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# **Project Management in the German Trade Sector: A (Preliminary) Action Research Framework For The Introduction Of Computer Assisted Management Of Projects In Small And Medium Sized Enterprises**

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## **Abstract**

*This paper describes an framework for the introduction of project management in the German trade sector, at a time when businesses are increasingly involved in inter-organisational activities, using an action research approach. The paper initially describes the project management issues particular to small and micro enterprises and explains why action research is conceptually the most appropriate research method for this project.*

*The framework developed for the carrying out of this project is based on the necessary phases of the project and the resulting research cycles. Among the many questions raised, it is important to examine why project management has not been popular with this part of the production sector. Additionally we need to explore the special needs of the trade sector with its particular structure, the education of the employees, the size of the businesses, the manpower involved, typical projects and organisational issues.*

## **Keywords**

Action Research, Interorganizational Systems, Project Management, Research Frameworks, Research Methodology, Small Businesses Research

## **INTRODUCTION**

Project management is becoming increasingly popular in industry. Some optimists even claim that “...into the 21<sup>st</sup> century, project-based management will sweep aside traditional line function management” (Pinto and Kharbanda 1995). Project management has expanded from its original, more limited use within the private sector, and is now becoming popular in social problem areas or emergency aid (Gareis 2000). We have also seen a transformation away from the very strict definition of projects towards a more practical view (Lock 1996). As a result, project management is no longer used merely for managing special needs but is increasingly becoming a standard way of doing things.

In this light it is surprising to see that project management does not seem to be so popular with small and medium enterprises (SMEs). As the need for businesses of all sizes to engage in cooperative, inter-organisational activity increases, SMEs are particularly at risk of being forced to adapt to Information Technology, which they do not understand, and in which they have no experience. Many of these businesses undertake projects and, as we will see later, have an unconventional way of managing these. Amongst the many reasons for involvement in project management are some, which particularly apply to SMEs. Some of these are, for example, the ever-increasing competition and customer focus which companies of all sizes face. This apparent contradiction formed the basis for a closer look at SMEs and it became apparent that a large number of smaller businesses whose work is typically project oriented are part of the trade sector. Because of the particular way trade is organised in Germany research into the requirements and benefits of introducing project management also for virtual projects to the German trade sector forms the basis both of this paper and of a longer-term more general research project. It was against the background of the unique approach taken by the German trade sector that the project “Computer Assisted Project Management in Trade” (ProHIT<sup>1</sup>) was started.

## **THE GERMAN TRADE SECTOR**

The trade sector is the economic backbone of rural Germany (Handwerkskammer 2000). Overall, trade contributes 16% to Germany’s Gross Domestic Product (GDP) and, because of the traditional structure and labour intensive processes involved, trade business trains 38% of German apprentices (Handwerkskammer 2000). This is more than double the employee/apprentice ratio existing in industry.

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<sup>1</sup> Projektmanagement im Handwerk mit Informationstechnischer Unterstützung.

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What is trade? The organisation of the trade sector is unique to Germany, although some eastern European countries have begun to create similar structures. Trade businesses are usually micro or small<sup>2</sup> enterprises. The term “trade business” is not clearly defined, but the code of the trade organisation, the “Handwerksordnung” (HWO) defines trade businesses as those registered in the “Handwerksrolle” – a central register where all trade businesses must be registered.

In order to be registered in the Handwerksrolle, businesses must fulfil the “Handwerksfähigkeit”<sup>3</sup> and “Handwerksmäßigkeit”<sup>4</sup>; and in order to be “Handwerksmäßig” businesses (or a considerable part thereof) must work in a way typical of trade. Typical trades are listed in Appendix A of the HWO and include the: building, electrical, metal, carpentry, textile, food production, health and body care, cleaning, glass, paper and ceramic trades. It is the federal Government’s responsibility to keep the list up to date.

