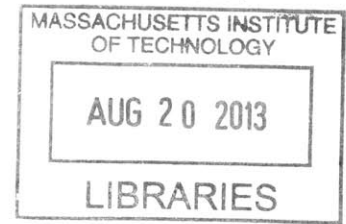


**Change Management Approach for Enterprise Transformation and  
Improvement**

by

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Submitted to the System Design and Management Program  
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# **Change Management Approach for Enterprise Transformation and Improvement**

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## **Abstract**

Enterprises, companies and organizations around the world strive to achieve competitive advantage by designing and implementing more advanced business and organizational architectures, streamlined and robust processes and structures, and effective and scalable management systems and practices. Industry, academia and management consulting companies have developed a variety of organizational models, change frameworks and transformation roadmaps to facilitate and to support business improvement activities and initiatives. The overall change management landscape, however, remains rather vague, overlapping and fragmented at the same time.

To reduce this ambiguity and to be able to make a better-educated choice of models and frameworks to use, a close examination, classification, mapping and analysis of leading models and frameworks is conducted here. Common themes and distinct features are identified. An alternative high level organizational model is proposed. The coupled nature and duality of organizational models and change frameworks are identified and explored. Macro and meso levels of change management are considered and bridged via the classification of change management actions and interventions and the decomposition of change management planning and transformation design phases. To complement high level change management frameworks with applied tools, a change management projects scoring approach called "BLUE-over-RED" is proposed. In addition, an attempt to formulate a formal problem of organization transition trajectory optimization using the apparatus of operations research and graph theory is made.

**Thesis Supervisor:** Eric Rebentisch

Research Associate, Center for Sociotechnical Systems Research, MIT

*"The world would have been better off if books were written  
by those who really have something to say."*  
Wise man (can't find the source)

## Table of Contents

1	Introduction.....	9
1.1	Motivation .....	9
1.2	Thesis Goal .....	9
1.3	Synergy of organizational models and change frameworks .....	10
1.3.1	Approaches to organizational change.....	11
1.3.2	Organization of the thesis .....	18
2	Organizational Models .....	20
2.1	Existing Models.....	20
2.1.1	McKinsey’s 7S’ and Organizational Health (OH) Frameworks .....	23
2.1.2	Galbraith’s Star-model.....	26
2.1.3	MIT LAI Enterprise Architecting framework .....	27
2.1.4	Organizational Models’ Analysis Summary .....	28
2.2	Proposed New Model .....	28
2.3	Conclusion .....	30
3	Transformation Frameworks and Change Management.....	32
3.1	Comparison of enterprise transformation and improvement frameworks .....	32
3.1.1	Carnegie Mellon IDEAL framework .....	35
3.1.2	McKinsey’s 5A’s framework.....	36
3.1.3	MIT ESAT framework .....	37
3.2	Frameworks Analysis Summary .....	37
3.3	Change Management Interventions and Action Areas.....	39

4	Transformation Planning and Critical Success Factors.....	43
4.1	Existing change and transformation projects scoring approaches .....	44
4.2	Suggested approach: Blue over Red .....	51
4.3	Project scoring and categorization .....	54
4.4	Blue over Red summary .....	59
5	Formal methods of enterprise transition modeling.....	61
5.1	Problem definition and existing methods.....	64
5.2	Graph-based interpretation of transition path finding problem .....	68
5.3	Modeling, practical implications and interpretations .....	72
5.4	Summary and key takeaways of the formal approach.....	76
6	Conclusion.....	77
7	Bibliography and References .....	80

## List of Figures

Figure 1 The most prominent schools of thought in change management .....	12
Figure 2. Prime focus of various change management schools.....	14
Figure 3 Thesis structure and organization.....	18
Figure 4 Nine elements of organizational health ( <a href="http://solutions.mckinsey.com">http://solutions.mckinsey.com</a> ).....	25
Figure 5 Variations of Star Model (Galbraith, 2002) .....	27
Figure 6. Proposed new organizational model.....	29
Figure 7 Duality: model of organization and transformation framework.....	32
Figure 8 Identification of interventions and actionable items .....	40
Figure 9 Categorization of interventions and change actions .....	42
Figure 10 Change projects definition cycle.....	43
Figure 11 DICE Scoreboard. (Sirkin, Keenan, Jackson 2005) .....	46
Figure 12 Beckhard's Change Formula as System Dynamics Model .....	49
Figure 13 BCG DICE Score vs. Bechhard's Change Formula .....	50
Figure 14 Blue over Red scoreboard.....	56
Figure 15. Monte-Carlo simulation of Blue-over-Red project scores and outcomes .....	59
Figure 16 Effectiveness-efficiency transition space. (source: Gruenwald 2011).....	63
Figure 17 Cumulative Payoff in the transformation phase.....	66
Figure 18 Graph model of enterprise system transition .....	70
Figure 19 Reference dependencies of payoff, cost, effectiveness and efficiency.....	74
Figure 20 Illustration of various objective functions: Mountain climbing paths.....	76

## List of Tables

Table 1 Organizational Models .....	22
Table 2 Comparative mapping of transformation frameworks and models.....	34
Table 3 Scoring table for the attributes in nominator .....	55
Table 4 Scoring table for the attributes in denominator .....	55
Table 5 Data collection for Blue-over-Red approach (notional) .....	58
Table 6 Graph based model of enterprise transition.....	71

# **1 Introduction**

## **1.1 Motivation**

Enterprises, companies and organizations around the world strive to achieve competitive advantage by designing and implementing more advanced business and organizational architectures, streamlined and robust processes and structures, effective and scalable management systems and practices. They are trying to eliminate inefficiencies and waste, to maximize value delivery, to optimize workflows and to instantiate new, innovative approaches of project and program management, units' coordination, performance assessment, quality control and employees' motivation and engagement. While in some cases these improvement projects and transformation initiatives are driven by management teams within institutions, it is a common practice to engage management and operational consultants to define and to support such projects and initiatives. Management consulting firms, industry and academic institutions have developed and employed a number of techniques, practices, frameworks and models for organizational and enterprise transformation and improvement. Some of these frameworks, often, have catchy names and are used extensively as marketing and branding tools. It would be interesting to look behind the glossy billboards and to discover the real value and content of these frameworks and models, which is presumably hidden underneath the flashy acronyms, sexy diagrams and obsessive use of alliterations.

## **1.2 Thesis Goal**

While many frameworks and models remain proprietary and are barely exposed to the outside world, a closer examination of these models and frameworks will be conducted to identify their key elements, strengths and weaknesses, distinct features and commonalities. Assessment of the applied context of these frameworks, level of generalization, limitations, and gaps and overlaps between their components in order to create a systematic layout and a comparison map will be performed. Also, since

transformation and improvement of any organization, enterprise or institution assumes that certain actions need to be taken to change the state of the corresponding system I would like to evaluate how transformation and improvement frameworks are related with change management theory and practice. In addition, a detailed look at transformation planning phase improvement projects definition and change interventions sequencing is going to be taken. Applicability and relevance of some methods of operations research and formal methods will be examined. It will be studied, how these methods can be applied to facilitate transformation planning and optimal transition trajectory path finding.

Thus, I will try to evaluate the boundaries and to define the essence of existing models and frameworks, to formulate suggestions on how an ideal framework might look and propose an alternative model of organizations. This approach assumes a systematic analysis of established theory and practice in change management and enterprise transformation. The expected outcomes are an integration of change management and improvement implementation planning, methods of identification of interventions, and development of a change roadmap.

### **1.3 Synergy of organizational models and change frameworks**

One of the key ideas, which are pursued here, is a demonstration of the fact that any transformation and improvement framework, which aspires to be complete and holistic, should be based on two key artifacts: a model of the organization/enterprise and a transformation, improvement or change management framework. Ideally, the transformation and improvement frameworks should be based and built upon a foundational model. However, it will be demonstrated through provided analysis, that while in some cases the transformation and improvement frameworks and organizational models are designed and work in tandem, in other cases organizational models and transformation frameworks are very loosely coupled or exist independently. A model of the organization is extremely important; it defines the approach we are reasoning about organizations, defines the levers which are in our possession, and helps

to explain how the observable behavior and performance of the organization is linked to underlying components and artifacts of the model. However, often such a model represents a somewhat static snapshot of the organization and does not necessarily provide means and guidelines to define how to change the state of the organization and transition to another orbit. This is where the transformation and improvement frameworks come into the play. These frameworks in the generic case do provide certain guidance and steps which need to be taken to make a change. One may argue that organizational change, transition and transformation is extremely subjective and depends a lot on the environment, context, personalities, surrounding landscape, and available actions and resources, and therefore it is very difficult to generalize and the applied value of such frameworks is limited. It might be true, but it is assumed that even generic frameworks, which need a lot of customization and context-dependent adjustments, are better than pure ad-hoc approaches.

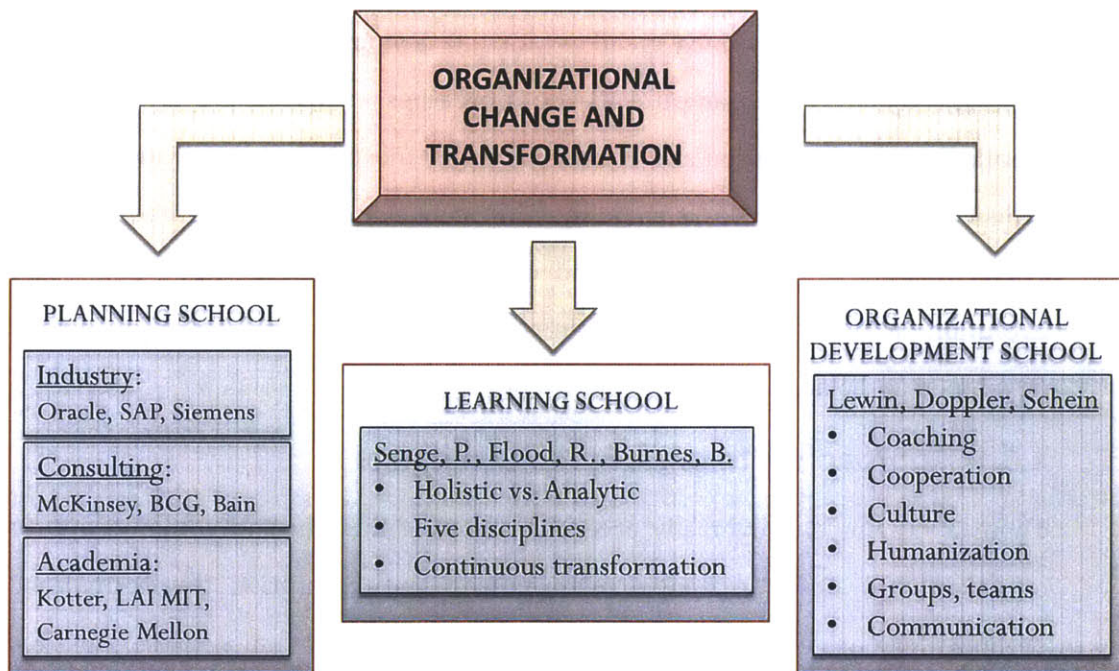
Another prime observation and conclusion is that most of the organizational models and transformational frameworks share the same core elements, while at the same time they do have certain distinct features and characteristics. So it is interesting to trace the evolution of thought in this domain and see how the original ideas were further developed and elaborated by the followers.

### **1.3.1 Approaches to organizational change**

There is no single, universally accepted school of thought and common approach for organizational design, change management and enterprise transformation. Since organizations are extremely complex and fluid socio-technical systems, this domain is certainly shaped by a cross section of management science, operations research, sociology and even cognitive science. At least identify three prominent and distinctive approaches (Burnes, 2009) to change management and enterprise transformation can be identified. These approaches are called here the planning school, the learning school and the organizational development school.

### 1.3.1.1 The planning school

The planning school is probably the most representative and widely accepted, though often representatives of this school do not recognize each other and rarely reference each other, since most are attempting to provide unique contributions and rarely benchmark themselves to others. Most consulting organizations belong to this school since their business models often are based on short-term engagements, where the outcome or deliverables are usually recommended courses of actions, directions and lists of changes, which need to be implemented to improve business performance. So the premise is that it is possible to figure out in a short period of time what needs to be fixed/changed and then execute the proposed plan that will improve the situation.



**Figure 1 The most prominent schools of thought in change management**

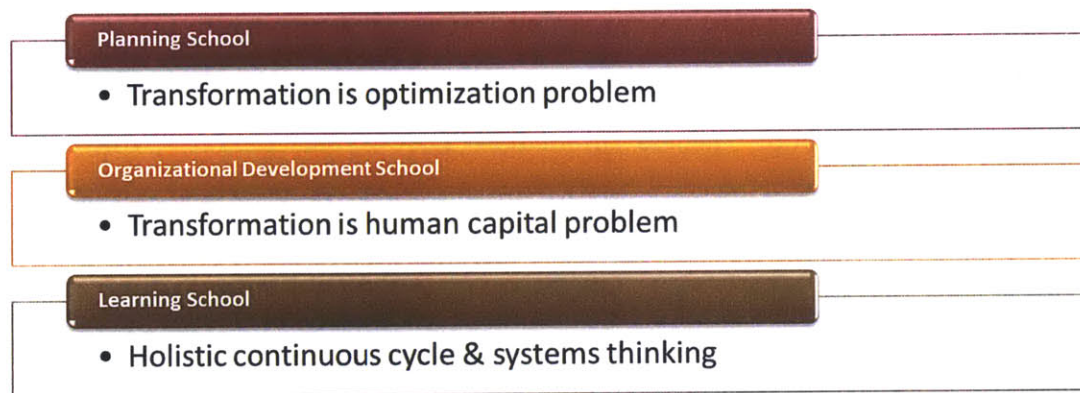
Another branch of the planning school is represented by industry enterprises and conglomerates. Big multinational corporations often have internal consulting units or groups, which are intended to improve business performance and operational efficiency within the organization and provide support to management in different improvement

projects. However, sometimes corporate consulting functions act almost like true consulting firms, providing consulting services to external clients (Porsche Consulting, Hitachi Consulting, IBM Global Services). Sometimes these services are complementary to the products that are designed and sold by these organizations. E.g. SAP designs and develops flagship enterprise resource planning software (ERP), which is almost de-facto the standard among Fortune 500 companies. And either SAP itself or more often SAP partners provide services on deployment and implementation of ERP products to end customers. In fact, deployment of ERP systems is often a significant change management project by itself for organizations that decide to implement it. ERP systems nowadays go way beyond pure business automation. They contain modules which can cover and model almost any business process, structure, role, decision rule and flow. Therefore in many cases these systems are a critical piece of any change management project, and they often contain dedicated tools to facilitate organizational change execution and implementation, e.g. such as SAP Organizational Change Management Toolkit (<http://scn.sap.com/docs/DOC-8040>).

Academic institutions such as Carnegie Mellon's the Software Engineering Institute and their extremely wide spread Capability Maturity Model (CMM) and (CMMI) and much less known "IDEAL" improvement framework also belong to "Planning School". The Massachusetts Institute of Technology Sociotechnical Systems Research Center and Lean Advancement Initiative developed an enterprise architecting framework and Enterprise Strategic Analysis and Transformation framework (ESAT) (Nightingale; Srinivasan 2011). John Kotter from Harvard Business School, whose book "Leading Change" (Kotter, 1996), is considered as a seminal contribution to change management theory fits squarely in this category.

Summarizing an overview of the planning school, a conclusion can be made that members of this school primarily treat change management and business performance improvement as an optimization problem. Change is largely accomplished through alignment, elimination of waste, maximizing utilization, solving problems of multiple

stakeholder satisfaction by changing primarily tangible things such as structures, processes, rules, and responsibilities. While the planning approach to organizational design and transformation is often criticized for being somewhat mechanistically biased, strong belief in the rational nature of decision making and over-emphasis on monetary incentives of the people (Burnes, 2006), it still remains the most dominant methodology, de-facto employed in many enterprises, consulting companies and organizations in general.



