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IT Transformation Decision Processes: A Conceptual Framework for Efficiency/Effectiveness Optimization

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ABSTRACT

Decision processes are complex managerial challenges for long-term information technology (IT) initiatives with an organization-wide scope (in short: IT transformations). Costs, benefits, and risks of such IT investments are hard to capture, and the dozens of prescriptive methods proposed for IT project evaluation have proved to contribute little to solve the dilemma in practice. Thus, as opposed to continue the search for another prescriptive evaluation methodology, this paper follows a new approach: it targets the development of a conceptual framework that allows for the improved management of holistic IT decision processes - as opposed to cook-book approaches that attempt optimizing the corresponding decisions. The paper introduces a descriptive conceptual framework capable of describing the key components (e.g. socio-political elements) of practical IT transformation decision processes, while at the same time providing enough structure (e.g. rational decision process structures) to allow for decision process effectiveness/efficiency optimization. The framework is then leveraged to deduce theoretical levers for the improvement of practical decision processes. It is suggested as a basis for future structured/holistic case study research of practical IT transformation decision processes. To allow for the latter, the paper introduces an approach for the approximation of the involved input and output parameters in the framework.

Keywords: Decision analysis, information technology, IT transformations, decision support systems

INTRODUCTION

An IT transformation can be defined as an IT initiative with long-term objectives that substantially enables or supports a company's business strategy (Ross and Beath 2002). Such IT decisions are particularly difficult in practice, as only a part of the value from such an investment stems from direct measurable process improvements. Anticipated impact often relates to future business improvements, enabled through applications based on the IT transformation.

Complementary, managerial decision makers in companies find it hard to incorporate the diverse stakeholder's preferences into their decision-making, and theoretical models provided by research are often commented as too abstract and complex (Reiner 2004, pp. 36). Unfortunately, a significant share of IT budgets in companies is spent on exactly such IT transformations (Weill and Broadbent 1998, p. 82), which makes "good decisions" crucial for IT transformations. Thus, managers and researchers agree that wrong IT investment decision can have dramatic consequences for companies.

Concluding from such observations, one of the largest dilemmas in IT transformation decision making seems to be the connection of theoretical approaches provided by research and the needs of practical decision-makers. Most of the manifold methods provided by research are prescriptive and have rarely found their way into practice. They prescribe how practical decision processes should be conducted; many focus the evaluation phase with complex approaches to quantify the value of options, derive measures for the uncertainty involved, or attempt to benchmark the alternatives of choice between companies. All have in common, that they do not attempt to capture/model practical IT transformation decision situations, and thus miss the important link required as the basis for the practical optimization of IT transformation decision processes. When methods are applied at all, they are often picked in an ineffective ad-hoc style (mostly financial discounted-cash-flow-based approaches). In many cases decisions are not the results of an exhaustive decision process at all, but mostly follow the decision-makers "strategic intuition".

This paper attempts to narrow this gap between available theoretical approaches and practical decision situations by stating the research question: "What opportunities exist to appropriately model practical IT transformation decision processes as a basis for the inclusion of available theoretical methods and the overall improvement of the decision process effectiveness and efficiency?" We will deduce a conceptual framework to describe practical IT transformation decision processes that is suitable for the deduction of theoretical levers for improvement as well as providing the structure for the future research of practical IT transformation decision processes.

Research Methodology

This study follows the research methodology of analysis of documented empirical work and explorative expert interviews to derive requirements for such a conceptual framework which is summarized in section 2. Based on these requirements, in the next section we analyze available IT decision methodologies and methods for their fit with these requirements and matching structures will be leveraged for the deduction of the conceptual framework. Section 4 then introduces an approach to approximate/quantify the involved input and output parameters to connect the framework to practical decision situations and set up a basis to construct propositions, describe optimization problems, and serve as the basis for future case study research. Furthermore, theoretical approaches on how to improve effectiveness/efficiency of decision processes are suggested.

