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Abstract

Mobile technologies are reshaping the global economic landscape, enhancing speed and comfort of communication and information exchange. Existing studies on the economic impact of mobile technologies taking a socio-technical system perspective are scarce. Our study shortly describes an integrative approach for such systems, which is in detail described in Högler et al. (2015), and specifically constructs the first activity in the integrative approach, i.e. defining the target objectives of the mobile system; it provides a case study at an SME to show this step's applicability and validity. In defining the target system the Analytical Hierarchy Processing technique is extended. It encompasses a) the identification of objectives, and b) the determination of the hierarchy of objectives, c) the determination of the dependencies between objectives, d) the identification of strengths of the dependencies, and e) their likeliness of appearance, a f) prioritisation and g) a consolidation of all previous sub-steps. The case study confirms the validity and applicability and provides reasons for generalisation.

Keywords: Mobile Systems, Target Systems, Integrative Approach, Analytical Hierarchy Processing, Economic evaluation

1 Introduction

We are living in a digital world that is directed increasingly by mobile technologies. These have "emerged as a primary engine of economic growth […]" (Bezerra et al. 2015), becoming "the

fastest adopted technology of all time" (ibidem). According to e.g. West (2014), mobile technologies have enabled new forms of communication, interaction and work; by doing so they have revolutionized business practices in all ranks. Nevertheless, when it comes to investigating the economic impact of mobile technologies in companies, particularly SMEs, little research work is done yet. In an in-depth analysis of existing economic analysis approaches (see Högler 2012) the author concludes that still methodologies are prevalent that only focus on monetary effects and thus neglect many aspects of mobile technologies – i.e. qualitative effects like impacts on employees or structural and organizational changes. These effects as well as the strategic alignment of mobile technologies and thus their overall organizational success need to be considered more explicitly (cf. Vuolle 2011). An approach is required that allows new ways of assessing and evaluating economic impacts of mobile technologies which have to be considered as parts of socio-technical systems.

A socio-technical system includes hardware, software, people, and business or community structures and processes (Alter 1999, 2001; Whitworth 2006). In the context of mobile technologies, the authors define a mobile system as a set of mobile technologies and human (system) elements, which are inherently related by structures and processes (see also Goos & Zimmermann (2005)). They aim at integrating people, processes and mobile devices into internal, mostly stationary corporate and enterprise-wide process chains. Hence, they may overcome spatial separation and information losses (Schiller 2000; Isaac & Leclercq 2006). Mobile systems exist in different forms and have a multiplicity of characteristics, which make them specific compared to stationary Information and Communication Systems (ICS). This specific setting implies certain singularities to be considered for their implementation and evaluation.

These considerations have encouraged the development of an integrative approach, which is shortly described in section 2. In this paper we specify the integrative framework of Anonymous (2015) by constructing the details of its first activity: the definition of the target system. The definition of the target system is of high importance as it is not only the basis for all further activities of the integrative approach, but also for any requirements definition. In contrast to objectives that are defined as a "specific result that a person or system aims to achieve within a time frame and with available resources" (Business Dictionary 2016), requirements are "(1) a condition or capability needed by a user to solve a problem or achieve an objective […]" (CMMI 2006, p. 553) and are derived from objectives. An improper requirement definition (Davis et al. 2006) is according to many researchers and consulting companies, the most-cited reason for implementation failures and represents "the lack of clear understanding of what the company wants to achieve" (IMG 2015).

The goal of this work is to present and validate the proposed definition of the target system by a case study at an SME. The case study research design was chosen as it is a useful tool for testing theoretical models by applying them in real world situations (Yin 2013). In our case we apply the first activity of the integrative framework in a practical case in the building industry.

In the next section we will first re-address (Högler et al. 2015) the integrative framework and define its first activity in detail. In section 3 the case study is described and analysed. We end this paper with conclusions, impact and discussion.

2 The Integrative Framework – A Socio-Technical Approach for the Evaluation of Mobile Systems

The analysis of existing approaches shows that an integrative approach for the evaluation of information and communication systems (ICS) needs to consider, besides monetary and qualitative effects, also interdependencies between the systems´ elements as well as singularities and related critical success factors of ICS to predict the potential system performance (Högler et al. 2015). Following these specifications, it becomes clear, that research on ICS evaluation taking an integrative view is scarce. Mobile systems, a form of ICS, have been chosen as object of investigation as they are more complex than stationary ICS and have specific singularities that need special attention. The assumption is that if the integrative framework works well for mobile systems, then it can be used for any kind of ICS.

The integrative framework for mobile systems as proposed by Högler et al. (2015) builds on following principles (figure 1):

- For an integrative evaluation a detailed internal (intra-company) analysis and design has to take place, including business process reengineering.
- A detailed economic analysis is necessary which considers all life-cycle costs as well as quantitative, qualitative and integrative benefits of mobile systems.
- A sensitivity analysis has to be proceeded that surveys in which way success factors and risks affect the potential target achievement when implementing mobile systems.

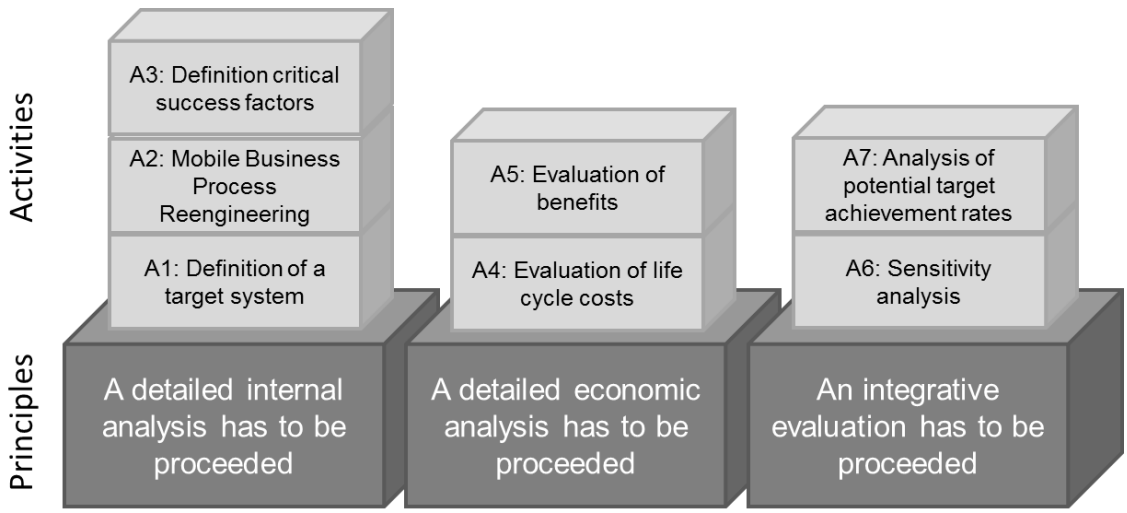

Figure 1. The integrative framework

These principles are covered by the seven activities of the framework (see figure 1):

1. Activity 1: Definition of the target system by following the multi-attribute decision making (Hwang & Yoon 1981). This activity outlines a new procedure for defining the target system leveraging the Analytical Hierarchy Process (AHP) (Saaty 1996). The main contribution of this paper is that the AHP is extended and applied in the context of an integrative approach for evaluating the economic efficiency of mobile systems in order to determine objectives for such a system. The uniqueness of the extended AHP is that the determination of priorities is not based on subjective assessment, but on the following steps (see figure 2), differing from previous approaches:
   - Interdependence analysis between individual objectives (Kirchmer 1999; Drews & Hillebrand 2010; Rückle & Behn 2007);
   - Consideration of the effective strength of the objectives and the probability of occurrence of interdependencies (Klabon 2007; Charette 1991) and thus their respective value; and
   - Preference-neutral weighting of objectives in the context of these latter two aspects.

   By following such a preference-neutral weighting and prioritization of objectives, a consistency test becomes unnecessary and is thus omitted in the proposed procedure.

   The validity of this activity is the main focus and contribution of this research paper and will be described in section 2.1 in detail. Agile methodologies like SCRUM are considered not appropriate for the definition of the target system as they focus on defining and managing *requirements*, which are derived from *objectives*. As such methodologies are process models that focus on project and product management, they are used in a later stage of implementing a system than the definition of the target system.

