and society as whole e.g. national (SRA) strategic research agendas (Pirinen, 2008a). Information and communications Technology (ICT) is also a driver for service innovations, creative development objectivities and future oriented strategies and programs. Some examples of ICT drivers are the programs of the ICT cluster of the Finnish Strategic Centres for Science Technology and Innovation (ICT SHOK), information intensive lead innovation systems and ICT intensive living labs. This kind of co-creative action requires a proactive, multidisciplinary approach and research that has the potential to be commercially developed. The case environment used here, Laurea University of Applied Sciences, is a research and development-oriented university of the applied sciences that focuses on service innovations and the production of high quality professional competence. Its specific task is to foster collaboration, international competitiveness and regional development in the Helsinki metropolitan area.

The object of this study is to model and utilize research and theories on ICT intensive services, innovation and ICT related design approaches for service innovations that are relevant to societal issues. In addition, they are to be performed in a way that integrates students and those using the innovation and therefore they should take place within environments that allow for internationalization and in which knowledge transformation is used and focused upon.

INTEGRATIVE ACTION

Integrative action related to the three tasks, education, research and development, and regional development, builds bridges between technologies and applications and enables research results to be turned into products and services and economic success (Pirinen, 2008b). To achieve that, it is believed that innovation alliances should be made between various stakeholders, particularly in science, business and politics. In the integrative action model, vertical cooperation, namely lead innovations, are geared toward certain services, applications and branches that benefit from specifically coordinated support contributions from technological areas. In integrative cooperation, technological alliances that pursue technological objectives are jointly created by science and business simultaneously with service platforms. This implemented innovation system includes different types of cooperation, action, research and activities. Laurea's role in this "lead innovation ecosystem" is focused upon service innovations and the production of high quality professional competences that are integrative and centered on students working with other participants in a project. The general integrative action process and its main elements are illustrated in Figure 1.

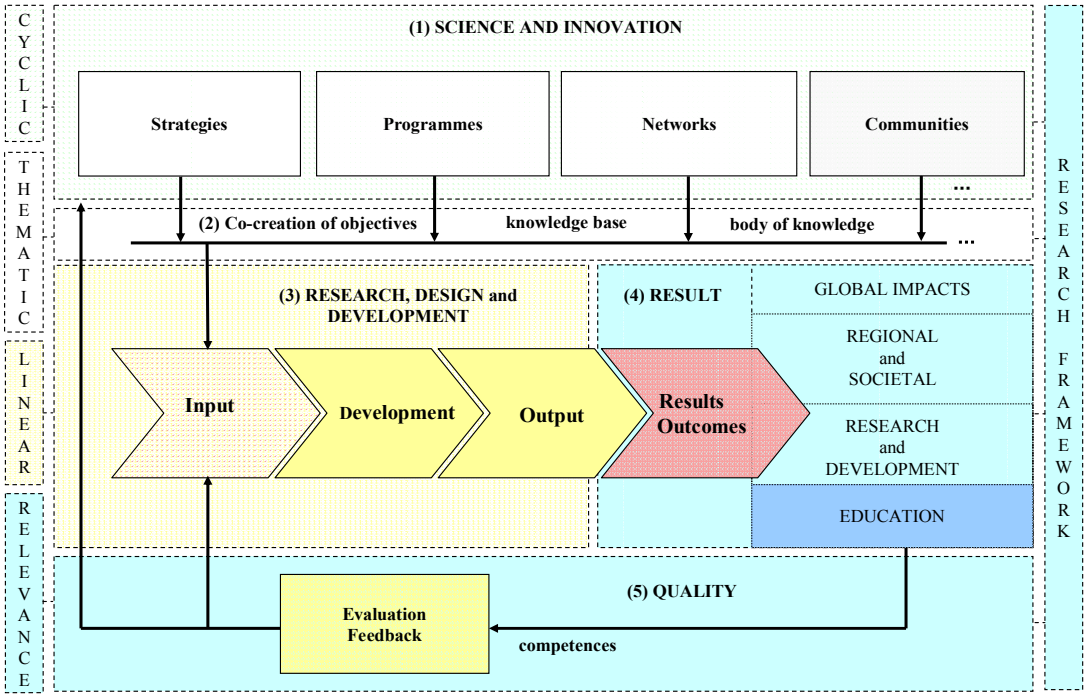


Figure 1. Integrative Action Model

Integrative Action Process

The integrative action process (Pirinen, 2008b) is an application used in the best practices of exploratory and creative learning and the culture of Learning by Developing (LbD) (Pirinen and Fränti, 2008). The first objective was to implement and integrate the three statutory tasks within the contexts of services, service design, security and ICT at Laurea University of Applied Sciences. The main contribution of the integrative action and process model was the creation of a linear development framework for cyclic innovation activities that have a research, action and quality perspective. The system itself is a *kind of "work system"* (Alter, 2008) *within an innovation system framework* and a liberation process for innovative activities, rather than a fully automated process for innovation generation. In practice, innovative learning cycles do not follow any fixed order (Engeström, 2001) and methodological freedom and creativity are emphasized in the orientation to an innovation. Hence, the nature of an integrative process is to support rather than manage cyclic and thematic elements and their objectives in both the

linear and relevance elements. Integrative action focuses on mentoring, group work, professional communities, novel methodologies, living labs, spirit and flow, trust, and value in authentic value networks.