**Figure 2. Prime focus of various change management schools**

In fact, it wouldn't be a big stretch to claim that the entire multi-billion dollars management consulting industry is in fact a flagship of the planning school. The very nature of consulting engagements is very adherent to the principles of the planning school: short term analysis, problems decomposition, data and metrics driven root cause analysis, identification of gaps and deficiencies, and, finally, outcome/deliverables in the form of proposed corrective actions. Despite the known limitations and drawbacks of the planning school, since it remains a mainstream in real business world, the scope of this thesis is limited to consideration of the planning school only, since detailed evaluation of the organizational development school, the learning school and other alternative approaches to organizational change is beyond the area this research. However, for the sake of completeness and better understanding of how the planning school is different from others, brief overview of the other two schools is included.

### 1.3.1.2 Organizational development, learning schools

Contrary to the planning school, the organizational development school considers people with their emotions, their needs, aspirations and a range of motivations, which is broader than just financial incentives, as a cornerstone of organizational design and change (French, Bell 1995). The Organizational Development (OD) school, associated with such figures as Lewin, Dopler, Shein and others claims to pursue goals that on the surface seem to be contradictory: achieving improvements in the organization's performance through humanism and harmony by increasing quality of working conditions and climate within organizations and groups (Sullivan 2010). The emphasis is made on shaping the organizational culture, harmonization of group interactions and dynamics, involvement of individuals, attention to communication, and encouragement of new desired behaviors. Organizational development school practitioners seem to agree (Cummings, Worley, 2005) that the core values of this approach are equality, employee empowerment, consensus building, culture of collaboration and horizontal relationships. The following key components of this school are usually outlined: Field Theory, Group Dynamics, Action Research and Lewin's Three-Step Model (Burnes, 2009).

Without diving deeper into the organizational development subject here, I would like conclude that the prime focus of this school of thought in the context of change management is on group behavior, engagement and participation on individual level, creating favorable conditions for change by eliminating restraining forces and identifying required actions to change the status quo towards desired direction. In other words the business performance improvement problem is primarily related to human capital, human development and interaction problems. It's needed to note that in fact there are certain similarities between planning school and OD school. E.g. the Action Research in OD is somewhat similar to generic planning-execution-control cycle: researching/analyzing the problem, identifying the required actions to mitigate or eliminate the problem and executing them, and, finally, evaluating outcomes and

effectiveness of actions taken. The major difference, however, is in implied context. In the case of the planning school, the context is usually depersonalized, but systematic. It is driven by a “mutually exclusive, collectively exhaustive” (Cosentino, 2007) framework – the bible of any aspiring management consultant. While people and groups are certainly present in the analysis/framework, usually they are treated as yet another box on a flow-chart diagram. The OD school, as it was noted earlier, does emphasize the importance of behaviors, relationships, power and resistance, while devoting little or no time to other aspects of business and organizational performance. Another major difference is certainly a scope. Since OD by its definition is targeted on the group and individual level, it is often difficult to apply to bigger structures and scale it up for distributed entities, which are very common in our era of globalization. In turn, the planning school is almost scope agnostic: the bigger the problem, the better. Certainly, it is fair to admit, that change management is only one aspect of business improvement engagements. There are other dimensions of management consulting practice, which are equally important, such as strategy, markets and marketing, technology, operations and the list goes on. Still, since business improvement of any kind does imply a need for change, it is fair to compare the planning school with the organizational development school, since the underlying motivations are similar, while the methods and approaches are different.

The last representative, which is included into our systematization of change management theories and approaches, is the so-called “learning school”. One of the most prominent and widely cited books on the topic of the learning organization is Peter Senge’s *The Fifth Discipline* (1990), who introduced a set of interlinked practices or “disciplines” which organizations need to cultivate in order to ensure acquiring of knowledge in an organizational context to be able to adapt and to implement changes required to stay competitive (Senge, 1990). He argues that there are five components (disciplines), which are essential for an organization to become successful by transforming into a learning organization: personal mastery, systemic thinking, shared

vision, team learning and mental models. He also suggests that a traditional “analytical” approach of dealing with the complexities of real life organizations is flawed. Breaking down (decomposing) the bigger problem or system into smaller more tangible chunks represents a risk of losing a sense of “wholeness” and distorting original meanings and dependencies. As an alternative he proposes a holistic approach to dealing with complexities and systems thinking as a way to understand interrelations, causalities, drivers and motivations. He believes that the organizational transformation process should be a continuous cycle of building organizational knowledge in a holistic and systematic manner, which is a prerequisite to success.

Comparing these three different schools of change management conclusion can be made that no school is dominant or preferred over the others. They do share some similarities, but also have distinct and differentiating features. The Planning school or traditional consulting school is attractive, since it is better structured, data driven, deals with complexities by decomposing problems into smaller chunks and trying to enumerate all contributing factors of observable behaviors and outcomes. In the same time, it might be lacking a systematic approach and tends to deal with localized contexts and might not take into account all implicit and explicit dependencies of various dimensions of the organizational models. Also, it devotes somewhat secondary attention to the “soft” side of organizations – people, their motivations, relationships, engagement, resistance and development. In contrast, the Organizational Development school almost solely focuses on the soft side and tends to be applied on the group and individual level, while complex, multidimensional organizations seem to be out of scope. The Learning school, being very appealing in its proclaimed objectives and principles is probably the less practical of all three, since it gives somewhat limited guidance on implementation details.

In conclusion of this overview of the different change management approaches and theories, it seems to be logical to suggest that an “ideal” change management theory should aggregate best practices and build upon the strengths of these three schools.

These schools are not mutually exclusive and can be complementary. This suggestion does not pretend to be very novel. There is already a tendency to apply the best suited tools and methods depending on context, which (Burnes, 2009) calls an emergent or contingent approach.

### 1.3.2 Organization of the thesis

Figure 3 represents the logical organization of this thesis, which comprises five chapters. Analysis starts on the meta-level with an evaluation and critical analysis of existing enterprise models and transformation and improvement frameworks. Then it will descend to the meso-level and evaluate in detail one industry case and change management practice. Review and systematization of change management interventions will be conducted, and an approach to the identification of relevant

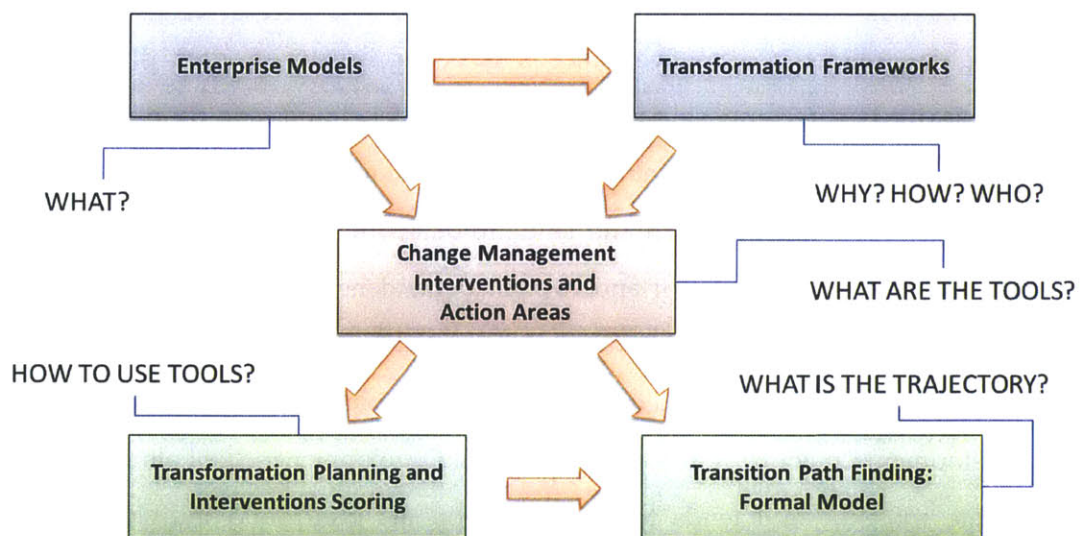


Figure 3 Thesis structure and organization

interventions for change management projects and initiatives is going to be suggested. Subsequent chapters are devoted to more applied problems of transformation planning, change projects evaluation and prioritization, and formal methods of optimal organizational transition trajectory finding. Both final chapters start with a review and

analysis of existing methods, but provide alternative approaches to the problems by encapsulating strengths of the existing methods and eliminating their shortcomings.

## 2 Organizational Models

### 2.1 Existing Models

Since in context of given thesis organization is considered as a system, it is believed that before someone can start talking about transformation frameworks and organizational improvement approaches (which are intended to guide on how to change the state of the system), it is essential to define the model of the organization itself, or the model of the underlying system. There is a tendency to limit definition of organizational models to just organizational structure (e.g., the org. chart), definition of roles, responsibilities and reporting hierarchy. However, it has been widely admitted that models of organizations go far beyond the structural dimension, e.g (Galbraith 2002, Keller 2011). Some influential and recognized organizational models are listed below:

- Galbraith's Five Star model (strategy, people, processes, rewards, structure);
- McKinsey's 7S' model (strategy, systems, structure, skills, style, staff, shared values) and McKinsey's Organizational Health (OH) model;
- MIT LAI Eight Views Enterprise Architecting Framework (strategy, policy, organization, information, processes, knowledge, products, services);
- Carnegie Mellon – Software Engineering Institute, Capability Maturity Model Integration.

This list does not pretend to be an all-inclusive list of the organizational models deserving attention. There are other, well-known and adopted models and frameworks. There is a prominent group of process-centric models/approaches, - such as Business-Process-Modeling (BPM) (Havey 2005), Business-Process-Reengineering (BPR) (Hammer & Champy, 1993), Business Process Management (BPM) (Gartner, 2012). This group, while being focused on continuous process optimization is not limited to it. It is an overall management approach, which strives for business effectiveness and efficiency. Another significant group is represented by IT-biased models and frameworks. The category of "Enterprise Architecture frameworks" is usually associated with such frameworks as The Zachman Framework for Enterprise Architectures, The Open Group Architecture Framework (TOGAF), Federal Enterprise Architecture (FEA).

Despite their IT driven origination, the scope of these frameworks is broader than just IT. It also includes consideration of complexity of the organizational system and alignment of IT-enabled processes with business objectives, strategy and capabilities. (Sessions 2007)

Kaplan's Balanced Scorecard is yet another method and model of organizational performance and alignment. It is a multidimensional model, which main premise is that performance of the organization should not be judged exclusively by financial outcomes. Other dimensions, such as customer perspective, business process perspective and learning and growth perspective are equally important and need to be aligned (Kaplan, Norton 1996). Ashridge Mission Model (Campbell, Nash 1992) would be another model in our extended list of organizational models. It is interesting, and different from some other models, in a sense that it tries to combine strategic direction, cultural motivators, behavioral and ethical aspects of organizational context. It also stresses the importance of "purpose" of the organization and aligned company's and employees' values.

So, as it has been observed, the domain of organizational models is pretty vast and diverse. However, having enumerated some of the representative examples in different parts of the spectrum, the models, which are short-listed: Galbraith's Five Star, McKinsey 7S' and McKinsey OH model, MIT LAI Eight Views Enterprise Architecting Framework and Carnegie Mellon's CMM(I) represent a more uniform subset of the models, which can be compared more easily, since they are defined in a similar context, serve somewhat similar purpose and often share the same terminology and notions.

Needless to mention, the selected models are rather high level and abstract. They cannot really be considered as true models, which can reflect with sufficient level of proximity a real embodiment of organization and design details. Predominantly, they offer certain structured mental categories or so-called frameworks, which define a way of thinking and reasoning about organizations. It is common for these frameworks to suggest decomposition of organizational design/architecture into secondary dimensions and then define respective attributes and subcomponents within every dimension. Some

frameworks define relationships (links) between dimensions, but in most cases it is postulated that everything in the organization is linked to everything else, so the notion of linkages becomes secondary, but can be categorized at the attribute level, such as strong/weak link, etc.

Table 1 Organizational Models

Dimension	MIT LAI EA	McKinsey's 7S	Galbraith's Five Star	CMU CMMI
<b>HARD ATTRIBUTES</b>				
<b>Structure</b>	Organizational View	Structure	Structure	Org Process Definition (OPD) Org Process Focus (OPF) Org Perf Management (OPM)
<b>Product/Service</b>	Product/Service	Systems		Product Integration (PI) Product Quality Assurance (PPQA)
<b>Processes</b>	Processes View	Systems	Processes	16 Core Process Areas
<b>Technology</b>	IT view	Systems		Technical Solution (TS)
<b>Strategy</b>	Strategic View	Strategy	Strategy	
<b>External Context</b>	Policy/External Factors View			
<b>SOFT ATTRIBUTES</b>				
<b>People</b>	Organizational View	Staff	People	Organizational Training (OT)
<b>Values</b>		Shared Values		
<b>Capabilities</b>		Skills		
<b>Culture</b>		Style	Rewards	

In

Table 1 an attempt is made to cross-map and match key components and categories of various models in order to understand what parts of the models are common and shared, and what elements are rather distinct and unique. A common list of dimensions

in the first column is derived from the intersection of distinct first level of decomposition components of given models. This common list of dimensions and categories of organizational models is not only important as a reasoning tool, but also serves as a foundation for change management frameworks, since often, a change management interventions catalog is structured along the same dimensions which are being used for defining base organizational models.

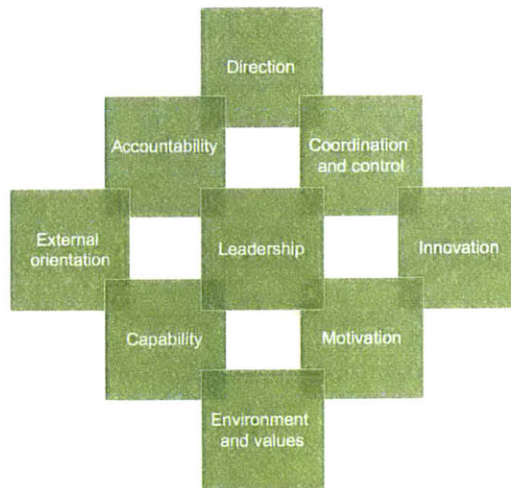
Following the McKinsey's tradition a set of common dimensions is divided into two subsets: "hard" and "soft" attributes. Some models, e.g. MIT LAI EA and CMMI do not have explicit differentiation between hard and soft attributes, while others have it clearly highlighted. There is a substantial overlap among these frameworks, but each one has its specifics and certain biases. Organizations, as sociotechnical systems, are certainly a composition of "hard" or tangible categories and "soft" or less tangible, usually people related categories. "Hard" categories include structures, processes, strategy, policies, technology, products and services. In turn, "soft" categories/dimensions include culture, values, people and their capabilities, motivations and drivers. Here the various organizational models will be reviewed in the chronological order they appeared.

### **2.1.1 McKinsey's 7S' and Organizational Health (OH) Frameworks**

McKinsey's 7S' framework is first in our evaluation, since it was developed by McKinsey and Company consultants in 1982 (Peters, Waterman 1982). It is claimed that this book, "In Search of Excellence", was the first to break a traditional paradigm that the organization is a structure – "who does what" and "who reports to whom". Instead of hierarchy and a traditional organization chart, 7S represents a set of interconnected categories, which are intended to represent soft and hard dimensions of organizational design. Strategy, systems and structure are considered to be "hard" dimensions, while skills, style, staff and shared values represent the "soft" side of the organization. Despite the fact that by now this framework is 30 years old it is still listed

on McKinsey's web-site as "...an important tool to understand the complexity of organizations. Today, more than ever, structure alone isn't organization." ([www.mckinseyquarterly.com](http://www.mckinseyquarterly.com)).