The second criterion, the “Handwerksfähigkeit”, requires a business to be capable of doing quality work in its chosen trade. One of the most important regulations is that the director or owner of the business must have the relevant qualification to work in this area. This can either be the “Meistertitel” which means that s/he must be a Master of a trade, or must have an equally acceptable qualification. The process of becoming a master of a trade involves a number of stages of training, which are very similar to the processes involved in the original mediaeval trade guilds. Starting as an apprentice for three years, one becomes a Journeyman after successfully passing the “Gesellenprüfung” exam. Journeymen seldom go on the traditional journey but continue training and, after having completed the set stages, can attempt the Master exam “Meisterprüfung”. Businesses without the relevant qualification will be prevented from enrolling in the HWO, although the legislative process is slow and computer technicians are not governed by the HWO. This has meant that it is now difficult to force established enterprises into fulfilling the qualification criteria.

Because enrolment in the “Handwerksrolle” is mandatory, the list is maintained and controlled by the Chamber of Trade (Handwerkskammer), whose members fund this institution. Every registered member must pay a profit-based annual fee to the chamber and, because registration is mandatory in order to be working legally, the annual fee is also mandatory (Pieroth and Störmer 1997). In exchange for this fee businesses obtain various services which include: consultation, quality assurance, certification, apprentice training assistance, further education, legal advice and taxation advice.

In addition the chamber acts as lobbyist for the trade sector and takes part in projects to modernise this traditional sector. These projects help businesses that would usually not find the time and resources to introduce new concepts and technologies without interfering with the day-to-day business.

Despite the benefits of membership, the mandatory fee concept is not without its critics and some businesses and politicians suggest that such an organisation is unnecessary and that the register could also be kept without the overheads of running a chamber. It is also claimed that those paying most are least in need of the services and are merely cross-subsidising those which are less able to succeed in the market.

## **PROJECT MANAGEMENT AS PART OF THE STRATEGY**

Project management is becoming one of the critical success factors in industry (Lock 1996). At the same time information technology is becoming more powerful and affordable so that even small businesses are looking for computer assisted methods to improve their business processes (Handwerkskammer 2000). It is therefore important to understand the structure of trade businesses and their specific requirements.

### **Requirements of the Trade Sector**

#### **Leadership In Trade**

One of the main characteristics of trade businesses is their management, which is characterised by the personality and style of the business’s master of the trade. The management principle can be described as patriarchal, charismatic and personality run. Trade businesses are often run by improvisation and intuition, rather than by management principles. The main advantage of this form of organisation is its flexibility. Communication is short and direct with enough flexibility to react to change quickly. This, in turn, means hardly any formalisation and a virtually non-existent planning and control system, with the result that business strategies or aims are not obvious and often hard to analyse or implement – very much the sort of organisation, which Mintzberg (1996) described as “entrepreneurial”.

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<sup>2</sup> Small in the sense of the German Handelsgesetzbuch (HGB) Par. 267 I. Businesses with 50 or less employees.

<sup>3</sup> To be capable of working in a certain trade.

<sup>4</sup> To be like a trade.

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This structure means that there is very little call for additional training or consulting because of the workload of running a day-to-day business. This can lead to overestimating the capabilities of the organisation, or to taking rushed decisions because there is no necessity to justify or discuss decisions taken.

Leadership in trade business is usually restricted to one person. The orientation and size of the businesses do not allow for business specialists to be employed and therefore the trade master is besieged by operative and management duties, with the result that management duties often come last. This situation calls for the development and implementation of an IT supported strategy. While this is, in some ways, typical of all small businesses the nature of the trade sector in Germany means that there is really no alternative to running a trade business in this fashion, with the result that IT-related solutions provides the only real hope for more effective management of these organisations. This is even stronger in a cooperative situation with two businesses in a similar field but different region are in close cooperation and need to coordinate resources and time on communal projects or shared resources.

An additional challenge is the demand for integration of the elementary information technology strategy (Fritz 2000). The internal accounting and controlling is not well developed – certainly not to industry standard, and the businesses would like to develop something along the lines of a Project knowledge management system (Frank et al. 2001). As the examples given above have suggested, trade activity in Germany (as in the rest of the world) increasingly require cooperation between organisations in the achievement of mutual goals. As eCommerce and Internet-linked activity increases, the demand for businesses within the trade sector to collaborate electronically is growing. In a sector where computer support is almost unknown in even the basic sense, the demands which increasing reliance on Information Systems will have the potential to make life difficult, if not impossible, for those business which cannot adequately cope with the challenge of integrating systems and planning processes across organisational boundaries.