Elements of Integrative Action

There are several reasons for presenting a clearer specification of the elements of the general integrative action model (Pirinen, 2008a). The first is the confusion with regard to practical management. However, a completely different type of management is required for different actions in the integrative action model. The second reason is the core idea behind the "changing of objectivity", which refers to the balancing of subjectivity and objectivity to support creativity. The third reason is that commercially beneficial innovation is impossible without radical intervention. The fourth reason is the fact that we live in a time of globalization and this means that our future business will focus more on creativity and innovation. The fifth reason is that good quality is important and requires different types of action in order to be achieved e.g. it takes creativity and innovation into account and research includes relevance, validity and rigor. The sixth reason is that the application of the pragmatic theory of knowledge and the activity of innovation orientation require different types of action and flexibility. Based on these reasons, a clearer definition is sorely needed in order to differentiate between and clarify different actions. Four elements are specified by (Pirinen 2008a): 1) cyclic - which supports creativity and innovation, this element emphasizes the importance of mental and physical creations and the non pragmatic freedom part of the methods and philosophies used in action and design; 2) thematic - which supports the co-creation of lead innovations, and the scopes and structure of a body of knowledge; 3) linear - which supports the implementation of research, as well as development and action processes; and 4) relevance - which supports validity and scientific rigorousness, as well as the quality and relevance of a task's execution. "Research enablers" in integrative action is illustrated in Figure 2.

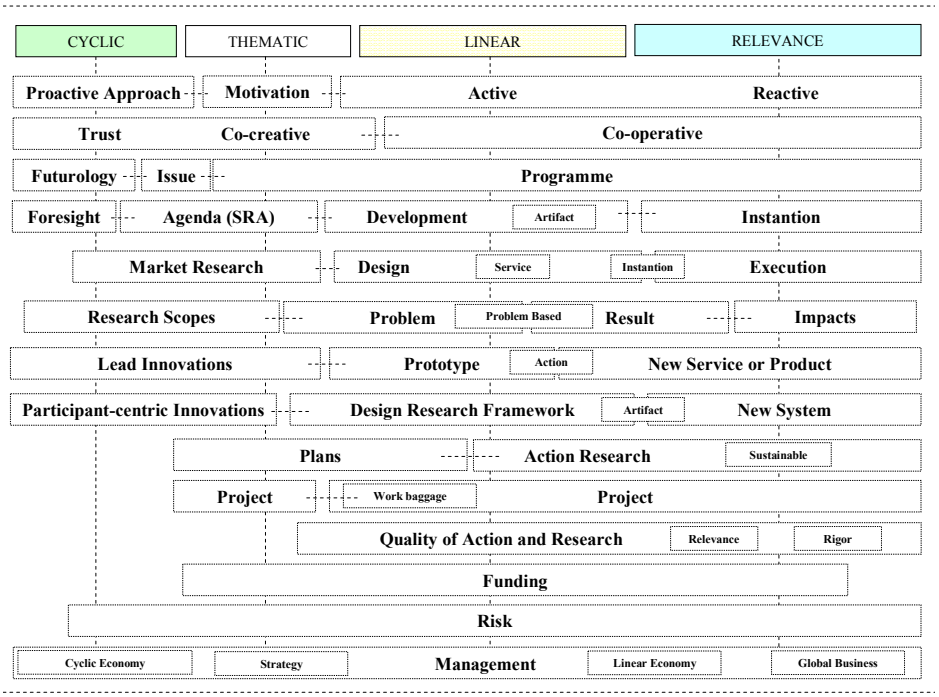


Figure 2. Research Enablers in Integrative Action

Competence creation means the use of knowledge in Integrative Action

Empirical practice (Rauhala, 2008; Laine et al., 2008; Pirinen, 2008a; Pirinen and Fränti, 2008) and literature (Hakkarainen et al., 2004; Engeström, 2001) have shown us that, in order to develop expertise about a pragmatic situation, students and other participants must integrate a body of knowledge with knowledge and understanding and do so by performing actions within authentic situations. The existence of competence creation means using knowledge in action. This knowledge is based *firstly on the pragmatic theor*y of knowledge and *secondly on cyclic action*, in which learning is approached through the three

metaphors of learning: (1) knowledge acquisition; (2) participation; and (3) knowledge creation (Paavola, Lipponen, and Hakkarainen, 2004). Laurea University of Applied Sciences has co-created and selected Learning by Developing (LbD) as its principal pedagogical approach and culture of learning. The term "authentic" means that all transactions and implementations of learning situations are simultaneously connected to real development cases in the world of work and have a definite value in the value network.