However, recently, in 2011, McKinsey consultants Scott Keller and Colin Price published a new book - "Beyond performance" (Keller, Price 2011). While paying tribute to the 7S' framework legacy, they suggest that it is time for it to retire. They admit that among companies which served as an example of excellence, by 2006 20% no longer were around and another 46% were struggling. They suggest that a key weakness of the legacy framework is its static nature and lack of dynamic perspective, which leads to a syndrome of short-term planning and a sole focus on reaching quarterly and annual targets, while longer-term sustainable growth is not in the picture. The authors suggest that overemphasis on performance leads to negligence in other aspects of a healthy business such as teamwork, investment in R&D, employees' loyalty and satisfaction, and other aspects of the business. It is interesting to see the alternatives McKinsey offers in the current context and environment. Firstly in addition to "performance" as an ultimate measure of success they introduce a term of "organizational health". By "health" they mean the ability of the organization to sustain performance over time by superior alignment, execution and agility. In terms of the framework, now they suggest static and dynamic views. The static view is basically a replacement for the 7S framework, which is now called the "Organizational Health Model", and consists of nine elements or components. Those components are direction, leadership, culture and climate, accountability, coordination and control, capabilities, motivation, external orientation and innovation and learning.



**Figure 4 Nine elements of organizational health (<http://solutions.mckinsey.com>)**

Certainly, the model is now more verbose than before, and there is no intention to review here every component in detail, since it is better to refer to the source (Keller, Price 2011). However, it would be interesting to compare the Organizational Health (OH) Model to the legacy 7S' framework to see what is genuinely new and what is inherited from the old framework. The term strategy is now abandoned, but it appears to have been substituted with direction. Former "skills" seems to be a direct match with "capability". The key characteristic of the consulting framework is that it has to satisfy the "mutually exclusive, collectively exhaustive" condition; while in the new "OH" model there seems to be an overlap between some of the elements (e.g. it is somewhat questionable whether accountability is a separate category and not a part of "coordination and control".) In any case both "accountability" and "coordination and control" can be mapped to 7S' "systems" and "structure". New categories of "Culture and climate" as well as "Motivation" can probably be mapped to the former "shared values". The same would be true for "Leadership" in the new revision and "Style" in the old one. Thus, truly new elements of the latest "OH" organizational model are "Innovation" and "External Orientation". It can certainly be admitted that it is a step forward compared with the legacy 7S' model, which was somewhat self-centric, and did not include consideration of external links and alignment with major outside

stakeholders of the organization. "Innovation and Learning" is also a somewhat new element and I would venture to suggest that probably it has been inspired by subsequent work on learning organizations (e.g., Senge 1990). Thus, the new "Organizational Health" model is certainly an improvement compared with the legacy 7S' and probably better suited to the current environment, but it is hard to call it radically different since it shares major categories with the previous framework. Our initial taxonomy of organizational models in Table 1 contains only original 7S' model, but it seems to be beneficial to analyze the evolution of the approach towards an organizational model and framework within a leading management consulting organization in the world. Clearly the new Organizational Health model does build upon its predecessor, but expands boundaries of the model and introduces certain new elements and categories such as innovation, external orientation, environment and leadership. However, the main change can be noticed in overall theme – performance and particular financial performance is no longer an ultimate measure of success. Focus is now on sustainable business practices, accountability, social responsibility and personnel development.

As it was mentioned earlier, (Keller, Price 2011) also introduced dynamic view or dynamic frames, or change framework, which is intended to complement the organizational model and provide guidance to achieve sustainable performance. So the new alliteration was born, which is now called 5A's, comprised of "Aspire", "Assess", "Architect", "Act" and "Advance". This framework will be reviewed in the next chapter, where different change management frameworks will be compared and evaluated.

### **2.1.2 Galbraith's Star-model**

Galbraith's model (Galbraith, 2002) is the most succinct one and highlights the importance of the motivational aspect in organizational design, while not focusing on outcomes produced/generated by organization, such as products and services. While it claims to be a decision-making framework, it seems to be more relevant to call it a

decision support framework, since in essence, the five-star model first and foremost is a model, which allows decision makers to think about organizations in a structured way and to answer such questions as: how it is structured, what are the roles, how are decisions made, how is performance assessed and what behavior is encouraged, and how various elements or components of organization are aligned with strategy. It is easy to see that most of the elements are shared with McKinsey's 7S' framework.

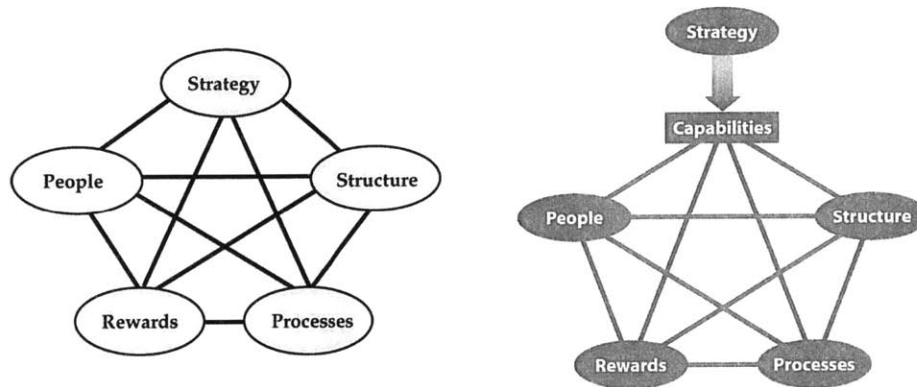


Figure 5 Variations of Star Model (Galbraith, 2002)

### 2.1.3 MIT LAI Enterprise Architecting framework

The MIT LAI Enterprise Architecting framework seems to be the most comprehensive framework, which incorporates products and services dimensions. It also includes a policy dimension, which defines the constraints and context of operations and activities. It does not clearly differentiate between hard/soft sides of enterprise and encapsulates/hides many soft subcomponents related to people, culture and skills within the organization dimension. Another key differentiator of LAI's framework is that it is assumed to be an "enterprise" level framework rather than an "organization" level framework, which requires an even more high-level approach to assessing design and architecture of the entities under consideration.

#### **2.1.4 Organizational Models' Analysis Summary**

It is easy to notice that these models/frameworks of organization/enterprise design/architecture are rather informal and loosely structured. Primary users of these frameworks are consultancies and executives/managers of the companies, which they can rely on (refer to) as reference models while going through due diligence, analysis of the current state and hypothesizing areas of improvement and required design changes to enhance the organizations' effectiveness and efficiency, and to define more radical transformational initiatives and projects.

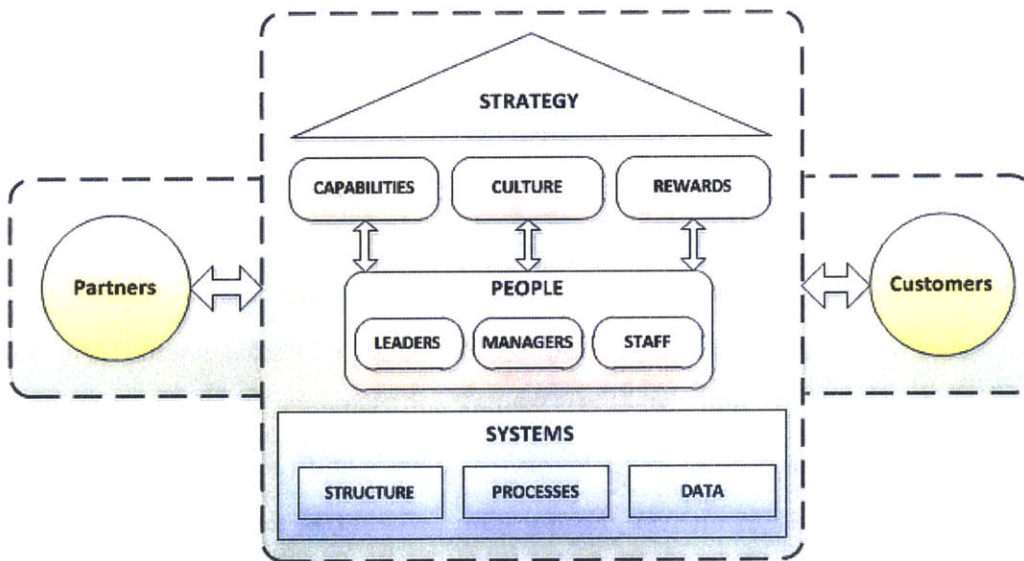
However, these kinds of analyses using the modeling and design hypothesis definition process are significantly experiential, qualitative, heuristics-driven, and subjective at times. Introduction of a more formal approach through defining a model of the organization and its transformation is intended to provide a decision-making support foundation/basis which will enable decision makers to define more educated and fact-driven courses of action and interventions.

### **2.2 Proposed New Model**

Based on previous critical analysis and evaluation of existing organizational models, the attempt to create an alternative model will be made. This model will draw upon the strengths of existing models, but will mitigate and eliminate their deficiencies. The suggested model highlights the fact that an organization is an open system and at least major external stakeholders such as customers and suppliers should always be brought into consideration, since they are key elements in overall value delivery and process flow. The suggested model also emphasizes a "soft" dimension of organization and illustrates the fact that "staff/people" is not a set of uniform elements. The model introduces three groups of internal stakeholders which in many cases have different motivations, objectives, rewards and essential capabilities. These differences should be taken into account while assessing the current state of the organization, defining the

desired state, or defining relevant actions and interventions. Thus, the proposed model is comprised of the following dimensions and components:

1. Strategy: the guiding roadmap, direction and purpose of the organization.
2. Systems:
  - organizational, technological and spatial structures;
  - variety of processes in different process categories;
  - data and knowledge: aggregated representation of artifacts and accumulated experience;
3. People or internal stakeholders including leadership, middle management and regular employees;
4. Primary soft dimensions: culture, capabilities and rewards.
5. Interfaces: primary communication and value exchange channels with suppliers and customers.



**Figure 6. Proposed new organizational model**

The “hard” dimension of “systems” in the proposed model aggregates “structure” and “processes” components, which are available in all reviewed models, but adds another element called “data”, which emphasizes the fact that data is an essential element of

decision making, which allows the decision makers and management in general to minimize “subjectivity” and close the feedback loop to evaluate the consequences of the actions taken and quickly adjust course if needed.

Comparing the proposed model with the other evaluated models the distinct features of the new model, which make it more relevant and usable, can be highlighted. The important difference is that the proposed model is an open or at least semi open system, and includes consideration of major dependencies and interfaces. It is an important consideration since no organization exists in vacuum, while both Galbraith’s model and McKinsey’s model do not consider explicitly these dependencies. Another feature, which is advocated here, is a significant emphasis on the soft dimension of the model or soft attributes of the organization. From our point of view it is people, talent acquisition, development of the professional capabilities, retention and career development that are the major basis and source of achieving competitive advantage in a modern economy.

## **2.3 Conclusion**

Why is having a model of the organization or enterprise important for any change management efforts or managing organization in general? It is believed that if there is no strong synergy between the model of organization and transformation or change management practice, it is doubtful that change management and business improvement efforts will succeed. While not being a precise reflection of the organizations they represent, models serve as a basis and foundation for the reasoning process and help us to answer the question – “what is the organization?” Without answering this question, the attempt to answer the question “how to make this organization better?” is almost doomed. Being disconnected from an organizational model, transformation efforts and change initiatives can very quickly become ad-hoc, non-systemic actions, which are not planned and designed based on underlying available levers, adequate and sufficiently detailed understanding of existing phenomena, and implicit and explicit causal relationships. Using organizational models

in transformation planning and change management allows for providing better support, logic and justification of planned actions, interventions and strategic shifts.

Organizational models out there are very numerous and diverse and often are applicable in a certain context. The list of the models selected for more close analysis is similar in a way that they are fairly generic and universal. With certain assumptions they can be applied in various industries and environments. On the surface, evaluated models are rather simple and usually represented as a set of interdependent components, blocks, pillars, which represent different dimensions of the organizations. These components were mapped to some universal set of dimensions and noticed that in many cases there is a significant overlap between various models. At the same time, such a mapping helped us to identify the distinct features and key emphases of the considered models and identify potential gaps in others. The attempt was made to enrich the field of knowledge of organizational models by synthesizing an alternative model which is intended to provide a well-rounded representation of the organization in the context of an open system with a clear distinction between the soft and hard hemispheres of the organization and highlighting the imperative importance of overarching strategy and mission.

### 3 Transformation Frameworks and Change Management

Now, once the representative set of organizational models is reviewed, a similar exercise with change management frameworks will be conducted. A deeper evaluation of the notion of change management, tools and methods in use will be executed. The importance of organizational models for successful transformation frameworks has been already mentioned, and it can be observed that at least three leading consulting and academic institution have in their arsenal both an organizational model and a transformation/change framework. Sometimes, organizational models are used independently of the framework and in some cases the link between the model and transformational framework is weak, but still, the tandem construction is there, even if it is not always explicitly visible and realized. So the different frameworks can be mapped and compared to identify common areas and distinct features. It will be also attempted to see how closely-coupled these frameworks are with their respective organizational models. Figure 7 illustrates the observation of the pairs of organizational model-transformation frameworks in leading academic and consulting institutions.

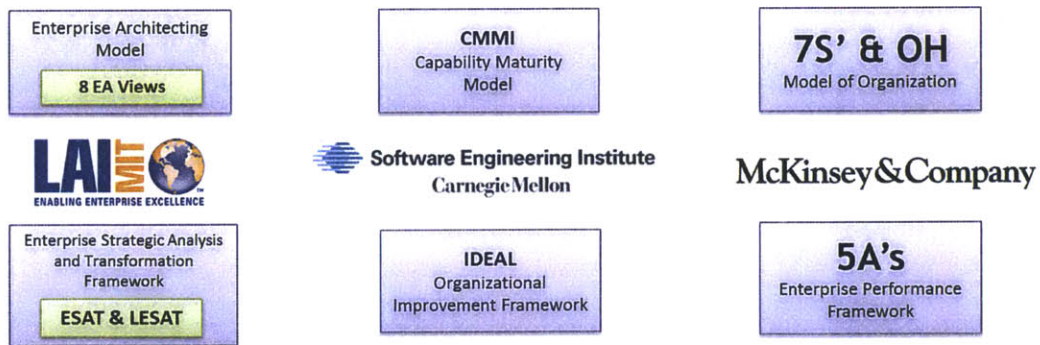


Figure 7 Duality: model of organization and transformation framework

#### 3.1 Comparison of enterprise transformation and improvement frameworks

In our analysis of transformation frameworks a slightly different approach to what was employed for comparing organizational models is going to be used. It will not be tried to

find the “least common denominator”. Instead, comparison of the selected contenders against a baseline, defined by forefathers of change: Kurt Lewin and John Kotter, will be performed. The list of the frameworks in comparison is as follows: MIT’s Enterprise Strategic Analysis and Transformation framework (ESAT) (Nightingale, Srinivasan 2011), Carnegie Mellon’s IDEAL framework (Gremba, Myers 1997) and McKinsey’s 7A’s framework (Keller, Price 2011). It is easy to notice, that the institutions behind the respective frameworks presented in this list are derived from our initial list of organizational models. However, Jay Galbraight, whose “Star” model (Galbraight 2002) was evaluated in previous chapter, to the best of publically available knowledge, did not develop a distinct transformational framework. Instead, he is extending his organizational model and markets it as universal all-inclusive methodology for organizational design and improvement. Therefore, it is decided to exclude it from consideration, since it does not really fit our intended analysis and is somewhat biased towards the structural dimension.

