Business transformation project's architect's profile (BTPAP)

Antoine Trad
Institute of Business and Information Systems Transformation Management, France

Damir Kalpić
University of Zagreb, Faculty of electrical engineering and computing, Croatia

Keywords
Business Transformation Projects, Enterprise Architecture, Mathematical Model, Artificial Intelligence, Profile Management, Human Resources, Critical Success Factors and Performance Indicators.

Abstract

This article proposes a holistic mathematical model for the selection, supporting and evaluation of a transformation architect's or manager's profile. The model uses critical success factors, natural programming language environment and an adapted decision-making system to define the optimal BTPAP. The authors propose the use the BTPAP in various types of transformation projects, like for example, in the case of transformation of enterprise's human resources activities, financial systems transformation, logistics transformation projects, or even in audit operations. The BTPAP is a specific profile which is mainly based on the manager's original capabilities and affinities, which are in turn supported by the optimal educational curriculum, by worthful experiences in transformation projects and above all, such profile should be supported by a tuneable transformation framework. A transformation framework is a set of existing frameworks that are integrated to support all types of transformation activities, like the selection of the optimal BTPAP. This framework's originality is that it can be used in any stage of the transformation project for any type of problem and to audit the BTPAP's effectiveness. The main limitation is the enterprise's capacity to restructure and unbundle its legacy environments.

Introduction

The BTPAP for a transformation manager (or simply the *Manager*) has become a central issue in managing complex problems. The authors use the term *Manager* for a business architect, because in hyper evolution of technology and methodologies, classical project management activities have become an automated process.

BTPAP's main concepts are based on: 1) Farhoomand's work that describes three basic profiles, the Advocate, the Technocrat and the Samaritan (Farhoomand, 2004); 2) An Applied Mathematical Model for Business Transformation and Enterprise Architecture: The Holistic Profile Management System (HPMS) (Trad, & Kalpić, 2020a, 2021a); 3) The Selection and Training Framework (STF) for Managers in Business Innovation Transformation Projects (Trad, & Kalpić, 2013a); 4) The Selection and Training Framework (STF) for Managers in Business Innovation and Transformation eProjects - The Profile of a Business Transformation Manager (Trad, & Kalpić, 2014d); and 5) The Selection and Training Framework (STF) for Managers in Business Innovation and Transformation Projects - Integrating the restructuring process of the global economy (Trad, & Kalpić, 2014f).

The authors will try to prove that the BTPAP is a combination of many skills, by using the Applied Holistic Mathematical Model for Architect's Profile (AHMM4AP), used for the selection and support to a *manager*, who is the *Project's* leader and main architect. The AHMM4AP is based on Critical Success Factors (CSF) and on a unique mixed research method (Trad & Kalpić, 2017a, 2018a, 2020a). The BTPAP can be used to support Human Resources (HR) activities. BTPAP's activities are supported by a Decision-Making System for AP (DMS4AP), Knowledge Management System for architect's profile (KMS4AP) and an Enterprise Architecture (EA) (Blackburn & Rosen, 1993; Neumann, 2002). The Proof of Concept (PoC) uses

a case from the insurance domain (Jonkers, Band & Quartel, 2012a; Trad, 2013), where the focus is on the *Manager's* profile who is capable of managing a BTP (simply a *Project*). *Manager*s are supported by a framework that can estimate the risks of failure of a *Project*. The BTPAP supports the selection of *Manager*s, who manage the implementation phase of complex *Projects*. There, the selection process identifies BTPAP's main characteristics and background. *Project's* main issue lies in the transformation of a Legacy Environment (LE) into a lean and automated system, where the role of the *Manager* and his/her capabilities in managing the implementation phase of the *Project*_is critical. The BTPAP and his or her optimal education's curriculum have no precise description and this article's main goal is to deliver such a description, using a systemic and cross-functional approach. A BTPAP must be capable of managing *Project*'s Complex Implementation Phase (PCIP) that requires a set of in-depth DMS4AP, KMS4AP, EA, and implementation skills. The PCIP is the major cause of high failure rates. Therefore, there is a need to investigate the BTPAP who needs skills for the PCIP. The authors' previous works have located a gap in the existing methodologies related to *Projects* that offer no insight into the BTPAP and have concluded that the Architect of Adaptive Business Information System (AofABIS) is to be considered as the optimal choice. The BTPAP is an enhanced version of the AofABIS and corresponds to the evolution of technology. Today *Projects* rely on business schools' accountants' profiles to deliver *Managers*. However, this is not the optimal approach.

The AofABIS and the BTPAP

A BTPAP must be capable of transforming LE's Information and Communication Systems (ICS) and to exploit avant-garde technologies in order to successfully conduct a *Project*. Such *Manager*s and organizations need holistic methodologies, like The Open Group's Architecture Framework's (TOGAF). This article shows that the BTPAP needs holistic or cross-functional skills, and is mainly a technocrat, which is in contradiction with the applied methods of business schools who engage cheap interface accountants, who are schooled to deliver tuned balance sheets and cannot manage PCIPs (The Economist, 2000). The BTPAP uses the *Framework* that is based on the Research and Development Project (RDP) (Trad & Kalpić, 2018a). The BTPAP is agnostic to any specific application field and is based on the Architecture Development Method (ADM) (The Open Group, 2011a). The used EA method and its ADM are central to implement *Projects,* where the BTPAP is used for the *Manager*'s selection. The authors will try to prove that a qualified technocrat's profile would be a base for the BTPAP (Farhoomand, 2004), who needs to be assisted by a DMS4AP (Trad & Kalpić, 2013a). *Projects* lack a holistic approach and need a BTPAP. Figure 1 describes the relation between the BTPAP and the AofABIS. The *Framework's* and RDP's interactions, include three components: 1) DMS4AP; 2) KMS4AP; and 3) BTPAP.

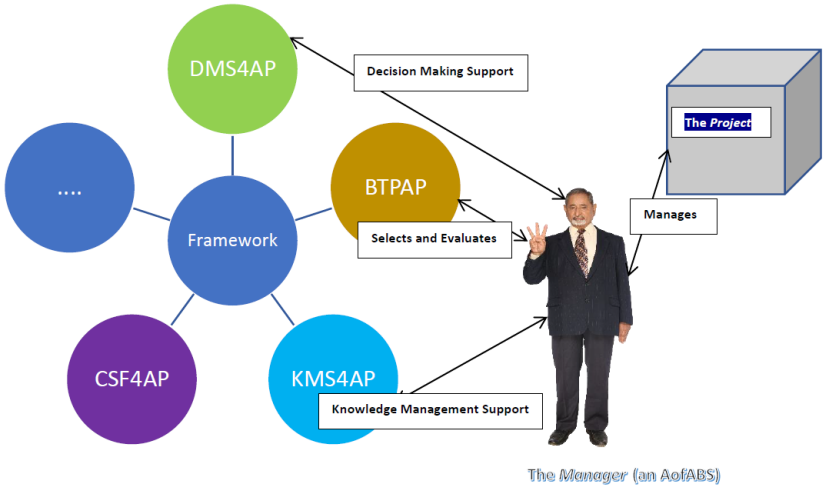

Figure 1. The relation between the BTPAP and the AofABIS

The research development project

The Researched Literature Review and the Gap

Projects high failure rates (Bruce, 1994) that is due to the PCIP, needs a *Framework,* which recommends linking the AHMM4AP-based Heuristics Decision Tree (HDT) to all levels of the *Project*, as shown in Figure 2 (Agievich, 2014). The BTPAP can be applied to various types of HR activities and the Research Question (RQ) is: "Which transformation managers' characteristics are optimal for the complex implementation phase of transformation and enterprise architecture projects?"