Information System Framework and Integrative Action

The Information System Framework (Hevner, March, Park, and Ram, 2004) presents a conceptual framework for understanding, executing, and evaluating information systems research that combines behavioral science and design science paradigms. The Onion Model (Fränti and Pirinen, 2005) extends traditional and instructional learning into the culture of LbD. This results from the paradigm shift from reactive education methods to a culture of proactive knowledge creation through co-creative and co-instructive research and development. Integrative action links Living Labs and institutional integrative learning environments on a thematic level. It integrates citizens and their needs for care, education, a social entity, creativity and value in a participatory way. This can be understood as being motivated by the knowledge of the participants, which allows them to focus on the service and uses their self motivation and freedom to achieve creativity and produce innovative products and services. These perspectives are based on the "necessity of producing one's own creations" in inquiry based learning (Hakkarainen et al., 2004) and the three metaphors of learning (Paavola et al., 2004). Using the Integrative Action underlines the fact that the extension of integrative action does not change the Information System Framework Model. Instead, a creativity element is the influencing factor there, as is illustrated in Figure 3.

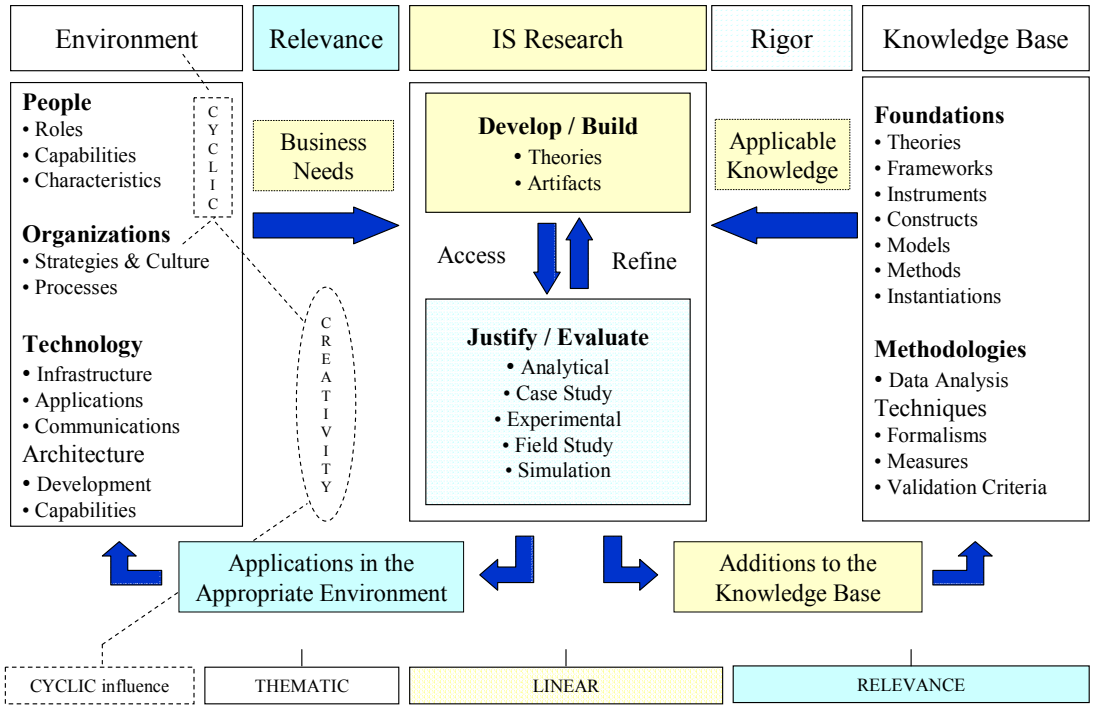


Figure 3. Information System Framework (Hevner et al., 2004)

The aim of the presented extension to the Information System Framework is to add more creativity support to it, because of the importance of mental creativity in IS design. It is applied within the Information System Framework that co-operates within integrative action, because integrative action links value networks and motivation based creativity (which is also non pragmatic i.e. it is a thought based activity) to linear development. An "early innovation issue, a hidden innovation or

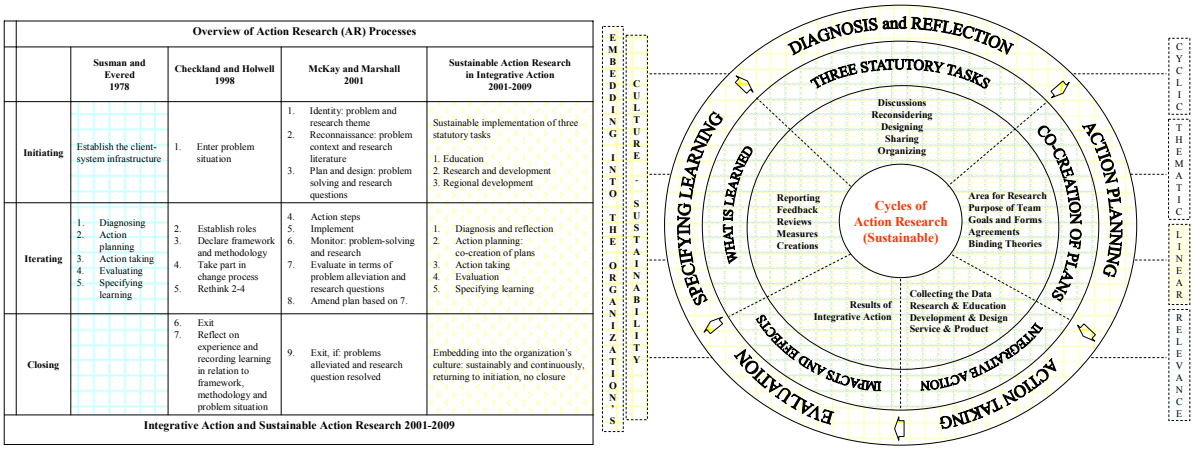
method" may exist without a problem and so it is necessary that creativity and co-creation is supported (Pirinen, 2008c). This view focuses on a paradigm shift from problem based thinking to the support of creativity and "learning by design" thinking in an Information System Framework (from problems to social scopes).