Kurt Lewin’s three step model (Lewin 1947) is one of the first and early models of organizational change. He argued that successful change or transformation should involve three main phases: unfreezing, moving and refreezing. One of his premises is that individuals and organizations exist in quasi-stationary equilibrium, defined by the balance of driving and restraining forces. Therefore, in order to be able to change the state of the system, be it a person or organization, the mandatory pre-condition is to destabilize the system, to challenge the status quo or in other words “unfreeze” the state of the system. “Unfreezing”, however, is just an enabling phase, and actual change or transformation is conducted in the “moving” phase. This phase includes identification of actions, which should produce the desired outcome and their execution. Results of transformation can, however, be short-lived if the next phase – “refreezing” is missing. This phase is intended to ensure acceptance of a new equilibrium, new routines, norms and behaviors. This enables change to be sustainable and prevents slow regression to the origin point. It has been decided to refresh the memory and to recall the three-step

model since there is a tendency to forget about initial ideas, once their owners are no longer in active duty. Nowadays, often, discussions about change management have a tendency to start with the seminal by many regards, but hardly the first work of John Kotter (Kotter 1996), which after more close consideration in many aspects is built upon ideas of Lewin's work. Detailed evaluation of Kotter's work and his 8-steps change framework or model is not included here, since it is very well known work which is included in the curriculum of many business schools. It is essential, however, to highlight the fact that this model is an application of ideas of Lewin's on the nature of the change in individuals and groups and translation and elaboration of these ideas in managerial terms and organizational context with a bit more prescriptive and better defined sequence of steps.

**Table 2 Comparative mapping of transformation frameworks and models**

<b>Lewin, Kurt</b>	<b>Kotter, John</b>	<b>McKinsey's 5A</b>	<b>CMU-IDEAL</b>	<b>MIT LAI ESAT</b>
<b>Unfreezing</b>	Create a Sense of Urgency	<b>Aspire</b>	<b>Initiating</b>	Determine Strategic Imperative
	Creating Guiding Coalition			Engage Leadership in Transformation
	Developing a Vision and Strategy	<b>Assess</b>	<b>Diagnosing</b>	Understand Current State
		<b>Architect</b>	<b>Establishing</b>	Envision and Design Future Enterprise
Align Enterprise Infrastructure				
<b>Movement</b>	Communicating the Change Vision	<b>Act</b>	<b>Acting</b>	Create Transformation Plan
	Empowering Employees for Action			Implement and coordinate Transformation Plan
	Generating Short-Term Wins			
<b>Refreezing</b>	Consolidating Gains and Producing More Change	<b>Advance</b>	<b>Learning</b>	Nurture, Process and Embed New Thinking
	Anchoring changes in the Culture			

Table 2 represents a comparative mapping of the transformation frameworks under consideration alongside with Lewin's three-step model and Kotters's change framework.

In chronological sense, Lewin's model is obviously far ahead, it is followed by the Kotter's 8-steps model and CMU IDEAL framework, both dated 1996. The next in a row is MIT's ESAT framework, while McKinsey's 5A's is the latest arrival, published in 2011. Without going into in-depth analysis of the content of each and every step an early observation can be made that CMU IDEAL and McKinsey's 5A's have one-to-one mapping of steps and semantics of these steps seems to be very similar.

### **3.1.1 Carnegie Mellon IDEAL framework**

Carnegie Mellon is one of the leading software engineering institutions in the world, and is very well known thanks to enormous popularity of their Capability Maturity Model (CMM), which was originally designed for the software industry and later generalized to a broader business processes context as a Capability Maturity Model Integration (CMMI). Moreover, the latest CMMI version (SEI 2010, CMMI-DEV, V1.3) modestly defines itself as "a simplified representation of the world". There is no intention here challenging or accepting this bold statement, but in real life scenarios CMM(I) is typically applied as an appraisal framework, which provides a uniform 5 level continuous scale for assessing maturity of various process areas within organizations. In any case, while CMMI has a notional ideal state, which is presumably associated with the highest level of maturity, it does not provide directions or guidance on how to achieve this in a given context. To address this flaw of the capability maturity model, SEI in 1996 developed a complimentary framework called IDEAL, an acronym which is comprised using names of sequential phases of transformations and organizational change. The model consists of five phases (Gremba, Myers 1997):

- I – Initiating. Laying the groundwork for a successful improvement effort.
- D – Diagnosing. Determining where you are relative to where you want to be.
- E – Establishing. Planning the specifics of how you will reach your destination.
- A – Acting. Doing the work according to the plan.
- L – Learning. Learning from the experience and improving your ability to adopt new technologies in the future.

If one goes into details of every of these phases it becomes obvious that they can be related fairly easily to the steps in Kotter's model. However, Kotter's model is certainly more illustrative and appealing, while IDEAL model is somewhat too "common sense" and too generic. As it was noticed before, both models: Kotter's and IDEAL were published the same year. But interestingly enough, the IDEAL framework has never been nearly as popular as its predecessor CMM/CMMI or competing Kotter's framework.

### **3.1.2 McKinsey's 5A's framework**

This framework is the latest arrival to the change management and process improvement scene (Keller, Price 2011) from one of the most influential management consulting firms in the world. In the previous chapter their new organizational model, called Organizational Health model or (OH) was evaluated. It is presented as a successor of long lived 7S' model. In alignment with our premise, that comprehensive change management framework should rely on a strong organizational model; McKinsey introduced a notion of five frames or stages of organizational transformation. These stages are Aspire, Access, Architect, Act and Advance or collectively 5As. It would be a stretch to proclaim that this framework provides truly revolutionary approach to change process; however, it would be fair to admit, that it is articulated in a very appealing, simple and memorable manner, - it's McKinsey after all. In essence, these phases can be described by five basic questions:

- Aspire: where do we want to go?
- Access: How ready are we to go there?
- Architect: What do we need to do to get there?
- Act: How do we manage the transition?
- Advance: How do we keep moving forward?

Ironically, the 5As framework has exactly the same number of steps as IDEAL model and you really need to go into details in order to establish true differences between these two. Acceptance and proliferation of Lewin's ideas can also be observed. E.g. the

Learning phase of the IDEAL model and the Advance phase of the 5As model to some extent reinforce and expand upon the Lewin's notion of "refreezing", stressing the fact that ability to sustain the change and using the result of transition as a platform for defining the next cycle of continuous improvement.

### **3.1.3 MIT ESAT framework**

Enterprise Strategic Analysis and Transformation framework (Nightingale, Srinivasan 2011), originated within an academic institution, but nonetheless has been developed based on numerous industry case studies, with participation of major multinational enterprises and US government agencies. It was applied in real life context and subsequently refined and enriched. Therefore it is rigorous enough, yet practical. The cornerstones of this framework are three continuous cycles: strategic planning cycle, planning cycle and execution cycle. These cycles are further broken down into rather specific and prescriptive steps, which form the entire transformation roadmap. ESAT is also relying on enterprise architecture model, which comprises various lenses: leadership, stakeholders, process architecture, performance measurement, alignment, resources, maturity and waste. The Enterprise model and transformation framework are pretty tightly coupled, which is considered to be differentiating feature of ESAT from the other frameworks which were reviewed. Every transformation step is designed from a different lenses perspective and defined in terms of prerequisites, constituent activities, tools and overall alignment of transformation strategy and plan with enterprise vision, mission and objectives. Nonetheless, this framework, while being rather distinct and comprehensive, can also be mapped on steps level to other frameworks which were considered and the Kotter's model as a baseline as shown in Table 2.

## **3.2 Frameworks Analysis Summary**

After conducting this review and comparative mapping of various frameworks it can be concluded that on a high level these methodologies/frameworks/models are somewhat

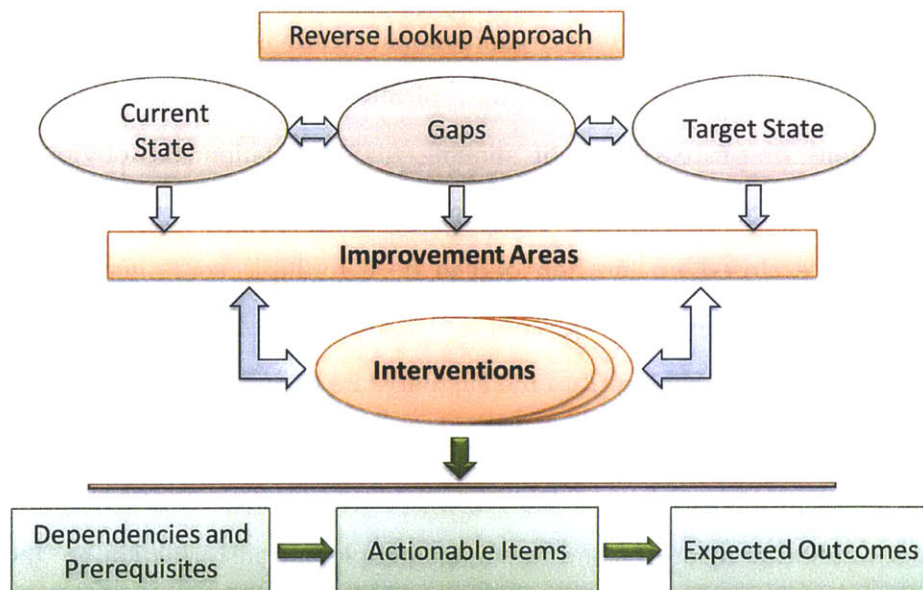
similar and use semantically equivalent phases of transformation/change under different labels. The devil, as always, is in the details, and all the frameworks which have been considered are important for overall understanding of the evolution of management science thoughts on organizational models and change frameworks. One may also argue that these frameworks can perfectly fit into Deming's (Deming 1986) definition of a universal management control cycle: Plan-Do-Check-Act (PDCA) or its Six-Sigma interpretation Define-Measure-Analyze-Improve-Control (DMAIC), though the latter is rather specific to quality improvement rather than business transformation and change management. These additional references help to highlight the fact that the variety and diversity of various frameworks and tools for business/process improvement and transformation is already overwhelming. And probably the management science and practice does not need yet another framework, or, at least the author is not in a position to propose a meaningful alternative to existing venerable and proven methodologies. At the same time, there is always room for improvement and complementary, tactical tools and approaches, which would provide decision making support and more rigorous approach to transformation planning, risk assessment and evaluation of options, which will be introduced in subsequent chapters.

### **3.3 Change Management Interventions and Action Areas**

So far organizational models, transformation frameworks, and change management in a broad sense have been under consideration and analysis. The term “broad” means that whenever there is a discussion about business improvement and organizational transformation, the entire journey can be described by a variety of frameworks that have been just considered. Starting from Kotter or Lewin, whatever your origin point is, they define phases, steps or frames of transition, which need to be passed to accomplish the ultimate goal. As it was discussed previously, most of the frameworks agreed on the fact that essential prerequisites of any transition are the thorough and adequate understanding of the current state and some definition of the desired state or target. The result of differentiating between current and desired states gives the gap, which can be expressed as a cumulative numerical value in case of CMMI-like assessment tools are used or can also expressed in qualitative terms if more abstract and less data driven framework, such as McKinsey Organizational Health is used. Even in the CMMI case the single number, which defines the gap typically can be broken down into gaps in various dimensions or process areas, if sticking to SEI notation. So, obviously, the goal of transformation is formulated as closing the gap. Depending on how significant the gap is it can be closed in one hop or can be a multiple stage iterative transition with intermediate adjustments to the course of actions if required.

Thus, the actual transition from the current state to the desired state is the area of focus of change management in narrow sense. How to plan the transitions, what actions and in what sequence need to be taken, how to assess and mitigate risks, how to control risks, to allocate resources and to engage people in transformation are the topics which change management in “narrow” sense is concerned about. One may argue that all these items are in fact day-to-day activities and concerns of managers on all levels. It is a common practice that transformation or change at the end is typically driven and executed by management and leadership of the organizations with or without support of consultants and dedicated change teams. However, the objective of change

management is to enable, define and execute a transformation plan which might require significant changes to the current status quo, customs, behaviors, culture, and norms on a soft side, processes, structures, technology, tools, and policies on a hard side. So the difference is in the scale of the change and its multidimensional nature, which typically involves various aspects of operational and strategic activities. So how can the gap be closed? Two fundamentally different approaches are defined here, one of those is favorable and the other one is deficient. The first is a brute force approach or direct lookup approach. Direct lookup approach means that it starts from trying to apply tools and actions, which are readily available at management disposal without holistic analysis of the situation, sources of resistance, dependencies and anticipated outcomes. Application of this approach often leads to sub-optimal strategies, ignorance of side effects of the actions taken, stretched resources, fatigue, and fragile, unsustainable results of the transformation.



**Figure 8 Identification of interventions and actionable items**

The alternative approach, which is advocated here is a so-called “reverse lookup approach” when instead of trying to apply tools in current possession (if you have a hammer every problem is a nail), planning and identification of required actions should

start from the gaps between the desired and target states themselves. This idea is similar to what is referred to as “backward mapping” (Nadler, Tushman 1997). Gaps should be first classified into improvement areas and after that, for every improvement area identification of relevant actions is performed. Such an identification process, certainly, cannot be unconditional and should take into consideration the current constraints and resources of the organization, but priority should be given to achieving the final result of closing the gap in a given dimension or improvement area, while consideration of constraints becomes secondary and constraints themselves might need to be challenged. The following artifacts and activities constitute the process of identification of interventions and actionable items:

- Catalog of interventions/actions and their mapping to potential performance gaps.
- Defining transformational engagement roles and roadmaps.
- Prioritization, planning, risks and cost assessment for interventions planning/scheduling.

Often in change management practice, actions, activities, and projects which are defined and designed to change organizations are called interventions. It seems to be a reasonable term since the main intent of change management is to challenge the status quo, disrupt the system and make it move in the envisioned direction. So it can be reiterated that change management interventions are a sequence of planned activities, actions, projects and events, which are intended to help organizations/enterprises to change their state and improve performance, effectiveness, efficiency, or other attributes which are chosen to describe/define the state of the enterprise as a system.

The following attributes, which are required to describe and to define various interventions, are suggested:

- Definition of the need and expected outcome.
- Change target and context of the intervention.

- Specific focus or purpose.
- Source of internal support or opposition.
- Requirements, specifications and constraints.
- Costs and benefit analysis.

Potentially, all interventions can be categorized by relating them to relevant dimension of an organizational model, e.g.: changing structures, changing processes, technological interventions, changing behaviors and mindsets, building capabilities, or changing boundaries of the organization as a system.



**Figure 9 Categorization of interventions and change actions**

This consideration of change management interventions and their attributes helps to transition to the following chapters of the thesis. By relying on the attributes of the interventions it will be attempted to introduce a more formal approach to transformation planning, change project scoring and prioritization, selection of optimal transition trajectories and steps. The idea is that if it is possible to acquire sufficiently reliable information about costs, benefits, risks, prerequisites and duration of specific interventions or actionable items, then it would be plausible to apply certain methods of operations research in defining transformation plans and roadmaps.

## 4 Transformation Planning and Critical Success Factors

An essential element of any enterprise transformation or lean transformation for that matter is the inevitable change of organizational structure, processes, practices and boundaries in order to achieve desired goals. Change management theory often calls actions and activities needed to implement the changes “interventions”. Interventions can be elementary actions, focused on changing a particular attribute of the organizations, but often interventions can have a broader definition and include a variety of actionable items within the overall intervention definition. E.g. one of the cornerstone phases of the MIT Enterprise Strategic Analysis and Transformation (ESAT) framework (Nightingale, Srinivasan2011) are the transformation plan definition step, actionable project descriptions step and deployment plan step. While these steps cover the conceptual essence of change management and provide certain implementation guidelines, they do not go into details of estimates, risk assessment and decision making in transformation mode. Therefore, it’s felt necessary to expand and enrich e.g., the ESAT framework to include more formal and prescriptive mechanism of defining transformation projects, prioritizing them, scheduling and execution.