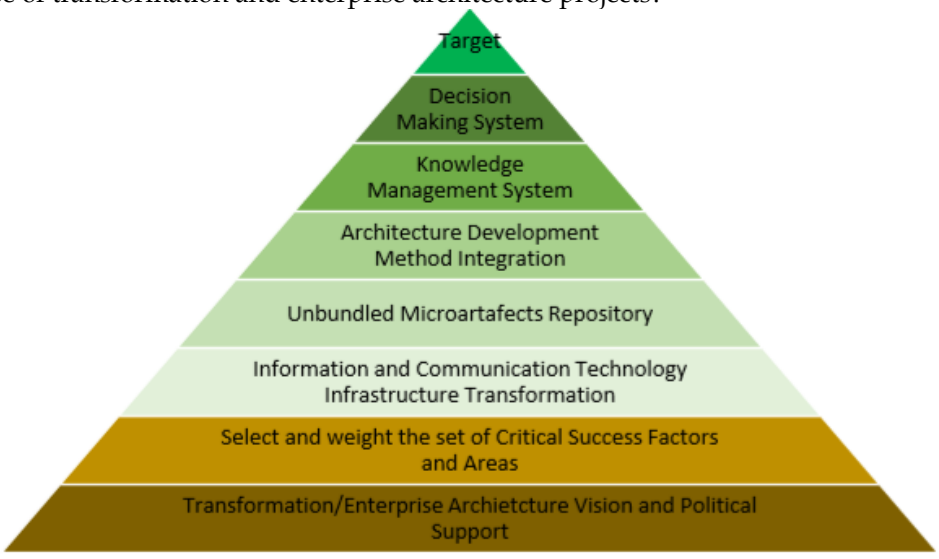

Figure 2. Levels of *Project's* interaction.

The knowledge gap was acknowledged mainly because the existing literature on failure rates and methodologies treating *Projects* offers no insight into the BTPAP, who can manage *Project*s and their PCIP (Trad & Kalpić, 2013a, 2013b). This RDP inspects the BTPAP, which is mainly based on the already defined AofABIS, enforced with new discovered features. The uniqueness of this RDP promotes a holistic unbundling process and the alignment of standards and strategies to support BTPAP for *Projects* (Farhoomand, 2004). The RDP uses a holistic approach that combines: 1) *Project* topics; 2) AHMM4AP and HDT; 3) Software modelling and implementation; 4) Business engineering; 5) Financial analysis; 6) BTPAP definition; 6) EA; 7) Integrating standard market standards; and 7) it offers a concrete methodology.

Review and Check of the Critical Success Factors/Critical Success Areas

The *Framework* promotes the transformation using Critical Success Area (CSA) that contains a set of CSFs, where a CSF is a set of Key Performance Indicators (KPI), where each KPI corresponds to a single *Project's* requirement and/or an item that can be a profile requirement or skill that has a column in each evaluation table (Putri & Yusof, 2009; Peterson, 2011). A *Project* starts with the first phase called the feasibility phase to check the basic CSFs, to check if the *Project* makes sense; it ends with success or failure. Based on the literature review and evaluation processes, the CSFs are used and evaluated using the following rules:

- References should be credible and are estimated by the authors and follow a classification process.
- *Projects* are the result of defined changes measured by CSFs.
- Applied modelling language should be limited in order to make the *Projects* manageable.
- The ADM is mature and can be used to manage the PCIP.
- The ADM manages the *Framework's* iterations and CSFs tuning.
- If the aggregations of all the *Project's* CSA/CSF tables are positive and exceed the defined minimum, the *Project* continues to its PoC or can be used for problem solving that uses a business case.

The Business Cases

Business Case Basics

The PoC uses an Applied Case Study (ACS), developed by the Open Group as a concrete study which represents the possibilities to implement a *Project* that transforms the company ArchiSurance. This study is suitable because it integrates cross-functional domains. BTPAP CSF are measurable by a weighting that is roughly estimated in the 1st iteration and then tuned through ADM iterations. In each iteration the BTPAP evolution is verified by using the DMS4AP; where EA CSFs are essential (Felfel, Ayadi, & Masmoudi, 2017).

The Architecture Development Method and Projects

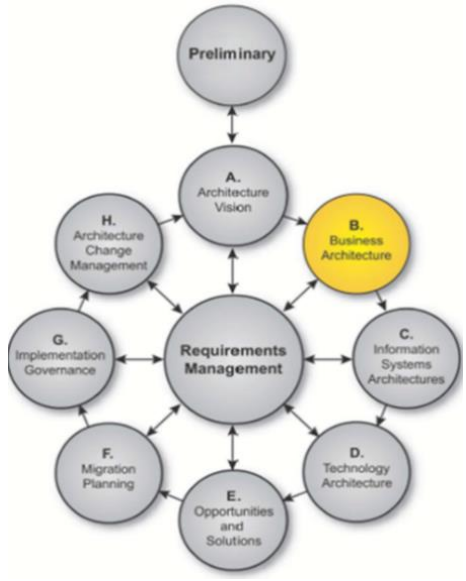

Figure 3. Business architecture phases (The Open Group, 2014b)

This RDP focuses on the design of *Project's* integration and presents the influence of BTPAP to select the *Manager*. In the actual age of distributed intelligence, complexity, knowledge, economy, and technology (Gardner, 1999), the *Framework* offers a HDT that supports a set of BTPAP problem types (Markides, 2011), where the DMS4AP offers a set of BTPAP solutions in the form of recommendations (Trad & Kalpić, 2014d). The *Framework's* parts must synchronize with the ADM shown in Figure 3.

Mathematical model usage

The Mathematical Model Basics

CSFs define the initial nodes that are identified as vital for successful targets to be reached and maintained and is the AHMM4AP's basic element that is needed for the *Project* evaluation (Morrison, 2016). The BTPAP uses a CSF based AHMM4AP uses a proprietary environment, for the *Project*. The AHMM4AP nomenclature is presented to the reader in Figure 4 in a simplified form, to be easily understood, on the cost of a holistic formulation of the model. The Domain is the Architect's Profile (AP), as shown in Figure 4:

The symbol $\sum$ indicates summation of weightings/ratings, denoting the relative importance of the set members selected as relevant. Weightings as integers range in ascending importance from 1 to 10.