INTEGRATIVE ACTION IS MULTIDISCIPLINARY IN ITS APPROACH

The integrative action model is used as part of a larger innovation system value network, and a single intervention must be part of a larger network of transactions and international transformations. The scalability of a rigorous research system is a prerequisite for the sustainability and quality of action. The nature of action in the target organization is cyclical e.g. a work year starts and ends in the co-creation of planning, where teachers and management co-create different kinds of action planning every year. Almost all instances of strategy (strategies, agreements and objectives) are managed using bottom-up and student centered principles. Strategies are balanced and complementarily adjusted with other actors in a region, helping them learn to work and act together. The aim is to foster and improve regional development, the "third task", and cluster based thinking in the innovation system's value network from the perspective of service development and innovation. The nature of action inside the integrative action process is a clearly proactive, active and reactive philosophy that is based on shared learning processes in the value networks of the innovation system.

Sustainable Action Research Model in Integrative Action

Action research aims to solve current practical problems while expanding scientific knowledge. Unlike other research methods, in which the researcher seeks to study organizational phenomena but not to change them, the action researcher aims to bring about organizational change while simultaneously studying the process. It is strongly oriented toward collaboration and change and involves both researchers and subjects. In this case it is iterative in scope and a continuous research process that capitalizes on learning by both researcher (as a member of the expert community) and other participants (e.g. students, colleges, collaborators and management). In Laurea's case, it is a method that puts researchers in a co-operative and co-creative role. In this environment, a genealogy of action research is based on "diversity in information systems action research methods" (Baskerville and Wood-Harper, 1998). Action research assumes that a complex social process is best studied by introducing changes in that process and by observing their effects. An environment's action research system, used citations and their linking elements are illustrated in Figure 4.



Overview of Action Research (AR) Processes

	Susman and Evered 1978	Checkland and Holwell 1998	McKay and Marshall 2001	Sustainable Action Research in Integrative Action 2001-2009
Initiating	Establish the client-system infrastructure	1. Enter problem situation	1. Identity: problem and research theme 2. Reconnaissance: problem context and research literature 3. Plan and design: problem solving and research questions	Sustainable implementation of three statutory tasks 1. Education 2. Research and development 3. Regional development
Iterating	1. Diagnosing 2. Action planning 3. Action taking 4. Evaluating 5. Specifying learning	2. Establish roles 3. Declare framework and methodology 4. Take part in change process 5. Rethink 2-4	4. Action steps 5. Implement 6. Monitor: problem-solving and research 7. Evaluate in terms of problem alleviation and research questions 8. Amend plan based on 7.	1. Diagnosis and reflection 2. Action planning: co-creation of plans 3. Action taking 4. Evaluation 5. Specifying learning
Closing		6. Exit 7. Reflect on experience and recording learning in relation to framework, methodology and problem situation	9. Exit, if: problems alleviated and research question resolved	Embedding into the organization's culture: sustainably and continuously, returning to initiation, no closure

Integrative Action and Sustainable Action Research 2001-2009

EMBEDDING INTO THE ORGANIZATIONS

CULTURE - SUSTAINABILITY

Figure 4. Sustainable Action Research includes Design

This research environment combines the theory and practice of action research and is mainly based on the classic action research process and action research cycle (Susman and Evert, 1978; Checkland and Holwell, 1998), and McKay's and Marshall's (2001) model (McKay and Marshall, 2001), which also references Susman and Evert and Checkland in relation to problem solving and research. The action research model used consists of five consecutive phases that are repeated so that the results of one process cycle are fed back as inputs for the next cycle. The phases of the action research cycle are (1) Diagnosis and reflection: reflection on the work or the work environment from the perspective of the three statutory tasks, raising questions, recognizing and specifying a problem area to be researched and affected through a change in procedures. (2) Action planning: learning about the problem and planning for change, innovation and also self-motivating through the co-

creation of strategies, scopes, plans and implementations by using the organizational bottom-up model (Pirinen, 2008a). In particular, planning also connects the thematic and linear elements to action research. (3) Action taking: changing the ways in which work is carried out, implementing the changes, connecting the linear element of integrative action to action research. (4) Evaluation: the assessment of the effects of the change: the evaluation of a new situation and the success of changes that have involved the relevance element of integrative action. (5) Specifying learning: reflecting on what has been learnt and reporting the whole effort, updating the knowledge base, the body of knowledge and documentation. Descriptions of the analysis and evaluation criteria are explicated in order to recognize the validity of action research. Future research then continues from the next focus area that emerges from this phase. Interventions will continue all time in a sustainable case and begin from its initiation stage.

