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Research as a Process: A Comparison between Different Research Approaches

Helena Bukvova
Technische Universität Dresden, Germany

Abstract
The research process plays a central role in science. To support research and researchers, it is necessary to understand the research process and its phases. Although the literature offers different research processes, these are often focused on specific research paradigms and methods. The aim of this working paper is to define a research process common to different research approaches: behavioral science, design science and action research. The paper reviews research process models from the literature and finally introduces a model of a general research process. The model can be used to further explore the tasks of researchers, with the aim of identifying possibilities of supporting researchers.

Keywords: research process, research, behavioral science, behavioral science, design science, action research

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Introduction

Scientific research provides the means of refining and widening scientific knowledge. The understanding of the principles and methods of scientific research is therefore crucial for every scientist. The education of research methods plays an important role in academic education, particularly at universities. Different scientific disciplines have developed different research methods and practices. However, as this paper documents, these differences are on the operative level. With regard to the research process as a whole, researchers throughout different disciplines follow the same procedure.

Research, as a systematic enquiry leading to the construction of new knowledge (compare Bordens & Abbott, 2007, p. 2; Graziano & Raulin, 2009, p. 26), does not take place solely in science. It is also carried out daily by each individual (compare Bannister & Fransella, 2003). However, scientific research (also scholarly research or academic research) follows particular guidelines and procedures to ensure the quality of research results. Scientific research intents to create scientific knowledge in particular field (Hockey, 2000, p. 3) through the process of systematic scientific enquiry, the research process (Clark & Hockey, 1989). The research process as well as the research results have to fulfil certain standards (Heinrich, 1993, pp. 62-66; Shugan, 2004, pp. 174-175). Among others, scientific research must be public, replicable, unprejudiced and independent and it must advance the state of the art (Heinrich, 1993, pp. 62-66; Shugan, 2004, pp. 174-175). Due to this crucial role of the research process in science, the understanding as well as the theoretical analysis of the research process are relevant for any research directed towards improving and supporting science (compare Söldner, Haller, Bullinger, & Möslein, 2009).

In this working paper I introduce several models and descriptions of the research process. My aim is to discuss the models, contrast the approaches and point out similarities. I show, that the models and procedures share a number of phases. Differences are based on different aims of the research approaches, which the processes use (behavioural and design science), and other understanding of the role of the researcher. The result of the working paper is a general research process model that can be used to describe the research across the approaches. This working paper is based solely on literature study. It is not the purpose of this paper to introduce new phenomena, but to review und sum up the existing publications on this topic. The paper should serve researchers as a foundation for further enquiries into research practice. The working paper is further based on the radical constructivist understanding of reality (compare e.g. Kenny, 2009; Rusch, 2007).

Research process in the behavioural science

Most research processes represented in the literature follow the principles of behavioural science. Behavioural science has its origins mainly in natural sciences. Methods of behavioural science seek do describe, explain and predict phenomena (often human behaviour). The result of behavioural research process is the creation or the evaluation of theories. (Hevner, March, Park, & Ram, 2004, p. 2; March & Smith, 1995, 253) This

section discusses five models of behavioural research processes: Björk 's (2007) model of scientific communication, research process by Bordens and Abbott (2007), research process by Graziano and Raulin (2009), process of nursing research by Lacey (2006) and business research process by Blumberg, Cooper, and Schindler (2008).

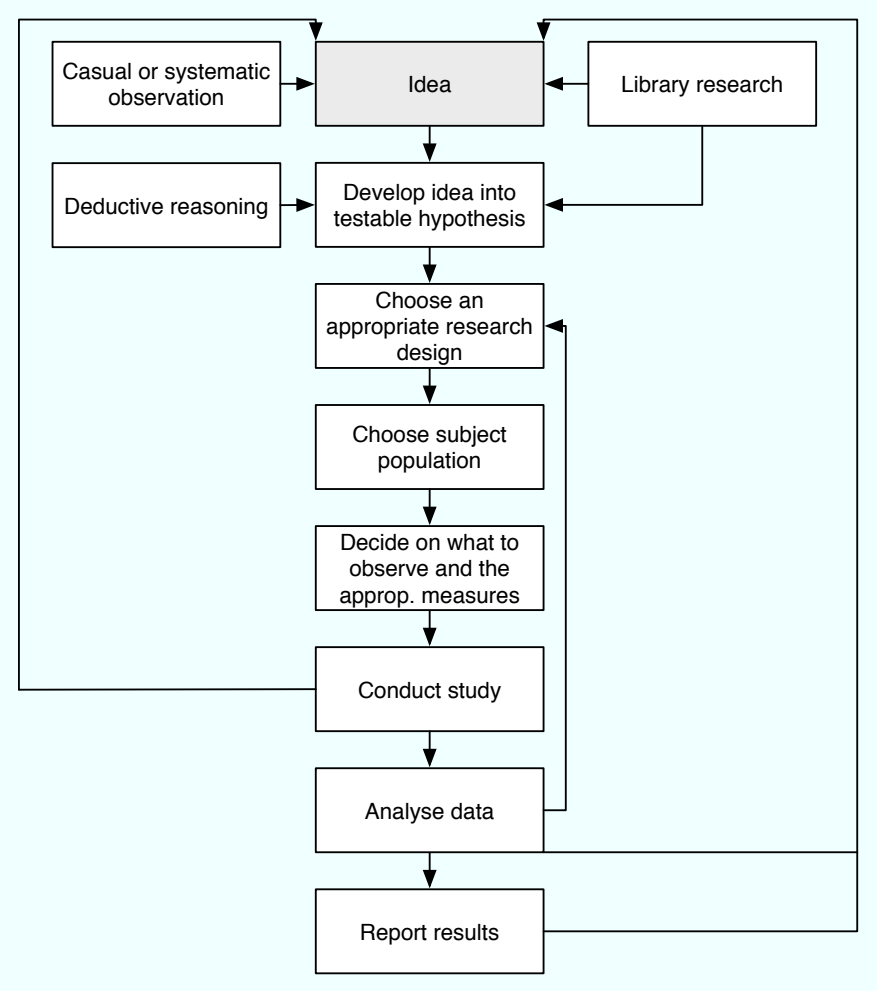

Figure 1. **Research process by Bordens & Abbott (2007, p. 24)**

The research process by Bordens and Abbott (2007) is a good example for behavioural research. The process is strictly oriented on behavioural science. According to Bordens and Abbott (2007, p. 8), research methods outside of behavioural science are considered non-science. Further, Bordens and Abbott acknowledge only empirical (mainly quantitative) research methods. Figure 1 shows the steps of the process.