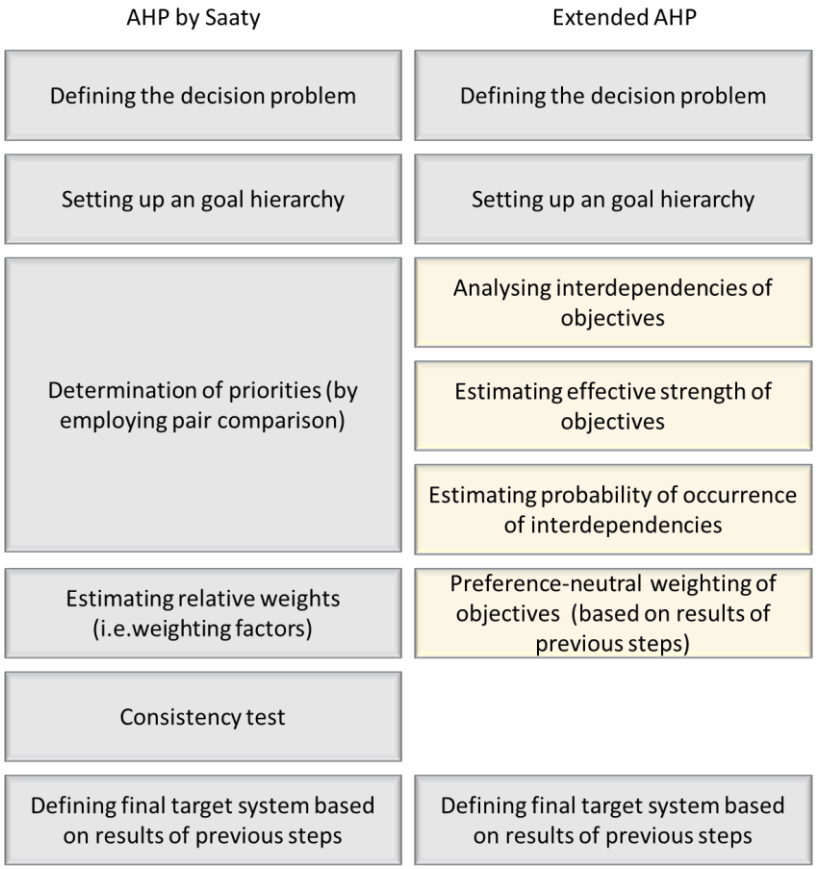

Figure 2: Comparison of original and our extended AHP

2. Activity 2: Mobile Business Process Reengineering as proposed by the authors builds upon Mobile Process Landscaping (Gruhn & Wellen 2001; Köhler & Gruhn 2004).

3. Activity 3: Definition of critical success factors, their interdependencies, correlation analysis and weighting (Iqbal et al. 2015; Nysveen et al. 2015; Hway-Boon & Yu 2006).

4. Activity 4: Evaluation of life cycle costs (Wild & Herges 2000; Berghout et al. 2011), performed by identifying costs during the whole lifecycle of mobile systems including the preliminary phase, utilization phase and disposal phase.

5. Activity 5: The evaluation of benefits, based on the total benefit of ownership model (Gadatsch & Mayer 2004), involves the capture of cost savings and non-monetary benefits or qualitative and strategic variables which are not considered in the traditional approaches of economic evaluation.

6. Activity 6: Sensitivity analysis: As an uncertainty of the results achieved in the previous steps remains, a sensitivity analysis is conducted to check the stability of results. Particularly the variables *success factors* (Corsten 2000; Rockart 1979), *risks* (Kronsteiner & Thurnher 2009) and the accompanying volatility effects (Kulk & Verhoef 2008; Singh & Vyas 2012) are analysed.

7. Activity 7: Analysis of potential target achievement rates: Based on the results of the sensitivity analysis, the potential achievement rates can be determined. To do so, results of activity 1 (target system), activity 2 (current and target processes incl. key (performance) indicators) and activity 6 (volatility effects) are merged.

2.1 Definition of the Target System

The definition of the target system is the first activity of the integrative framework. Figure 3 depicts the single steps:

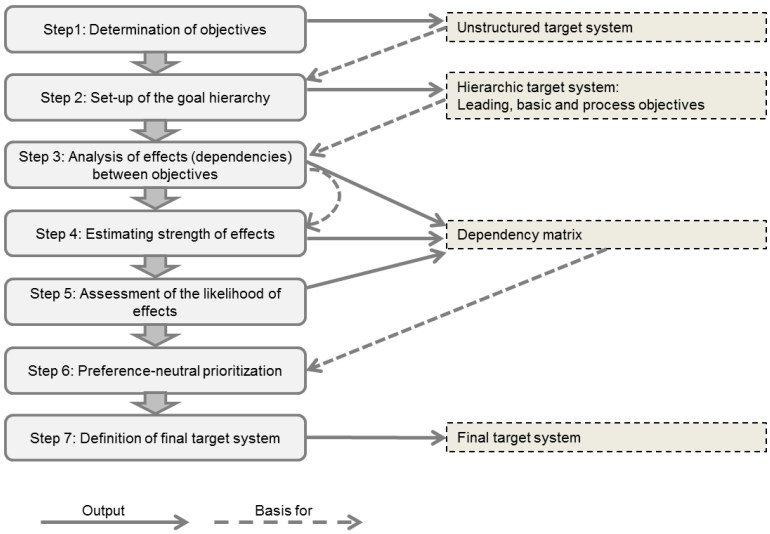

Figure 3: Steps in the definition of the target system

First, objectives are determined e.g. by task observation, in a workshop or from interviews with the help of a questionnaire. An unstructured target system contains all gathered objectives. In step 2, the identified objectives are brought in a hierarchical relationship (goal hierarchy; what we define in levels 'key objectives', 'basic objectives' and 'process objectives'). A goal hierarchy is only complete if "each element of a hierarchy level has a direct relationship to the next higher element [...]" (Ahlert 2003, p. 37) (figure 4).

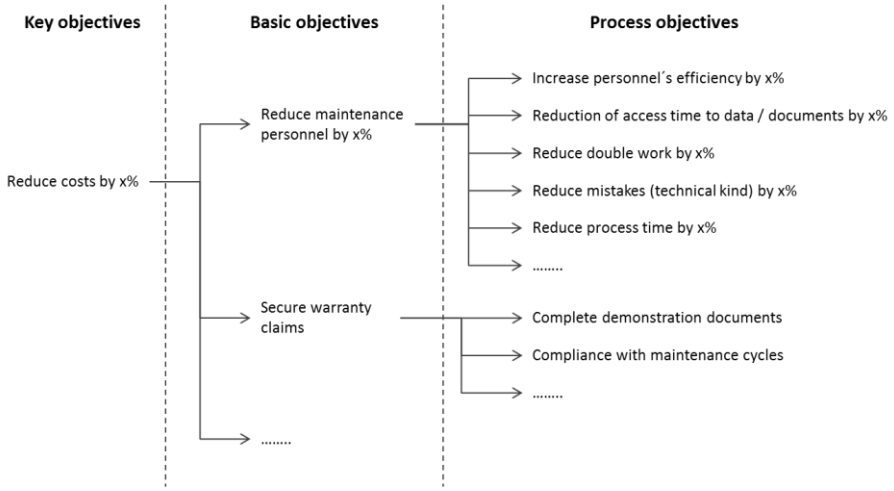

Figure 4: Example for a goal hierarchy

In the 3rd step, the identified process objectives are evaluated in a paired comparison concerning their mutual, direct interdependencies. The aim of this comparison is to identify particularly competing objectives, as setting priorities among them reduces inconsistencies in the target system.

The strength of interdependencies is estimated in step 4, which is largely subjective and based on experience of the involved interviewees. The scale for the estimation can be chosen freely, but it should not be too fine-grained, since this would cause pseudo-accuracies (Meixner & Haas 2012, p. 202). Thus, the authors propose a three-level scale (low (value 1), medium (value 2), strong effects (value 3)).

Next the estimation of their likelihood (probability) is needed (step 5). It is methodologically based on risk management (e.g. NIST 2012, p. 23) and in practice on the experience of the involved individuals. Again a three-level scale is proposed to estimate the likelihood of effects: effect is possible, but improbable (value 1); effect is probable (value 2); effect will occur with the utmost probability (value 3).

It is necessary that the interviewees agree internally on the nature of the effects – but not necessarily on their effective strength and likelihood, since without such an agreement, the target-relation-matrix cannot be installed. The individual effects between objectives should not be regarded as absolute and as in all circumstances occurring, but rather they indicate general trends which may be reinforced, mitigated or neutralized under certain circumstances, or by the use of respective (appropriate or inappropriate) systems.

To ensure that mainly high priority objectives are pursued, which have the greatest benefit, competing relations between objectives must be detected. This is done in the 6th step, where the objective priorities are determined. Based on the prospect theory by Kahneman & Tversky (1979), a preference-neutral weighting assumes that the weight of an objective can be determined by its active and passive value. To receive these values, for each objective its strength of effects is multiplied with the likelihood of its occurrence. The resulting

(mathematical) products are subsequently summed up for each objective in both the horizontal (so-called "active value”) as well as in the vertical ("passive value") axis of the table. This procedure is legitimate insofar as the value of an effect can be defined as the product of strength of effects and their likelihood of occurrence (see also Kahneman & Tversky, 1979). A threshold should be defined by a decision maker which allows the classification of objectives in different priorities. As there is no standardized procedure for defining a threshold, the authors propose to choose a threshold that divides the objectives 'on sight'.

In the last step (7) the final target system is defined by consolidating the earlier steps and assigning final priorities to objectives.

3 Definition of the Target System in an SME of the Building Industry

We validate the first activity of the integrative framework in practice. We do so by operationalizing it at an SME in the building industry, where the definition of the target system was applied in the field of resource planning processes for workers who spend most of their working time outside of the company´s industrial premises (e.g. truck drivers, operators). An earlier version of the integrative framework, including the activity for defining the target system, has been applied to a large company (Högler et al. 2015). From this experience we were able to fine-tune the first step, and prepare optimally for our SME.