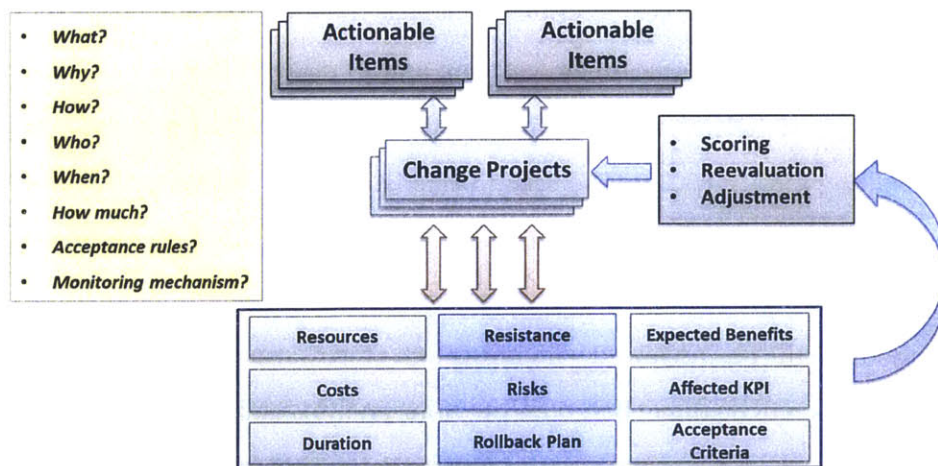


Figure 10 Change projects definition cycle

Figure 10 represents a typical change management projects definition cycle which includes initial packaging of the actionable items into projects, since a project is a commonly accepted form of conducting business activities in most of the organizations. Projects in general, and change projects in particular should have a clear definition and specification, which answers the questions: what needs to be done, why we are doing it, what are the tools and methods we are using, how do we know that we accomplished the goal and how we can ensure that we are staying on track. In addition, change projects need to be assessed from cost, duration and risks standpoint. Expected benefits and affected performance indicators have to be specified. In case an organization is dealing with significant change or transformation the number of such change projects can be numerous. Inevitably, the question of rankings and priorities arises since rarely all projects can be executed in parallel due to resource constraints, dependencies and logical sequencing. Once an initial assessment is done, often adjustments and repackaging of change projects is required until after a satisfactory transformation roadmap is developed.

#### **4.1 Existing change and transformation projects scoring approaches**

To achieve stated goals a critical analysis of two existing approaches to change management project assessment, scoring and prioritization will be executed. The first is a well-known "DICE" method (Sirkin, 2005) developed and popularized by the Boston Consulting Group (BCG). The second one is a change management model, which was originally developed by (Beckhard and Harris 1987), and later on it was reshaped by Dannemiller Tyson Associates, (Dannemiller, 2000). The strategic intent of these methods will be reviewed, identification their strengths and evaluate gaps and deficiencies will be done. Based on previous analysis and the guiding principles of ESAT more general and comprehensive approach/method will be synthesized to support change management projects assessment, planning and deployment.

BCG points out that the predominant view of traditional change management practice, which has its roots in Organizational Development Science, has a biased focus on a “soft” side of change and transformations, where leadership style, organizational culture, effective communication, employee motivation and group dynamics play the most important role. While BCG admits that the “soft” side of the change management should not be neglected or undervalued, they believe that it is unwise to underestimate the value of the “hard” factors in change projects. The factors, which they identified as most critical for change project success, are “Duration”, “Integrity”, “Commitment” and “Effort”, collectively “DICE”, where these components/factors have the following meaning:

- **(D)uration:** duration of the program or time between iterations—the shorter, the better
- **(I)ntegrity:** project teams’ skill and ability to complete the initiative on time
- **(C)ommitment:** senior executives’ and line managers’ dedication to the program
- **(E)ffort:** the extra work employees must do to adopt new requirements—the lesser, the better

The core idea of this framework is that by assessing each component of this framework before executing a major transformation initiative management can identify problem areas and make necessary adjustments to the transformation plan and individual projects or their sequences. The DICE framework assumes that every factor is graded on a scale from 1 to 4 (using fractions if necessary), where a lower score is better and 1 means a high likelihood that a given factor will contribute to project success and 4 means that it is highly unlikely. The DICE score then is calculated using the following formula:

$$\text{DICE Score} = D + (2 \times I) + (2 \times C_1) + C_2 + E,$$

where  $C_1$  and  $C_2$  are respectively senior management commitment level and line-management commitment level. The received scores are interpreted in the following

way: if score is between 7 and 14 then the project is in so called “Win” zone and has the highest likelihood to succeed; a score higher than 14 and lower than 17 puts the project into the “Worry” category indicating that risks to the project success are rising; if the project score is higher than 17, project falls into the “Woe” category with little chances to succeed, especially if the score is 19 and above. The authors suggest that while the grading of individual factors can be subjective it is possible to achieve a good level of accuracy by using assessment techniques, which are not disclosed. In any case the DICE approach can provide comparative scores of the various projects under a transformation umbrella, which will allow you to prioritize them and identify risky projects which might require refinement or extra attention. Another way to increase accuracy is to use historical data and grade or benchmark factors against those in the past.

It has to be noted that BCG admits that the DICE framework is suited best for large-scale transformations that cut across business units, functions, and locations. “In such change efforts, it is critical to find the right balance between centralized oversight, which ensures that everyone in the organization takes the effort seriously and understands the goals, and the autonomy that various initiatives need.” (Sirkin, 2005) The authors also suggest that the DICE can be used in different ways to track projects, manage a portfolio of projects and force conversations about possible scenarios of transformation flow and outcome.

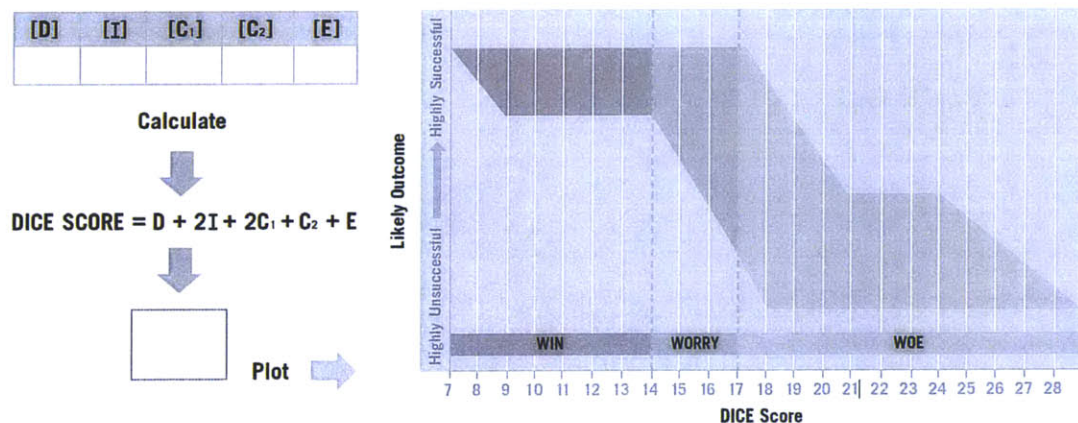


Figure 11 DICE Scoreboard. (Sirkin, Keenan, Jackson 2005)

It's necessary to note that the DICE formula is additive, therefore it is not very sensitive to unfavorable values of some of the attributes. Also the duality of C (commitment attribute), which is split into two, makes the formula a little weaker since it implies that one can compensate for low commitment level of senior management by a higher level of commitment of mid management and vice-versa. While BCG promotes the DICE formula as a recipe to address the "hard" side of change management, it would be a stretch to classify management commitment as a hard attribute. Also, if all variables of the formula are considered, the measure of commitment is the most difficult to evaluate objectively. Another confusion, which practitioners might have about using this formula, is the reversed meaning and scale of some attributes. As it was noticed, for D (duration) and E (effort) the favorable values are the lower values, which fits the scoring schema for this formula. However, C (commitment) and I (integrity) have to be scored on a reversed scale – the higher the actual value of the attribute the lower score have to be assigned to it in order to use it in DICE formula. Another deficiency of the DICE formula, once you try to use it in order to prioritize or compare various change projects or programs, is that it does not take into account the impact or relative measure of benefit expected from the execution of a given project or program. It is focused more on assessing chances of a given project to succeed, while ignoring the expected payoff. Therefore, if relying solely on the DICE formula, it is inevitable that projects of lower risk and most often lower expected benefit will pop up into the top of the list.

An alternative version of predicting success of the change projects and transformational initiatives was suggested by (Beckhard and Gleicher, 1987) and refined later by (Dannemiller, 1992). This formula relies on key aggregate critical success factors affecting the likelihood of success of organizational change programs. The formula itself is rather succinct and simple. It is sometimes written as a ratio:

$$P_s = \frac{D \times V \times F}{R}$$

Where  $P_s$  – the chances of success of change program implementation depend on

D – The degree of dissatisfaction with the current situation

V – Compelling vision for the new state (North Star)

F – Effectiveness, practicality and impact of the first steps

R - Resistance (cost of change)

Another version of the same formula and essentially the same idea is to write it as inequality:

$$**D \times V \times F > R**$$

As one can see from the above formulas they suggest that dissatisfaction with the status quo, compelling vision and effective first steps are mandatory attributes and critical success factors. If any of this is missing, then the probability of the success will be close to zero. Compared with the DICE formula, which is cumulative, Beckhard's formula is using a product, which makes it much less tolerant of the absence or low value of any of the contributing factors. It can also be seen that conclusions, which can be derived from the analysis of this formula, resonate with follow up ideas and practices of change management. The idea of importance of dissatisfaction with status quo is almost directly equivalent of Kotter's change management model – "creating a sense of urgency". The ideas of effective, practical first steps with visible impact are also exploited in the MIT ESAT framework as a suggestion to generate "quick wins" first, while planning implementations of change programs and projects. Another parallel, which can be drawn, is a consideration of resistance to change and measures, which can be taken to overcome the resistance.

Beckhard suggests that dissatisfaction is a key factor in motivating people to change but is limited in that it does not provide any direction. In other words, while people know that they are not satisfied with the current situation, they don't necessarily know what can be done to change the situation and in what direction they should go. For organizations that are not performing well this can be what many have called a

“burning platform.” When the platform is burning everyone is convinced that something needs to be done to change the trajectory, otherwise it is a sure way to sink into the ocean and become history. The question remains – in which direction should you jump? Successful organizations, on the other hand, often become complacent with their performance and can even become arrogant. Xerox of the 1970s is an “extreme” example of this pattern (Kotter and Heskett (1992)). While having superior technology and being a pioneer in the fields of copiers, they overlooked the rapid invasion of cheaper products from Japanese manufacturers, which resulted into the sharp decline of their market share. The more recent and vivid example of this pattern is Nokia, which enjoyed domination of the cell phone market scene for over a decade, but failed to realize quickly enough the changing trend of wider adoption of smartphones and the entrance of heavyweight competitors, such as Apple and Google, with superior products.



**Figure 12 Beckhard’s Change Formula as System Dynamics Model**

Figure 12 represents Beckhard’s formula as a conceptual system dynamics model. There is a stock or cumulative variable which represents resistance to change. A pushing force, which contributes in lowering the resistance level, is dissatisfaction with the status quo. However, the higher the level of resistance, the more compelling the vision required to overcome resistance. The best way to demonstrate compelling vision

and convey the message to the changing entity is by talking and implementing effective and appealing first steps. Success, which is generated by these quick win projects, instills “believability”, which in turn will help to lower the level of resistance.

Overall, Beckhard’s formula represents a bit of a narrow view of factors, which can impact negatively the probability of transformation and change projects success. The only denominator in this formula is a resistance to change, while other potential factors such as cost and effort needed to execute change project, resources needing to be allocated, duration and risks are not considered.

**BCG DICE Score**

$$DICE = D + (2 \times I) + (2 \times C_1) + C_2 + E$$

**D** – duration of project/intervention  
**I** – integrity (capabilities, skills)  
**C** – commitment  
     C1 – executive,  
     C2 - mid management;  
**E** – effort (extra work)  
*The higher score - the riskier!*

- Does not consider potential payoff
- Does no directly assess risks and resistance
- Additive by nature. Low sensitivity.
- Does not consider sense of urgency

**Change Formula:  
Beckhard, Gleicher, Dannemiller**

$$P_s = \frac{D \times V \times F}{R}$$

**D** – the degree of dissatisfaction  
**V** – compelling vision  
**F** – impact of first steps  
**R** - resistance (cost of change)  
*The higher score - the better!*

- Conceptual rather than practical
- Resistance and cost are aggregated
- Duration is not taken into account
- Benefit is not considered

**Figure 13 BCG DICE Score vs. Beckhard’s Change Formula**

Generally speaking, Beckhard’s formula is rather conceptual and might be difficult to apply on practice. The BCG DICE formula provides certain guidelines and scoring approaches, where every factor is scored on the same scale, therefore the target range and distribution of cumulative scores is known upfront. It allows defining certain clusters/ranges of the scores to classify projects in categories. Beckhard’s formula does not define the scoring mechanism and leaves it up to individuals to make their own

interpretation of the application of the change formula. Figure 13 summarizes key characteristics, strengths and weaknesses of both approaches.

## 4.2 Suggested approach: Blue over Red

It has been noticed that both approaches – the BCG DICE method and Dannemiller change formula have certain drawbacks and deficiencies. To address the discussed limitations of existing approaches a new approach for facilitating assessment, planning and definition of transformation projects and programs will be synthesized. The intent is to define a formula that will produce a relative score of given projects which will indicate relative priority of the project. Our formula is represented as a ratio, where the numerator contains all variables which contribute into project success, while the denominator contains variables which are associated with risks and therefore impact negatively the chances of the project to succeed.

$$T_{score} = \frac{B \times (L + U + E)}{(R + E)} \times \frac{1}{D} = \frac{BLUE}{RED}$$

The following attributes of the project are identified, which contribute positively in a higher score of the projects, when prioritization and comparison of various change initiatives is executed:

- B** – Benefit/Impact/Payoff.
- L** – Leadership (vision/commitment).
- U** – Urgency/Dissatisfaction.
- E** – Execution Capabilities.

First of all, certain cumulative expected measure of the benefit, expected from a given project needs to be defined. This allows us not only to assess risks and the probability of a given project to succeed, but also gives a certain understanding of the cost/benefit ratio, which is an essential part of most business planning activities. The second critical factor, which is defined as “Leadership”, can be interpreted and further decomposed into leadership commitment and leadership vision. These are critical components,

which should be present in tandem. Vision without commitment becomes an idealistic dreaming about the future, while no one is desperate to move forward. Commitment without vision is no good either since it is a true path to burning resources and going in circles. Only when both these elements of leadership success factor are present then can be assigned a higher score.

The next factor – “Urgency”, resembles the first step in Kotter’s model and is also used in Beckhard’s change formula. However, this factor is missing in the BCG DICE formula. Urgency can be explicit, which is also known as “burning platform” or it can be implicit or anticipated. The latter case is more difficult to manage, since in most cases organizations tend to prefer the status quo situation to any change. It is a responsibility of the leadership, change agents and change team to convey, explain and communicate the sense of urgency and the reasoning behind change and transformation projects. At the same time the sense of “urgency” should not be interpreted literally. From a pure mathematical point of view it might look like the more critical the current situation is, the higher are the chances of the transformation project to succeed. This is too straightforward and misleading an interpretation of the “sense of urgency”. It has to be treated more as a mental category, common belief, which is shared by all members of the organization rather than true critical situation when people start jumping out from the board. It is true that often hardship and declining performance of the organization can contribute to instilling a shared sense of urgency, but they cannot be considered as a mandatory prerequisite.