#### Services In Trade

In addition to the organisational aspects of the business there is the aspect connected with the services, which trade businesses provide. Many trade businesses are positioned in a niche market and production is characterised by bespoke or small quantity production. This production process, combined with the specific ordering process of small quantities, requires a more sophisticated project management approach. Cooperation in virtual projects of businesses in similar areas and an electronic coordination and ordering process will help to optimise. This is especially important because the small size of trade businesses means that they do not have access to capital markets and therefore need to be more cash flow conscious than their industry counterparts (Handwerkskammer 2000). In common with the management process, the service process of these organisations is hardly formalised and highly flexible. This may lead to the false conclusion that precise planning is unnecessary and unbeneficial. However this is not the case because trade projects are also capital intensive. Processes start with a binding offer and thus production and handover must be carefully planned and controlled. Clearly, the need to link inter-organisational processes and planning adds a further layer of complexity to this already difficult process for small and traditional organisations.

Traditionally, trade businesses have developed over generations. Most are family run and in their 2<sup>nd</sup> or 3<sup>rd</sup> generation. This structure is responsible for the way businesses are run. These enterprises are mostly small with a typical workforce of between 6 and 40 (Handwerkskammer 2000). The demands of the electronic age are particularly severe for such organisations.

Trade businesses tend to specialise in one particular field and have qualified staff for their trade. Most of the work done is labour intensive and, by definition, non-industrial. While the majority of the work is done manually, there is also a wide range of technology involved. In some cases a high level of technology assists the production, while other businesses hardly use any technology. The workflow is usually not defined and integration of planning, production, and administration has not been developed, although there is awareness that integration is important.

There are two main types of work for trade sector organisations – either the production of goods, or repair. A typical example of production would be the construction of a house, which would be done to the specific directions of a customer. Even though the construction of a house is not a unique process, it is a bespoke production process and has some non-routine and customisation elements that make it distinctive with specific time, cost, and performance requirements. There is also need for cooperation between the different trade businesses involved in the production, because this type of project cannot be performed by just one trade but has to be shared – with one business taking the coordination role. All trades involved need to get involved in the virtual project thus optimising the coordination of the schedule by minimising the coordinating effort by close Cooperation.

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No one would call the repair work carried out on a car a project – and yet this can also have some non-routine elements and, in the case of some more complex operations (such as the restoration of a house) there is a need for a detailed project plan defining resources and responsibilities for the various phases of the project. Project management is thus becoming an ever more important issue to trade businesses of all sorts – to the point where it may well be considered a critical success factor.

### **Limitations Of Conventional Methods**

The process of researching the introduction of appropriate forms of IT for the German trade sector soon showed that the situation called for a special method. Traditional concepts of systems analysis and design were not sufficient to develop and implement the right strategy. It is not possible to take a project management system off the shelf and install it on a computer to give those businesses the benefit of an integrated computer-assisted management of projects. First it was necessary to create - in cooperation with the participating businesses – a communal understanding of project management in SMEs. This is by no means a trivial task because most businesses were not even aware that there was room for improving the traditional way of doing things. It has never been the intention to implement change for the sake of change but to develop an atmosphere of communal trust in order to allow for a constructive cooperation, which will make the project a success.

Traditionally, a lot of the work done in trade is project based, so it seems natural that trade businesses would turn to project management in order to organise their work. In practice, the opposite is the case. Even though the management of projects is a standard activity for these businesses, there is hardly any IT or theoretical support for the process. Projects are looked at as orders and are finished consecutively, rather than being planned and worked on in an interlaced fashion where possible, which would give businesses more flexibility and the opportunity to plan ahead.

At present businesses are not capable of planning ahead for more than two months (Handwerkskammer 2000). The thought behind this Strategy is that, by implementing an IT supported project management tool with an option to integrate it into the existing IT infrastructure thus allowing partners to work on a virtual project by creating a communal workspace on something like an extranet, several cooperating businesses can work on one project base with the prospect to coordinate a joint project plan.