In contrast to most of the available research literature, which focuses on large companies, the authors have chosen an SME as they have typically fewer financial resources and lower IT expertise (Andersson & Tell 2009; Forsman 2007; Haug et al. 2011; Huin 2004) in comparison to larger companies. At the same time, SMEs are the economic backbone of many countries in Germany, representing 99.8% of companies, whereas 89.3% are companies with less than 10 employees (IfM 2013). Particularly for these micro companies a proper definition of the target system is of key importance in this context as they need to increase their digitalization level to increase their efficiency and to develop new products and services (cf. BMWi 2016).

According to the Annual Report on SMEs of the European Commission (Muller et al. 2014), the building industry is one of the five most important SME sectors in the EU28, but is facing since the economic crisis still many challenges. One of the challenges is the fact that the building industry lags significantly behind other sectors in terms of ICT adaption (Hosseini et al. 2013). As different kinds of vehicles are used for the transport of construction material, their reliability and disposability is of high importance; resource planning and maintenance management systems help to keep track of (maintenance) schedules and thus to increase availability and service life of vehicles and machines. Bearing these facts in mind, we think that our case study organisation, which is providing mainly mobile services for the building and construction industry in Germany, is appropriate. Moreover, as many German construction logistics companies, the case study SME faces competition from eastern European countries and has to optimise processes to increase efficiency of staff and to become more competitive.

The particular SME was also selected due to already existing contacts of the authors with the organisation, allowing easy access to management and operational employees.

3.1 Description of the Case Study

The case study company is located in Rhineland-Palatinate, Germany, and has six employees; two in management (CEOs) and four operational workers (truck drivers). Main activities of the company are excavation and earthwork, supplying of building material, pavement and demolition works and garden design within a range of 100 km around their offices. The fleet of cars encompasses 15 vehicles, among excavators, wheel loaders, caterpillars and trucks that have to be maintained regularly and that form the backbone of the daily business. As all processes rely on the availability and reliability of the cars, their maintenance is of key importance.

The application of the first activity of the integrative framework to a real case study followed the recommendation of Yin (2013, pp. 84) and Maimbo & Pervan (2005), resembles the approach of Miles et al. (2013), and had four stages:

- Designing the case study protocol (section 3.2),
- conducting the case study (section 3.3),
- analysing the case study evidence (section 3.4) and
- developing the conclusions, recommendations and implications based on the evidence (section 4).

The single stages – used to validate the theoretical construct of the framework – are described in detail in the following sections. We end our paper with a discussion on the validity of our integrative framework based on its partly operationalization.

3.2 Designing the Case Study Protocol

The research methodology integrates a structured case study protocol that guides in conducting the case study (Yin 2013) and supports to address issues of both rigor and validity in the data collection process. The protocol was upfront designed following the procedure proposed by Maimbo & Pervan (2005) (see annex I). While the case study was conducted, the proposed protocol was followed. The following subsections describe the case study's process and results in detail. The procedure follows the seven sub-steps (see section 2.1) of activity 1 of our Integrative Framework.

3.3 Conducting the Case Study

To get a first impression on the daily work, a task observation and analysis (Kosiol 1976) was proceeded; for this, one of the authors was accompanying a truck driver for 4 days. The a-priori categories of objectives contained in this questionnaire were the result of:

a) main literature on business process (re-)engineering and management (e.g. Hammer & Champy 1993; Gruhn & Wellen 2001; Turowski & Poustchi 2004; Aichele 1997;

Darnton & Darnton 1997; Harrington et al. 1997; Staud 2006) and mobile business (e.g. Köhler & Gruhn 2004; Lehner 2002; Schiller 2000) and

b) former analyses proceeded in the timeframe 2006-2009 at several German companies, mainly of the chemical industry and the public sector, when one of the authors was working as a product manager at "Rösberg Engieering Ingenieurgesellschaft mbH für Automation" for mobile maintenance management systems at several German companies in the chemical industry.

These objectives were completed with objectives that were identified during the task observation and its analysis. For the final questionnaire, their hierarchy was constructed (also based on literature review, see a)), leaving room for additional objectives in the semi-structured interviews (see excerpt in Table 1 for the constructed questionnaire; full questionnaire in annex 2):

Key objective 1	**Profit maximization**
Basic objective 1.1	**Cost reduction**
Process objectives:	
	Savings on machines by
	Savings on personnell costs by
	Savings on (maintenance)processes by
	Savings on repairs by
	Savings on material consumption by
	Increasing availability of own machines by
	Securing warranty claims
	Other process objectives
Basic objective 1.2:	**Increasing plant availability by x%**
Process objectives:	
	Reduction of troubles by %
	Reduction of system failures by
	Other process objectives

Table 1: Excerpt of the questionnaire

Two workshops were subsequently held, executing steps 1-6 with the participants, using the constructed questionnaire. During the workshops no additional objectives were mentioned by the participants, indicating that the literature, working experience and task observation and analysis proved to be appropriate preparation for building the questionnaire. The scheduling of workshops was in all cases spontaneous with a lead time of one or two days as a longer lead time led to postponements due to unscheduled workload. The workshops were conducted in separate groups – one with the management (2 CEOs) and one with a worker (truck driver). The visits took place early 2016, the workshops had an average duration of 2 hours.

For step 7 a third workshop with the company's management and an external financial advisor was performed. By this, the separate results from the two different groups were consolidated and eventually agreed upon. During this workshop one of the authors presented the determination of objectives in every single step. Objectives with high priority were discussed in detail with the CEOs and the financial advisor. Objectives with low priority were omitted as the CEOs and the financial advisor wanted to focus on objectives with the highest positive impact. The advisor, although not involved in the process, confirmed the transparency of the procedure as well as the achieved results, which accord with his findings to a great extent.

3.4 Results and Analysis

The outcomes of the semi-structured interviews with CEOs and worker can be summarized and processed as follows.

3.4.1 Step 1-2: Determination and structuring of objectives

Table 2 shows the results of the two workshops for the determination of objectives. The worker identified more process objectives than the CEOs. This implies that he sees more need for optimisation than the CEOs. Here, the worker sees much more need for action than the CEOs. The reason for this could be a constant information loss between the CEOs and the workers, which is either not recognised by the CEOs or not always reported / confirmed by the workers. In contrast, the CEOs identified the key objective “enhancing (the company) image” which was not chosen by the worker.

Also the percentages for the quantitative objectives differed in some cases, but only to a limited extent. Summarising the findings, the worker saw less potential in cost savings regarding repairs than the CEOs. At the same time, he has identified additional cost saving potential by enhancing the availability of machines, at maintenance processes and for the material consumption. In contrast, the worker saw less potential to reduce the workload (20% in comparison to 40% desired by the CEOs). In terms of the key objective “enhancing process quality”, the worker generally saw a higher need for optimization than the CEOs, although there are only slight differences for most process objectives. Note the difference in the process objectives “efficiency of machines” (worker: 50%, CEOs: 30%) and “improving the planning ability (calculability) of tasks”, where the worker sees a higher need for improvement (100% in comparison to 70% mentioned by the CEOs). Also this difference indicates the different view on current processes and related deficiencies. It seems that the worker sees himself strongly affected by the unpredictable nature of task allocation.

		CEOs		Worker		
		%			%	
Key objective 1	**Profit maximization**		x	x		
Basic objective 1.1	**Cost reduction**		x	x		
Process objectives:						**Legend:**
	Savings on machines by	30	x	x	25	X: Objective identified by participant as relevant
	Savings on personnell costs by					
	Savings on (maintenance)processes by			x	10	
	Savings on repairs by	50	x	x	30	
	Savings on material consumption by			x	20	%: numeric description of the quantitative objective (best-case scenario)
	Increasing availability of own machines by			x	50	
	Securing warranty claims		x	x		
Key objective 2	**Increased process quality**		x	x		
Basic objective 2.1	General support of processes			x		
Process objectives:						
	Enhanced task overview		x	x		
	Reduction of information losses by	90	x	x	100	
	Prevention of entry errors (validation documentation)			x		
	Secure available knowledge		x	x		
	Overview on "who, what, when"			x		
	Predictive Maintenance		x	x		
	Optimization of maintenance intervals		x	x		
Basic objective 2.2	**Enhanced Controlling /Monitoring**		x	x		
Process objectives:						
	Problems / troubles with machines		x	x		
	Problems / troubles within processes		x	x		
	Condition of machines			x		
	Repairs of machines		x	x		
	Tracking of tasks / processes		x	x		
	Efficiency of employees		x	x		
	Efficiency of machines		x	x		
	Material consumption		x	x		
	Inventory / stock			x		
	Costs of machines		x	x		
	Costs of employees			x		
	Costs of processes		x	x		
	Costs of material		x	x		
Basic objective 2.3	**Enhanced working conditions**			x		
Process objectives:						
	Reduction workload of personnel by	40	x	x	20	
	Compliance with regulations		x	x		
	Increased work safety		x	x		
Basic objective 2.4	Enhanced data availability			x		
Process objectives:						
	Ubiquitous data availability			x		
	Seamless collection of data / information			x		
Basic objective 2.5	**Support of decision processes**		x	x		
Process objectives:						
	Enabling data analysis			x		
	Fast access to (all) necessary documents			x		
	Complete verification documentation		x	x		
Basic objective 2.6	**Minimization of environmental effects**		x	x		
Process objectives:						
	Compliance with environmental protection requirements		x	x		
Key objective 3	**Reaching production targets**		x	x		
Basic objective 3.1	**Optimisation of processes**		x	x		
Process objectives:						
	Increased utilization of machines by	30	x	x	50	
	Reduction of downtime of personnel by			x	100	
	Reduction of downtime of machines by			x	100	
	Reduction of process interruptions by	80	x	x	100	
	Reduction of unnecessary work by	90	x	x	100	
	Reduction of follow-up work by	90	x	x	100	
	Reduction of duplication of work by	90	x	x	100	
	Reduction of false tasks by	90	x	x	100	
	Unambiguousness of tasks		x	x		
	Increased predictability of tasks by	70	x	x	100	
	Enhanced task planning		x	x		
	Enhanced resources planning		x	x		
	Enhanced coordination of personnel	50	x	x	40	
	Increased productivity of employees by			x		
	General improvement of operational procedures		x	x		
	Reduction of paperbased documentation by			x		
Key objective 4	**Improved Image**		x			
Basic objective 4.1	Increased quality of processed tasks			x		
Process objectives						
	Increased process quality		x	x		
	Enhanced working conditions			x		
	Minimised environmental impacts		x	x		