The process begins with the generation of new ideas for studying behaviour. If an idea is to be used in scientific research, it has to be clearly defined and the involved variables

have to be isolated. The expected relationship of the variables is then described in a hypothesis. The hypothesis serves as a foundation for the study. Once the hypothesis is clear, it is possible to choose the research design (e.g. experimental or correlational study). Then the study subjects are selected. When it was decided, what behaviour exactly will be observed and how it will be measured, the study can take place. Finally, the results of the study are analysed and presented to the scientific community. The study results (as well as the study or the analysis of the data) can trigger a new research process. (Bordens & Abbott, 2007, pp. 22-25)

The research process by Graziano and Raulin (2009) also focuses on behavioural science, but it is less strict than the process by Bordens and Abbott (2007). Graziano and Raulin (Graziano & Raulin, 2009, 2) also define science as a process of enquiry. Science acquires its knowledge through observation (empiricism), but also through reasoning (rationalism) (Graziano & Raulin, 2009, 9-10).

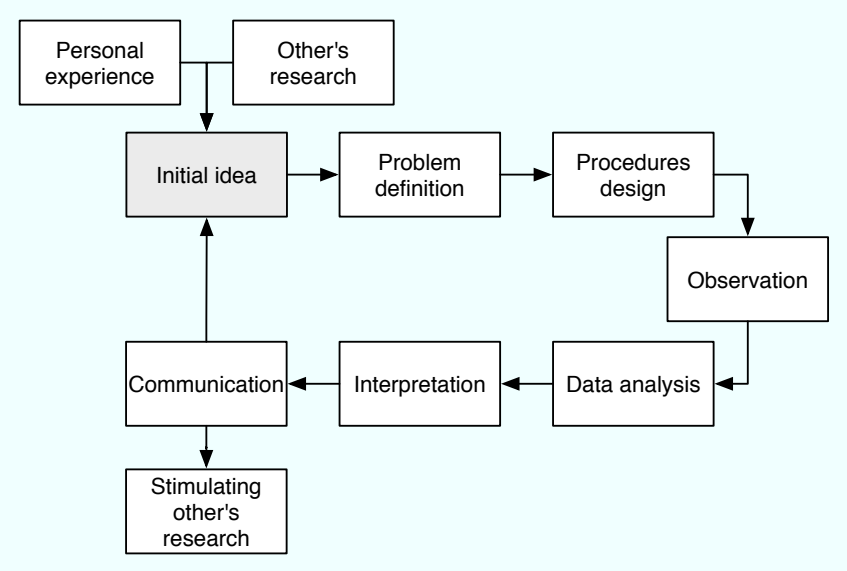

Figure 2. **Research process by Graziano & Raulin (2009, p. 40)**

The process (see Figure 2) begins with the generation of an initial idea. Personal experience or existing research can serve as an inspiration for a new research process. To explore the idea with the help of scientific research, it has to be clearly defined. In the next step, therefore, the problem to be addressed is described in the form of a research question. The research procedure that should lead to the solution of the research question is defined in the procedure-design phase. The resulting research design determines the study participants and conditions as well as the data-collection and data-analysis methods. After the observation has been carried out, the data is analysed and interpreted. The final communication of the results to the scientific community can trigger a new research process or stimulate the activity of other researchers. (Graziano

& Raulin, 2009, pp. 36-41)

Björk (2007) describes a very complex model of a research process (see Figure 3). Although Björk does not clearly define his understanding of science, the terms he uses place the model in behavioural science. The focus of the model is scientific communication. The model therefore distinguishes activities that serve to acquire existing knowledge from activities that generate new knowledge. The inputs of the process are "scientific problems" and "existing knowledge". By studying the existing research knowledge, the researchers devise a conceptual framework and hypotheses for further research. Then, data from existing repositories are collected and analysed. The researchers then do experiments and make observations with selected scientific methods. The collected data as well as the new empirical data is analysed in order to draw conclusions and create new scientific knowledge. (Björk, 2007, p. 16) The research process is further embedded in a broader process called "Do research, communicate and apply the results" consisting of the stages Fund R&D, Perform the research, Communicate the results and Apply the knowledge (Björk, 2007).