- The symbol $\underline{\cup}$ indicates sets union.
- The AHMM4AP defines the *Project* as a model, using CSFs weightings and ratings.
- The selected corresponding weightings to CSF ϵ { 1 … 10 } are integer values.
- The selected corresponding ratings to CSF ϵ { 0.00% … 100.00% } are floating point percentage values.
- A weighting is defined for each BTPAP CSF, and a rating for each KPI.

A Quantitative-Qualitative Research Mixed Model

Basic Mathematical Model's (BMM) Nomenclature

microRequirement	= KPI	(B1)
CSF	= Σ KPI	(B2)
Requirement	= CSF = ∪ microRequirement	(B3)
CSA	= Σ CSF	(B4)
microKnowledgeArtefact	= ∪ knowledgeItem(s)	(B4)
neuron	= action->data + microKnowledgeArtefact	(B5)
microArtefact / neural network	= ∪ neurons	(B6)
microArtefactScenario	= ∪ microartefact	(B9)
AI/Decision Making	= ∪ microArtefactScenario	(B10)
microEntity	= ∪ microArtefact	(B7)
Entity or Enterprise	= ∪ microEntity	(B8)
EntityIntelligence	= ∪ AI/Decision Making	(B11)
BMM(*Iteration*) as an instance	= EntityIntelligence(*Iteration*)	(B12)

The Generic AHMM's Formulation

AHMM	= ∪ ADMs + BMMs	(B13)

AHMM's Application and Instantiation for a Specific Domain

Domain	= EARM	(B14)
AHMM4(*Domain*)	= ∪ ADMs + BMMs(*Domain*)	(B15)

AHMM's Application and Instantiation for National Security and AIbDS

Domain	= AIbMT	(B16)
AHMM(*Domain*)	= ∪ ADMs + BMMs(*Domain*)	(B17)

Figure 4. The applied mathematical model's nomenclature (Trad, & Kalpić, 2020a)

A BTPAP problem, RQ, CSF or phenomenon are examined in iterations relating breadth and depth, using the HDT, which is specialized for unknown problems or the ones that appear in a preliminary phase or initial iterations. Then, the *Framework* qualitative research module input data stream(s) consist of(s) of sets of numbers that are collected from sets generated by using designed/structured and approved/validated statistically processed data object collection modules. Just analysing data is a partial, limited static solution. There is a need for a dynamic proactive qualitative heuristic method like the author's HDT algorithm. There is also a need to control the activities and behaviour of persons (and groups), which are an important part of the *Entity's* internals and to proactively detect any probable violations. Possible violations can be modelled to deliver controlled access to *Entity's* internals through political backup, spying services, assigned roles, responsibilities & credentials, and defined standards.

The Applied Business Transformation Mathematical Model

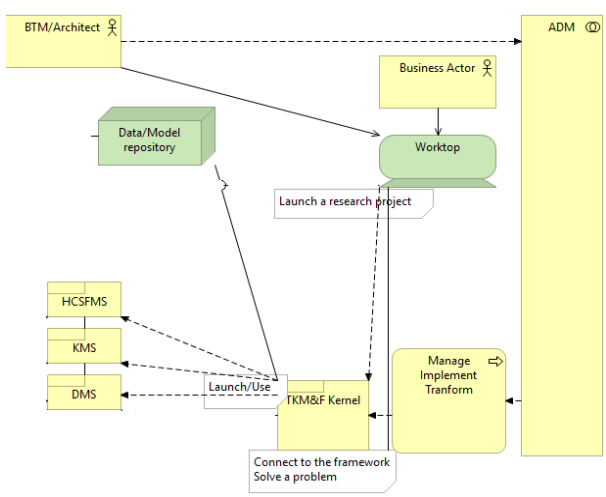

Figure 5. The decision making and knowledge management interface.

The AHMM4AP for BTPAP has a composite structure that can be viewed as follows: 1) The static view; 2) The behavioural view; and 3) It is the skeleton of the *Framework* that uses microartefacts' scenarios. The

AHMM4AP can be modelled after the following formula for Business Transformation Mathematical Model (*BTMM*) that abstracts the *Project*:

AHMM4AP = $Weigthing_1$ * AHMM4AP_Qualitative + $Weigthing_2$ * AHMM4AP_Quantitative (B18).

AHMM4AP = ∑ AHMM4AP for an enterprise architecture's instance (B19).

BTMM = ∑ AHMM4AP instances (B20).

The objective function of the *BTMM*'s formula can be optimized by using constraints and with extra variables that need to be tuned using the AHMM4AP. The variable for maximization or minimization can be, for example, the *Project's* success, costs, or another CSF. For the BTPAP PoC the success will be the main and only constraint and success is quantified as a binary 0 or 1, where the objective function definition will be:

Minimize risk *BTMM* (B21).

The *BTMM* is a combination of *Project* methodologies and a holistic mathematical model that integrates the enterprise organisational concept and ICS. The AHMM4AP is a part and is the skeleton of the *Framework* that uses microartefacts' scenarios to support BTPAP requests (Kim & Lennon, 2017). The BTPAP components interface the DMS4AP and KMS4AP as shown in Figure 5, to evaluate, manage and map CSFs for BTPAP's selection activities; if the aggregation of all the *Project's* CSA/CSF tables exceeds the defined minimum, the *Project* continues to its second part of the PoC. The initialization phase generates the BTPAP types of problems to be analysed. The AHMM4AP is a part of the *Framework* to support BTPAP requests (Agievich, 2014).

USAGE OF KMS4AP

Unit of Work as the Building Block

The *Framework's* Microartefact granularity and responsibility for a given AHMM4AP scenario is a complex undertaking (Kim & Lennon, 2017). The implementation of the "1:1" mapping and classification concept ensures that resources pass from one component to the other with a mapping concept. The EA concept uses methodologies like the ADM to support BTPAP's activities (Neumann, 2002).

EA, Technology, Services and Standards

A *Manager* must have in-depth skills to manage an agile *Project* and its PCIP; where adequate mapping and synchronization concepts can be used to integrate various types of standards; this is a major recommendation for the BTPAP. The strategy is enabled by the establishment of an ADM based iterative model that can map *Project's* microartefacts in a "1:1" manner (The Open Group, 2011b). The scope complexity lies in capability of the BTPAP to synchronize the *Project's* vision with its capabilities (Trad & Kalpić, 2015b). The BTPAP must be capable of integrating the *Framework* using a mixed bottom-up approach that is based on Service Oriented Architecture (SOA) or Microservices standards, which are the backbone of the *Project's* unbundling process.