Table 2: Management (CEOs) objectives and worker (truck driver) objectives shown together

3.4.2 Steps 3-5: Analysing effects between objectives

In the next step, the effects or dependencies between process objectives were analysed as described in section 2.1. As key and basic objectives are used only for structuring process objectives, they have been omitted during the analysis. For each objective its strength of effects is multiplied with the likelihood of its occurrence. The resulting (mathematical) products are subsequently summed up for each objective in both the horizontal (so-called "active value") as well as in the vertical ("passive value") axis of the table.

The results of the steps 3-5 were two tables: one contains estimations of the CEOs and the other estimations of the worker. As the interviews were proceeded separately and the different participant groups (2 CEOs, 1 worker) had no possibility to discuss their assumptions and estimations, the authors propose to keep the different target systems until step 7, where the resulting target systems are merged. The resulting target-relation-matrices document the effects between individual objectives (step 3).

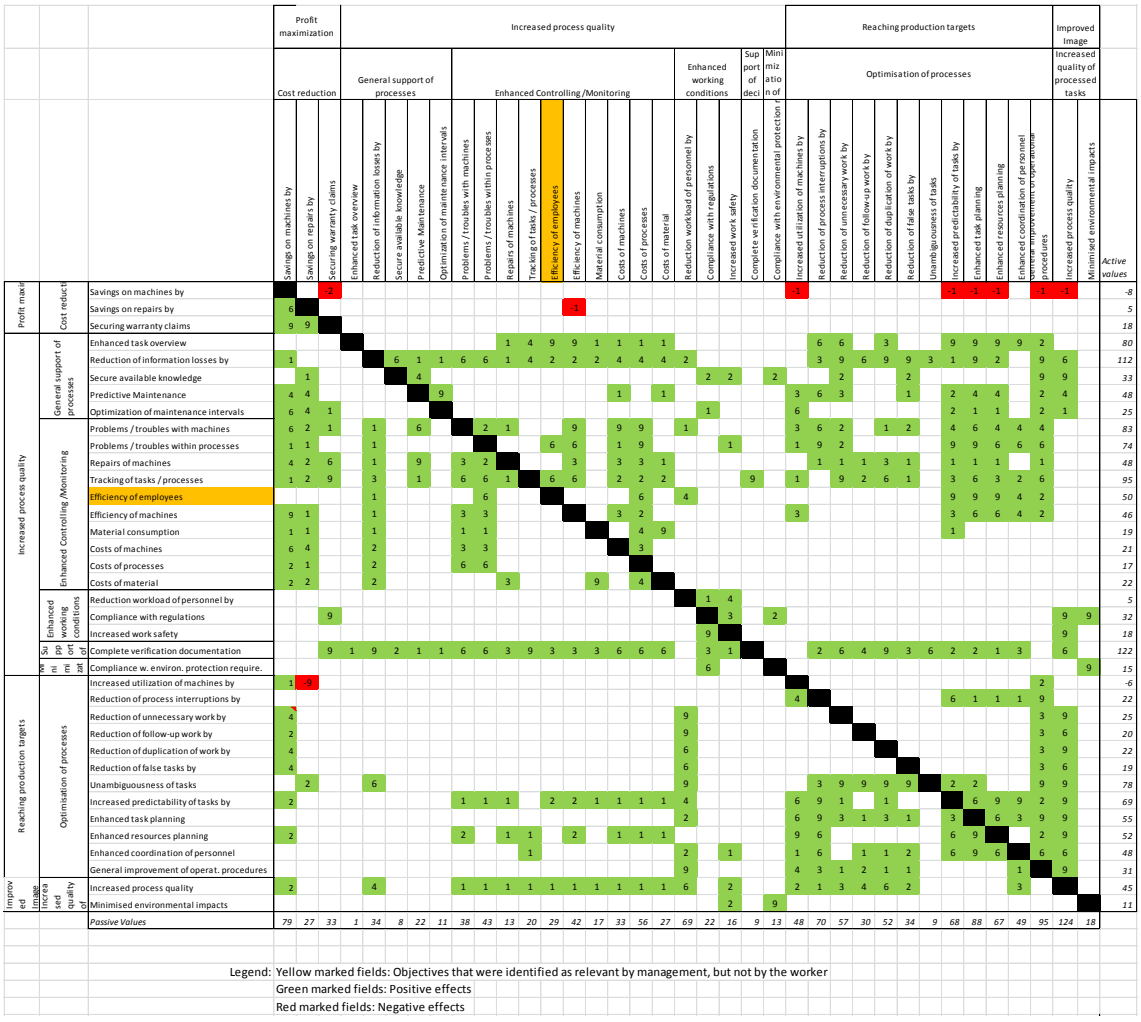

Table 3: Results of steps 3-5, CEOs´ view

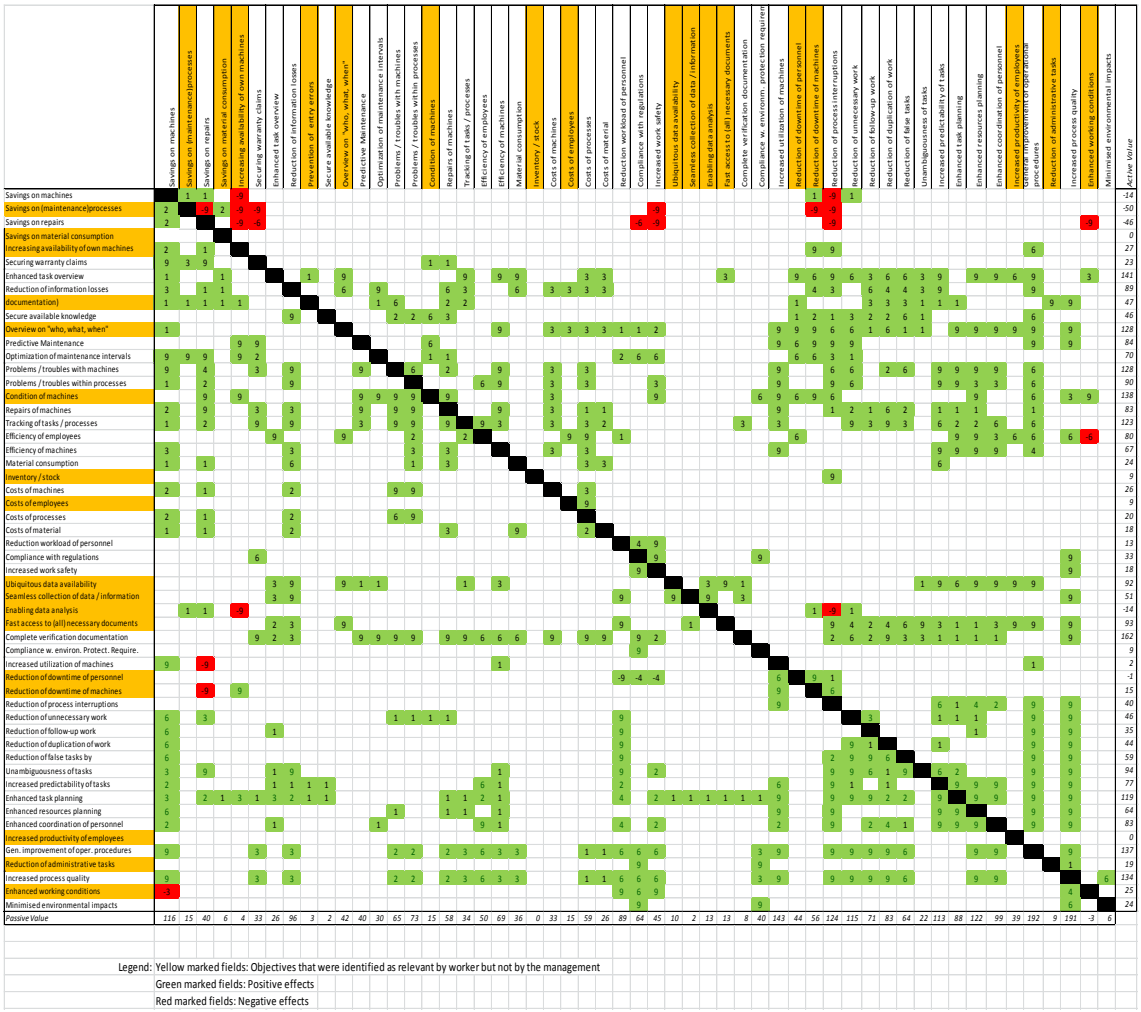

Table 4: Results of steps 3-5, worker´s view.