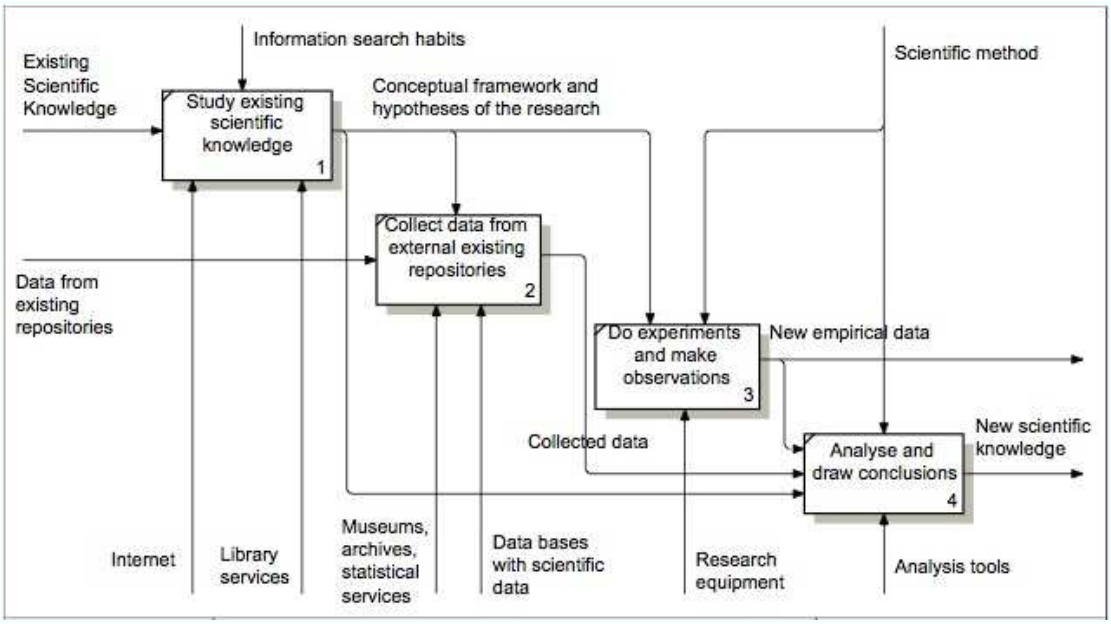

Figure 3. **Research process by Björk (2007, p. 16)**

Lacey (2006) presents a research process from the area of nursing. The process (Figure 4) and its steps are described in a very general way, making them suitable also for other disciplines.

The research process begins with the development of a research question. The research question is often based on an idea or a 'hunch'. To serve as a foundation for a research, the idea has to be refined to a research question. The researchers then study

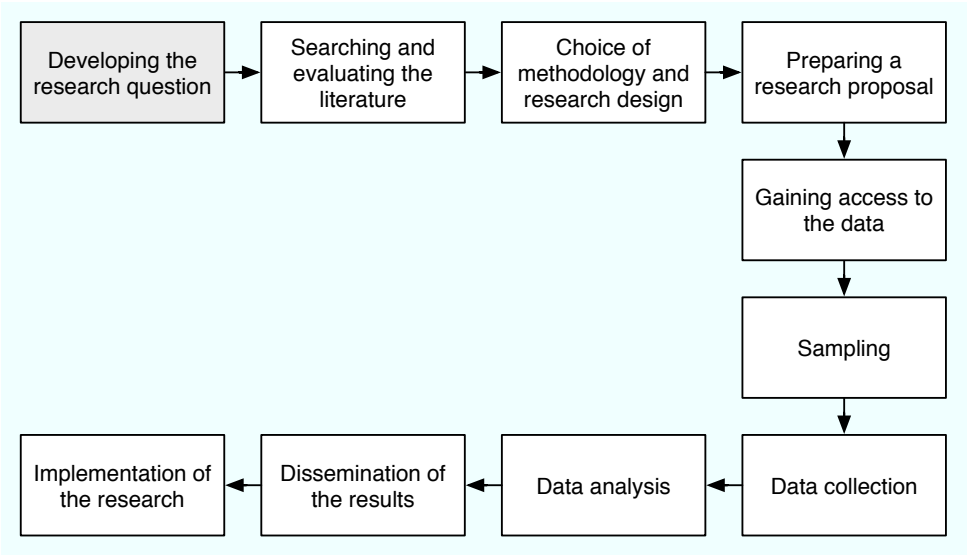

Figure 4. **Research process by Lacey (2006, p. 17)**

existing literature to determine the state of research related to the problem. The literature search can lead to a further refinement of the research question. Afterwards, the methodology of the study is chosen and the research design is determined. Different research designs (e.g. quantitative or qualitative) are possible. Lacey (2006) points out that all approaches are valid, given that they fit the research question and the needs of the research. In the next stage, a research proposal is prepared, giving details about the planned research. Lacey mentions gaining the access to the necessary data as a separate step, due to ethical and legal issues connected to the use of patients' data. Once the data is available, a suitable sample can be selected and the data collection takes place (preceded if necessary by a pilot study). The data is analysed according to the selected methods. The results of the research are disseminated, mostly through publications in scientific journals or presentation at conferences. Lacey sees the implementation of the research results as an important part of the research process in nursing.

Finally, Blumberg et al. (2008) describe a business research process (see Figure 5). Their process begins with the development and the exact definition of the research question. The research question of the business research process has to be connected to an existing management problem. Preceding the research design, researchers might have to provide a written research proposal. The research proposal describes the exploration of the management research question. The proposal can be used to obtain funding for the research project. The next phase, the research design, describes the activities leading to the fulfilment of the research objectives. Blumberg et al. point out the benefits of using different methods to prevent bias. The research design begins with the definition of an overall design strategy. Based on this, the relevant population and sampling methods

as well as data collection methods are determined. The actual collection of data is generally preceded by pilot testing, to detect problems with the selected instruments. If necessary, the instruments are revised before collecting the data. The data is then analysed and interpreted. Blumberg et al. focus on quantitative research. The data analysis therefore covers mainly aggregation of data and the use of statistical methods. Finally, the research results have to be reported to the target audience. These are, in the case of business research, managers facing management decisions. (Blumberg et al., 2008, pp. 55-76)