Obviously, no manager wants to be in a burning platform situation. However, how can you increase the perceived level of dissatisfaction with the status quo in an organization before you lose market share? There are several approaches and techniques that are considered effective and often employed: comparison to others (benchmarking), feedback from stakeholders, and enterprise assessment. Comparison of your organization’s performance relative to other organizations is a good way to understand what is possible and where your organization stands relative to that level. Feedback

from stakeholders, including customers, employees, investors, and partners can increase dissatisfaction if the feedback is accepted as credible and thought of as a “gift” as opposed to a nuisance. Finally, assessment using a model or standard is another way to identify opportunities for improvement that might not emerge from comparison to others or feedback from stakeholders.

The last factor in the numerator of our formula is “Execution” or execution capabilities. A similar variable in the DICE formula is called “Integrity”, but it feels somewhat like the term integrity was used just for the sake of creating a catchy acronym. The execution capability seems to be a better term which reflects the fact that transformation project success depends a lot on current capabilities of the individuals involved in the transformation project as well as the synergetic ability of the teams and leadership to execute.

The denominator in our formula contains the following factors:

**R** – Resistance/Risks.

**E** – Effort/Cost.

**D** – Duration.

First of all an aggregate factor of resistance to a change and risks which are often interrelated is defined. Usually, resistance to change is a subset of risks, since resistance might not be something which is explicit and easy to foresee and account for. Often times, resistance to change will surface only when particular actions are already taken and new rules are imposed. The topic of resistance is well explored in change management literature (e.g. Burnes 2009), but it feels that it is better to expand the definition and define this factor as aggregate risk rather than just resistance.

Effort and cost of the change projects is not something that is well discussed in change literature. In the same time a proper allocation of resources to change management programs and projects is an essential integral part of the change management process. However, it is often assumed, that change projects will be executed by the same

employees on top of their regular responsibilities. Failure to properly plan and allocate resources to change and transformation projects often results in failure.

The last factor in our denominator is duration of the project. The BCG DICE also uses duration in their scoring formula. However, they insist that overall duration of the change project is not that important, while periodic progress review is. It can certainly be concurred that it is a good management practice to have a periodic review of the projects with clear milestones and defined acceptance criteria. However, in the context of a priori planning, assessment and prioritization of the change projects it becomes a secondary consideration. In context of the suggested formula there is a tendency to consider the overall duration of the project as a critical factor, while the execution practice of iterative monitoring still stays in place.

The suggested formula and approach for assessing, prioritizing and refining change and transformation projects provides a more comprehensive view and approach for scoring of the change management and transformation projects, since it incorporates factors of benefit, risk, cost and time. This differentiates it from existing approaches, such as DICE and Beckhard's change formula, while it inherits the strong attributes of existing approaches. It is succinct, yet illustrative and practical.

### **4.3 Project scoring and categorization**

To make the formula more practical and useful for real-life applications, it is essential to provide guidelines and a scoring approach to weight different attributes of the formula on a relative scale. To be able to compare projects and change management interventions in various contexts it should be possible to assign relative scores in a consistent manner. It is suggested using a 1 to 4 scale for all factors in the numerator and denominator of the formula. In order to provide certain guidance to decision makers and projects assessors the following scoring tables were developed, which map numerical values of

scores for every given attribute to relevant adjectives, which serve as a reference points for assigning the scores.

Score	Benefit	Leadership	Urgency	Execution
1	Low, Intangible	Indifferent	Unaware	Impotent
2	Noticeable	Curious	Surfaced	Functional
3	Sizable	Supportive	Critical	Capable
4	Smashing	Committed	Burning Platform	Highly Capable

**Table 3 Scoring table for the attributes in nominator**

Table 3 contains scoring adjectives for all attributes in the numerator of the scoring formula. In the similar fashion scoring table for all attributes in the denominator of the scoring formula is defined.

Score	Resistance	Risk	Efforts	Duration
1	Nonexistent	Negligible	No extra effort	Instant
2	Implicit	Low-Medium	Minor	Short
3	Explicit	Medium-High	Substantial	Medium
4	Proactive	Prohibitive	Overwhelming	Perpetual

**Table 4 Scoring table for the attributes in denominator**

As it were discussed before, the BCG DICE formula uses a linear score scale. It means that a single number is calculated for every change project and three ranges of cumulative scores are defined: a “win” zone from 7 to 14, a “worry” zone from 14-17, and a “woe” zone from 17 to 28. As one can notice, these ranges are of a different size. “Worry” zone is just 3 scoring points wide, while “woe” zone is 4 times bigger – 12 points. It makes it questionable what is the value of having three intervals, since the middle zone is negligible compared with the other two. Most probably such a designation of the intervals is driven by the cumulative nature of the DICE formula, which makes it less sensitive to changes of values of constituting variables.

For the “Blue-over-Red” formula it is suggested to use a different approach. Instead of using a single score the formula is unfold into two dimensions. By regrouping the formula it can be noticed that we have a ratio of “Benefit” over “Duration”, which is nothing else but a first derivative of the payoff, or payoff velocity. It is certainly an important differentiator of the proposed approach, where not just the absolute value of the benefit anticipated or derived from given transformation or change project is considered, but also the time span over which this benefit is supposed to be derived is taken into account.

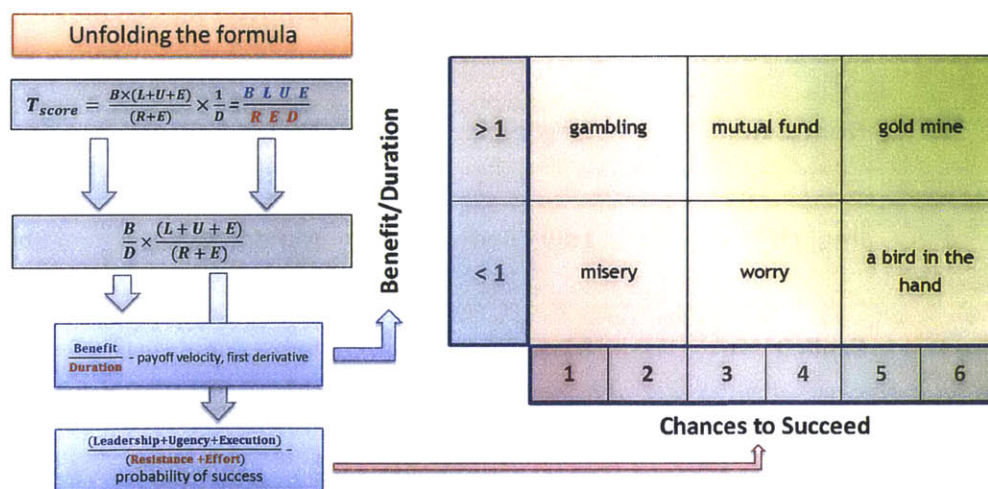


Figure 14 Blue over Red scoreboard

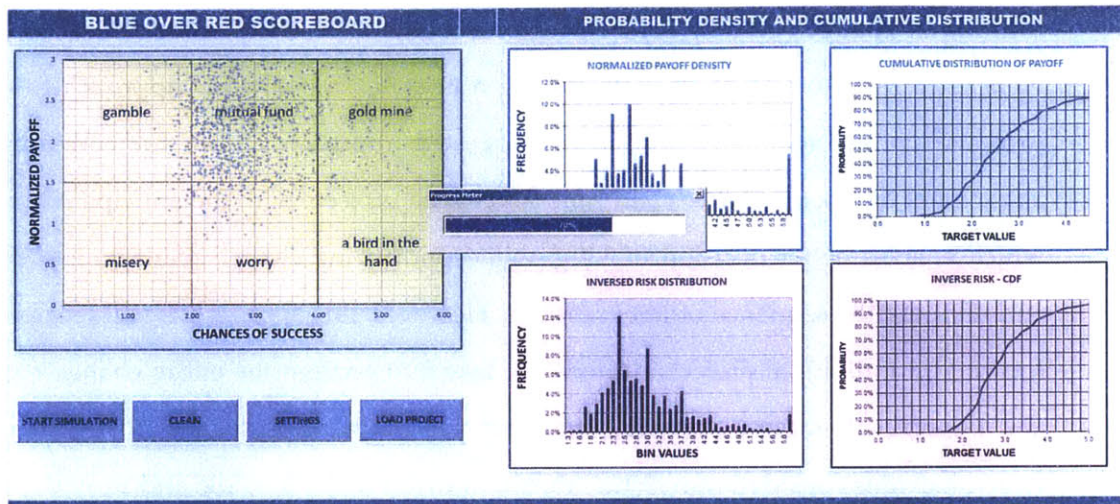
Thus this approach allows us to define relative scores of contribution factors, group them in two dimensions and place our projects on a scoreboard as depicted on Figure 14. However, a common critique of various assessment methods, such as CMMI and others when single number is used to define quality or properties of the system or organization is that an “average” cannot be an ultimate way to judge the observed phenomena (Savage 2009). To address this concern and to avoid relying solely on averages, a complementary approach is suggested, which allows taking into account uncertainty, differences in opinion and the stochastic nature of causes and effects in real life.

It is assumed that scores of contributing variables are collected based on an assessment of different individuals. Certainly, different people might have differences in opinion, but instead of averaging scores from different respondents and relying on single number, it is suggested using inputs from different respondents to define possible stochastic attributes of the underlying parameters/variables, such as a mean and standard deviation, e.g. as defined in Table 5.

Table 5 Data collection for Blue-over-Red approach (notional)

BLUE OVER RED ANALYSIS																		
ATTRIBUTE	SCORES								ATTRIBUTES									
	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5	Respondent 6	Respondent 7	Respondent 8	1s	2s	3s	4s	Distribution	# Responses	Mean	Mode	Deviation	Skew
BENEFIT/PAYOFF	3	1	4	3	3	4	2	2	1	2	3	2		8 🟡 2.75	3	0.81	-0.39	2.90
DURATION/ TIME	1	1	3	2	1	2	1	2	4	3	1	0		8 🟢 1.63	1	0.63	0.82	1.91
LEADERSHIP/ COMMITMENT	2	3	3	3	4	3	2	4	0	2	4	2		8 🟢 3.00	3	0.5	0	3.28
URGENCY/ DISSATISFACTION	2	1	2	3	3	4	3	2	1	3	3	1		8 🟡 2.50	2	0.75	0	2.70
EXECUTION CAPABILITIES	2	3	4	4	3	4	3	2	0	2	3	3		8 🟢 3.13	4	0.66	-0.28	3.35
RESISTANCE/ RISK	1	1	1	2	2	3	2	2	3	4	1	0		8 🟡 1.75	2	0.56	0.4	1.00
EFFORT/ COST/ RESOURCES	2	2	2	1	1	1	3	3	3	3	1	0		7 🟡 1.71	2	0.51	0.6	1.30

Then the assumptions are made that real outcomes or actual values of these parameters are randomly distributed and they follow a certain probability distribution function. In base case scenario it is assumed that all variables follow normal distribution, but in a particular context, the modeler and transformation planner can substitute the normal distribution with the other functions, which might be more relevant in their particular case.



**Figure 15. Monte-Carlo simulation of Blue-over-Red project scores and outcomes**

In given case there is a reliance on the assumption about normality of distribution of these parameters. It is suggested to use a Monte-Carlo simulation to generate a set of possible outcomes, which will give better information to decision makers about range of possibilities of the outcomes and help them to make more informed and educated decisions. All outcomes or results of the simulation can be placed on a single scoreboard, and the density of the outcomes and the spread will certainly provide better information, than a single average number as shown on Figure 15.

#### **4.4 Blue over Red summary**

Any organizational transformation or change initiative which is of significant scale cannot be taken lightly when it comes to planning, definition of change projects, risks assessment and breaking down a set of identified interventions into manageable chunks or projects. Traditional methods of program and project management might not necessarily be applicable “as is” since transition and change often assumes entering unknown territory. Therefore some additional factors, attributes and sources of uncertainty have to be taken into account. Two established approached of change projects assessment and scoring were evaluated: the BCG DICE formula and Beckhard’s

formula of change. Certain deficiencies of existing approaches were identified, which were attempted to address by introducing a new BLUE over RED approach to change projects scoring and evaluation. The suggested approach allows for combining the assessment of risks, resources and time for change projects with the anticipated benefits, which enables better decision making, while prioritizing change management projects and defining the sequence of interventions. However, this approach is still localized and focused on individual projects. It does not take into account the entire change roadmap and possible alterations of steps. Therefore yet another approach will be introduced, which includes consideration of the transition trajectory as a whole and provides means to its optimization.

## **5 Formal methods of enterprise transition modeling**

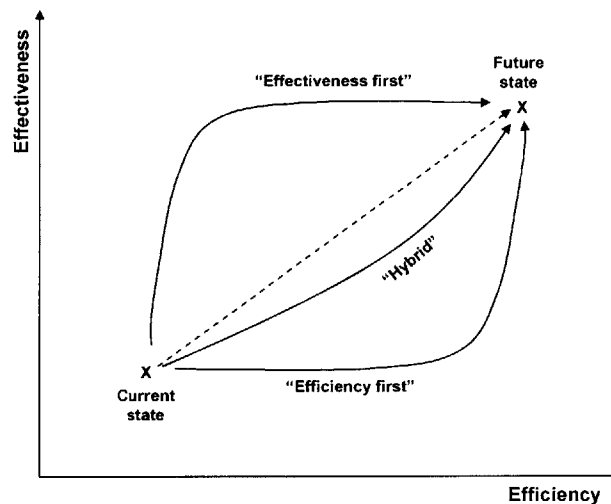
The objective of this chapter is to define a formal model and approach for organizational/enterprise transformation and transition modeling. There is an attempt to employ methods and approaches of operational research such as graph theory and linear/dynamic programming to define an approach and method to generate a set of optimal transition trajectories. These methods take into consideration the initial state of the organization, the target/designed/desired state, and available set of actions and interventions, which are identified to enable the required transition. Interventions and actions define elementary/atomic transitions between interim states of the organization and can be assigned attributes of cost, potential payoff, and duration. In a more general, stochastic scenario, certain probabilistic characteristics, - such as probability of transition jump success and probability of resistance to applied interventions can also be specified. Since it is almost impossible to translate conceptual models of the organizations and enterprises such as the McKinsey 7Ss or MIT Enterprise Architecting models into the formal ones, it is suggested to rely on parametric models of the organizations and do not deal with the internals. It means that there is no visibility and knowledge of the organization or enterprise and consider it as a black box. Instead observable externalized indicators and attributes of the organization or enterprise are going to be used. Selection of the appropriate set of indicators and parameters for modeling is a problem in itself. The list of indicators can be as short as single parameter, e.g. market capitalization (a parameter, which is frequently used by financial institutions to compare relative strength and performance of publically traded companies.) The list can also be very extensive and can contain dozens of various financial metrics, ratios and performance indicators. In this particular case a goal to define the most relevant and objective set of indicators to capture enterprise performance is not pursued. Instead it is suggested that that selected set of indicators can be context-specific and different from one organization to another and also depends on the level of analysis and decomposition. If someone is dealing with the enterprise as a whole – then it might be relevant to rely on generally

accepted financial indicators, such as stock price, volume, market share, return on equity, etc. However, in many cases the level of analysis is more granular and less financially driven. This is true in case when scope is limited to an isolated business unit of the enterprise or even function within business unit, such as a R&D or product development. In these cases imposing financial indicators as a prime measure of organizational performance might not be feasible since the entity under consideration might be just a complementary step in much larger value stream. Therefore it is difficult to judge performance based on purely financial indicators, since often times we are dealing with internal costing models, which can distort true underlying performance characteristics by establishing rather artificial rules required for accounting purposes.