3.4.3 Step 6: Preference-neutral prioritization

For the preference-neutral prioritization, the active and passive values have been calculated as described in section 2.1 for each interview group. The CEOs and the worker were asked to insert a vertical and a horizontal line that divides the identified objectives into four priorities (A-D). To do so, they were asked to compare two objectives that are near to the centre of the figure and to decide which of these objectives is more important than the other and then to decide which priority the more important objective should get. Within three iterations (management) and two iterations respectively (worker) the thresholds were defined.

The resulting dependency matrix of each interview group is shown in figures 5 and 6:

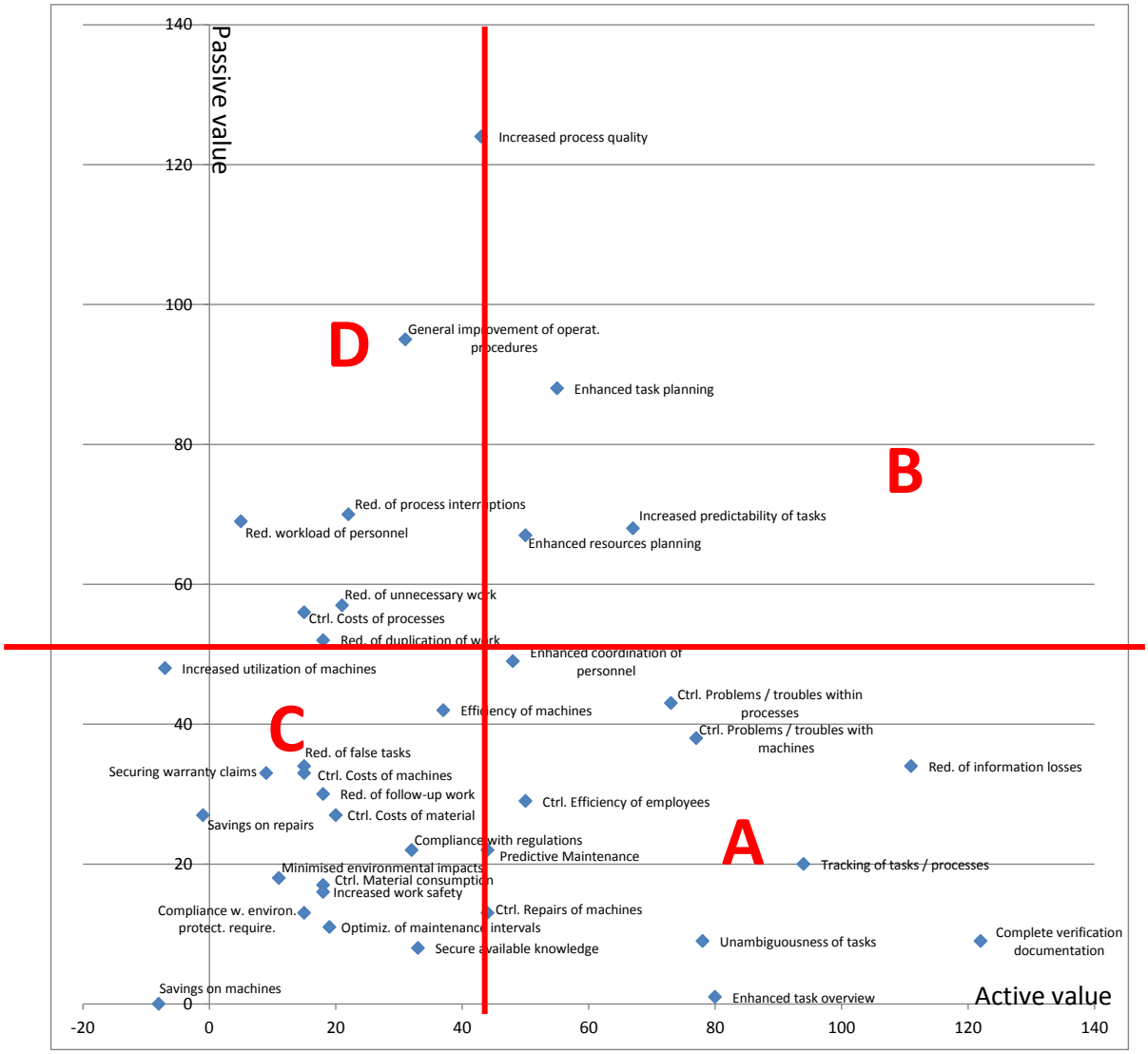

Figure 5: Objectives and their preference-neutral priorities (CEOs)

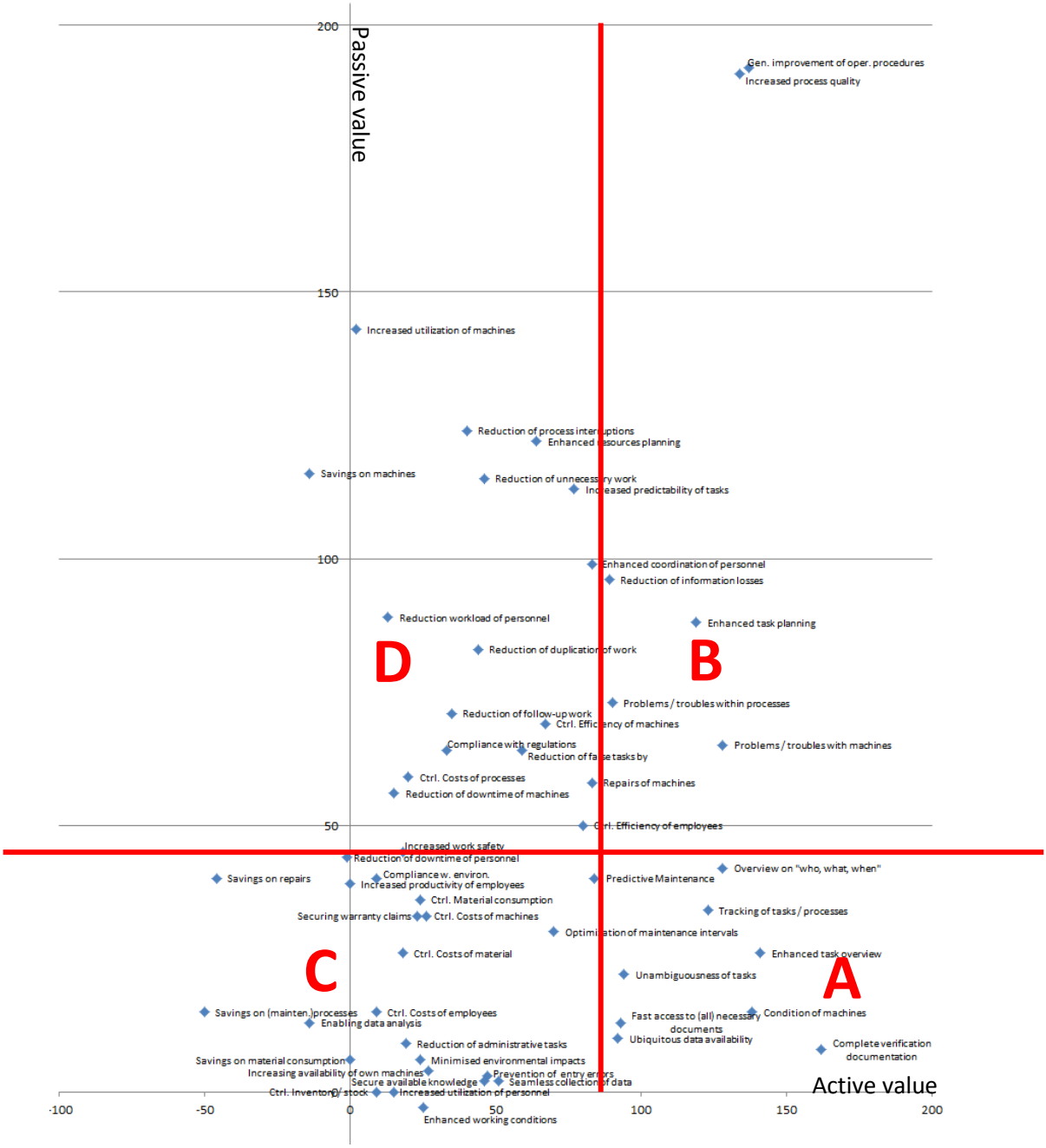

Figure 6: Objectives and their preference-neutral priorities (worker)

3.4.4 Step 7: Definition of the final target system

In the last step the final target system is defined by merging the existing target system of CEOs and the interviewed worker and assigning final weightings to objectives. Table 5 gives an overview on the objectives and their preference-neutral prioritisation (result of step 6). The

main focus of the discussion was put on figures 4 and 5 as well as on table 5, which was the basis for merging and consolidating the two target systems.