Although the number of process steps in the presented research processes from the behavioural science vary, there are clear similarities. All processes begin with an idea. The source of these ideas is not clear. They can be connected to practical problems (e.g. in business management or nursing) or triggered by existing research. The ideas have to be further developed before they can serve as a foundation for research. This ensures, that the research project will have a clear focus. Bordens and Abbott (2007) call for a hypothesis as grounds for the new research. Others also suggest refining the initial idea into a research question. Using research questions as a starting point enables research design on different level of constraint (see Graziano & Raulin, 2009, pp. 41-44), allowing e.g. also qualitative research methods. The planned research methods with regard to sampling, data collection and data analysis are determined in the research design. Deciding upon research methods before actively gathering the data helps maintain the rigour of the research process. It also ensures, that the combination of methods is suitable. After the data-collecting and data-analysing activities have taken place, the results are reported to the targeted audience. Besides the scientific community, for research projects derived from practical problems these are also relevant practitioners. Similarly, applied research sees the implementation of the research results in practice as a part of the research process (compare Björk, 2007; Blumberg et al., 2008; Lacey, 2006). The process models mostly also demonstrate the cyclic character of research. New research ideas can be triggered by research results or practical application of the findings.

Design science

Although most researched process descriptions are founded on behavioural science, there is another possible scientific approach: the design science. The design science (also design research) seeks to develop artefacts (constructs, models, methods and instantiations) that solve a particular problem (compare Cole, Purao, Rossi, & Sein, 2005; Hevner et al., 2004; March & Smith, 1995; Simon, 1996). To distinguish between design science and "simple" design, the artefact has to present an innovation of the existing scientific knowledge base by improving technical, social or informational resources (Hevner, 2007; Järvinen, 2007). The design science and the behavioural science are not incompatible. On the contrary, there is a consensus, that methods of behavioural science can support steps of the design science research(Cole et al., 2005; Hevner et al., 2004; March & Smith, 1995). However, there are clear distinctions. Most prominently, the design science is prescriptive, using the prescriptions to create artefacts, whereas behavioural science fo-

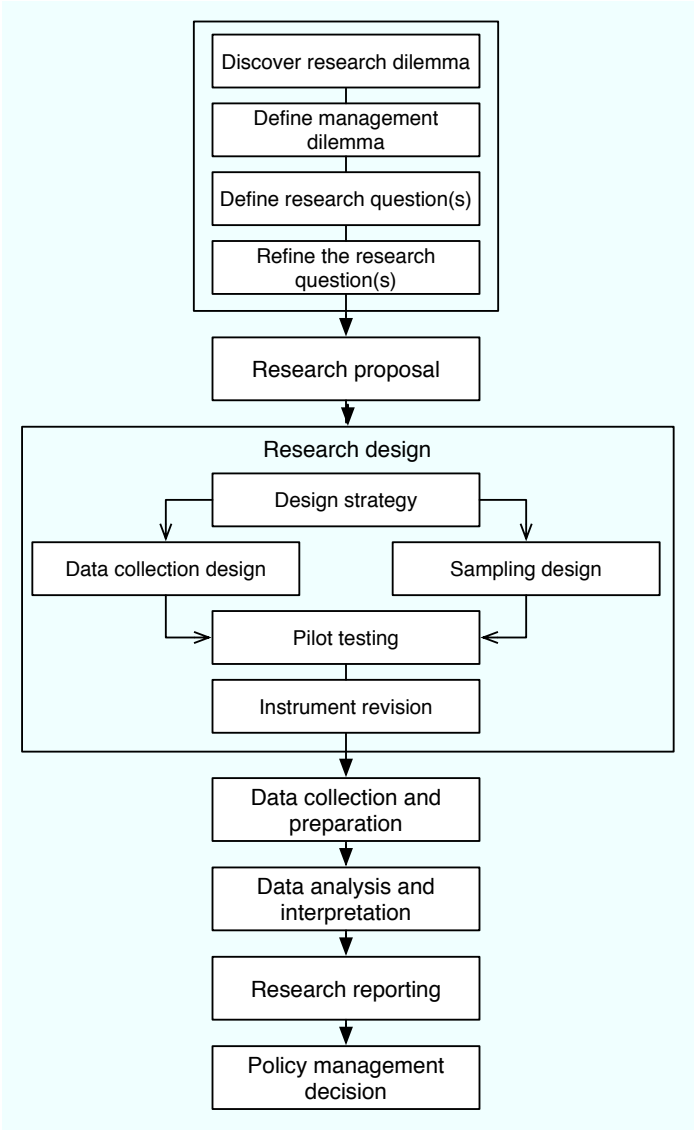

Figure 5. **Research process by Blumberg et al. (2008, p. 57)**

cuses on description and explanation (March & Smith, 1995, 254). This section contains three research processes from the design science: the research process by Vaishnavi and Kuechler (2007), the three cycles by Hevner (2007) and the research process by March and Storey (2008).

The research process by Vaishnavi and Kuechler (2007) (see Figure 6) begins with the awareness of the problem. The awareness can have different sources. It can come from the practice or from research development in science. The output of this process step is a proposal for new research. In the next step, the researchers suggest a tentative design, which becomes a part of the research proposal. The tentative design is an output of a creative, ill-defined activity. The suggested tentative design is implemented in the development phase. The focus of the development phase lies on the methods used, not on the implementation of the artefact itself. The resulting artefact can be only a prototype. The artefact is evaluated in the next process step, using defined performance measures. Finally, in the conclusion of the process the results are consolidated and the knowledge gained in the project is classified.