In addition, traditional methods of project management do not provide for the special needs of SMEs, because they work on the assumption that a project is special to the business; that it is something which requires the creation of a particular project group within the business and which is in a position to focus on only one project at a time (Litke 1995). Also it is assumed that there is enough manpower to be able to subdivide the duties in a project and, possibly, to have someone solely responsible for the planning while the members of the project team have specific duties to perform. In trade businesses this will not be possible for many reasons of which the most obvious is that there is usually not the manpower to create such a project team. Secondly, there is often no special circumstance around which the project revolves – project work is simply the day-to-day routine of the business. The process of planning is often intuitive and informal, so the process of planning a project to any level of detail should not be too complicated and time consuming. It should possibly be combined with a task, which has to be performed anyway, and which might be replaced or assisted by the project plan. At the same time the use of IT should enhance the SMEs position by compensating the deficit of the small workforce. The long-term Strategy needs to be carefully drafted with the aim to develop a concept to free resources for the productive sector of the business by standardising as many of the processes by working and sharing them electronically. Additionally it is necessary to analyse the customer front office to see if there is scope for Marketing or possibly eMarketing as part of the long-term Strategy.

## **A FRAMEWORK FOR COOPERATIVE RESEARCH AND DEVELOPMENT IN SMALL AND MEDIUM SIZED ENTERPRISES**

As this description of the German trade sector shows, the overall research project is taking place in an environment with a unique structure and specific requirements. In order to be able to undertake effective research in this environment it is essential to find an appropriate research method, one which will provide both depth and flexibility, while offering the researcher the opportunity to participate actively in the change process. These requirements suggested that action research might be an appropriate research method.

### **Background: Action Research**

Action research is based on the assumption that social systems need a specific approach, one different from the traditional sciences. The theory is that an objective view of social systems is not appropriate for creating a theory (Susman and Evered 1978). The change experiment is an efficient method of gaining critical knowledge about social systems (Lewin 1946).

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Action research, like all qualitative research methods, combines research and practice by intensive case studies, going deep instead of gathering wide data. In comparison to other research methods, action research is a combination of practical and theoretical research (Galliers 1992). It can be seen as a subset of case study with the additional feature of conceptually allowing the researcher to be a change manager by taking an active part while conducting research. Therefore action research can be described as a method to assist practical problem solving and expand scientific knowledge (Hult and Lennung 1980).

Conceptually, action research uses the synergy created by the collaboration of researchers with practitioners within a certain setting. The iterative process (see figure 1) of action research requires researchers and practitioners to work together in diagnosing a problem, to intervene and learn by reflecting on the past cycle (Susman and Evered 1978).

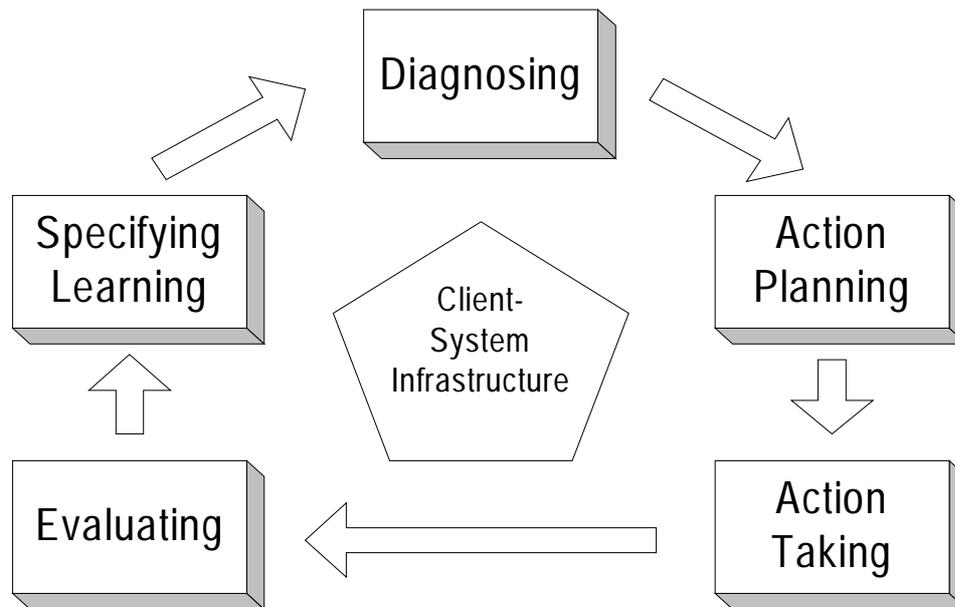


Figure 1: The cyclical process of action research (Susman 1983).