A comparison of objectives shows that prioritisation of CEOs and the worker correspond to a great extent. It is obvious, that a complete documentation is a very important objective as the preference-neutral prioritisation (table 5). The objectives “tracking of tasks & processes”, “enhanced task overview” and “unambiguousness of tasks” have also been identified for both groups as of high relevance and received very similar weightings.

Analysing the other objectives it becomes clear, that the worker has a higher information need as his priority-A objectives focus mainly on a better data and document availability as well as on a better overview on the assignment of tasks and the state of machines. From this we can derive that the worker faces information losses and a lack of necessary information during his daily work.

The CEOs focus on very similar objectives, but from another perspective. E.g. the “reduction of information losses” has received the second highest weighting for objectives of priority A, which supports the findings described in the previous paragraph (worker´s view). Five objectives focus on enhancing monitoring and controlling, mainly of processes (“tracking of tasks”, “troubles within processes”, “efficiency of employees”), but also of machine malfunctions and repairs. The latter ones are both important factors for allowing a predictive maintenance, which was also identified as a very important objective for the CEOs. The objectives “unambiguousness of tasks” and “enhanced coordination of personnel” are connected to the objective “better task overview” as the latter one is the prerequisite for a better coordination.

	CEOs				Worker		
	Objectives	Active Value	Weighting	Weighting	Active Value	Objectives	
Priority A	Complete verification documentation	122	15%	17%	162	Complete verification documentation	Priority A
	Reduction information losses	112	13%	15%	141	Enhanced task overview	
	Tracking tasks / processes	95	11%	14%	138	Ctrl. condition of machines	
	Ctrl. problems / troubles machines	83	10%	13%	128	Overview on "who, what, when"	
	Enhanced task overview	80	10%	13%	123	Tracking tasks / processes	
	Unambiguousness of tasks	78	9%	10%	94	Unambiguousness of tasks	
	Ctrl. problems / troubles within process	74	9%	10%	93	Fast access to documents	
	Ctrl. efficiency of employees	50	6%	9%	92	Ubiquitous data availability	
Priority B	Predictive Maintenance	48	6%	20%	137	General impr. of operat. procedures	Priority B
	Ctrl. repairs machines	48	6%	19%	134	Increased process quality	
	Enhanced coordination of personnel	48	6%	18%	128	Ctrl. problems / troubles machines	
	Increased predictability of tasks	69	39%	17%	119	Enhanced task planning	
	Enhanced task planning	55	31%	13%	90	Ctrl. problems / troubles within processe	
	Enhanced resources planning	52	30%	13%	89	Reduction information losses	
Priority C	Ctrl. efficiency of machines	46	15%	20%	84	Predictive Maintenance	Priority C
	Secure available knowledge	33	11%	17%	70	Optimization of maintenance intervals	
	Compliance with regulations	32	11%	12%	51	Seamless collection of data	
	Optimization of maintenance intervals	25	8%	11%	47	Prevention of entry errors	
	Ctrl. costs of material	22	7%	11%	46	Secure available knowledge	
	Ctrl. costs of machines	21	7%	7%	27	Increasing availability of own machines	
	Reduction of follow-up work	20	7%	6%	26	Ctrl. costs of machines	
	Ctrl. material consumption	19	6%	6%	25	Enhanced working conditions	
	Reduction of false tasks	19	6%	6%	24	Ctrl. material consumption	
	Securing warranty claims	18	6%	6%	24	Minimised environmental impacts	
	Increased work safety	18	6%	6%	23	Securing warranty claims	
	Compliance w. environ. protection requirem.	15	5%	5%	19	Reduction of administrative Tasks	
	Minimised environmental impacts	11	4%	4%	18	Ctrl. costs of material	
	Savings on repairs	5	2%	4%	15	Increased utilization of personnel	
	Increasing availability of own machines	-6	-2%	2%	9	Ctrl. Inventory / stock	
Priority D	Increased process quality	45	28%	2%	9	Ctrl. cost of employees	Priority D
	General impr. of operat. procedures	31	19%	2%	9	Compliance w. environ. prot. requirem.	
	Red. of unnecessary work	25	16%	0%	0	Savings on material consumption	
	Red. of process interruptions	22	14%	0%	*0*	Increased productivity of employees	
	Red. of duplication of work	22	14%	0%	-1	Reduction of downtime of personnel	
	Ctrl. costs processes	17	11%	-3%	-14	Enabling data analysis	
	Reduction workload	5	3%	-11%	-46	Savings on repairs	
	Savings on machines	-8	-5%	-12%	-50	Savings on (maintenance)processes	
				11%	83	Ctrl. repairs of machines	
				11%	83	Enhanced coordination of personnel	
	Legend:			10%	80	Ctrl. efficiency of employees	
	Yellow marked cell:			10%	77	Increased predictability of tasks	
	- objectives that were identified as relevant			9%	67	Ctrl. efficiency of machines	
	by management, but not by worker (CEOs'			8%	64	Enhanced resources planning	
	column)			8%	59	Reduction of false tasks	
	- objectives that were identified as relevant			6%	46	Reduction of unnecessary work	
	by worker, but not by management (Worker's			6%	44	Reduction of duplication of work	
	column)			5%	40	Reduction of process interruptions	
				5%	35	Reduction of follow-up work	
	Priority A: Very important objective			4%	33	Compliance with regulations	
	Priority B: Important objective			3%	20	Ctrl. costs of processes	
	Priority C: Less important objective			2%	18	Increased work safety	
	Priority D: Least important objective			2%	15	Reduction of downtime of machines	
				2%	13	Reduction workload of personnel	
				0%	2	Increased utilization of machines	
				-2%	-14	Savings on machines	

Table 5: Comparison of results (preference-neutral prioritization)

	Both	CEOs	Worker
Priority A	Complete verification documentation	Ctrl. efficiency of employees	Ctrl. condition of machines
	Tracking tasks / processes	Predictive Maintenance	Overview on "who, what, when"
	Enhanced task overview	Ctrl. repairs machines	Fast access to documents
	Unambiguousness of tasks	Enhanced coordination peronnel	Ubiquitous data availability
Priority B	Enhanced task planning	Increased predictability of tasks	General impr. of operat. procedures
	Enhanced resources planning		Increased process quality
Mixed priorit	Reduction info. losses		
	Ctrl. problems / troubles machines		
	Ctrl. problems / troubles within process		
	Legend:		
	Yellow marked cell: - objectives that were identified as relevant by management, but not by worker (CEOs' column) - objectives that were identified as relevant by worker, but not by management (Worker's column)	Mixed priority: Objective received different priority	

Table 6: Merged priority A and B objectives of CEOs and worker

During the feedback loop workshop the CEOs and financial advisor discussed the results. They have been asked by one of the authors to merge objectives for “A” and “B” prioritization. As they recognized the importance of their own but also of the worker´s high priority objectives, they agreed on the following consolidation of priorities of objectives with A or B priority:

- Priority A for objectives, that are relevant for the CEOs AND the worker (column “Both” in table 6)
- Priority A for objectives, that have priority A for the CEOs OR the worker
- Priority B for all other objectives.

The resulting final target system is shown in table 7. It will be used by the CEOs as starting point for the definition of requirements of an ideal resources planning system (with focus on mobile processes) and in a later stage for the support of the decision making process on which system to implement.

Priority A	Priority B
Complete verification documentation	Enhanced task planning
Tracking tasks / processes	Enhanced resources planning
Enhanced task overview	Increased predictability of tasks
Unambiguousness of tasks	General impr. of operat. procedures
Ctrl. efficiency of employees	Increased process quality
Predictive Maintenance	
Ctrl. repairs machines	
Enhanced coordination peronnel	
Ctrl. condition of machines	
Overview on "who, what, when"	
Fast access to documents	
Ubiquitous data availability	
Reduction information losses	
Ctrl. problems / troubles machines	
Ctrl. problems / troubles within process	

Table 7: Final target system

4 Conclusions, Recommendations and Implications

In this paper the authors applied the definition of the target system as part of an integrative framework for determining the economic impact of ICS using the example of mobile technologies, which was described in detail in section 2.1. This validation was carried out through the practical case in a German SME (building industry) described in this paper which was in its first stages of deciding whether to implement a mobile resource planning system. The main results of the applied procedure for defining a target system were presented in section 3.4. Defining the prioritised target objectives in the context of the German SME proved to be usable: we were conveniently able to a) defining a priori objectives and a resulting questionnaire through among others literature and task observation and analysis, b) holding workshops in identifying and prioritising objectives, and c) validating and consolidating results in a separate workshop with CEOs and an external financial advisor.