Analysis of the Established IT Transformation Decision Process

To address the research question, we analyzed surveys (Bacon 1992; Ballantine et al. 1999; Seddon et al. 2001; Willcocks and Lester 1999) and case studies (Demkes 1999; Farbey et al. 1992; Farbey et al. 1999) in the literature. They focused on large-scale IT investment decisions with anticipated long-term effects. In addition, multiple 1-3 hour interviews with experts (researchers; members of ERP selection, implementation and consultant projects; healthcare IT system vendor; etc.) were conducted in 2003-2004 to complete and confirm findings from literature (Reiner 2004, pp. 36). The interviews targeted the explorative identification of relevant aspects of IT transformation decision processes. The interviews were taped, transcribed, and made available to the interviewee for review.

Three main categories were extracted through the analysis: (a) the identification of critical contextual influences, (b) important decision process components, and (c) corresponding key parameters for the conceptual framework.

From Farbey et al. (1992, 1993, & 1999), it can be deduced that the IT transformation context is an important influence on a related decision process in a specific IT decision case. It determines the complexity of a specific decision, and influences the effort required to reach a "good" decision. Three categories of contextual influences emerge from the analyses, external (industry-specific), project-related (problem/scope/objective definition), and internal (organizational capabilities) contextual influences. Most interviewees underline the importance of these factors; moreover, they indicate that these three categories are most likely capable to summarize all considerable contextual influences without missing any important element. Consequently, the conceptual framework should be capable of modeling the industrial complexity and pace of the IT transformation decision process (R1: external context). Secondly, the framework needs to consider the quality of problem, scope, and objective definition for the IT transformation decision process (R2: project-related context) and thirdly, the framework needs to consider the organizational capabilities that are available for an IT transformation decision process (R3: internal context).

On a refined investigation 5 additional requirements for the proposed framework were identified, which are illustrated and structured in Table 1. While historic research in IT decision-making has mostly focused the evaluation phase, the expert interviews clearly confirmed the requirement to also include explicitly the sub-processes of alternative and scenario generation as well as a final phase of organizational decision-making (R4-R6: these three phases were agreed-on as the most important ones, and can be considered the greatest common divisor of all analyzed empirical findings). Besides these structural aspects, R6 adds the need to capture difficult tasks within a decision process. The search and use of required information is considered challenging in an IT decision process (Bernroider and Koch 1999; 2000; Willcocks and Lester 1994; 1999), these *static* decision process components need to be modeled. Comparably, *dynamic* components, as capturing the method selection and application, are included in the requirements as well. This task is often insufficiently solved in practice (Bacon 1992; 1994; Ballantine et al. 1999).

Seddon et al. (2001) provides evidence that working on the improvement of a decision process can foster better IT decisions. The conceptual framework, however, must track the relation of time and resources spent on the decision process phases and its anticipated outcomes (R7: tracking input parameters) and must control and track the quality of a decision process (R8: tracking output parameters.

Besides these requirements for a decision process optimization framework, the experts indicate that the model should be as simple as possible without sacrificing much of its generic validity for a wide range of IT transformation situations; it should be adjustable to decision maker's and project team's skills, and it should leverage existing IT appraisal methods wherever applicable.

Observations	Requirements for a conceptual framework to model IT transformation decision processes	
Influences of the decision process context	R1	The framework needs to consider the industrial complexity and pace of the IT transformation decision process (external context).
	R2	The framework needs to consider the quality of problem, scope, and objective definition for the IT transformation decision process (project-related context).
	R3	The framework needs to consider the organizational capabilities that are available for an IT transformation decision process (internal context).
Relevant decision process phases and components	R4	The framework is required to model the decision process from an initial need for an IT transformation to the final act of choice; it requires the flexibility to capture multiple decision project stages, or subsequent decision projects.
	R5	The framework needs to model the phases of alternative and scenario generation, the evaluation of alternatives in scenarios, and the phase of organizational (socic-political) decision-making.
	R6	The framework needs to capture static (availability and quality of information required) and dynamic (method selection and application) components of the decision process phases.
Key decision process parameters	R7	The framework needs to measure the time and resources spent on the decision process phases (to allow for optimizing the process efficiency).
	R8	The framework needs to measure/approximate key decision process quality parameters (to allow for optimizing the process effectiveness).