The presentation of this integrative action implementation uses conceptual and physical *creations* to specify designing and learning in action research. It is an application for the "pedagogical necessity of producing one's own creations" in inquiry-based learning (Hakkarainen et al., 2004). The same necessity exists: 1) in the world of designing and creativity in the framework of information systems; 2) in the Learning by Developing culture; and 3) in the co-creative bottom-up leadership culture.

Design Research

Design research (DR) is also rooted in pragmatism in discussion (Haack, 1976). For the pragmatist, truth and utility are indistinguishable as truth lies in utility. Thus, for DR, the relevance is evaluated by the utility provided to the organization and developers. Thus DR must pass both the tests of science and practice (Markus, Majchrzak and Gasser, 2002). Different terms have been used to describe this mode of research, including Design Science and Design Science Research (Hevner et al. 2004). DR consists of activities concerned with the construction and evaluation of technological artifacts to meet organizational needs as well as the development of their associated theories. Consequently, DR is concerned with artificial rather than natural phenomena and is rooted as a discipline in the sciences of the artificial (March and Smith, 1995). One set of guidelines for the conducting and evaluating of a DR is the seven elements of 'DR criteria' (Hevner et al., 2004). These guidelines are summarized in Figure 6b. Design research must necessarily make a dual contribution to epistemic and practical utility. Any piece of research must add to existing theory in order to make a worthwhile scientific contribution and the research should assist in solving the practical problems of practitioners, specifically problems that are either current or anticipated. Two research methods in the information systems field with this dual orientation are design research (Hevner et al. 2004) and action research (Baskerville et al. 2004; Davison, Martinsons and Kock, 2004). Design research consists of activities concerned with the construction and evaluation of technology artifacts to meet organizational needs as well as the development of their associated theories. In brief, behavioural science is concerned with theories that explain human or organizational behaviour, while DR is concerned with creating new and innovative artifacts (Hevner et al., 2004). In Figure 6b, the similarities of the fundamental characteristics of action research and design science are presented (Järvinen 2007). In integrative action different types of designs are integrated into an environment, practice and action as well as living labs. Furthermore, all sustainable action research phases include design e.g. economic design, service design, product design, system design and action design, as illustrated in Figure 4. Thus, action research is similar to but differs slightly from design science in integrative action. Action builds bridges from knowledge to competence and bridges design to the development and making of a commercial product, although this involves different processes, goals and theoretical assumptions. Integrative action connects an innovation system to these perspectives through the behavioural sciences i.e. psychological, sociological and educational and these bases are then further articulated (Hakkarainen et al., 2004).

Service Design

The earliest contributions of Service Design to the perspective of marketing and management disciplines are connected to Shostack's (1982) article "How to Design a Service". It describes the integrated design of material components, namely products and immaterial components services. A design process can be documented and codified using a "service blueprint" to map the sequence of events in a service and its essential functions in an objective and explicit manner. Effective service marketing requires the recognition of the complex combination of products and services which make up a simple service (Shostack, 1982). A review "Services as Subject Matter for Design" further articulates Shostack's work and states methods of service design (Mager, 2004). These principles are shown in Figure 6a. The Service Design Network was launched by Köln International School of Design in 2004. Currently, the international service design network (from the perspective of marketing and management) extends to service designers around the world, professional service design agencies and educational institutions such as Laurea. The Service Design of IS in integrative action is mainly based on the ITIL v.3 (The Information Technology Infrastructure Library) and it describes Service Design's principles, processes, technology related activities, tools, implementation and risks (ITIL, 2007).

VALUE-BASED ABSTRACTIONS AND DEMOSTRATIONS

The abstraction of value network and integrative action in which design is presented as a value base transformation from cyclic to linear action is illustrated on the left hand side of Figure 5. In this model, designing is part of the interventions that occur within linear and relevance action and inside action research as well. Design research is rooted in pragmatism (Haack, 1976) but in this model creativity and design itself are also included in the pragmatic section and the section related to "freedom" which is part of the space of freedom of methods and philosophies. The necessity of this "freedom" has been made evident and has been tested and demonstrated in the Learning by Developing (LbD) culture. The contribution of the construction is that it cooperates with and links the cyclic innovation space to linear and relevance pragmatism. The perspective also focuses on the fact that designing is meant for "designing value" and that a value transformation happens in designing work. The purpose of action is to produce valuable interventions (e.g. from lost value to added value), while research is an entity for designing and action, namely design research and action research. Finally, action and design sciences address the production of knowledge for all forms of designing and action.