Enterprise Security Strategies

Entities face a set of barriers and difficult situations, which need the management of security Risks (sRisk), using a specialized framework to support their activities. sRisks may include CSFs related to reputation, routine operational procedures, legal and human resources management, financials, the risk of failure of internal controls systems related to the Sarbanes-Oxley Act (SOX) and global governance. The BTPAP defines capabilities to protect the *Project* from attack by 1) Localizing gaps in the infrastructures of partners; 2) Review of detection, and real-time security solutions; 3) Blocking of cumulative attacks; 4) Defining a security strategy to locate potential weaknesses; 5) Building a robust defence; 6) Integrating security in transactions; and 7) Applying qualification procedures (Clark, 2002).

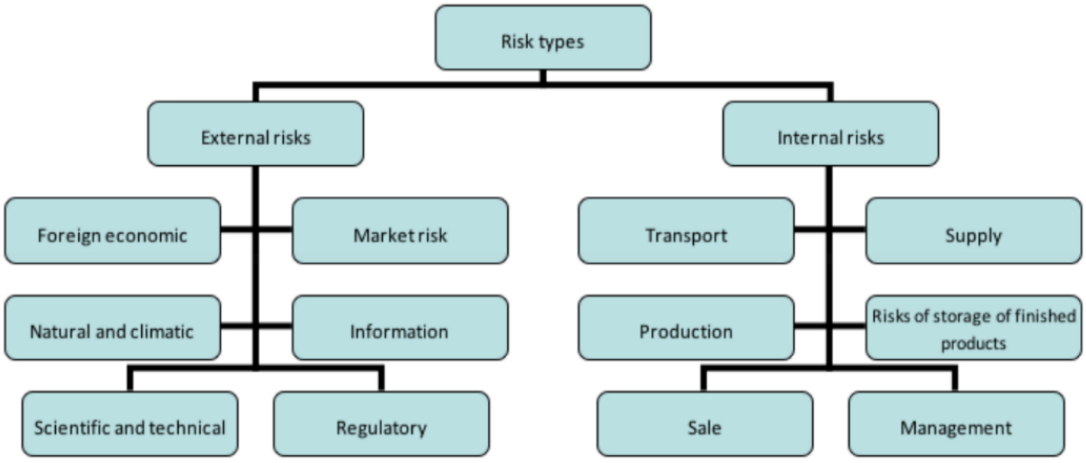

Figure 6. Types of economic risks (Kiseleva, Karmanov, Korotkov, Kuznetsov, & Gasparian, 2018)

sRisks' management integration is complex and needs massive use of tools and technology to radically improve performance and ensure tangible benefits by using the *Framework*. Accounting-oriented management of sRisks promotes off-shoring and ruthless growth. It can have a negative effect on *Projects* because it may promote confused and contradictory conclusions. Management of sRisks is of strategic importance and if a *Project* is successful, the transformed *Entity* will excel. Transformed *Entities* with an efficient sRisks management automate this management by using the *Framework,* which is in turn supported by the ADM. The *Entity* chooses a strategy to achieve its goals and tries to find ways to avoid sRisks. Evaluation of sRisks and the definition of the probability of hazardous events and the choice of solutions is specific to *Entity* and its eco-system. sRisks are, in most cases, difficult to discover and classify, due to their diversity and complexity. There are various types of sRisks that are related with each application domain. sRisks' neutralization is a technical, financial, and mathematical process for the implementation of decisions for the transformation measures. The sRisks' management structures sRisks by using CSAs, weights them and uses delimiters to select the related CSFs. The sRisks' management analyses the CSAs by applying scenarios for mitigation. sRisks management system's key principles are: 1) Principle of integration using a systemic and holistic approach; 2) Principle of continuity using a set of procedures; and 3) Principle of validity. It provides an analysis of the ratio of costs to reduce possible sRisks. Figure 2 shows an example of sRisk classification that is used in economic practice (Kiseleva, Karmanov, Korotkov, Kuznetsov, & Gasparian, 2018).

Resources, Artefacts, Factors Management and Qualification Procedures

Actual design, development, qualification, and operations for *Projects* are still in infancy stage, or simply chaotic. Tools for the PCIP are still confronted with serious issues. These issues show that tools are still inappropriate for large *Entities* of intelligent systems and the authors recommend using the HDT concept. The *Manager* must have the capacity to manage the *Framework's* repository and continuum that map BTPAP CSFs to types of *Project's* resources. This mapping concept is supported by the ADM which associates CSFs, resources and Microartefact scenario instances to *Project's* requests (The Open Group, 2011a).

Architecture development method usage skills

The ADM is a generic method and recommends a set of phases and iterations to develop the *Projects*; it designs parts of the transformed system interfaces, other *Project* deliverables and standard frameworks. The BTPAP must be capable of defining the set of basic EA requirements for the *Project* that are stored in the *Framework* KMS4AP database (Trad & Kalpić, 2014e).

Architecture Phases

The ADM manages the *Project's* development iterations; in this section the authors present main ADM's phases and *Project's* interactions: 1) The preliminary phase selects the relevant BTPAP CSFs and interactions; 2) The architecture vision and Business Architecture (BA); 3) The ICS architecture; 4) The technologies architecture, and 4) The requirements management and tests. For BTPAP the BA is important.

Business Architecture

The *Manager* must use the *Framework* to apply standards that deliver added value and robustness to *Projects*. In order to move towards a just-enough BA that is known as the target or the final interaction architecture, where important adjacent domains are clearly shown and the others are blurred, because of their low level of importance. The BTPAP must be capable to align: 1) BA's traditional vision; 2) BA's principles; and 3) Standards management to support BA and EA. The traditional BA layers represent a silo model of the fundamental components. It is very hard to merge these four components into an agile system.

Decision making and knowledge management systems

A Complex and Risky Process

BTPAP management is supported by the BTPAP' selection, training and evaluation using the DMS4AP. The DMS4AP's results are presented as a set of possible solutions or possible BTPAPs for the *Project*. The best solution proposes the right BTPAP in relation to the selection, evaluation, and training activities. BTPAP and DMS4AP integration may face selection problems due to complex HDT processing evaluation process, what implies that the analysis and management of risk is one of the important pre-requisites to ensure the success of BTPAP activities, which are supported by the KMS4AP (Hussain, Dillon, Chang & Hussain, 2010).

The Knowledge Management System

The BTPAP must be capable of managing profile Knowledge Items (pKI); where eKIs and microartefact scripts are responsible for the manipulation of intelligence and they control various knowledge processes. The KMS4AP supports the *Project's* underlying mechanics to manage pKI microartefacts. The *Manager* is responsible for designing extraction of pKIs using holistic systemic approach (Daellenbach & McNickle, 2005; Trad & Kalpić, 2016a). A *Framework* interfaces the KMS4AP to enable an efficient search process. The KMS4AP manages various types of information related to *Projects* which helps the selection process. A *Project* interfaces the KMS4AP/pKI, where sets of CSFs are stored (Trad & Kalpić, 2017a). The intelligence strategy is included in EA's roadmap and the *Manager* selects tools for KMS4AP and DMS4AP operations (Alhawamdeh, 2007).