In order to improve validity of the integrative framework, further implementations in practice are necessary in other branches and for different kinds of applications. Further case studies are planned within some research projects, specifically the German projects BigDieMo1 and Mittelstand 4.0 Stuttgart and the EU-funded project PERMIDES, which are currently in the preparation phase. In addition, the proposed methodology for defining a target system can be applied to different kinds of target systems, not only in the field of mobile IT as presented in this paper as it is a generic approach based on the Analytical Hierarchy Process which is used for decision-making processes in general. The authors are aware that for validating the complete integrated framework from the very beginning of a project until the first monitoring stage (e.g. after 2 years after implementation), more case studies and longitudinal data collection is needed.

1 For more information see: https://www.ksri.kit.edu/news_1765.php

References

Ahlert, M. (2003). Einsatz des Analytic Hierarchy Process (AHP) zur Analyse von Wirkungsbeziehungen im Relationship Marketing. Wiesbaden: Gabler.

Aichele, C. (1996). Kennzahlenbasierte Geschäftsprozessanalyse. Wiesbaden: Gabler.

Alter, S. (1999). A general, yet useful theory of information systems. Communications of the AIS. 1 (13), pp. 13-60.

Alter, S. (2001). Which life cycle: Work system, information system, or software? Communications of the AIS. 7 (17), pp. 1-52.

Andersson, S. and Tell, J. (2009). The relationship between the manager and growth in small firms. Journal of Small Business and Enterprise Development. 16 (4), pp. 586-598. http://dx.doi.org/10.1108/14626000911000938.

Berghout, E., Nijland, M. and Powell, P. (2011). Management of lifecycle costs and benefits: Lessons from information systems practice. Computers in Industry. 62 (7), pp. 755-764.

Bezerra, J., Bock, W., Candelon, F., Chai, S., Choi, E., Corwin, J., DiGrande, S., Gulshan, R., Michael, D.C. and Varas, A. (2015). The Mobile Revolution: How Mobile Technologies Drive a Trillion-Dollar Impact. BCG Perspectives. Retrieved on 16.08.2015 from https://www.bcgperspectives.com/content/articles/telecommunications_technology_business_transformation_mobile_revolution.

BMWi Bundesministerium für Wirtschaft und Energie. (2016). Retrieved on 27.04.2016 from http://www.bmwi.de/DE/Themen/Digitale-Welt/Mittelstand-Digital/mittelstand-4-0.html

Business Dictionary (2016). Retrieved on 25.04.2016 from http://www.businessdictionary.com/definition/objective.html

Charette, R. N. (1991). The Risks with Risk Analysis. Communications of the ACM. 34(6), p. 106.

CMMI (2006). CMMI for Development, Version 1.2. Software Engineering Institute. Retrieved on 25.04.2016 from http://resources.sei.cmu.edu/asset_files/TechnicalReport/2006_005_001_14771.pdf

Corsten, H. (2000). Lexikon der Betriebswirtschaftslehre. München: Oldenbourg.

Darnton, G. & Darnton, M. (1997). Business Process Analysis. Albany: International Thomson Business Press.

Davis, A. et al. (2006). Effectiveness of requirements elicitation techniques: Empirical results derived from a systematic review. In Requirements Engineering, 14th IEEE International Conference, 11.-15.09.2006 (pp. 179-188).

Drews, G. and Hillebrand, N. (2010). Lexikon der Projektmanagement-Methoden. Freiburg: Haufe.

Forsman, H. (2008). Business development success in SMEs: a case study approach. Journal of Small Business and Enterprise Development. 15 (3), pp. 606-622. http://dx.doi.org/10.1108/14626000810892382.

Gadatsch, A. and Mayer, E. (2004). Grundkurs IT-Controlling: Grundlagen - Strategischer Stellenwert - Kosten- und Leistungsrechnung in der Praxis. Wiesbaden: Vieweg.

Goos, G. and Zimmermann, W. (2005). Vorlesungen über Informatik, Band 1: Grundlagen und funktionales Programmieren. Springer, Berlin.

Gruhn, V. and Wellen, U. (2001). Process Landscaping: Modelling Distributed Processes and Proving Properties of Distributed Process Models. In: Unifying Petri Nets: Advances in Petri Nets. Ed. by Ehrig et al. Lecture Notes in Computer Science 2128. Berlin: Springer.

Hammer, M. & Champy, J. (1993). Reengineering the Corporation: A Manifesto for Business Revolution. New York: Harper Business Essentials.

Harrington, H. J; Esseling, K. C.; Nimwegen, V. (1997). Business Process Improvement Workbook. New York: McGraw-Hill.

Haug, A.; Pedersen, S.G.; and Arlbjørn, J.S. (2011). IT readiness in small and medium-sized enterprises. Industrial Management & Data Systems. 111 (4), pp.490 – 508. http://dx.doi.org/10.1108/02635571111133515.

Högler, T. (2012). Framework for a Holistic Evaluation of ICT. In 25th Bled eConference 19.-22.06.2012. https://domino.fov.uni-mb.si/proceedings.nsf/0/a0f9c70c2698908fc1257b6e003b0e2b/$FILE/03_hoegler.pdf

Högler, T., Versendaal, J. and Batenburg, R.S. (2015). Evaluation of Mobile Systems – An Integrative Framework. In American Conference on Information Systems, 13.-15.08.2015. http://aisel.aisnet.org/amcis2015/EntSys/GeneralPresentations/7

Huin, S.F. (2004). Managing deployment of ERP systems in SMEs using multi-agents. International Journal of Project Management. 22 (6), pp. 511-517. 10.1016/j.ijproman.2003.12.005.

Hwang, C. and Yoon, K. (1981). Multi Attribute Decision Making: Methods and Applications – A State of the Art Survey. Berlin: Springer.

Hway-Boon, O. and Yu, C.M. (2003). Success factors in e-channels: the Malaysian banking scenario. International Journal of Bank Marketing. 21 (6/7), pp. 369-377.

IfM Institut für Mittelstandsforschung Bonn. (2013). Retrieved on 27.04.2016 from http://www.ifm-bonn.org/statistiken/unternehmensbestand/#accordion=0&tab=1

IMG International Management Group. (20.10.2015). Succeed with IT projects. 07.02.2016, from http://imgcorp.co.uk/outside/archives/12194.

Iqbal, N., Nadeem, W. and Zahee, A. (2015). Impact of BPR critical success factors on inter-organizational functions: an empirical study. The Business & Management Review. 6 (1), pp. 152-165.

Isaac, H. and Leclercq, A. (2006). Give me a mobile phone, and I will work harder! Assessing the value of mobile technologies in organizations: an exploratory research. In Proceedings of the International Conference on Mobile Business ICMB.

Kahneman, D. and Tversky A. (1979). Prospect theory: An analysis of decision under risk. Econometrica. 47 (2), pp. 263-291.

Kirchmer, M. (1999). Market- and Product-Oriented Design of Business Processes. In: Business Process Engineering – Advancing the State of the Art. Ed. by Elzinga, D.J., Gulledge, T. R. and C.-Y. Lee. New York: Springer, pp. 131-144.

Klabon, M.L. (2007). An Investigation of the Quantification of the Probability of Occurrence of Software Engineering Project Risks with Bayesian Probability. http://calhoun.nps.edu/bitstream/handle/10945/3121/07Dec_Klabon.pdf?sequence=1&isAllowed=y (visited 11/22/2015).

Köhler, A. and Gruhn, V. (2004). Mobile Process Landscaping am Beispiel von Vertriebsprozessen in der Assekuranz. In: Mobile Economy: Transaktionen, Prozesse, Anwendungen und Dienste. Proceedings of the 4. Workshop Mobile Commerce. Ed. by Pousttchi, K., Turowski, K. Bonn: Köllen, pp. 12-24.

Kosiol, E. (1976). Organisation der Unternehmung. Wiesbaden: Gabler.

Kronsteiner, R. and Thurnher, B. (2009). Opportunities and Risks for Mobile Decision Support. In: Handbook of Research on Mobile Multimedia. Ed-. by I. K. Ibrahim Hershey: IGI Global, pp. 93-104.

Kulk, G.P. and Verhoef, C. (2008). Quantifying requirements volatility effects. Science of Computer Programming. 72 (3), pp. 136-175.

Lehner, F. (2002): Grundlagen und Entwicklung - Einführung und Motivation. In: Teichmann, René; Lehner, Franz (ed.): Mobile Commerce - Strategien, Geschäftsmodelle, Fallstudien. Heidelberg: Springer 2002, pp. 3-28.

Maimbo, H. & Pervan, G. (2005): Designing a case study protocol for application in IS research. In Chau, P. (ed.): Proceedings of the Ninth Pacic Asia Conference on Information Systems, Hong Kong, pp. 1281- 1292

Meixner, O. and Haas R. (2012). Wissensmanagement und Entscheidungstheorie: Theorien, Methoden, Anwendungen und Fallbeispiele. Wien: Facultas.

Miles, M. B.; Huberman, A.M. and Saldana, J. (2013). Qualitative Data Analysis: An Expanded Source Book. California: Sage Publications.

Muller, P.; Gagliardi, D.; Caliandro, C.; Bohn, N. U. and Klitou, D. (2014). A partial and fragile recovery: Annual report on European SMEs 2013/2014. European Commission.