By engaging actively with the businesses it is easier to understand the specific situation and, in close collaboration with the business owners, to implement change with the possibility of evaluating the results. The biases, which are developed by this method, are made explicit – and are thus an asset to the researcher, rather than a potential liability. The longer-term research project thus involves the investigation of a certain number of businesses with a view to analysing their experiences and understanding the imperatives, which drive them. Action research is research by development (Baskerville and Wood-Harper 1996).

To make action research work it is important to document and evaluate each cycle. In addition to developing a theory in one's own office, action research provides the opportunity to try out that theory with practitioners and the additional benefit of gaining feedback – so that after adapting the theory, it can be tried out once again. This “hermeneutic circle” allows the researcher to play an active part in the change process with the advantage for the practitioner of gaining influence by being included in the evaluation process (Avison et al. 1999). The iterative process involved makes action research an ideal method to transfer theoretical knowledge and to make IS research practice relevant.

However this has to be done with great care because it is easy to be sidetracked by time pressures or the complexity of specific problems. The challenge is to always reflect on the aims of the project and not to lose the drive for scientific reflection (Watson and Wood-Harper 1996). Great discipline and experience are expected of an action researcher because one must be able to differentiate between practical and academic targets. Casuistic research is not sufficient; it is important to make one's findings comparable, while being original and conceptual at the same time. Action research is a theory-finding rather than a theory-testing research method (Frank et al. 1998).

### Application of the Research Method

One of the challenges of doing research in trade is that it is centred on people. As described above the businesses are very personality run and therefore there is little hard data to be analysed. People define the business strategy; they have different objectives and attitudes and these may also change over time. Action research is a peculiarly

appropriate method to apply in this social setting. In order to conduct research with the aim of understanding the impact of change by introducing something new to an existing environment in close collaboration with the people in that environment, action research is clearly the most suitable (indeed, in many ways the only possible) research method. The issue of developing and implementing computerised project management in trade businesses is the domain of action research in IS. Of course, the research method must be adapted to cater for the special circumstances arising out of the focus on trade.

In this case the cycle and research strategy is determined by the phases and tasks to be performed during the different stages of the research. Some of the tasks are:

- The general explanation of the project.
- The reduction of pre-existing objections to working with academics in the businesses.
- Raising consciousness of the inevitable change by introducing an e-strategy.
- The resentment of technology as a planning and coordinating tool.
- Researching possibilities for introducing a coordinated resource-ordering tool for trade.
- Raising awareness of the specific issue, in this case recognising project management and its IT support as one critical success factor.
- Development of a user interface to get acceptance for the planning and coordination tool.
- Researching project management and coordinating requirements of SMEs.
- Examining the information- and communication infrastructure of the businesses.
- Implementing the adopted a virtual project management tool for trade.
- Implementing Communication, Planning, Controlling and Coordination.
- Training the people involved in how to use the tool.
- Iterative testing and reflecting of the tool.
- Interviewing and observing.
- Further development.

### **Support by Conceptual Models**

In order to develop a mutual understanding of the problem, it is important to use a common language to be able to develop an information system. This is also one of the prerequisites for an effective demonstration of business processes. A long recognised instrument for such a task is method-based modelling. Conceptual modelling with its abstraction from technical issues has brought great improvements in this field, although research has shown that for the task of implementing an integrated project management system into an enterprise this is not sufficient. It has emerged that business processes are instrumental for business engineering (Österle 1995) and thus we need an information system, which supports business processes – and consequently need an enterprise-modelling concept.

The model acts as the medium for cooperation between the researcher and the practitioners in the cooperating businesses.

This is done by introducing intuitive symbols (figure 2) to describe and verify business processes (Frank 1999).

An additional issue that speaks for the process model is customer orientation. The businesses want to introduce project management to emphasise the view of their customers (Barkley and Saylor 1993). Therefore it is important to include the customer view into the model. Including the customer into the business process model, thus making the customer part of the enterprise model, will do this.