In many cases enterprise transformation and business performance practitioners suggest an idea that, if financial performance indicators are put aside, the underlying performance indicators can be split into two major categories: effectiveness and efficiency. Casual definition of effectiveness is “doing the right thing”, while “efficiency” is “doing things right”. (Nightingale 2011) also suggests that one of the principles of enterprise transformation is that effectiveness should have a priority and be considered first in any improvement and transformation effort. To some degree this principle does provide clear guidance for transformation planning, but do we have to follow it literally? Is it the only path? Do we have to achieve the maximum level of effectiveness possible and only then address efficiency? Or maybe there is some middle ground and incremental improvements in effectiveness should be followed by efficiency improvement efforts? (Gruenwald 2011) suggests that the effectiveness-efficiency state-space can be used to define a transition path for an organization from current state to desired state and even be used to identify and investigate “lean potential”. When he is talking about different transition implementation strategies or trajectories he defines three baseline strategies. The “efficiency first” strategy focuses on elimination of wastes and cost reduction to free up resources, which could be used elsewhere. “Effectiveness first” strategy usually requires investments in effectiveness measures, while the payoff

might not be immediate. It assumes more deep changes in processes, structures and architecture of the organization to achieve more long-term and sustainable benefits.

While both above strategies are legitimate and can be employed in particular context when situation calls for it, (Gruenwald 2011) suggests that in most real life scenarios some hybrid strategy should be employed, where incremental changes and improvements of effectiveness are either alternating with the measures to improve efficiency or at times can be executed in parallel.



**Figure 16 Effectiveness-efficiency transition space. (source: Gruenwald 2011)**

While it sounds like a feasible way to execute transformation and move enterprises from the current state to the future state, a question remains how to find the optimal trajectory or transition path. What should be the balance of efforts between improvement of effectiveness and efficiency in different phases of transformation? Can the transition trajectory be found using more formal and data driven approaches?

It is suggested that identification of an optimal transition trajectory can be done based on optimization relying on the utility function of the organization in consideration. It is commonly accepted that in the general case there is no single universal utility function accepted by all stakeholders, since often times stakeholders might have different or even contradictorily perceptions of the utility. There is no objective here to come up with a universal utility function, which will balance and aggregate objectives of various

stakeholders. Instead, it is assumed that a utility function is defined for the prime decision maker, whose actions and activities are rational and solely focused on maximizing his or her instance of the utility function for a given organization. However, it is suggested that the enterprise utility function during the transformation phase might not be identical to the baseline organization utility function in steady state. Depending on the objectives of the transformation, available resources, organization readiness, risk profile of decision makers and variety of other factors transformation utility function can be formulated differently.

## **5.1 Problem definition and existing methods**

In order to be able to implement formal methods of defining the optimal organizational transformation trajectories it is essential to set a concrete representation for organizational structure, processes, actors, relationships, primary and secondary value streams, etc. While organization structures can reasonably easily be modeled by graphs where vertexes represent actors or entities and edges represent reporting and subordination relationships, formal representation of less tangible artifacts is much more difficult.

Butts and Carley (2006) defined a formal framework of organizational change. They suggest that in a general case an organization can be defined as a set of graphs  $G_1, \dots, G_n$ , which can be referred as  $\mathbf{G} = \{G_1, \dots, G_n\}$ . However, they are not making any other assumptions about these graphs. E.g. either these graphs are directed or undirected, weighted or cyclical. They also do not define what these graphs comprise. What are the edges and what they represent, what are the vertexes and what is their meaning? Also they do not specify if there are any relationships between different graphs in their structural universe, while they assume that potentially all graphs in the set  $\mathbf{G}$  might share vertexes. Moving further, Butts and Carley suggest that any organizational transformation denoted as  $T$  can be modeled as a change walk from initial state  $G_\alpha$  to  $G_\omega$  in change graph collection  $G_T$ . The time interval between the initiation of structural

transformation and its completion is a function of the transformation itself and defined as  $\Delta(T)$ .

Since this model suggests a rather high level of abstraction and does not even intend to demonstrate how it can be mapped to real life entities and relationships, it is questionable how such a model can be used by practitioners and business executives. Also the model itself is focused solely on structure and it is not clear how other aspects of business activities and organization can be represented. Without additional clarifications and use cases it looks like a purely academic exercise rather than an actionable framework.

Implicitly, Butts and Carley admit that it is “non-trivial” to operate with the set of the models they are proposing. E.g. they suggest that there is a payoff function for every organizational model:  $\pi(G)$ , but they propose to use a proxy function, which will rely on a set of “structural indexes” rather than on an underlying collection of suggested graphs. Thus, introduction of structural indexes explicitly assumes that at least for a purpose of formulating a payoff function originally proposed model is substituted with a parametric model which is based on observable and measurable performance, structure and processes indicators. Therefore, the suggested payoff function is an additive function of separable payoffs associated with weights of given indexes (parameters).

$$\pi(G) = \sum_{i=1}^m \beta_i g(f_i^* - f_i(G))$$

Where  $\beta_i$  is a weight of the given index or parameter, and  $f_i(G)$  is actual value of the parameter for given structure set  $G$ . Also a wrapper function  $g$  is introduced, which by definition is any even decreasing function. It implies that the authors believe that optimization of organization by means of transformation can be formulated as a linear optimization problem with the goal to minimize the cumulative weighted deviation of the values of key indices of the organization in the target state from their respective optimal values. The authors suggest that estimation of weights can be done based on empirical performance data or simulation. It can be observed that the proposed payoff

function is not explicitly based on the proposed graph model and definition of optimal values of selected indices is not defined. Such a loose coupling of the underlying structural model with a purely parametric payoff function is probably inevitable due to the enormous complexity of representation of real life organizations in formal terms. However, there is not sufficient evidence that optimization of the transition path is a convex problem, since contributing factors in many cases are represented by non-linear functions.

Based on suggested payoff function, the cumulative payoff for the entire transformation is defined as a combination of “direct” payoff derived from the fact that the organization occupies particular state  $G_{i-1}$  for period  $\Delta(T_i)$  and “indirect” payoff associated with execution of transformation actions and interventions -  $\pi(T_i)$ . Thus the overall payoff is formulated as:

$$\pi(W) = \sum_{i=1}^n \pi(T_i) + \sum_{i=1}^n \Delta(T_i) \pi(G_{i-1})$$

It is easy to observe that it is nothing else but a numerical integration, which can visually be represented as:

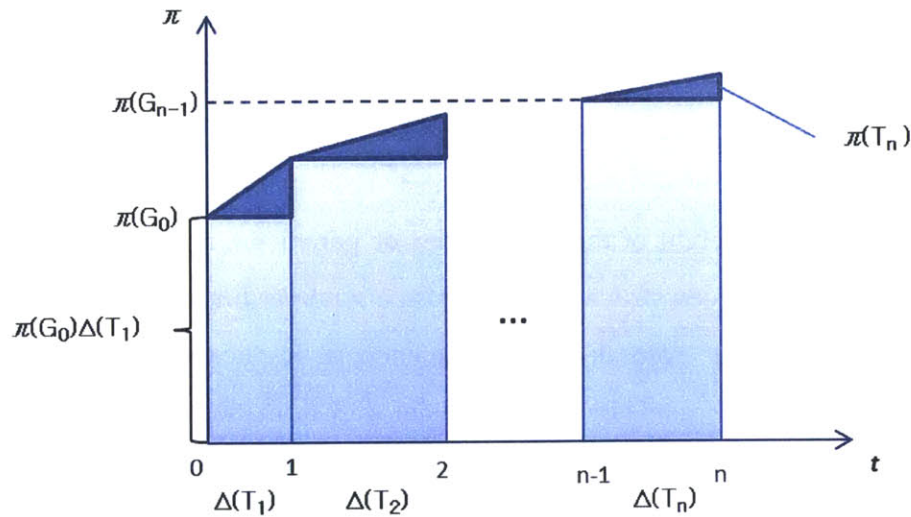


Figure 17 Cumulative Payoff in the transformation phase

This notation is a little confusing. The payoff function in steady state  $\pi(G_i)$  represents the instant payoff (or payoff derivative), therefore it needs to be multiplied by the duration of given phase to calculate the cumulative payoff. While incremental payoff associated with given transition is already of a cumulative nature -  $\pi(T_i)$  and does not depend explicitly on duration of the transformation phase -  $\Delta(T_i)$ . It means that  $\pi(G_i)$  and  $\pi(T_i)$  are fundamentally different functions, while currently expressed using the same symbolic notation. At the end for finding the optimal transition sequence Butts and Carley (2006) suggest using a modified version of a Dijkstra algorithm to find a path of maximum payoff. The algorithm requires all possible intermediate states to be defined which correspond to vertexes of the transition graph, that payoff functions for every state have to be known, and every pair of adjacent vertexes has to be linked by no more than one edge. Every edge has an associated transformation with its own payoff function and is categorized by duration of given elementary transition.

Overall, it can be concluded that unnecessary complexity of structural models is introduced, which plays a limited role in subsequent discussion about finding the optimal transition trajectory, since at the end it is assumed that every given instance of the structural model  $G$  can be expressed via so-called "structural indexes". While structural indexes are claimed to be based on underlying instance set  $G$  of structural models, the mechanism and approach of identification of such a dependency or function is left aside. Overemphasis on the structural nature of transformations – any other attributes of the organization design, such as processes, resources, capabilities and even attributes of underlying structural elements are not taken into consideration. The assumption about the convex nature of the problem of transformation path optimization weakens the possibility to generalize this approach to many real life applications.

Extrapolation of the path finding approach to a scenario under uncertainty is questionable, since it is suggested to operate with the expected values of the payoffs for finding an optimal path, while variances are used only as implicit indication of risk but are not taken into account while making decisions in intermediary states.

Levchuk and Pattipati (2002) propose the entire family of formal models for enterprise optimization in uncertain environments. They do not limit organizational optimization and modeling to just structural models, and also include the dimension of *processes* into consideration. They also attempt to take into account the probabilistic nature of the organizational transition and employ a dynamic Bayesian network as the underlying mechanism for their reasoning. It is proposed to comprise a set of nodes of this network based on actions, events, effects, and goals. The authors assume that they would be able to define for every node, which is considered to be a random variable, a probability distribution function at any given moment. It remains unclear, though, how those mentioned probability distribution functions are defined. Defining of causal dependencies and edges along with conditional probabilities of transitions and associated costs seems to be a significant undertaking, therefore, transition from a qualitative conceptual model to a quantitative one might be challenging. Despite these concerns, formulation of the “effect-based mission planning” seems to be close to stated objectives of this chapter. Moreover, the idea of having multiple objective functions is similar to our idea of having a different utility function during the transformation phase. More specifically Levchuk and Pattipati (2002) suggest the following possible strategies for mission planning: maximizing the likelihood of success, minimize time to achieve desired effects, minimize cost of a strategy, and maximizing the payoff from the achieved goals.

## **5.2 Graph-based interpretation of transition path finding problem**

Thus two different models of organizational transformation planning and transition path finding were reviewed. While both models are intended to solve the mission planning and organizational transformation optimization problems, they cannot be applied directly to the formulated class of problems in two dimensional effectiveness-efficiency space. Also, as it was noticed, conceptually, existing models are supposed to cover a variety of rather generic scenarios of organizational transformation and they

both require and assume availability of rather exhaustive and reliable information about underlying attributes of the system, transitions, actions and outcomes.

In the proposed model for the purpose of organization transition trajectory optimization a parametric model of the organization will be used. A set of parameters can be rather arbitrary, but it has to be representative and sufficient for decision making. For the sake of simplicity and ease of visualization scope is limited to two dimensions only: effectiveness and efficiency. It is assumed that these parameters are measurable with a certain level of precision at any given moment. Thus the state  $S_i$  of an organization in given moment  $t_i$  can be defined by a set of values of selected parameters:  $S_i = \{p_1^i, p_2^i, \dots, p_n^i\}$ .

The set of possible states of the system is finite and known upfront. The initial state of the system  $S_0$  and target state -  $S^*$  are identified. In order to transition from the initial state to the desired state, adequate actions need to be taken in order to change values of underlying parameters to their desired levels. Changes in parameters are believed to be discrete (since measures are taken in discrete moments of time and not constantly). Also for the simplification it is also assumed that a given action or intervention can change only one parameter value at a time, but not multiple values. Implementation of a given action or intervention causes incremental change of the value of the related parameter. All actions and interventions are categorized by the following attributes: cost, duration, benefit and risk derived from changing related parameter value from the original state  $p_k^i$  to  $p_k^{i+1}$ .

Such definition of the transformation optimization model allows us to translate it into graph representation, or being more precise, into a directed acyclic weighted graph, where vertexes or nodes correspond to states of the organization within defined parameter space. Subsequently, edges correspond to elementary or atomic transitions between states. Therefore, edges in the graph are mapped to actions or interventions, which need to be taken or executed to incrementally change the state of the underlying system or transition between two adjacent vertexes. As it was noticed before, this graph

is multi-weighted, since every edge has attributes of cost, duration, benefit and risk. Desired state  $S^*$  in this graph corresponds to a terminate node, which should be the final destination of the transition path. The initial state  $S_0$  by definition has no inbound edges, which means that the possibility of rollback or unsuccessful execution of the transformation action or initiatives is not considered at this point. In two-dimensional parameter space the graph model of enterprise transformation planning can be depicted as shown on Figure 18.

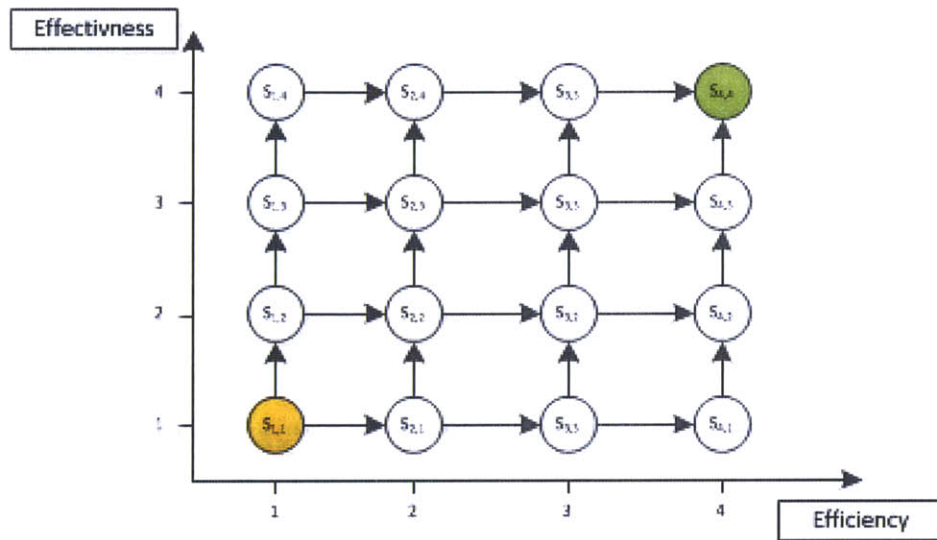


Figure 18 Graph model of enterprise system transition

It is necessary to note, that weights or attributes assigned to the edges in the described graph are not static in the general case. Since every edge corresponds to a transition from some intermediate state  $S_u$  to state  $S_v$  it is assumed that there is a way to define functional dependency of the desired edge attributes and underlying change in system state or parameters of the system. In the general case, the weight attribute of a given edge  $W_{u,v}$ , which connects the corresponding vertexes  $S_u$  and  $S_v$  is a delta of values of a certain function

$$W_{u,v}^j = F_j(S_v) - F_j(S_u) = F_j(p_1^v, p_2^v, \dots, p_n^v) - F_j(p_1^u, p_2^u, \dots, p_n^u),$$

where  $j \in \{1, \dots, k\}$ , - index of the attribute or weight of the given edge.