NIST. (2012). Guide for Conducting Risk Assessments. National Institute of Standards and Technology (NIST). Special Publication 800-30. http://csrc.nist.gov/publications/nistpubs/800-30-rev1/sp800_30_r1.pdf (visited 01.03.2016).

Nysveen, H., Pedersen, P.E. and Skard, S.E.R. (2015). A review of mobile services research: Research gaps and suggestions for future research on mobile apps. SNF Working Paper No 01/15. http://brage.bibsys.no/xmlui/bitstream/handle/11250/279041/A01_15.pdf?sequence=1&isAllowed=y (visited 22.11.2015).

Rockart, J.F. (1979). Chief Executives Define Their Own Data Needs. Harvard Business Review. 57 (2), pp. 81-93

Rückle, H. and Behn, M. (2007). Unternehmenserfolg mit Zielen. Renningen: Expert.

Hosseini, M.R.; Chileshe, N.; Zuo, J.; Baroudi, B. (2013). Approaches of Implementing ICT Technologies within the Construction Industry. Australian Journal of Construction Economics and Building – Conference Series. 1 (2), pp. 1-12. http://dx.doi.org/10.5130/ajceb-cs.v1i2.3161.

Saaty, T. L. (1996). Multicriteria Decision Making: The Analytic Hierarchy Process. RWS Publications, Pittsburgh.

Schiller, J. (2000). Mobilkommunikation. Techniken für das allgegenwärtige Internet. Munich: Addison-Wesley.

Sing, M.P. and Vyas, R. (2012). Requirements Volatility in Software Development Process. International Journal of Soft Computing and Engineering. 2 (4), pp. 259-264.

Staudt, E. (2996). Reporting und strategische Steuerung im Profifußball. In: Karagiannis, Dimitris; Rieger, Bodo (Hrsg.): Herausforderungen in der Wirtschaftsinformatik. Heidelberg: Springer, pp. 127-142.

Turowski, K. & Pousttchi, K. (2004). Mobile Commerce - Grundlagen und Techniken. Heidelberg: Springer.

Vuolle, M. (2011). Measuring Performance Impacts of Mobile Business Services from the Customer Perspective. PhD thesis, Tampere University.

West, D.M. (2014). The State of the Mobile Economy, 2014: Its Impact and Future. Center for Technology Innovation at Brookings. Retrieded on 15.06.2015 from http://www.brookings.edu/~/media/research/files/papers/2014/09/10-state-of-mobile-economy-west/state-of-mobile-economy_v13.pdf.

Whitworth, B. (2006). Social-technical Systems. In: Encyclopedia of Human Computer Interaction. Ed. by C. Ghaoui. Idea Group Reference. Hershey, pp. 533-541.

Wild, M, and Herges, S. (2000). Total Cost of Ownership (TCO) – Ein Überblick. In: Arbeitspapiere WI, Nr. 1/2000. http://geb.uni-giessen.de/geb/volltexte/2004/1577/pdf/Apap_WI_2000_01.pdf (visited 11/22/2015).

Yin, R.K. (2013). Case Study Research: Design and Methods (Applied Social Research Methods). Thousand Oaks: Sage Publications.

Annex 1: Upfront case study protocol

Preamble	Confidentiality and data storage	Anonymous, full data
	Publication	For research purposes only
	Documentation	Via Laptop and Excel file
	Layout of protocol	Excel file (Annex 2)
General	Overview of research project	It is generally accepted that ICT & ICS are an integral part of most businesses. Also accepted is that many of these systems are ineffective and under-utilised, but in most cases it is less a shortcoming of the implemented technologies but the lack of business/IT alignment and appropriate evaluation methodologies. To close this gap, it is proposed that a new way of evaluation and alignment between IT and business is necessary – a so-called socio-technical approach. The proposed Integrative Approach starts from the very beginning in a user-centric way and allows to identify critical success factors (both human and technical ones) that lead to a better business/IT alignment. The research aims to address the application of the first activity of the Integrative Approach – definition of a target system – in practice at a German SME in the building sector.
	The case research method	A triangular and qualitative-quantitative research approach is followed, including a literature study, previous workshops and a questionnaire that will be used during interviews. Operational task observations: in order to learn the SME's operations several days the tasks of one or more employees are to be observed. The subsequent interviews will follow the procedure proposed by Miles and Huberman (2013): Collect data (interviews with 3 separate groups: blue collar(s), management and external financial advisor). Structure data (following steps 2-6 of the proposed procedure for defining the target system); this should also done in association with the interviewees. Reduce data (step 7).
Procedures	Initial approach to organisation	Selection of cases: As most research is done within large enterprises, SMEs are chosen as research field. Maintenance processes are chosen as the author worked for years as product manager in the field of Mobile Maintenance Management. The selected company was chosen as good contacts already existed and the company is aiming at enhancing its processes. Number of cases: 1
	Establishing contact	The contact to the company management is established via private relationship to the company.
	Scheduling of field visits	4 days of task observation, 2 visits of the management (1 visit for interviews, 1 for discussion of results (together with financial advisor) and definition of further steps to be taken) 1 interview of financial advisor 1 interview with truck driver / employee / worker
	Session length	4 separate days for task observation, per subsequent interview 1 hour in average
	Equipment	Laptop, Excel file
Research Instrument	Semi-structured interviews	A questionnaire will be used during interviews, allowing also to add additional objectives that are not given by the questionnaire
Data analysis guidelines	Overview on data analysis process	Steps 2-6 of the 1st activity of the Integrative Framework (in association with the interviewees): - set up of goal hierarchy - analysis of effects (dependencies) between objectives - estimating strength of effects - assessment of the likelihood of effects - preference-neutral prioritization Step 7: - reduce objectives to final target system
	Convergence of data	Definition of an a-priori list of objectives (see annex 2): - Objectives related to "cost reductions" - Objectives related to "process quality" - Objectives related to "monitoring & control" - Objectives related to "working conditions" - Objectives related to "decision processes" - Objectives related to "environmental impact" - Objectives related to "processes" - Objectives related to "quality of work" Triangulation of data as follows: - 4 days observation of tasks of employees (truck driver) - 1 workshop with management (2 CEOs) - 1 workshop with employee (truck driver) - 1 workshop with management and external financial advisor - Suggested merging of outcomes Only one source of data (data gained during interviews) will be used as no further documentation or similar exists. Triangulation will be achieved by including all identified objectives into 1 table and taking average values of (steps 3-5)

Annex 2: Questionnaire

Key objective 1	**Profit maximization**
Basic objective 1.1	**Cost reduction**
Process objectives:	
	Savings on machines by
	Savings on personnell costs by
	Savings on (maintenance)processes by
	Savings on repairs by
	Savings on material consumption by
	Increasing availability of own machines by
	Securing warranty claims
	Other process objectives
Basic objective 1.2:	Increasing plant availability by x%
Process objectives:	
	Reduction of troubles by %
	Reduction of system failures by
	Other process objectives
Key objective 2	**Increased process quality**
Basic objective 2.1	General support of processes
Process objectives:	
	Enhanced task overview
	Reduction of information losses by
	Prevention of entry errors (validation documentation)
	Secure available knowledge
	Overview on "who, what, when"
	Predictive Maintenance
	Optimization of maintenance intervals
	Other process objectives
Basic objective 2.2	**Enhanced Controlling /Monitoring**
Process objectives:	
	Problems / troubles with machines
	Problems / troubles within processes
	Condition of machines
	Repairs of machines
	Tracking of tasks / processes
	Efficiency of employees
	Efficiency of machines
	Material consumption
	Inventory / stock
	Costs of machines
	Costs of employees
	Costs of processes
	Costs of material
	Other process objectives
Basic objective 2.3	**Enhanced working conditions**
Process objectives:	
	Reduction workload of personnel by
	Compliance with regulations
	Increased work safety
	Other process objectives
Basic objective 2.4	Enhanced data availability
Process objectives:	
	Ubiquitous data availability
	Data availability 24/7
	Realtime data collection / availability
	Seamless collection of data / information
	Other process objectives
Basic objective 2.5	**Support of decision processes**
Process objectives:	
	Enabling data analysis
	Fast access to (all) necessary documents
	Complete verification documentation
	Other process objectives
Basic objective 2.6	**Minimization of environmental effects**
Process objectives:	
	Compliance with environmental protection requirements
	Other process objectives
Key objective 3	**Reaching production targets**
Basic objective 3.1	**Optimisation of processes**
Process objectives:	
	Increasing utilization personnel by
	Increased utilization of machines by
	Reduction of downtime of personnel by
	Reduction of downtime of machines by
	Reduction of process interruptions by
	Reduction of unnecessary work by
	Reduction of follow-up work by
	Reduction of duplication of work by
	Reduction of false tasks by
	Unambiguousness of tasks
	Increased predictability of tasks by
	Enhanced task planning
	Enhanced resources planning
	Enhanced coordination of personnel
	Increased productivity of employees by
	General improvement of operational procedures
	Reduction of paperbased documentation by
	Reduction of administrative tasks by
	Other process objectives
Key objective 4	**Improved Image**
Basic objective 4.1	Increased quality of processed tasks
Process objectives	
	Increased process quality
	Enhanced working conditions
	Minimised environmental impacts
	Other process objectives