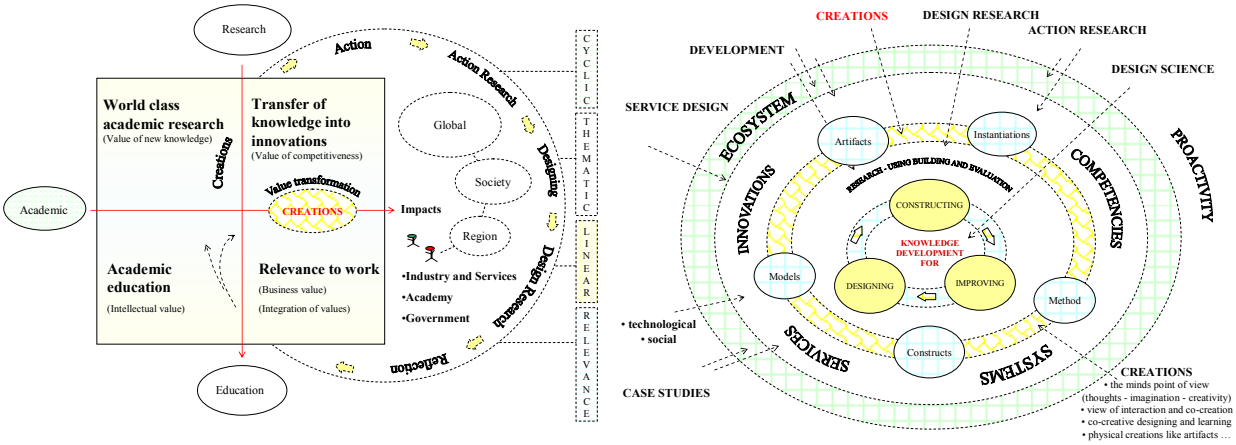


Figure 5. Value-based abstractions of Integrative Action Framework

The right hand side of Figure 5 illustrates the integrative framework in which action research is sustainable and embedded into integrative action and the LbD culture (LbD) for producing knowledge in order to guide the practice of the modification of action. Here case studies are conducted to gain a detailed understanding of innovations (Yin, 2009), while design research must produce a viable artifact in the form of a construct, model, method, or instantiation (Hevner et al. 2004), which exists as an instance of creation. Design science produces design science knowledge for the improvement the activities of design and construction. In other words, it produces the knowledge to implement an innovation (Järvinen, 2004; van Aken, 2004). A proactive approach is used for influencing the future and a service design is an activity aimed at materializing the non-material dimensions of services (Mager, 2004). Furthermore, the validity, relevance and the rigorousness of research work are implemented in the linear and relevance elements of the integrative action process. Lastly, the natural research scope synergizes the behavioral, psychological, educational and sociological sciences (Hakkarainen et al., 2004).

In this model the creations (abstract term) are realized from: 1) the minds point of view e.g. thoughts, imagined creations and the phenomena of creativity (mental creations); 2) a view of interaction that focuses on the co-creative nature of creations; and 3) creative designing and learning, which uses creations that can be developed from "one's own creations" in the learning, motivating and designing processes. This method has been proven to be a key to creativity and helped generate innovations. The artifacts, instantiations, methods, constructs and models (physical creations) are instances of "abstract creation". This model also covers the designing of non material and immaterial artifacts and processes such as, services, competence and the design of "spirit in services".

This "orchestrated research and development ecosystem" has been practiced and demonstrated in the Learning by Developing (LbD) culture and integrative action. The research organization Laurea was appointed as a centre of excellence in regional development for 2003-2004 and 2006-2007, and as a centre of excellence in education for 2005-2006 and 2008-2009. Currently, there are more than 30 active collaborative projects that use the Integrative Action Model with research activities. The selected and referenced cases illustrate the types and spread of the framework and demonstrations of the models and

frameworks have been presented in Fränti and Pirinen (2005), Pirinen (2008a), Pirinen (2008b), Pirinen (2008c), Pirinen and Fränti (2008).

DISCUSSION

Design research described by March and Smith (1995) and Hevner et al. (2004) seem to be concerned with and focused on artifacts. This is an important viewpoint when seeking guidance for designing within integrative action. The perspective that artifacts centered assumptions about design are not well suited to the design of organizational routines is stated by Pentland and Feldman (2008). They argue that live organizational routines are not machines, fixed computer programs or patterns. Rather, they are generative systems that can produce patterns of action based on local judgements and improvisation by actors. They articulate that artifacts alone are not enough to influence a living system. This perspective is included to and supports integrative models and value-based thinking as well as the co-creative bottom-up leadership model and they also agree with the view that artifacts and technology have a crucial role to play in enabling and constraining action (e.g. creations and added value versus lost value in action). This perspective encourages the use of more abstract and flexible elements in the cyclic area of innovation system.

Value and quality are different constructs according to Reeves and Bednar (1994). In the Integrative Action Model and in cyclic innovative action the challenge is to extract the components of value beforehand and therefore the model allow innovation results to be evaluated but not formalized and valued in advance. This perspective refers to a synthesis of objectivity, subjectivity and value. In this reasoning action research and design science can be implemented in the thematic, linear and relevance elements of an integrative process but the cyclic element is released into the domain of freedom (Pirinen, 2008a; Fränti and Pirinen, 2005).

CONCLUSION

The diversity of ways to generate innovation is huge and the nature of innovation generation is multidisciplinary. Figures 6a and 6b present a summary of the ideas related to innovation generation and compress and collect them into six perspectives on research and development in integrative action. The six perspectives are not exclusive and all of them are needed to successfully consider processes of integrative action.