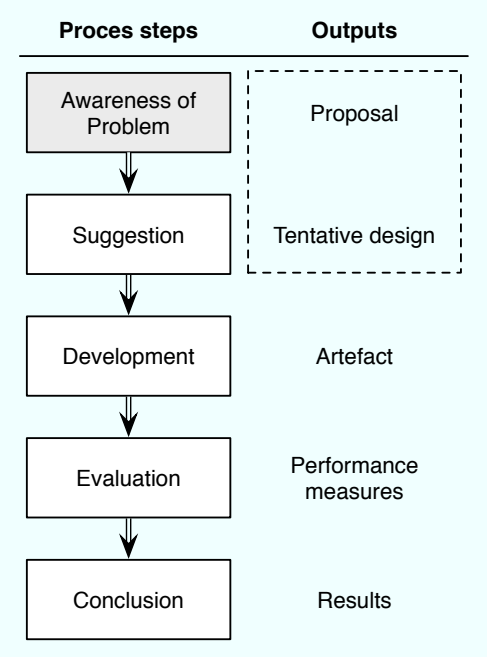

Figure 6. **Research process of design science by Vaishnavi & Kuechler (2007)**

Hevner (2007) offers a different representation of the research process. Instead of describing linear process steps, Hevner suggests three connected process cycles (see Figure 7). The core of the design process is the design cycle. The cycle iterates between development of design alternative and the evaluation until a satisfactory artefact is reached (Simon, 1996). Design science attempts to improve the environment by design-

ing artefacts. The second cycle, the relevance cycle, therefore connects the design to the environment by providing requirements on the design as well as testing the acceptance of the developed artefact. Finally, the rigour cycle ensures that the design research is grounded on theories existing in the knowledge base and contributes new knowledge to the discipline. The three cycles are interconnected. They have to be present and clearly defined in every design science research project.

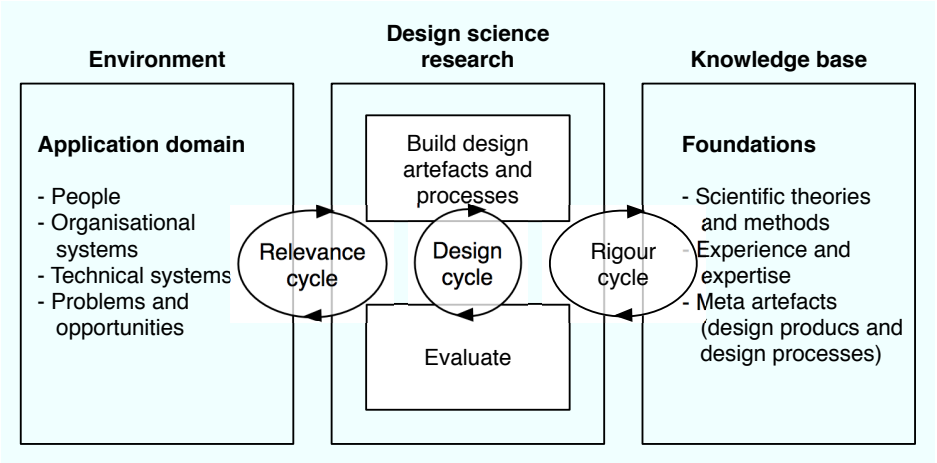

Figure 7. **Three cycles of deign science by Hevner (2007) (compare also Hevner et al., 2004)**

March and Storey (2008) describe six steps of a design science research process (see Figure 8). The process begins with the identification of a new problem. The researchers use the existing knowledge base of the scientific community to demonstrate, that no adequate solution exists. If the knowledge base offers a suitable solution, this can be used to solve the problem. In this case, the process could not contribute a new artefact to the knowledge base, but it would still be possible to gather new experience from the evaluation of the existing artefact. If no suitable solution is present in the knowledge base, the researchers develop a new artefact addressing the problem. The artefact is evaluated. At the end of the process, the researchers articulate their contribution to the knowledge base, but also to the practice. Similarly, the researchers describe the implications of their research for the scientific community as well as for the practice.

Just as in case of the behavioural science, the research process descriptions from the design science show a number of similarities (although some of them are not explicitly visible in the process models). All processes begin with an existing problem. This problem generally comes from the practice, although research advances can also be a source of new problems. Because the research problems are grounded in the practice, all three processes stress the necessity for continuous connection with the environment (particularly Hevner, 2007). Also, all three processes point out the need for the interaction with the existing knowledge base, to identify and compare existing artefacts but

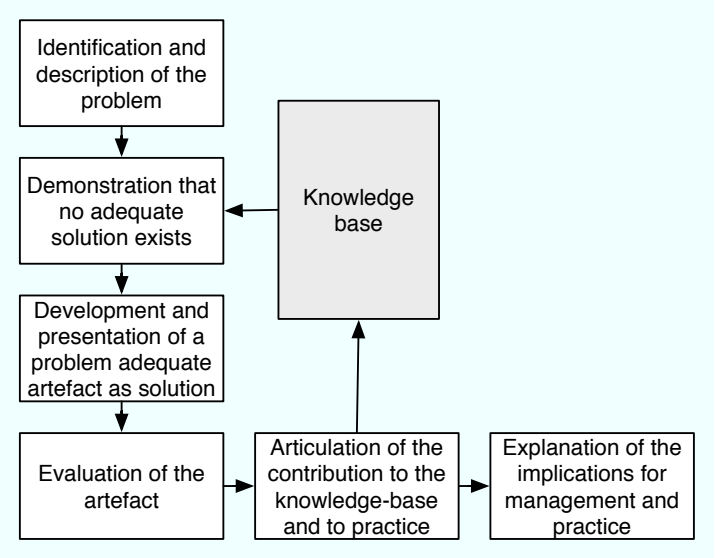

Figure 8. **Research process of design science by March & Storey (2008, 726)**

also as a source of appropriate methods. The core of design science is the design of the artefact solving the selected problem. To ensure scientific rigour and practical relevance, the artefact is evaluated. Hevner explicitly depicts the iteration between design and evaluation. Finally, at end of the research process, the researchers have to ensure that new artefacts, methods, theories and experiences become a part of the knowledge base and thus available for further research (Hevner, 2007; March & Storey, 2008; Vaishnavi & Kuechler, 2007).