Table 1: Requirements for a conceptual decision process framework

A DESCRIPTIVE CONCEPTUAL FRAMEWORK TO MODEL PRACTICAL IT TRANSFORMATION DECISION PROCESSES

Researchers have been searching for ways to improve IT transformation decisions for decades. Often, the quantification, the "measurement", of anticipated effects of IT transformations was the focused. Several researchers have given overviews of available methods (e.g., Demkes 1999; Farbey et al. 1992; Powell 1992; Renkema and Berghout 1996). While many methods are variations of financial discounted cash flow or cost/benefits analysis, some also take into account qualitative criteria, while others focus on purely strategic situation analysis. Rainer and Stix (Reiner and Stix 2004) clustered the most frequently used approaches along three categories: "financial", "multi-criteria", and "strategic". Most of the methods published provide important insights regarding qualitative and quantitative cost and benefits of IT investments. Unfortunately, none is capable of providing a measure that can be used as the sole criterion to resolve an IT decision problem in practice.

Consequently, a number of more holistic decision frameworks for IT investments have been proposed by researchers recently. Most of the models follow a rational decision process by adapting the logic of alternative generation, evaluation, and decision-making (e.g. Bernroider and Koch 2001; Demkes 1999; Kaplan 1995; Remenyi 1999). Single models, such as Renkema's model (Renkema 1998), consider practically relevant socio-political aspects and organizational decision practices (see Simon 1979). All of the decision models investigated are aimed at optimizing

IT decisions in a prescriptive way and are not fully capable of modeling practical IT decision situations. The models are not primarily designed as a basis for decision process optimization, and do not focus on the concretization of relevant process parameters. As such, the models are not perfectly suited to determining and improving the efficiency and effectiveness of IT decision processes.

The Framework

Normative-rational and socio-political decision models provide the structure to model and improve practical IT transformation decision processes. The incorporation of available supporting evaluation and decision methods results in a conceptual framework. A rating approach is introduced to allow for the approximation and controlling of important decision process parameters as a basis for optimization.

The conceptual framework starts from a clearly defined decision problem, objective, and scope (which represents a first hurdle in many practical IT decision situations). For a framework for optimizing the efficiency and effectiveness of an IT decision process, it is critical to define a "good", or optimal, decision process. For our framework, we build on a suggestion by Janis and Mann (1977, p. 11) and define a high quality decision process to be one, where the decision maker considers a wide range of alternatives, surveys the full range of objectives to be fulfilled, comprehensively searches for cost, benefits, and risk related to the alternatives, iteratively refines the process, and finally chooses an alterative with the most satisfactory profile of information identified. In addition, the decision process is of good quality when it targets satisfactory choices instead of optimal ones that would require infinite search (Simon 1979). Moreover, a high quality decision process is expected to deliver a concept of actions and choices that describe a path towards the anticipated objectives, as opposed to a simple choice (of an application, system provider, etc.) with unclear rationales, next steps, and actions. Furthermore, we work on the precept (of rational decision theories) that high-quality decision processes lead to high-quality decisions.