Integrative Action	Service Design	Design Science
What it produces? Produces research, development and educational results e.g. realizations, learning, competences, knowledge and impacts on action. Regional and global development results and impacts. Spirit and flow. Value Network.	**What it produces?** Products. Services requiring design (Service Design) are considered a product in the way a manufactured material product would be [15].	**What it produces?** Produces design science knowledge: concepts; constructs; models and; methods for improving design and construction [12, 13].
Values? Epistemic or practical utility in linear action. Knowledge produces competences in action. Nature of the multidisciplinary orchestration of different orientations. New artifacts and services.	**Values?** Focus on purpose, functionality, ergonomics, ecological integrity, economic feasibility and aesthetic maturity [15].	**Values?** Value or utility aspect of the design science knowledge [12, 13].
How executed? Action and evaluation are performed co-creatively and co-operatively with participants. This occurs on the linear and relevance levels. And a proactive approach occurs on the cyclic and thematic levels.	**How executed?** Service Design as integration of: the service strategy; developing of future service organizations; and the materialization of the non-material messages sent by the service provider [15].	**Activities?** Building and evaluation are the main activities in design science [12].
What effects and impacts? Learning, R&D contributions result in knowledge acquisition, participation and knowledge creation. Co-operation in value network within the innovation system.	**Effects and Impacts of Service Design?** Services are completed at the moment of purchase; services are "non material and living products". Impact on consumption [15].	**Reaching?** Following technological rules for certain types of design or construction issues [12].
Evaluated? Integrative results. Validity and *rigor* occur on the *relevance* level. Cyclic and thematic activities and action are evaluated but are not formalized in advance. Evaluation of innovations.	**Service Evaluation?** Services cannot be stored or standardized. They are visible and will be evaluated according to how they are consumed [15]. Relevance is culturally relative.	**Evaluation of knowledge?** Knowledge for the execution of design and construction tasks [10, 12].
Perspective? Values. Driven scopes, choices and drivers, e.g. motivation-based initiation of action. Innovation possibilities are focused. Creativity and agility in the innovation system.	**Perspective?** Atmosphere, spirit and flow [7]. Focuses on good services for business [15].	**Perspective?** Researchers' perspective. Initiated by the interests of researchers [12].
Nature of communication? Trust based communication. Participants and socio-constructivist audiences. Communication is trilogy: participant-scope-value. Communication is based on the properties of participant-scope-value.	**Communication?** The communication of services can occur directly or indirectly. Communication occurs also when customer buys a service or product [15].	**Communication?** Knowledge base as a communication system. Knowledge is generated, used and evaluated through the building action from the design and construction perspective [10, 12].

Figure 6a. Six perspectives: Action, Service and Science Frameworks

Proactive Approach	Design Research (DR)	Action Research (AR)
What it produces? The creation and scope of innovations; lead innovations; trust bases; and agile constructions to support creativity and innovations e.g. creativity in value networks and living labs [25].	**1. Design as an artifact:** design research must produce a viable artifact in the form of a construct, a model, a method, or an instantiation [10].	**What it produces?** Produces knowledge to guide practice of modifications of the action [2, 12, 13].
What are its values? Proactive social or economic activity and values prospects for individuals; value network; and region and innovation system [7].	**2. Object:** the object of design research is to develop technology-based solutions for important and relevant business problems [10].	**What are its values?** Utility aspect of the future systems. Modifies a given reality or develops a new system or the action [2, 3, 12, 13].
How executed? Using of innovative and creative activities; and freedom of methods. From problems to social scopes [7, 25].	**3. Via execution:** the utility, quality, and efficacy of a design artifact must be rigorously demonstrated via well-executed evaluation plans [10].	**How executed?** Action taking and evaluation [2, 3, 13].
What effects and impacts? Educational; research and development influences; regional; societal and global impacts; and proactive culture [7, 25].	**4. Research Contributions:** Effective design research must provide clear and verifiable contributions in the areas of the design artifact, design foundations and/or design methodologies [10].	**What effects and impacts?** Implications of practice and implications and contributions of the research in collaboration with researchers and participants of the action system [2, 3, 12].
Evaluated? Are evaluated but not formalized in advance [22]. Balancing of subjectivity and objectivity [24]. Evaluation of innovations [13]. Proactive evaluations. Evaluation of motivation.	**5. Research Rigor:** design research relies on the application of rigorous methods in both the construction and evaluation of the design artifact [10].	**Evaluated?** Evaluation of practical and epistemic utility. (scientific knowledge). Rigor and relevance [2, 3].
Perspective? Innovation system. Regional and societal development [24]. Proactive research and development approach in education [20].	**6. Design as a search process:** the search for an effective artifact requires utilizing the available means to reach desired ends while satisfying laws in the problem environment [10]. Perspective of problem environment.	**Perspective?** Action as participatory perspective: The researcher intervenes in the problem setting [2, 3, 12].
Nature of communication? Knowledge sharing and transformations. Integration of knowledge and people. Participation perspective [23]. Scaffoldings [22].	**7. Communication of Research:** Design research must be presented effectively both technology oriented as well as management-oriented audiences [10].	**Nature of communication?** Knowledge is generated, used, tested and modified in the course of the action research project [2, 3]. Knowledge sharing perspective.