Action research

Besides the two introduced approaches, I want to introduce another research concept: the action research. Action research is not seen here as a different approach, but as a different perspective on the research process. Whereas some representatives particularly of the behavioural science emphasise the need for objective and thus detached perspective of the researcher (compare e.g. Bordens & Abbott, 2007), the action research advocates participative research methods (Baskerville, 2001; Cole et al., 2005). In action research, researchers deliberately influence the environment they are studying. Instead of distancing themselves from the subjects of their study, the researchers actively interact and collaborate with them. The creation of new scientific knowledge is thus not separable from the real problem. On the contrary, new knowledge is generated through action. The research itself as well as the research results are directly connected to the specific problem and environmental settings. Finally, the research process has a cyclic form, iterating repeatedly between action and evaluation until a satisfactory result is reached. (Cole et al., 2005; Holter & Schwartz-Barcott, 1993; Hult & Lennung, 1980;

Järvinen, 2007; Peters & Robinson, 1984)

Action research has been linked and compared to design science, because both aim to change the environment to solve a given problem (Cole et al., 2005; Iivari, 2007; Järvinen, 2007). Iivari, however, points out that despite their similarities they are "historically, practically, ontologically, epistemologically and methodologically quite different" (p. 53). Although design science can profit by adopting practices from the action research, this should be reflected with regard to the particular research problem.

Susman and Evered (1978) describe an action research process consisting of five phases (see Figure 9). The process begins with the identification and the definition of the problem (diagnosing). Alternative actions that could solve the problem are then considered (action planning). One of the alternatives is selected and performed (action taking). The consequences of this action are studied and evaluated (evaluating). Finally, the implications and findings of the research process are specified (specifying learning) and can serve to trigger a further iteration of the research process. The client system is in the centre of the research process, stabilising the process and ensuring the relevance of the research findings for the real problem.

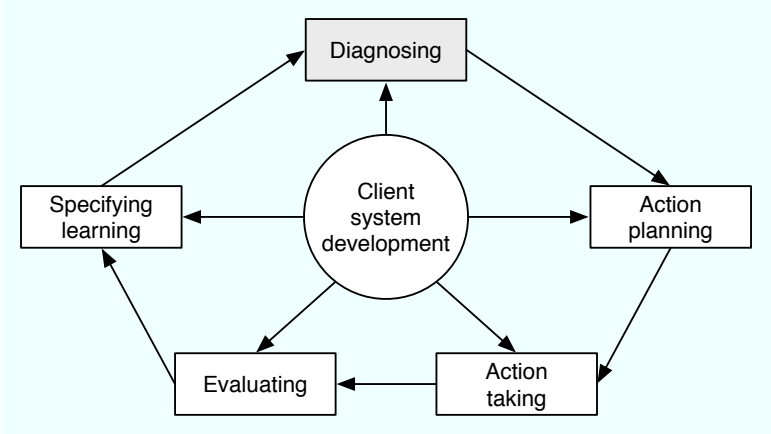

Figure 9. **Research process of design science by Susman & Evered (1978, 588)**

The process by McNiff and Whitehead (2006) follows the same pattern (see Figure 10. It begins with the observation of the environment of interest and the identification of a problem. The researchers then reflect on possible ways of addressing a problem. One of the alternatives is selected and performed. The action as well as the consequences of the action in the environment are observed and evaluated. The practice is then modified to reflect the new findings. The process does not close in a cycle, but continues to move in a different direction, due to the new findings. Although not explicitly described in the model, McNiff and Whitehead further see the communication of the research findings as a part of action research (p. 22) (McNiff, 2003, 10-12).

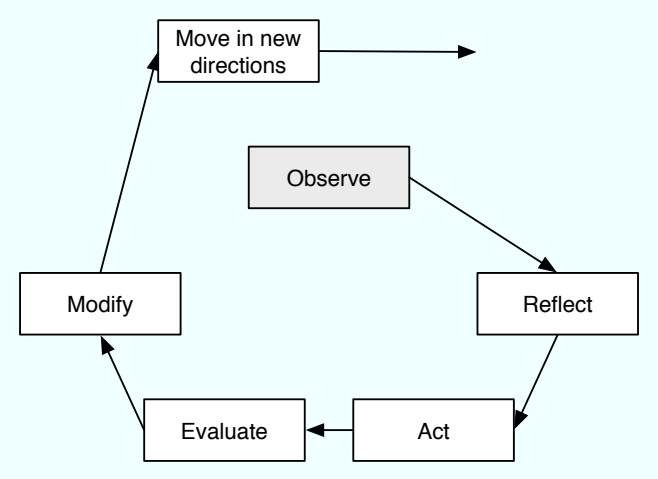

Figure 10. **Research process of design science by McNiff & Whitehead (2006)**

General research process

In the past three sections, I have presented research process models from the areas of the behavioural science, the design science and the action research. The discussions in the sections have already revealed similarities among the process models. In this section, I will compare the models across the different understanding of research and science. The aim is to show, that a general research process exists and is shared across science approaches.

Kraut, Galegher, and Egido (1987) proposed three stages of a research process: initialisation, execution and public presentation. This is a very simple model of the research process. If this model is compared to the research process descriptions from the behavioural science, design science and the action research, however, it is visible, that they all follow this simple pattern (except for Hevner (2007), who does not explicitly mention the research process steps). All presented processes begin with the generation of a research idea, which is then refined into a concrete research problem. Founded on the research problem, the research procedures are planned and prepared. The research is executed according to the plan defined in the initiation phase. The results an findings are then published. This pattern is visible across the different research practices. It is therefore possible to derive a general research process (see Figure 11).