The Decision-Making System

The DMS4AP is supported by the AHMM4AP formalism that uses a holistic approach for delivering a set of BTPAP suggestions in form of recommendations (Daellenbach & McNickle, 2005). The *Project* interfaces the DMS4AP, in which various profile templates are selected, enhanced, and tuned, using selected CSF sets for BTPAPs, then this process is orchestrated by the AHMM4AP's HDT, used to select the optimal BTPAP.

THE OPTIMAL PROFILE

Basics, Main Role and Skills Set

The BTPAP should have a deep understanding of *Projects* and the DMS4AP that is the first step towards the transformation process. S/he (in further text he) needs also in-depth knowledge of 1) Lean BAs; 2) Integrated development environments; 3) Businesspeople integration, 4) Agile project management, and 5) Coordination of ICS engineers. The ATPAP acts as business and ICS solution designer and architect. His estimated skills require a profound knowledge of the EA, BA, Business Processes (BP), DMS4AP, KMS4AP, services technologies and management fields. That rounds up the BTPAP whose main role is to act as the *Project's* coordinator of teams (Trad & Kalpić, 2014f). BTPAP's skills have an enormous impact on the concrete PCIP of *Projects*, where the managerial aspects of such *Projects* are not well defined. Currently,

there is no precise BA or EA set of recommendations and educational curriculum for such a BTPAP. There is an essential need for more investigation, especially regarding his role in increasingly competitive business environments. *Projects* influence the way BPs are implemented, managed, and integrated, what consequently forces business environments to continuously innovate. Many BTPAP selection CSFs directly or indirectly affect the *Project*. BTPAP's role can be defined by a set of CSFs, where the main CSF is the capacity to ensure the reusability of existing requirements, resources, microartefacts, components, and EA/BA paradigms. A BTPAP qualified specialist can help executive management select a *Manager* for *Project's* PCIP. The *Manager* will be challenged to use *Project's* status results, to change PCIP's business operations, re-engineer the ICS, or to re-schedule various tasks in the *Project* plan; all these mentioned activities can be automated. A BTPAP qualified *Manager* should be capable of offering: 1) The concept of PCIP, by using emerging technologies; 2) Solutions that are based on LEs as a better balance between costs, benefits, sustainability, and risk; and 3) A realistic EA/BA concept. The resultant adaptive business environment can be based on stateless business services/objects respecting a strict EA/BA paradigm and BTPAP's role and recommendations.

Framework and the Manager

Meta-management and business integration require a BTPAP who is also an innovation *Project* manager (Pm). The *Manager* must be an excellent agile Pm, who can implement a very light version of the disciplines TOGAF's EA/BA, services, and BPs. The use of BPs will enhance the management of KMS4AP and also help in the selection of a *manager*. The BTPAP's specific characteristics require a special educational curriculum based on ICS and business engineering. Future *Managers* need to have the ability to deeply understand *Entity's* unique EA/BA paradigm, and to swiftly identify Pm plans and to effectively implement them in the transformation process. According to the latest Gartner Study, "the ability to apply versatile and extensive methodological skills in managing business processes is the number one business priority for successful entrepreneurial activities" (Gartner, 2020). The implementation of this managerial recommendation is done by selection of the right *Manager* who has the proposed qualities and at least some education in business and ICS; and many years of concrete experience. The *Manager* needs to be supported by a *Framework*, that interfaces TOGAF and is used to establish *Project's* patterns. Such patterns structure the PCIP that needs to execute the following tasks: 1) Unbundling through services, and 2) Modelling and integration.

Needed Experience

The RDP is also based on the authors' experiences who have often encountered *Projects* with serious problems and having high rates of failure. That is why they want to pursue this RDP and contribute to this visceral problem related to complex *Project*s and to offer a BTPAP. The main difficulty lies in the duration of *Projects* that take many years to be finalized. The complex activity of interconnecting the company's business processing nodes, that is known as unbundling, is extremely complex, and in general it causes major resistance. Consequently, it may cause *Project*s to fail (Farhoomand, Lynne, Markus, Gable, & Khan, 2004).

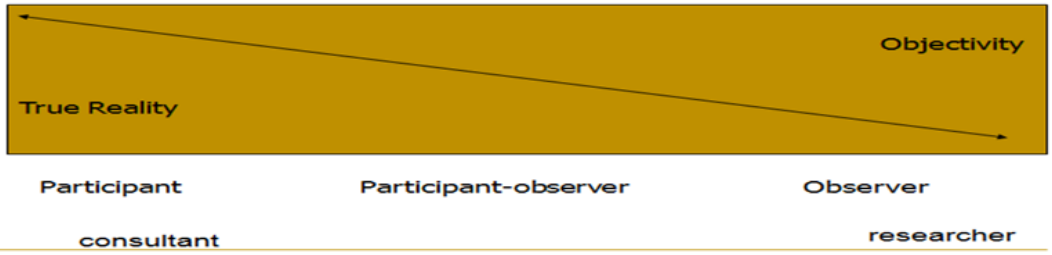

Figure 7. *The synergy between real world experience and research outcomes* (Trad, & Kalpić, 2020a)

The *Framework* offers selection and training concepts, where the training part is supposed to enhance the *Manager*'s knowledge by adopting holistic skills that include EA/BA modelling. And as show in Figure 7, the relationship between the reality of *Projects* (X axis) and its objective status (Y axis) may diverge.

Business Modelling and Integration

The *Manager* must have extensive knowledge of BP in *Project*s to manage the implementation of complex business scenarios. Scenarios can be used to automate the value chains which rationalize the *Entity's* activities and enable them to communicate with partners. The implementation of this important BTPAP recommendation is done by the training of the *Manager* who should have had the minimal experience in these domains before. The *Manager* must have extensive knowledge of infrastructure integration in *Project*s to manage the implementation of the existing scalable platforms. These CSFs are needed, to ensure that the *Manager* can rationalize the *Entity's* platform nodes and to enable cloud business communication through the *Framework*. For various LEs that must be transformed using an EA/BA approach, where the infrastructure is a crucial CSF to link its ICS to partners and clients. The *Manager* should implement performance CSFs to monitor the *Project's* progress. The main recommendation is provided by the training of the selected *Manager* for such tasks.