This approach enabled the diagnosis of the status quo by building a model describing the current position. The next step involved building the “vision model”, which describing the goal of the research project. This includes important tasks and their sequence, the organisational units within the business and the services performed. Because of the many processes in a business it was also important to introduce a process architecture describing the different relations of various processes. Finally this process vision was matched with the business strategy to rule out possible discrepancies.

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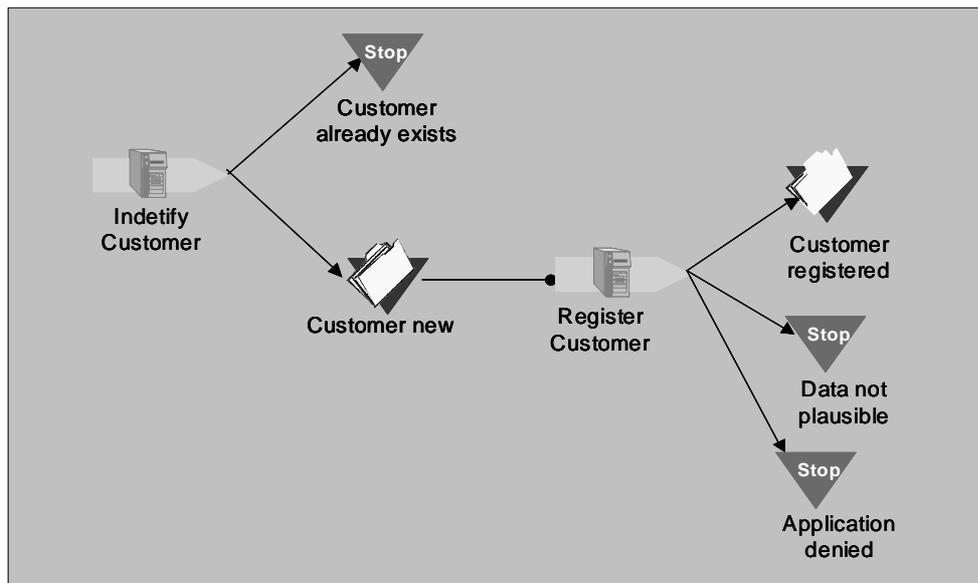


Figure 2: Example of a basic business process model (MEMO PML).

This development has not yet been finalised, but will continue development during the different phases of the action research process.

### The Framework

The process of learning in action research is one of learning about a special environment with the aim of generating knowledge, which will further enhance models and theories – without falling into the trap of being accused of doing consulting. However rigorous documentation, strong theoretical justification, non-existent budget pressures and the cyclical research process can defuse this (Gummerson 1988). In order to find the specific approach needed for this particular research project we take the cyclical process introduced by Susman and Evered (1978) as our starting point. This cycle (figure 1) consists of five phases: diagnosing, action planning, action taking, evaluating and specifying learning (Susman 1983). The technique chosen for data collection is part observation with in-depth interviewing. All phases will have people involved, necessary documents, aims, problems, and conclusions.

However we need to change the diagnosing phase. This new first phase could be described as an “**Awareness raising**” phase. This is necessary because of the special circumstances trade businesses work in. There is no conception that the organisation is sub optimal and therefore needs to be improved. Also, trade businesses are inclined to stop after having made any progress without trying to optimise. This phase will take place with the researcher and the business owner analysing the organisation. The theory is that processes in specific trade businesses can be made more efficient and transparent by the introduction of a computer assisted project management and cooperation in virtual projects.

During the **action-planning** phase, researcher and practitioners collaborate to establish what the desired future state is going to be. This process will be assisted by the introduction of a target model. Researchers take a strong part in this phase because of its theoretical nature. The business owner will participate in the refinement process.

The **action-taking** phase will then implement the plan into the client organisation with the intention of changing the status quo. This is done by directed change of the researcher in close collaboration with the owner and the employees of the business. A cautious approach might be called for because of the behavioural problems that change can cause, which could blur the outcomes of the research and endanger the whole project. The aim of this phase is to implement the system and to ensure that the system will be used for day-to-day project planning in the business.