The steps of the general research process are described in the following:

Generate idea. Research processes always begin with an idea. The source of the idea can differ. Applied research often generates its ideas based on practical problems (see Section Design science, Section Action research, but also Lacey, 2006). The discourse with colleagues, the study of scientific literature or just the researchers 'hunch' can also lead to a new idea. There is a general agreement among the

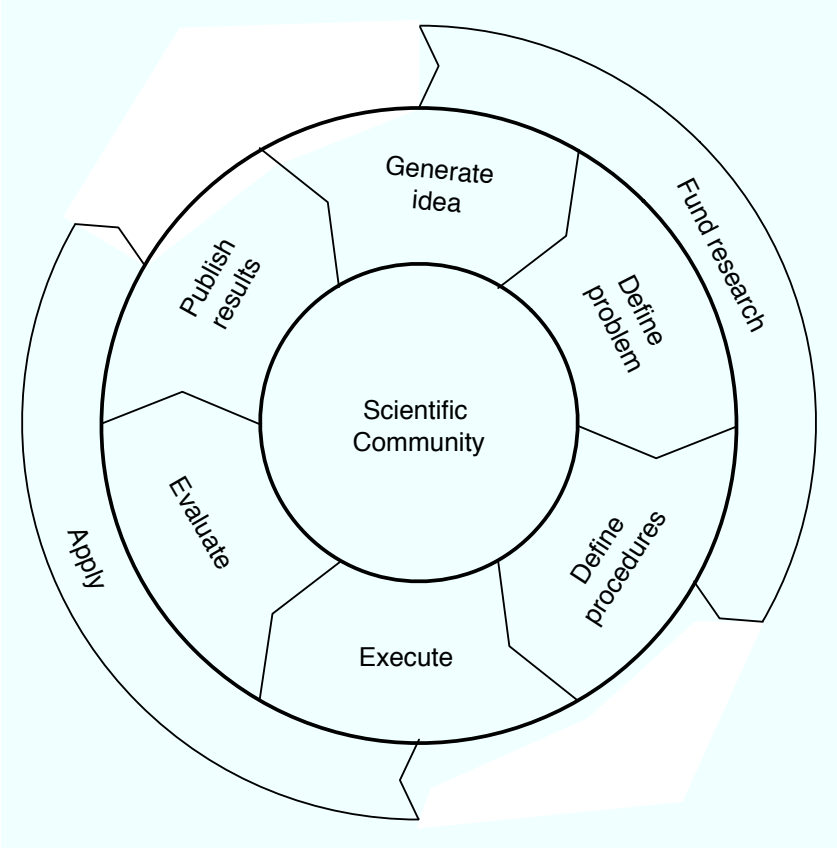

Figure 11. **General research process**

authors of the processes discussed in this paper, that the idea-generating phase is highly creative and ill-structured (e.g. Graziano & Raulin, 2009; Lacey, 2006).

Define problem. The research idea is not yet suitable to for scientific research. All research processes shown in this paper describe the need for the refinement of the idea. For this, the author has to reflect upon the idea and consult existing research as well as other relevant literature. The idea is then developed into a precise research problem. The precision of the problem description can differ. Depending on the the problem, but also the discipline and even the researchers' preferences, the definition of the research problem can have different levels of precision (compare Graziano & Raulin, 2009, pp. 41-44).

Define procedures. There is also a clear consensus that procedures and the methods of the research have to be defined beforehand. This ensures the quality of the outputs from the execution phase, whether they be data, design artefacts of action-based solutions. Some authors (e.g. Blumberg et al., 2008; Lacey, 2006; Vaishnavi &

Kuechler, 2007) also call for a written proposal that serves the presentation of the research project as well as a plan for the researchers executing the research. Depending of the planned research project, the design can contain different points. Projects from the behavioural science will decide on points like sampling, data collection and data analysis. Researchers from design science will be concerned with the design methods of an artefact. Action researcher will reflect about suitable actions and methods for the collection and analysis of data.

Fund research. Every research project requires resources in form of time of the participating researchers and assistants, equipment, services etc.. Sometimes, the resources are provided by the researchers in charge or their institutions. Other research projects need to apply for external funding. In any case, the use of the resources will have to be argued and justified. The instance providing the funding will only fund such research as is consistent with its aims (e.g the institutional aims, the funding-programme's aims, or even the researchers' own aims, if they are to invest their time). The search for funding will therefore influence the research project. The definition of the research procedures may be restricted (e.g. by given time span, maximum funding, or available funding type). Similarly, the focus of the problem definition may be directed by the aims of the funding institution (e.g. focus on a specific population). Even the idea generation can be influenced by available funding (e.g. the idea may arise after reading a call for research proposals). (compare Björk, 2007; Blumberg et al., 2008; Söldner et al., 2009; Lacey, 2006)

Execute. The execution of the procedures that were chosen and described in the procedures definition is the main difference between the scientific approaches. According to the approach, this phase would contain different sub-steps. This is of course mirrored by the procedures design. The behavioural scientists would select a suitable sample, observe it and collect necessary data. Design scientists would design an artefact. Finally, action researchers would take selected action and collect data describing the action and its consequences on the environment.

Evaluate. The evaluation phase is closely connected to the execution phase. This phase is common to the different research approaches, although its exact content may vary. In behavioural science, the collected data would be analysed and used to describe or explain the behaviour of interest. In design science, this phase would serve to test the designed artefact. To do so, the design scientist might have to adopt methods from the behavioural science and thus perform a second execution phase. In action research, this phase would include evaluation of the action taken and decision concerning further research cycles. In any case, the evaluation phase is concerned with the reflexion about the activities of the execution phase. The scientific research process thus demands a critical analysis of the 'raw' findings. This serves to ensure the quality of the research results.