Holistic Characteristics and a Generic Profile

The *Manager* must have holistic affinities and the most important recommendation is that he has cross-functional skills. The preferred basic BTPAP is a flexible and agile person, who can transform the LE and is also capable of exploiting the inter-related avant-garde technologies in order to successfully conduct *Project*s. Managing of complex skills and educational concepts, requires an HDT. The implementation in the real world is done by the BTPAP selection of the right *Manager* that has this main quality and has been proven in industry, which requires a generic role. *Managers* are visionaries, coaches, Pm leaders, business to technical coordinators, data scientists, and domain/industry experts. The following is an effective description for a *manager's* generic role (The Open Group, 2011d):

- The *Manager* has a responsibility for ensuring the feasibility of the EA/BA paradigm, in terms of optimally analysing pertinent concerns of the *Project's* stakeholders. The integrity of the *Project*, in terms of presenting all EA/BA views to various partners, optimally reconciling conflicting concerns of different parties (like the phenomena of resistance), and finding trade-offs for various *Project* problems, like security, availability and performance.
- The definition of an EA/BA paradigm is a key decision that the *Manager* should make. The defined paradigm has to be constrained by particular requirements, and that EA should be developed only to achieve the defined goals, and not reiterated ad infinitum as a reorganizational process…
- The role of a *manager* resembles more to that of a city planner than that of a building architect, and the resultant EA/BA paradigm can be characterized as a planned city (as opposed to an unconstrained slum), rather than as a well-designed building or set of buildings.
- A *Manager* does not create the ICS vision of the *Entity* but has the needed relationships with executives of the *Entity* to push the EA/BA vision, and to implement the strategic Pm for the *Project*. This Pm is tied to the business objectives/plans of the *Entity*. Design decisions are traceable to the final Pm and defined goals.
- The strategic Pm defined by the *Manager* is tied to the EA/BA governance processes and procedures of an *Entity*, therefore modelling and design decisions are not adapted to tactical and personal objectives.
- The *Manager* produces EA/BA documentation of design decisions for the *Project's* development team's external partners to execute.
- A *Manager* is involved in the entire *Project*, starting with collaborating with the customer to understand *Project* needs, as opposed to imagined goals, and then throughout the *Project* to translate the collected requirements into concrete capabilities, prototyped to meet the needs. Added to that, the *Manager* has to present EA/BA different models to clients that communicate and how the *Project* requirements should be implemented. He is therefore an essential participant in all ADM phases.

- The *Manager* is not an implementer, and he must remain at a level of abstraction, necessary to support PCIP's practical realization.

The Role of Soft Skills

The soft skills are subject to many research projects, that is why the authors do not treat how does the *Manager* manage the human factor, and the staff's para-psychological, behavioural and cultural aspects. The implementation of this managerial recommendation is done by the selection of a right *Manager* who has this very important soft qualities and primarily is a technocrat. The subject is out of this RDP's scope and the authors consider that it has been already researched by other scholars. However, they would like to point out that the classical business school graduate *Manager* often uses a human personification of complex ICS and other *Project* problems, which can be viewed as a sign of incompetence and is probably the main reason for *Projects'* failures. Such methods can be also the reason for enforcing responsibilities and engaging of an accountant for quantification of due processes, which undermines the essential hands-on skills.

Needed Hands-on Skills

The AofABIS must have extensive skills in *Project*s and especially PCIPs. His empirical hands-on skills must encompass: 1) Business architectures and BP management; 2) Automated environments (Krigsman, 2008); 3) Agile project management; 4) Integration processes; 5) Organizational engineering; 6) Decision-making; 7) EA/BA; and 8) Other concrete domains.

Therefore, it is recommended to adopt technocrat profile. A technocrat or a system architect depicts these notions (The Open Group, 2011d):

- The *Manager's* responsibility to know and concentrate on the critical *Project* topics and interfaces that have high priorities, and to manage other critical topics.
- The *Manager's* focus is on understanding the client's requirements, where qualitative approach is used more than quantitative measures. The *Manager* uses more inductive skills than the deductive skills of the implementor/developer. The *Manager* manages *Project's* guidelines, rather than traditional rules that implementor/developer uses as a necessity.
- The role of a *manager* may be performed by an experienced engineer, where the main *Project's* goal is to transform the *Entity*.
- The *Manager* must understand and interpret requirements, by probing for information, listening to information, to influence people, facilitate consensus building, synthesize and translate features into actionable requirements, articulate those ideas to others.
- The *Manager* identifies uses or purpose, constraints, risks, …
- The *Manager* participates in the discovery and documentation of the client's business scenarios that are driving the solution.
- The *Manager* is responsible for requirements understanding and embodies understanding of those requirements in the EA/BA specifications.
- The manager has to create an EA/BA model: take the requirements and develop EA/BA models of the components of the solution, augmenting the models as necessary to fit all the circumstances. To show multiple views through models to communicate the ideas effectively.
- The *Manager* is responsible for the overall EA integrity and maintaining the vision of the offering from an architectural perspective.
- The *Manager* ensures leverage *Project* opportunities are identified, using building blocks, and is a liaison between the functional groups to ensure that the leverage opportunities are well implemented.
- The *Manager* provides and maintains these models as a *Framework* for understanding the domain(s) of development work, guiding what should be done within the *Entity*, or outside the organization.
- The *Manager* must represent the *Entity's* view on the architecture by understanding all the necessary business components.

- The *Manager* validates, refines, and expands the EA/BA model. He verifies assumptions, brings in subject matter experts, … in order to improve the EA model and to further define it, adding as necessary new ideas to make the result more flexible and more tightly linked to current and expected *Project* requirements.
- The *Manager* should assess the value of solution-enhancing *Project* developments emanating from field work and incorporate these into EA models as appropriate.
- The *Manager* manages and continuously monitors EA and BA models and updates them as necessary to show changes, additions, and alterations.
- The *Manager* is an *agent of change*, representing that need for the implementation of the EA/BA.

Using the Enterprise Continuum

Complex *Projects* require additional *Managers* to support the *Project's* effort. The different categories of *Managers* who are mainly AofABIS, perform cross-functional tasks. The combination of foundation, systems, solutions, and customer architects may be utilized, as a *Project* team. Each *Project* member may have a specific focus, or specific roles and responsibilities, within ADM's phases of the development process. For a PCIP an experienced *Manager* should be assigned to manage and lead the team members. The *Manager* has the role of a Foundation Architect, whose responsibility includes architectural design and documentation at a technical reference model level; and the main types of architects are (The Open Group, 2011d):

- The Foundation Architect leads a group of the System and/or Industry Architects related the *Project*. The main focus of the Foundation Architect is on *Entity's* business functions required.
- The System Architect has the responsibility for architectural design and documentation at a system or subsystem level, like the management of the security sub-system. A System Architect shields the Foundation Architect from unnecessary *Project* details. The focus of the System Architect is on the ICS and related solutions.
- The Industry Architect has the responsibility for EA design and documentation at an industry or domain level. The focus of the Industry Architect is on industry problems and finding optimal solutions.
- The Organization Architect has the responsibility for architectural design and documentation of specific organizations. An Organization Architect re-uses artefacts from all other architects. The focus of the Organization Architect is on enterprise-level business solutions in a given domain.