In the last phase, the **evaluating phase**, researchers and practitioners undertake an evaluation process. This will determine whether the target has been reached and the change was successful. Because there is very little hard data to be gained it is especially important to be thorough with the documentation and conclusion of possible change. To verify one’s findings it might be necessary to repeat the evaluation phase. It is important to ascertain that the change was successful and that the result was a consequence of that change. This has to be done in close collaboration between the researcher, the business owner and all people affected by or using the tool. Also it has to be made clear that the researcher is looking for realistic and objective feedback. Employees might be hesitant to criticise or be over-critical because they fear repression or want to avoid change respectively.

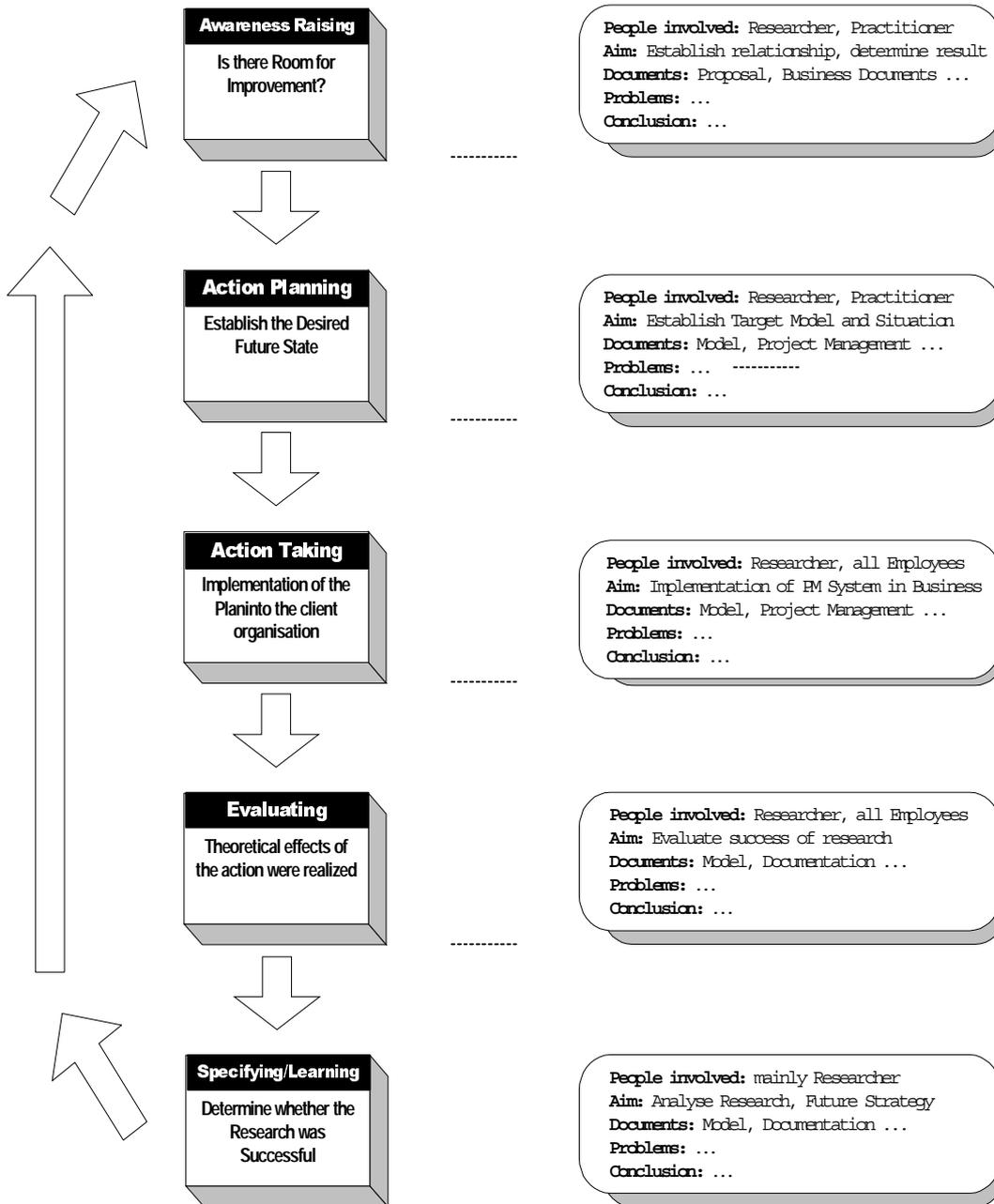


Figure 3: The framework for the virtual management of projects in trade

The last phase in the diagram (figure 3) **specifying and learning** is an ongoing process conducted during all phases. However it is formally put last because it is most important at this point. It will determine whether the research was successful or unsuccessful. If it was unsuccessful it is important to reflect on the research and the knowledge gained as a foundation for the next cycle or future research. If, by contrast, it were successful the next step would be the reorganisation of the business to adapt the knowledge gained by the research. Mainly the researcher does this but the practitioners may be involved as an opportunity to reflect and step back to get a more independent point of view. The aim of this phase it to establish a strategy for the next cycle or future research without losing the knowledge gained. As a result of the iterative process the theory building and data gathering process will be repeated until there is a clear hypothesis or clear evidence that this cannot be achieved.

For each phase of the cycle and each cycle there will always be thorough documentation of the phase. This will consist of the participants of each phase, the documents and models involved, the aims, possible problems in the phase as well as a clinical conclusion including a “what have we learned” in each phase of each cycle.

## **CONCLUSION**

An action researcher in IS takes certain risks because his/her findings may be rejected on philosophical grounds. Some of the arguments against the results of the project might be a confusion with consulting, combined with a lack of discipline and impartiality, so it is important to point out what has been learned so far and to describe the next phase of the research project

### **Implications Of Results To Date**

So far we have learned that trade businesses are struggling with the day-to-day routine of their work. There is little chance for trade businesses to implement change. This is often due to missing background knowledge or the lack of distance from one's own business. The unique structure of trade in Germany with its well-refined apprentice system and the requirement to be a qualified master in a trade in order to run a trade business makes research into this field distinctive from other action research projects.