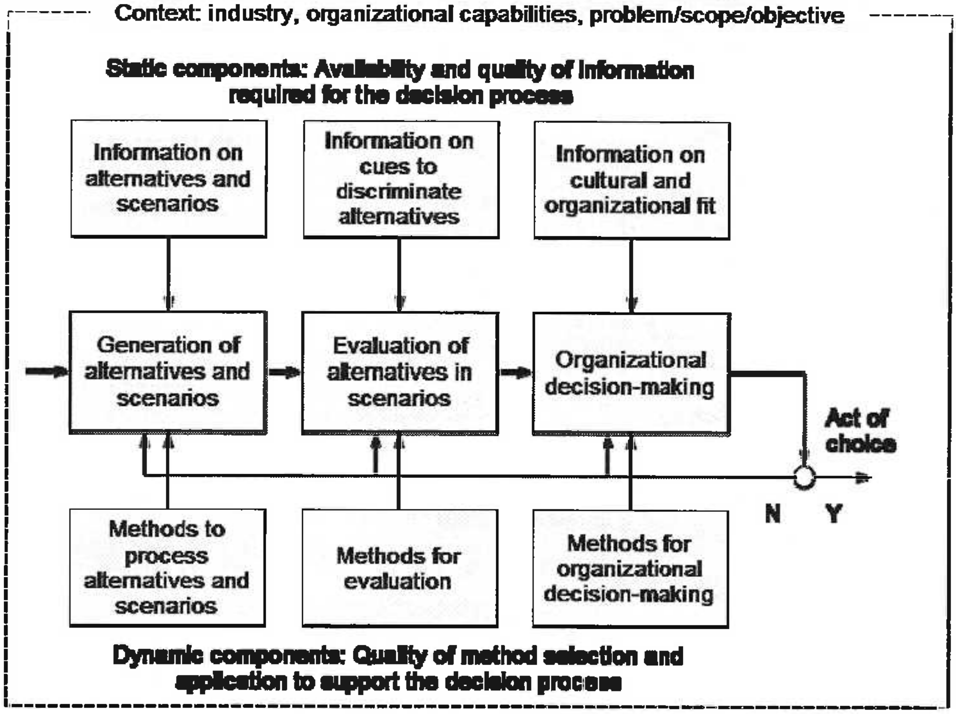

Figure 1: The conceptual framework.

The suggested framework for IT transformation decision processes (Figure 1) is expected to be capable of capturing most practical IT decision processes, and providing a basis for the optimization of their efficiency and effectiveness.

The framework builds on rational iterative decision models (e.g., March and Simon 1965; Mintzberg et al. 1995), extended with explicit socio-political aspects in the decision-making phase. It consists of three basic sub-processes. Each is individually supported with the tasks to search for information required in order to process the information for decision support. The resulting model describes a search-stop problem, as it proposes iteratively searching and processing information until a satisfactory quality of the decision process (and thus its results) is reached. The incorporated methods' central purpose is to navigate decision makers through a complex situation and help them focus on a number of relevant alternatives in likely scenarios, identifying dominant cues for differentiating the alternatives in several scenarios, and making stakeholders' interests and political preferences explicit.

A proper definition of the framework's scope, and the related target for improvement, is required in order to ensure a clear isolation of the optimization problem. As such, the model captures the process from a clearly stated IT transformation problem, through scope and objective to a final decision, resulting in a set of actions and choices as part of an IT transformation concept. The model does not, however, capture further steps (and follow-up decisions) in the IT transformation lifecycle, such as system and provider selection, proof of concept, system implementation, etc.

Parameterizing the Framework

Some basic assumptions and side conditions need to be considered for the parameterization of the introduced framework. Firstly, the input for the model is assumed to be given: a goal-neutral, in-depth formulated problem, objective and scope for the IT transformation to be decided upon (ideally, an array of goals for different periods in the IT transformation process, e.g. a stakeholder group satisfied with the decision in the short term, a successful pilot, and an improved market share of 5% in the long term). Secondly, the anticipated outcome of the decision process needs to be clear; we suggest a decision template enabling decision makers to take informed choices, given a feasible set of alternatives that have been evaluated in likely future scenarios, and taking into account socio-political and organizational aspects. Thirdly, the result function for the model needs to be defined; we introduce the following variables:

C	Total effort (cost) for the IT transformation decision process (e.g. internal and external personnel cost).
t	Total time for the IT transformation decision process (that corresponds with its efficiency).
C_{Team}	Effort (cost) per hour caused by the project team preparing the IT transformation decision.
Q	Overall quality of the decision process (that corresponds with its effectiveness).

We assume the cost for, and skills of, the project team is constant and no other cost is caused by the decision process. This allows the framework to focus on the time t in the optimization problem, while the costs C are correlated to t:

$$C = C_{Team} * t$$

While Q turns out to be hard to measure in practice, approximations are feasible (see next section) and allow for two basic optimization scenarios to be considered:

- *Efficiency optimization*: The required decision process quality Q is assumed for a satisfactory choice and held constant. An optimal decision process minimizes t.
- *Effectiveness optimization*: t is given and held constant. An optimal decision process maximizes the decision process quality Q, to maximize the chances for a satisfactory choice.

To connect these parameters with the above conceptual framework for IT transformation decision processes, t and Q are further split up into their component parts according to three process phases: generation (G), evaluation (E) and decision (D);

$$t = t_n = \sum_{i=1}^{n} t_i^G + t_i^E + t_i^D \text{ , and}$$

$$Q_i = f(Q_i^G, Q_i^E, Q_i^D),$$

whereas the new variables are defined as:

- n Total number of iterations until the final decision is made.
- t_i^X Time spent on sub-process X after iteration i.
- t_i Time spent on the decision process after iteration i.
- Q_i^X Cumulated quality of sub-process X after iteration i.
- Q_i Cumulated quality of the complete decision process after iteration i.
- $f()$ Function mapping the quality measures of all sub-processes to the process quality measure.