Existing Skills Frameworks

The authors based the BTPAP on existing skills frameworks like TOGAF's *Enterprise Architecture Skills*, shown in Figure 8, which categories of Skills. BTPAP's and his team's skill set needs to include the following essential categories of skills (The Open Group, 2011d):

- Generic skills, which include leadership, teamwork, inter-personal skills, …
- Business skills and methods, which include implementing business cases, BP management, strategic Pm, …
- EA skills, which include modelling, building block design, applications and role design, systems integration, …
- Program or Pm skills, which include managing business change, project management methods and tools, …
- ICS general skills, which include brokering applications, asset management, migration planning, service management, audit, …
- Technical ICS skills, which include software engineering, security, data interchange, data management, …
- Legal and governance environments, which include data protection laws, contract law, procurement law, fraud, …

The authors would add the knowledge and skills needed to transform an *Entity,* that is practically formalized in the proposed *Framework.* The key characteristics of a *manager* are (The Open Group, 2011d):

- Skills and experience in producing designs: he must be proficient in the techniques that go into delivering designs of complex ICS systems, requirements discovery and analysis, modelling solution context, identification of solution alternatives and their assessment, technology selection, and design configuration.
- Extensive technical breadth, with technical depth in one or a few disciplines. A *Manager* should possess an extensive technical breadth through his concrete experiences in ICS. This breadth should be in areas of software development and deployment, and in the creation and maintenance of the infrastructure to support the complex business environment. Current environments are heterogeneous, and the experienced *Manager* will have skills across multiple platforms.
- Method-Driven approach to execution. The *Manager* manages the *Project* through the consistent use of recognized design methods like the ADM. The *Manager* must have a working knowledge of more than one design method and be comfortable deploying parts of methods appropriate to the *Project's* context

IT Architect Roles	Architecture Board Member	Architecture Sponsor	IT Architecture Manager	IT Architecture Technology	IT Architecture Data	IT Architecture Application	IT Architecture Business	Program or Project Manager	IT Designer
Enterprise Architecture Skills									
Business Modelling	2	2	4	3	3	4	4	2	2
Business Process Design	1	1	4	3	3	4	4	2	2
Role Design	2	2	4	3	3	4	4	2	2
Organization Design	2	2	4	3	3	4	4	2	2
Data Design	1	1	3	3	4	3	3	2	3
Application Design	1	1	3	3	3	4	3	2	3
Systems Integration	1	1	4	4	3	3	3	2	2
IT Industry Standards	1	1	4	4	4	4	3	2	3
Services Design	2	2	4	4	3	4	3	2	2
Architecture Principles Design	2	2	4	4	4	4	4	2	2
Architecture Views & Viewpoints Design	2	2	4	4	4	4	4	2	2
Building Block Design	1	1	4	4	4	4	4	2	3
Solutions Modelling	1	1	4	4	4	4	4	2	3
Benefits Analysis	2	2	4	4	4	4	4	4	2
Business Inter-working	3	3	4	3	3	4	4	3	1
Systems Behavior	1	1	4	4	4	4	3	3	2
Project Management	1	1	3	3	3	3	3	4	2

Figure 8. *Enterprise Architecture Skills* (The Open Group, 2011d)

The proof of concept

The already mentioned ACS which has an archaic ICS, a mainframe, claim files service, customer file service.

Application Portfolio Rationalization Scenario, ICS Unification and CSFs

The PoC will try to select the *Manager* and uses a structured pool of CSFs to satisfy the BTPAP requirements. The ACS has already *Project* goals as shown in Figure 9, which can be considered as the base sets of CSAs.

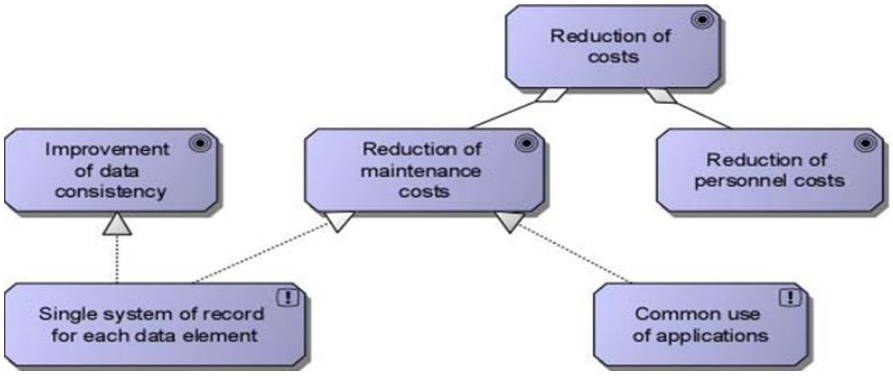

Figure 9. Transformation goals (Jonkers, Band & Quartel, 2012)

The BTPAP's needed EA skills for: 1) phase A or the Architecture Vision phase, needs EA roadmap; 2) Phase B or the BA phase, needs *Project's* target architecture and requirements definition; 3) Phase C or the Gap Analysis phase, needs for modelling a target application landscape; 4) Phase D or the Target Technology Architecture and Gap Analysis phase needs the final *Project's* infrastructure design; 5) Phases E and F, Implementation and Migration Planning, need the transition architecture, proposing possible intermediate situation and evaluates the *Project's* status. This PoC focuses on the *Manager*'s capability to make a common application architecture.

The Execution

The PoC is implemented using the *Framework* and is based on the AHMM4AP's instance. The BTPAP interfaces the DMS4AP that uses the selected sets of CSFs which are presented and evaluated in Table 1. The BTPAP required skills have mappings to specific *Projects* resources like CSFs and the used microartefacts are designed using EA/BA methodologies. The BTPAP also defines relationships between the skills needed for *Project* requirements and microartefacts. The PoC was implemented using the *Framework* client's interface, where the starting activity is to setup BTPAP CSFs. Once the development setup interface is activated, the scripting interface was launched to implement the needed microartefacts to process the defined CSAs. After starting the *Framework's* client, the sets of CSFs were selected and linked to a specific node of the HDT and the pool of microartefacts. The scripts link the AHMM4AP instance to the set of actions that are processed in the background. The AHMM4AP-based HDT uses servi

CSA Category of CSFs/KPIs	Influences transformation management	Average Result
The Applied Case Study Usage	CredibleStable	From 1 to 10. 9.00
The Usage of the Architecture Development Method	FullyIntegrated	From 1 to 10. 9.50
The Information and Communication Technology System	Transformable	From 1 to 10. 9.00
The Mathematical Model's Integration	IsApplicable	From 1 to 10. 9.00
The Decision Making System	Implementable	From 1 to 10. 9.00
The Knowledge Making System	Implementable	From 1 to 10. 9.00
The BTPAP Feasibility	Implementable	From 1 to 10. 8.00