Apply results. The application of results in the practice is not a necessary part of ev-

ery research process. Some disciplines do not consider the application of research results the researchers' responsibility. Other, applied disciplines see it as a necessary part of research (e.g. Blumberg et al., 2008; Lacey, 2006). Design science and action research are centred around practical problems. For these approaches, the application of results is generally a part of the research process. In design science, the application could be embedded in the evaluation phase (although other evaluation methods besides field testing are possible (Iivari, 2007, 54)). In action research, the application would be connected to the execution as well, because action research works by creating change in the focus environment. Connected to the application of research findings is the publication of research results. Researchers can assist the application by publishing the research results in media addressing relevant practitioners (Blumberg et al., 2008; Lacey, 2006).

Publish results. The publication phase is also clearly present across different approaches and authors. In this phase, the results of the research are summed up and published in suitable media. Scientific research would typically be published in scientific journals, books or presented on conferences. However, publication in media addressing practitioners could also be relevant. I have deliberately chosen to call this phase 'publish results' and not 'communicate results'. Scientific *publishing* is a formal, well-structured process with long tradition. Typically, only research results are a subject to scientific publication. Whereas *communication* can be also an informal, unstructured exchange among the researchers performing the research and the scientific community or other individuals. Communication can take place throughout the whole research process.

Scientific community. The whole research process is centred around the scientific community. Many authors, particularly in the design science, mention scientific knowledge as the starting and ending point of the research process (compare Figure 8). In the beginning of the research process, the researchers reflect their initial idea with regard to existing research in order to define the research problem. They also use existing research methods to define the procedures. The research results are published to become available to other researchers. This paper is based on radical constructivism. From this viewpoint, knowledge is actively constructed by each individual. It cannot therefore exists separately from the individual. Knowledge also cannot be transferred between individuals, but the knowledge construction can be stimulated through communication. (compare Rusch, 2007) The existing scientific knowledge (termed by some authors as 'knowledge base' (Hevner, 2007; March & Smith, 1995; March & Storey, 2008)) is therefore present in the scientific community. The researchers can benefit from this resource and contribute to it by communicating (formally or informally) with other scientists.

A research process does not always have to strictly follow this cycle. Smaller iterations also often take place within the main cycle. These iterations can be illustrated by adapting the three cycle model by Hevner (2007) from Figure 7. A scientific research

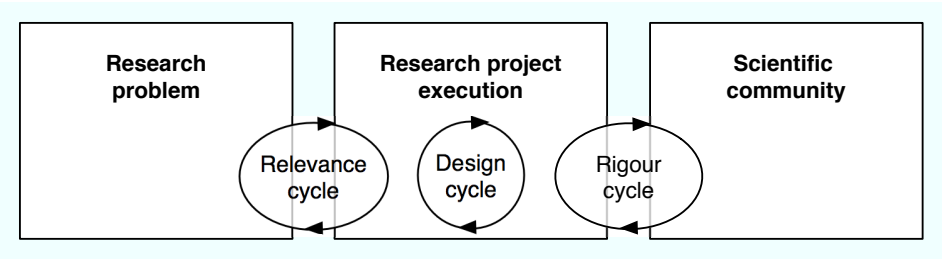

Figure 12. **Cycles in a research process (adapted from Hevner, 2007)**

projects contains three cycles, which are iterated according to the researchers' needs (see Figure 12). The relevance cycle ensures that the research activities are connected to the original research problem. The relevance cycle can lead to the iteration between the phases describing the problem and defining the design as well as the phases concerned with the execution and the evaluation. For research processes concerned with a practical problem, the relevance cycle would also guide the connection to the environment of focus. The execution cycle iterates between the execution and evaluation phase, leading to satisfactory results. Finally, the rigour cycle provides a connection to the scientific community. The rigour cycle can use iterations concerning nearly all phases of the process. Through the rigour cycle, the researchers can constantly check their activities and findings against the knowledge existing in the community, its methods but also values and practices.

Conclusions

This paper presents, discusses and compares research process descriptions and models from the behavioural science, the design science and action research. The analysis of the different processes shows, that it is possible to describe a general research process, common to the different approaches. From the existence of the general research process and the phases it contains I draw following conclusions:

Compatibility of different approaches. The wide consensus about the existence and the content of nearly all phases in the research process shows, that behavioural science, design science and action research share a similar understanding of science despite their differences. The use of the science approaches and the methods connected to them therefore does not appear to be mutually exclusive. The decision about suitable approach and methods should thus be governed not by principle position, but by the demands of the addressed research problem.

Emphasis on quality. Research processes across the science approaches contain mechanisms for ensuring quality of the research findings. All processes need a clearly defined research problem as a foundation. The research activities in the execution

phase are reflected beforehand and afterwards. Problems can be remedied by iterating between procedures definition, execution and evaluation. Unreflected, ad-hoc procedures are undesirable. Finally, the research results have to be published and thus opened to criticism of other scientists (and practitioners).

Importance of interaction with the scientific community. The interaction with the scientific community is an important part of the research process. The interaction can be formal or informal. The researchers are likely to consult the scientific community in nearly every phase. In the beginning of the process, the researchers study existing literature about relevant findings of other researchers, but also about suitable research methods. Particularly in the idea generating phase, the researchers are also likely to communicate directly with their colleagues to develop the research idea and later the problem definition. Throughout the execution and evaluation, the researchers can compare the preliminary results with other findings. Finally, at the end of the process, the researchers formally contribute their findings to the community through publications. The role of scientific communication in the research process is therefore crucial.

The general research process as well as the derived conclusions can serve as a foundation for scientific enquiries into research practices. A potential area of interest could be the role of research collaboration and its consequences on the research process. The general research process in this paper describes essentially individual research, possibly ignoring phases and activities arising from collaboration.

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Office:
Sprouts
University of Amsterdam
Roetersstraat 11, Room E 2.74
1018 WB Amsterdam, Netherlands
Email: admin@sprouts.aisnet.org

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