The introduction of an integrated management system for projects into trade businesses is not only a challenge because it offers the exceptional possibility to gain inside knowledge into a sector where it is very hard to gain an academic insight but also opens up a field that is virtually crying out for an action research project.

We have managed to establish a client-system infrastructure with a research environment of mutual understanding between the practitioners at all levels of the businesses and the researchers regarding joint goals. The data collection plan has been carefully drafted. The first carefully formulated action planning cycle is nearly finished and it is hoped to begin the action-taking phase by the end of July 2001.

By applying action research to a field so special to Germany and taking a thorough action research approach we are trying to point out the opportunities that action research has for this group of very traditional small businesses, facing a complex and essentially electronic future. This should create a platform for future action research in Germany's mainstream IS research.

### **Future Work**

Clearly, the research cycle must be further refined. The next step will be the implementation of the first-adapted project management system with the facility to plan virtual projects. This project plan can be accessed via the web with the possible option of entering data on a PDA while being out on a building site. This will make project controlling considerably more efficient and the management of delay or missing resources can be recognised closer to the time when they actually occur.

Additionally we plan on researching the possible differences on the way projects are managed in the highly regulated trade sector in Germany and the hardly regulated trade sector in rural Victoria (Australia).

In the long term it is intended to integrate the project management system into the whole information- and communication infrastructure of the businesses, making it intuitive to use and minimising the entry of redundant data. Also we will develop Marketing strategies for SMEs.

An additional step will be the work on the development of a project memory and management system, which provides for storing, retrieving and disseminating knowledge about projects. This will assist project managers, project workers and others involved with a project to plan and monitor projects – as well as to prepare for particular tasks within projects. The system features various layers that allow users to store, re-use and view knowledge on different levels of abstraction. The layers are based on comprehensive semantic models and allow for powerful queries and instructions.

In parallel we are working on a further project in the trade sector, which is researching the possibility of assisting businesses processes by means of fleet management systems. Both these projects, while dealing with internal human resource and project management skills, are also actively engaged in applying action research to the problem of moving traditional businesses into the world of information systems with minimum disruption and maximum effectiveness.

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