The quality of each subprocess can be further decomposed into its static and dynamic components. Thus, we suggest that

$$Q_i^X = h(Q'^X_i, Q''^X_i),$$

where Q' measures the static component (the information available), Q'' measures the dynamic one (the method-supported search, consolidation and processing of information) and h is a function consolidating these two quality measures. In the case of the evaluation sub-process (E), for example, the static component accords to the quality of information cues to discriminate alternatives in scenarios, whereas the dynamic component would be the quality of the method application for the corresponding evaluation. For future refinement of the model, both an extension of the number of sub-processes and further decomposition criteria for the quality measures could be considered.

After each iteration cycle, a process decision has to be made; can a satisfactory IT transformation choice be taken or is another iteration required? This choice is dependent on the quality of the decision process reached after iteration i and the time required to get to this stage. Depending on the objectives discussed before, the suggested optimization model is:

- *Efficiency optimization*: $t \rightarrow min!\, s.t.: Q_n > L$, where L is a parameter that defines a certain level of quality, which has to be fulfilled for a satisfactory decision.
- *Effectiveness optimization*: $Q_n \rightarrow max!\, s.t.: t < T$, where T is a parameter that defines the maximum time allowed until the decision has to be made.

The introduction of a utility function u combines the two cornerstones, the gained quality and the required time to achieve this quality, to a utility measure:

$$u(Q_n, t) \rightarrow \max!$$

Since quality is monotone increasing with respect to time and has a positive impact on the utility, its first derivative has to decrease (because quality is bounded); there will be at least one optimizer (assuming that time, i.e. cost, has an unbounded negative impact on the utility).

To leverage this conceptual framework for further research on optimization algorithms and heuristics, one more hurdle needs to be overcome, namely the estimation of parameters and functions involved. While t, n, and C can be measured (or counted) straightforwardly, L depends on the interaction with a real-life decision maker and can be estimated by using experience or benchmark data from comparable IT transformation decision efforts. As a challenge, the important quantification of all quality-related parameters, as well as their consolidation functions f and h, remain to be solved.

APPLICATION OF THE CONCEPTUAL FRAMEWORK

Similarly to other managerial decision challenges, IT decisions can be considered optimization problems. Their objective is to reach satisfactory (effective) choices within the shortest possible time and with the lowest decision process cost (thus being efficient). While such decision problems are regarded as non-trivial for IT investments in general, they are particularly complex for large IT investments that affect a major share of a company's strategy and business conduct in the long term, e.g., ERP system implementations.

Identification of Parameters

To provide a stage for optimization approaches and heuristics to improve the effectiveness and efficiency of the IT transformation decision process, quantitative representations of the quality parameters Q'^{X}_{i} and Q''^{X}_{i} are required. The purpose of such a parameterization is a systematic assessment of the decision process situation as an optimization (and controlling) basis. Therefore, we suggest a list of specific rating criteria (sub-factors) for each input parameter. We denote by $q^{X}_{i,k}$ the k-th quality sub-factor measure (scaled between zero and one) accumulated up to time i of the sub-process X. The sub-factors introduced as examples below in Tables 2-4 have been identified from the in-depth research of five case studies on IT transformation decision processes in healthcare, automotive, consulting, and IT services. (The summaries of criteria represent interim results of the research in progress).

Generation Phase

Sub-factors to approximate Q'^{G}_{i} and Q''^{G}_{i} in the phase of alternatives and scenario generation are listed in Table 2. High quality information for IT transformation decision support needs to include a comprehensive picture of the company's situation and strategy, alternatives to implementing an IT transformation, as well as the sound alignment of business and IT strategy (Henderson and Venkatraman 1999). Supporting methods should be chosen to match these specific requirements and fit to the organizational capabilities available for their application. For the static component subfactors, we thus evaluate the availability of information on the present and target state, as well as the information's reliability, structure and consistency. Dynamic component subfactors cover the method selection ("doing the right things"), organizational experience and skills regarding the method application ("doing things right"), and the focus of the method application ("minimize the complexity in doing things").