Let's summarize the suggested model of enterprise system transition using graph theory in the following table:

**Table 6 Graph based model of enterprise transition**

Elements	Formal Definition	Description	Graph Interpretation
Parameters	$\{p_1^i, p_2^i, \dots, p_n^i\}$	Observable and measurable characteristics of the system	Every parameter can be treated as a dimension in n-dimensional Euclidian space
States	$\{S_0, \dots, S^*\}$	State of the system defined by values of underlying parameters $S_i = \{p_1^i, p_2^i, \dots, p_n^i\}$	Vertexes of the graph, with $S_0$ being an initial vertex and $S^*$ - the final or terminate vertex
Transitions	$\{V_{u,v}\}$	Incremental changes of system state caused by execution of actions or interventions	Edges of the graph
Actions and Interventions	$V_{u,v} \rightarrow \{A_{u,v}\}$	One or more actions or interventions are linked to given transition	Supplementary attributes of the edges of the graph
Transition attributes	$\{W_{u,v}\}$	Cost, duration, benefit, risk of every atomic transition	Weights or distances assigned to the edges of the graph

The suggested model allows us to define the enterprise transition optimization problem as a well-known graph problem of finding the path of smallest length (or the inversed problem if an objective is maximizing the cumulative distance/weight of the path.) Taking into account that the proposed graph is multi weighted, then the problem in the base case scenario can be formulated as a problem of dynamic programming of finding the path of smallest cost, defining the path of greatest reward and defining the path which provides the shortest transition time:

$$Max/Min \sum_i^* W_{u,v}^j .$$

However, in a more realistic case, while defining the optimal transition trajectory it might not be sufficient to use a single attribute/weight of transition for decision making.

The given model certainly allows introducing some aggregate utility function, which will use all or some attributes of the elementary transitions/edges to define. Such a utility or payoff function is supposed to be defined by a decision maker and can be expressed in some additive form, e.g.:

$$U(v_{u,v}) = \sum_{j=1}^k \alpha_j \cdot W_{u,v}^j ,$$

where weights of the edges are factored in accordance to their importance and contribution, or, alternatively, some modified cost/benefit ratio based approach can be used, such as:

$$U(v_{u,v}) = \frac{W_{u,v}^{benefit}}{W_{u,v}^{cost} * W_{u,v}^{time}}$$

Usage of the aggregate utility/payoff function does not change our general approach of defining the optimal transition path. The same methods of path-finding can be utilized but they should rely on the utility value of the edges/transitions, rather than on original weights/attributes. There is no point to invent yet other algorithms of optimal path finding on graph; there are a number of perfectly suitable approaches to solve this task. In the majority of cases certain modifications of the popular Dijkstra algorithm are used.

### **5.3 Modeling, practical implications and interpretations**

Let's try to create the model in two-dimensional space of efficiency-effectiveness and simulate the transformation path-finding algorithm. In this case effectiveness –  $e_1$  and efficiency –  $e_2$ , are considered to be two observable and measurable parameters of the system. Certainly the measurement and interpretation of these parameters might be difficult in real life; however this task is outside of scope of this work. Therefore it is assumed that both parameters are unambiguously defined and can be measured with sufficient precision.

Also, it is assumed, that the current state of the enterprise  $S_0 = \{e_1^o, e_2^o\}$  is defined and known in these two dimensions as well as the desired or target state  $S^* = \{e_1^*, e_2^*\}$ . Thus, a gap can be defined in both dimensions which the enterprise is intended to close by executing a transformation plan and taking appropriate actions and interventions. Let's define  $\Delta(e_1) = e_1^* - e_1^o$  to be the effectiveness gap and  $\Delta(e_2) = e_2^* - e_2^o$ , the efficiency gap respectively. In order to define suggested multi weighted graph of enterprise transition it is needed to define several things. Firstly it is necessary to define how the attributes of elementary transitions can be expressed via underlying parameters in given dimensions of effectiveness and efficiency. For simplification two attributes limit is imposed – relative benefit or payoff and cost of a given transition. Defining the strict formal functional dependency of measurable parameters and derived variables such as benefit and cost is certainly a non-trivial task. Therefore, it can either be assumed that it is possible to rely on historical data accumulated by the enterprise and derive these dependencies by analyzing prior data or, alternatively, an expert modeling approach has to be employed. This approach is also referred sometimes as “reference mode”, - technique, which is widely used in System Dynamics – Sterman, 2000.

Figure 19 represents a suggested reference mode or dependency of payoff and cost from effectiveness and efficiency.

**Benefit(Effectiveness): S-curve**

$$B(e_1) = A + \frac{K-A}{(1+Qe^{-B(e_1-M)})^{1/\nu}}$$

**Cost(Effectiveness): log saturation**

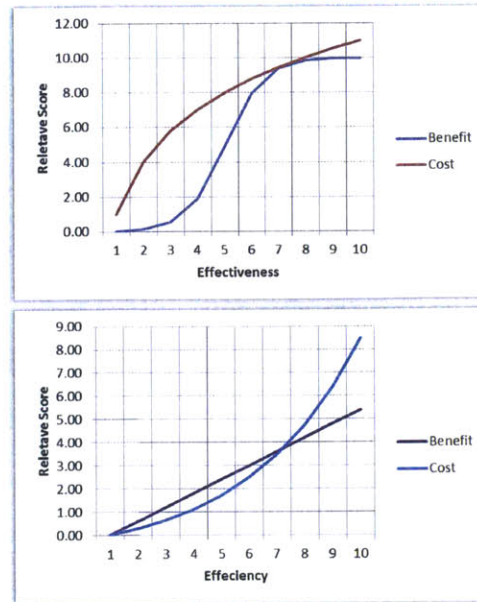
$$C(e_1) = K * \log(e_1)$$

**Benefit(Efficiency): ramp**

$$B(e_2) = A + \frac{K}{R} e_2$$

**Cost(Efficiency): exp growth**

$$C(e_2) = \exp\left(\frac{e_2}{K}\right) - 1$$



**Figure 19 Reference dependencies of payoff, cost, effectiveness and efficiency**

Common interpretation of these dependencies suggests that to increase effectiveness, substantial upfront investment is required. Therefore, initially, the cost curve rises quicker than the benefit curve. Therefore an s-curve like graph can be used to model the dependency of *benefit (effectiveness)* and the log saturation of *cost (effectiveness)*. The efficiency situation is the opposite. It is generally accepted that it is reasonably easy and inexpensive to generate quick wins and gains by eliminating obvious deficiencies and bottlenecks. However, further increase of efficiency is usually more costly, since underlying structures remain the same. Once the saturation limit of efficiency growth is achieved within current structures, a typical situation of diminishing returns is observed – the cost of further improvements exceeds the potential gains. However, it is important to note, that suggested reference mode dependencies are provided for illustration only and do not pretend to be an ultimate generic model. In every particular scenario, the modeler and stakeholders should agree and develop their own reference model.

The next step in defining a graph-based model of enterprise transition is to define intermediate states of the system. Obviously, intermediate states can be hand-picked, but it might not always be possible. A relatively simple approach to define intermediate

states is proposed. Gaps  $\Delta(e_1)$  and  $\Delta(e_2)$  are divided into a set of atomic intervals in order to generate all intermediate states of the system. Every interval will correspond to an edge of the graph or elementary transition which can be performed to change the state of the system. Combinations of these incremental changes in both dimensions will define a set of available states. Figure 18 illustrates this approach.

Thus almost all data to compete the graph model of enterprise transition are available. Actions, which are required to execute elementary transitions, are not specified within given model, since they are context dependent and it is assumed to be a responsibility of the decision maker and transformation planner.

Let's finally draw an allegoric illustration of the idea of enterprise transition path optimization and multiple objective functions. Let's assume that the current state of the system (position in space) is at the bottom of the mountain's north steep slope. The ultimate performance indicator or characteristic of the system is the current height. The objective or target state is to get to the summit of the mountain. If the prime objective function, - current height, is considered as the only ruling decision factor, it would mean that one would have to climb immediately using the shortest possible route (straight line) from our current position to the summit. In this case it is needed to deal with the consequences of our unfavorable initial position. The risks of climbing the steep North Slope are high and costs might be out of control. This illustrates well that the prime objective function, which is an ultimate measure of performance of the system (like market capitalization or revenue in business case) might not necessarily be the best choice for transition trajectory optimization. Alternatively, other objective functions can be employed, such as immediate gains with cost and risk control, or deferred gains with minimized risks as is depicted in Figure 20. Instead of trying to maximize and to increase the prime objective function immediately at each and every step, decision makers and transformation planners might be better off selecting an alternative strategy and create at-first favorable conditions for the transformation (e.g. by moving to the gradual south slope) and then execute the actual transition.

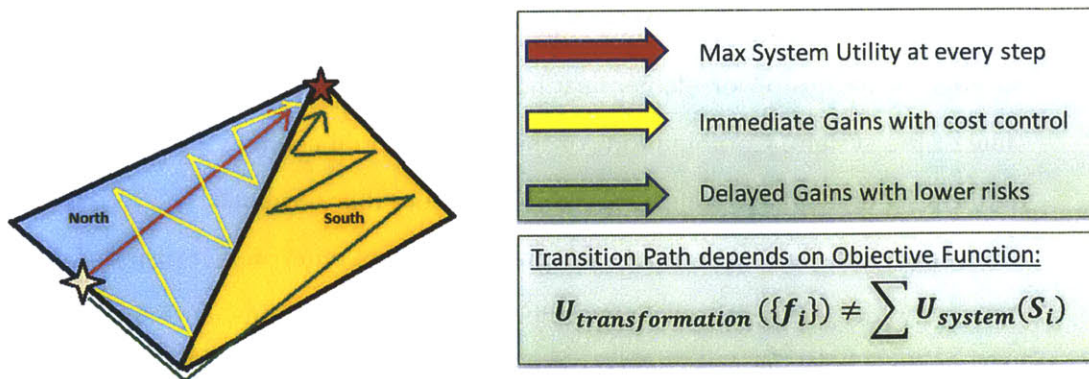


Figure 20 Illustration of various objective functions: Mountain climbing paths.

## 5.4 Summary and key takeaways of the formal approach

We've demonstrated how a transformation planning procedure can be formulated as a problem of formal optimization using the apparatus of operations research and more specifically dynamic programming on graphs. While the applicability of the suggested approach directly depends on the availability of a priori data and our knowledge of functional dependencies in the underlying organizational system, it does provide a rather prescriptive and objective way of defining an optimal transition trajectory. Another consideration which plays an important role in defining an optimal transition trajectory is a premise about multiplicity of utility functions and the assumption that a utility function during transition or transformation phase might be different than a utility function in steady state. Moreover, the risks of transition and potential undesirable side effects might greatly increase if the fact that a utility function during transformation in most cases needs to be altered is ignored.

## 6 Conclusion

Let's summarize the outcomes of our efforts and see if our stated objectives are reached. We've started with a classification of existing academic and industry approaches to change management and enterprise transformation. We've identified three main schools of thought in this context: Planning School, Organizational Development School and Learning School. We've highlighted distinct features of every school but discovered the fact that boundaries between schools are diffused, especially when change management and enterprise transformation are executed in practice. Then, the premise about the coupled nature of organizational models and change management frameworks was introduced, which is attempted to be backed up with the arguments by conducting subsequent analysis of existing organizational models and transformational frameworks. Detailed cross-examination of the most prominent organizational models, including Galbraith's Star model, McKinsey's 7S' and OH models, MIT LAI Enterprise Architecting Framework and Carnegie Mellon CMMI model, was performed. This analysis allowed for identifying generic core features shared by most of the models, and helped to identify their key attributes and potential weaknesses of existing approaches. We've proposed a new high level organizational model, which presumably advances existing approaches by defining the organization as a an open system and emphasizing the importance of soft dimensions of the models, including explicit accentuation of distinct internal groups of stakeholders including leadership, middle management and individual contributors.

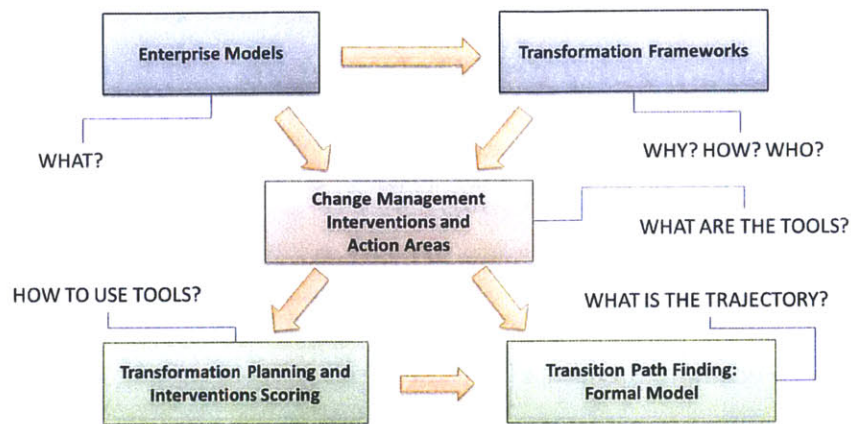
In the next chapter we've conducted a comparative analysis of a transformational framework using as a baseline and benchmark widely regarded change management models of Lewin and Kotter. Carnegie Melon's IDEAL framework, MIT LAI ESAT framework and McKinsey's 5A's framework were also evaluated. It has been concluded that despite the differences, all these frameworks belong to the class of step models; all of them share exploration, assessment phase, design phase and execution phase. In most cases a notional ideal state is introduced and a subsequent definition of a transformation

plan is targeted on closing the gap between the currently assessed state and the desired state. We've also reviewed existing models in chronological context, and tried to see how newer contributions are advancing the existing state of thought in change management science and practice. We've concluded however, that this domain is already very well-developed. Therefore we've decided to suppress a temptation to synthesize yet another change management framework.

Instead, in subsequent chapters we've introduced complementary tactical approaches and methods, which can be used in conjunction with existing frameworks. We've introduced a change projects evaluation approach, which is in essence represented as a scoring formula called "BLUE-over-RED". It enables prioritization and assessment of change projects from risk-benefit-cost-time perspectives and can serve as a handy tool when defining a roadmap for the transformation. Finally, it has been demonstrated how formal optimization methods can be used to define a preferable transition trajectory, which is represented as a conditional sequence of projects, actions or interventions. We've formulated the problem of changing the state of the organization as a system from current to desired state and showed that under certain assumptions it can be formulated as a multi-weighted directional graph path-finding problem. Thus, it is fair to state that all originally introduced objectives of this thesis are achieved.

This thesis might also be considered not just as a pure academic analytical exercise, but they presumably provide certain practical value and guidance for real life enterprise transformations and change projects. Let's refer again to the original diagram, which depicts structure and flow of this thesis.

To some extent this flowchart can serve as a template of the roadmap, which can be used by management consultants while undertaking efforts on large scale complex enterprise transformations. It highlights the importance of the initial discovery phase, which should go beyond getting a set of metrics in CMMI-style appraisals and calls for defining a comprehensive, adequate and holistic model of the target organization. However, the model is not the end in itself; it serves as a basis in subsequent future state



design and transformation planning phases and helps to take into account the interdependencies and causalities in the underlying dimensions and structures. Through interviews with transformation designers and change management consultants, it has been noticed that often, once the current state is identified and a target state is articulated, the details of implementation, the actual definition of a transformation plan and the execution phase itself often get much less attention than the assessment and design phases. It seems like a “tell us where do we need to go and we will figure out ourselves how to get there” paradigm often prevails. To cure this disease certain supporting tools were introduced, which can provide some level of decision making support in change planning and in defining transformation journey.

While the entropy is certainly increased by 70+ pages of content of this thesis, I hope that these efforts might help someone to navigate and to understand better the crowded, overlapping and often intentionally vague domain of change management and enterprise transformation. It can be also admitted that certain outcomes of this work are notional and analytical, therefore they lack sufficient empirical evidence. This I would be keen to see of these ideas can be developed further and validated in real life applications.

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