Figure 6b. Six perspectives: Research of IS in Integrative Action and SID

REFERENCES

1. Alter S. (2008) Defining information systems as work systems: Implications for the IS field, *European Journal of Information Systems* 17, No 5, 448-469.
2. Baskerville, R., Myers, M. (2004) Special Issue on Action Research in Information Systems: Making IS Research Relevant to Practice – Foreword, *MIS Quarterly*, 28 (3), September 2004, pp. 329-335.
3. Baskerville, R., Wood-Harper, A. (1998). Diversity in information systems action research methods, *European Journal of Information Systems (7)*, pp. 90-107.
4. Checkland, P., and Holwell, S. (1998): Action Research: Its Nature and Validity, *Systemic Practice and Action Research*, 1998, vol 11, no. 1, pp. 9-21.
5. Davison, R.M., Martinsons, M.G., Kock, N. (2004) Principles of Canonical Action Research, *Information Systems Journal* (14:1), pp 65-86.
6. Engeström, Y. (2001) "Expansive learning at work. Toward an activity-theoretical reconceptualization". Journal of Education and Work. Volume 14, no.1, pp. 133-156.
7. Fränti, M., Pirinen, R. (2005) Tutkiva oppiminen integratiivisissa oppimisympäristössä. Laurea Publications, Edita. (In Finnish).
8. Haack, S. (1976) The Pragmatist Theory of Truth, *British Journal of Philosophical Science* (27), pp 231-249.
9. Hakkarainen, K., Palonen, T., Paavola, S., Lehtinen, E. (2004) Communities of Networked Expertise: Professional and educational perspectives. Elsevier, Amsterdam.
10. Hevner, A.R., March, S.T., Park, J., Ram, S. (2004) Design Science in Information Systems Research, *MIS Quarterly* (28:1), pp 75-105.
11. "*ITIL v.3 Service Design*" (2007) The Information Technology Infrastructure Library, the Stationery Office, London.
12. Järvinen, P. (2007) Action research is similar to design science, *Quality & Quantity*, 41, 2007, pp. 37-54.
13. Järvinen, P. (2004) *On Research Methods*, Opinpajan kirja, Tampere, Finland, 2004.

14. Laine, K., Van der Sijde, P., Lähdeniemi, M. & Tarkkanen, J. (2008) (Eds.) *Higher Education Institutions and Innovation in the Knowledge Society,* Rectors' Conference of Finnish Universities of Applied Sciences ARENE, Nord Print, Helsinki.
15. Mager, B. (2004) Service Design a Review, Köln International School of Design, Service Design Network.
16. March, S.T., Smith, G.F. (1995) Design and Natural Science Research on Information Technology, *Decision Support Systems* (15:4), pp 251-266.
17. Markus, M.L., Majchrzak, A., Gasser, L. (2002) A Design Theory for Systems That Support Emergent Knowledge Processes, *MIS Quarterly* (26:3), pp 179-212.
18. McKay, J., Marshall, P. (2001) The Dual Imperatives of Action Research, *Information Technology and People*, 14(1), pp. 46-59.
19. Nunamaker, J., Chen, M., Purdin, T. (1990-91) Systems Development in Information Systems Research, *Journal of Management Information Systems, 7 (3)*, pp 89-106.
20. Paavola, S., Lipponen, L., Hakkarainen, K. (2004) Models of Innovative Knowledge Communities and Three Metaphors of Learning. *Review of Educational Research*. 749(4), pp. 557-576.
21. Pentland, B., Feldman, M. (2008) Designing routines: On the folly of designing artifacts, while hoping for patterns of action, *Information and Organization* 18, No 4, 235-250.
22. Pirinen, R. (2008a) Integrative Action Process in the Perspective of Globalization. *International Journal of Emerging Technologies in Learning (iJET)*. Volume 3, Special Issue, ICL2008, pp. 61-68.
23. Pirinen, R. (2008b) Integrative Action and Process Mode, *International Conference on Education and Educational Technology (EDU'08)*, WSEAS, Venice, pp. 89-94.
24. Pirinen, R. (2008c) Integrative Learning Environments in Perspective of Regional Development. *Pascal International Conference*, 28-30 May, University of Limerick.
25. Pirinen, R., Fränti M. (2008) Framework and Culture of Proactive Competencies Learning – Learning by Developing. *International Conference on Education and Educational Technology (EDU'08)*. WSEAS, Venice, pp. 83-88.
26. Rauhala, P. (2008) R&D Activities in Finnish Universities of Applied Sciences Promoting Regional Development in Laine et al. (Eds.), *Higher Education Institutions and Innovation in the Knowledge Society,* Rectors' Conference of Finnish Universities of Applied Sciences ARENE, Nord Print, Helsinki. pp. 95-101.
27. Reeves, C., Bednar, D. (1994) Defining quality: Alternatives and implications, *Academy of Management Review* 19, No 3, 419-445.
28. Shostack, L. (1982) How to design a Service, *European Journal of Marketing*, Bradford, Vol. 16, Issue 1, pp 49-64.
29. Susman, G., Evered, R. (1978) An Assessment of the Scientific Merits of Action Research. *Administrative Science Quarterly*, 23 (4), pp. 582-603.
30. Van Aken, J.E. (2004) Management Research Based on the Paradigm of the Design Sciences: The Quest for Field-Tested and Grounded Technological Rules, *Journal of Management Studies* 41:2, pp. 219-246.
31. Yin, R. (2009) *Case study research. Design and Methods*. Fourth edition, London, SAGE Publications.