Evaluation Phase

Criteria to approximate the quality-related parameters Q'^{E}_{i} and Q''^{E}_{i} in the process of alternative evaluation are listed in Table 3. The evaluation needs to consider all relevant alternative/scenario combinations, and this requires significant resources when a large number of combinations are to be evaluated. The information on cues to discriminate the combinations on their cost (hardware, software, customizing, implementation, operations and maintenance, security, transition, management, etc.), benefits (qualitative and quantitative, immediate and long-term, direct and indirect) and risk (technology risk, provider risk, motivation risk, scope creeping risk, market risk, etc.) should be determined against a suitable baseline.

Decision-Making Phase

Comparable to the above two phases, criteria to approximate the parameters Q'^{D}_{i} and Q''^{D}_{i} in the process of decision-making are listed in Table 4. For the IT transformation decision process it is necessary to incorporate information on socio-political elements. Therefore, the final phase of decision-making needs to take into account information on the organizational fit of the solution, as well as on decision makers' and stakeholders' personal objectives and targets.

Subfactor		Measure, %
$q'^{G}_{i,1}$	*Present state*: Strategic scenarios (business *and* IT)	Total of identified (future) business and IT scenarios (with the current infrastructure as starting-point) weighted by the estimated probability of occurrence
$q'^{G}_{i,2}$	*Target state*: IT transformation alternatives to achieve the objective scenario	Number of IT transformation approaches considered for alternative generation, in relation to theoretically available approaches (company-internal or on the market)
$q'^{G}_{i,3}$	*Condition of the information*: Reliability, structure, consistency	(Reliability % of alternatives/scenarios generated) * (Degree of alignment % between scenarios and IT transformation alternatives chosen)
$q''^{G}_{i,1}$	*Method selection*: Appropriateness of selected method(s)	Degree % to which the chosen method(s) are supportive in alternative/scenario generation ("doing the right things")
$q''^{G}_{i,2}$	*Match with experience and skills*	Percentage of project stakeholders that are experienced/skilled with the applied method(s) to create and process alternatives and scenarios ("doing things right")
$q''^{G}_{i,3}$	*Focus*: Consolidation and prioritization of alternatives and scenarios	1-(Percentage of redundant or irrelevant alternative/scenario information requried by the method)

Table 2: Criteria to approximate the generation input parameters Q'^{G}_{i} and Q''^{G}_{i}

Subfactor		Measure, %
$q'^{E}_{i,1}$	*Present state*: Business and IT infrastructure baseline	Number of business and IT process baseline functionalities documented in relation to the total of IT-transformation-affected functionalities
$q'^{E}_{i,2}$	*Target state*: Impact of alternatives on the baseline	Average for all alternative/scenario combinations: Number of impacted (directly/indirectly, qualitatively/quantitatively) functionalities documented as different to the baseline scenario in relation to the total of baseline functionalities
$q'^{E}_{i,3}$	*Condition of the information*: Reliability, structure, consistency	(Reliability % of evaluation information used) * (% of identified impact information allocated to categories as cost, benefits, risk, and implementation time)
$q''^{E}_{i,1}$	*Method selection*: Appropriateness of selected method(s)	Degree % to which the chosen method(s) are supportive in evaluation ("doing the right things")
$q''^{E}_{i,2}$	*Match with experience and skills*	Percentage of project stakeholders that are experienced/skilled with the applied method(s) to evaluate alternatives in scenarios ("doing things right")
$q''^{E}_{i,3}$	*Focus*: Consolidation and priorization decision cues to discriminate alternatives	1-(Percentage of redundant or irrelevant decision cue information suggested by the evaluation method(s))

Table 3: Criteria to approximate the evaluation input parameters Q'^{E}_{i} and Q''^{E}_{i}

Subfactor		Measure, %
$q'^{D}_{i,1}$	*Present state*: Organizational governance and decision environment	Percentage of affected cultural and organizational environments and decision culture made explicit (documented)
$q'^{D}_{i,2}$	*Target-state*: Stakeholder's preferences	Percentage of documented consequences on the organizational roles initiated by the IT transformation alternatives (potential political decision factors)
$q'^{D}_{i,3}$	*Condition of the information*: Reliability, structure, consistency	(Reliability % of evaluation information used) * (% of hidden preferences not made explicit)
$q''^{D}_{i,1}$	*Method selection*: Appropriateness of selected method(s)	Degree % to which the chosen method(s) are supportive in capturing stakeholders' (hidden) preferences (e.g., workshops, group decision-making)
$q''^{D}_{i,2}$	*Match with experience and skills*	Percentage of project stakeholders that are experienced/skilled with the applied method(s) to evaluate the organizational fit of alternatives ("doing things right")
$q''^{D}_{i,3}$	*Focus*: Consolidation and prioritization of stakeholder preferences	1-(Percentage of redundant or irrelevant stakeholder preferences identified and processed by the decision method(s))

Table 4: Criteria to approximate the decision-making input parameters Q'^{D}_{i} and Q''^{D}_{i}

Accumulation of the Parameters

For each sub-process, a weighted sum of the introduced sub-factors can be used to approximate each parameter's cumulated quality score after a specific iteration *i* in the decision process:

$$Q'^{X}_{i} = \sum_{k=1}^{m^X} w^X_k \, q'^{X}_{i,k}, \; with \sum_{k=1}^{m^X} w^X_k = 1 \quad ,$$

where w^X_k is the weight of sub-factor $q'^{X}_{i,k}$ in sub-process *X*, and m^X is the number of sub-factors in the approximated component of sub-process X (identical for Q''^{X}_{i}). This is not the only way of combining the sub-factors. It is, however, a commonly used method, even though it hides a lot of problems as for example: different scale-levels (nominal, ordinal or cardinal). High scores for a sub-process component correspond to high information respective method-application quality that is likely to provide to a satisfactory decision, and minimize the risk that further efforts on the sub-process could change the decision outcome.

Explanatory Example

As one simple exemplary heuristic, we suggest the following approximation of the consolidation functions. *h* consolidates the 2 sub-process components as a 1/2-weighted sum, and *f* summarizes the 3 sub-process qualities with 1/3-weights. (This rough approximation leaves room for improvement, as it assumes the quality measures as compensatory, e.g., a superior evaluation could compensate for a lacking generation of alternatives, which is true only to a certain degree.) With these functions defined, the decision quality *Q* is maximized from the given project team resources of *T*. Practical observations of IT decision processes indicate that 2 iterations produce good results, so half of the available time *T* is equally distributed to the sub-processes in the plan for a first iteration. The project team's actions consider the required sub-factors to reach a high quality in each phase. For the 2nd iteration, the remaining resources are distributed to each phase with weights proportional to $(1\text{-}Q^X_i)$, so that the most resources are spent on the currently poorest quality sub-process. After the 2nd iteration, one preferred solution (or the solution *not* to transform the IT) should remain. (In cases where more than one solution is left, further iterations could improve aspects in the process until weaker solutions are eliminated. More resources , however, will be required for a satisfactory decision. The overall process quality achieved would represent an informed decision, taking into account relevant alternatives in likely scenarios, discriminated by relevant cues. Moreover, socio-political aspects would have been recognized in a high-quality decision process.

CONCLUSIONS AND FUTURE WORK

Classical evaluation methods to "measure" the value of IT have proven insufficient for complex IT transformation decision processes in practice. Various surveys and case studies have shown the need for a holistic approach to IT decisions, supporting the complete decision process and the corresponding identification of information required, as well as the processing of information leveraging appropriate methods. This paper has proposed a conceptual framework incorporating these aspects; it is expected to be capable of capturing most practical IT decision situations. To allow for quantitative optimization approaches, a parameterization of the model was suggested; the corresponding introduction of central variables and functions along the decision process allows the identification of relevant parameters for its optimization. As such, it provides a first step towards optimizing the efficiency given a required level of sophistication (with respect to the effectiveness of given limited decision team resources) for IT decision processes. A further major hurdle is overcome with the suggestion of a logic to approximate the quality-related input parameters in the framework.

The next stage on the optimization path is open for further research, as the framework delivers a stage for various interesting optimization challenges; how much time and effort should be spent for each sub-process within an iteration; which sub-process should be continued with after the decision for iteration; how should time and effort be distributed between the simultaneous information search and processing for each sub-process? The framework allows the application of, and encourages for the search for optimization approaches from OR, that could lead towards a solution of the IT transformation decision problem.

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