Evaluate First Phase

Table 1. The BTPAP's research's outcome is 8.90

ces that are called by the DMS4AP actions. The BTPAP instance and its related CSFs, for selecting *Manager*s, were setup to be used; then the scripts were launched. This article's decision table and its result conclude the PoC's first initial phase, as illustrated in Table 1, which shows clearly that the BTPAP can be

used in *Projects*. BTPAP is not an independent component and is bonded to all the *Project's* overall architecture. The *Framework* and hence the AHMM4AP's main constraint to implement the BTPAP is that CSAs for simple *Projects* components, having an average result below 8.5 will be ignored. In the case of the current CSF evaluation an average result below 7.5 will be ignored. This work's conclusion with the result of 8.90 implies that BTPAP's integration is feasible for all types of *Projects, where* the complexity is integrating the BTPAP in *Projects* that must be done in multiple transformation iterations, where the first one should try to define the basic BTPAP and iterate to reach the final state.

Conclusion and recommendations

In this article, the focus is on the optimal BTPAP who can manage the design and PCIP of a *Project*. There has been a lot developed and written on enabling success in transformation projects, but the authors propose to inspect why *Manager*s fail in the PCIP of a *Project*. That is mainly due to the *Manager*'s lack of knowledge in managing business integration and implementation and the non-existence of adequate EA integration for such RQs. The RDP proposes a set of recommendations on how to proceed with the *Projects* where *Manager*s must attempt holistic implementation that is "*a proven approach that unites all disciplines in an organization to collaborate together to enable disruptive change*" and where "*…a few things have become clear: business transformation leaders require technical skills to define comprehensive and complete technical solutions and equally important, also require skills to build consensus among all affected stakeholders*". In a meta-managerial business driven coordination, the information technology is a commodity used to glue the various business components (Uppal & Rahman, 2013). There has been a lot of development and research work on the reasons for success or failure in *Projects*, but the authors propose to inspect the holistic aspects of *Projects*. The managerial recommendations are offered to help *Manager*s to decrease the high failure rates and are a result of the resources review, surveys outputs, interviews, simulation, and prototyping. BTPAP managerial recommendations, and the *Framework*, round up the approach needed for PCIPs, and the roadmap for selection and educational capacities, on how to select and train a *manager*. The most important managerial recommendation that was generated by the previous research phases was that the business transformation manager must be an AofABIS. The managerial recommendations for the BTPAP are based on the processing of CSFs which resulted from the literature review and surveys' outputs; these inputs were fed in the HDT. In this article, the focus is on the BTPAP's capabilities, roles, skills, and educational prerequisites. These characteristics and prerequisites are needed to holistically manage the design of PCIPs. The RDP tries to define the optimal BTPAP and his educational curriculum, which should be capable to finalize a *Project*. There has been a lot developed and written on enabling success in *Projects*, but the authors propose to inspect why they fail in the PCIP. Because of the satisfactory score, above 8.5, Table 1 shows that BTPAP's usage in *Projects* is possible and that today the *Framework* is ready and is the only methodology that can in parallel construct *Projects*, EA/BA blueprints, KMS4AP, DMS4AP and *Projects*. The resultant technical and managerial recommendations are:

- As BTPAP was established, the PoC checked its feasibility, and it replaces traditional manager's profile.
- The PCIP is the major cause for failure, therefore there is a need for optimal and qualified *Manager*.
- The *Manager* is an architect and a technocrat (Farhoomand, Lynne, Markus, Gable & Khan, 2004).
- The *Manager* must have experience in *Projects* (Neumeier, 2009; Capgemini, 2007; Capgemini, 2009).
- The *Manager* must be an agile Pm, who can implement EA blueprints.
- The *Manager* must have cross-functional skills (The Economist, 2000); such a person can be described as flexible and adaptable, capable of managing complexity (The Open Group, 2011b, 2011c).
- The literature review proved the existence of a knowledge gap between the traditional management skills and educational prerequisites for *Project*s.
- An evolutionary HDT supported the RDP is used to create the initial BTPAP prerequisites.
- The RDP proposes a concrete *Framework* on how to select, train and evaluate a *manager*.

- BTPAP's educational prerequisites produce general profiles that can cope with heterogeneous complexity and fast changes. High frequency changes are mainly due to the hyper-evolution of technology.
- The RDP confirms the role of *Manager* as an AofABIS.
- The actual business environments produce general profiles that can hardly cope with complexity of heterogeneous business systems.
- The PoC proved the research feasibility and delivered the recommendations on how to select and support *Manager*s.

The *Framework* supports the *Projects* by using the BTPAP and delivers a set of managerial recommendations.

References

Agievich, V. (2014). Mathematical model and multi-criteria analysis of designing large-scale enterprise roadmap. PhD thesis – Mathematical modelling, numerical methods and complexes of programs.

Alhawamdeh, M. (2007). The Role of Knowledge Management in Building E-Business Strategy. Proceedings of the World Congress on Engineering and Computer Science 2007 WCECS 2007, October 24-26, 2007, USA.

Blackburn, R., & Rosen, B. (1993). Total quality and human resources management: lessons learned from Baldrige Award-winning companies. Academy of Management PerspectivesVol. 7, No. 3 Articles. Published Online:1 Aug 1993.

Bruce, C. (1994). *Supervising literature reviews*. UK: in Zuber-Skerritt, O. and Ryan, Y. (eds), Quality in postgraduate education, Kogan Page.

CapGemini (2009). Business transformation: From crisis response to radical changes that will create tomorrow's business. A Capgemini Consulting survey. France.

CapGemini (2007). Trends in Business transformation - Survey of European Executives. CapGemini Consulting and The Economist Intelligence Unit, France.

Farhoomand, A. (2004). Managing (e)Business transformation. UK: Palgrave Macmillan.

Farhoomand, A., Lynne, M., Markus, M., Gable, G., & Khan, H. (2004). *Managing (e)Business Transformation: A global Perspective*. UK: Palgrave Macmillan.

Gardner, H. (1999). Intelligence Reframed: Multiple Intelligences for the 21st Century, Basic Books, New York.

Clark, D. (2002). *Enterprise Security: The Manager's Defense Guide*. USA: Addison-Wesley Professional.

Daellenbach, H., McNickle, D., & Dye, Sh, (2012). *Management Science - Decision-making through systems thinking*. 2nd edition. Palgrave Macmillian. USA.

Gartner (2020). IT Talent Drives Digitalization. Bridge the digital skills gap with the right IT talent strategy. Gartner. https://www.gartner.com/en/information-technology/insights/digitalization-transforms-it

Hussain, O., Dillon, Th., Chang, E., & Hussain, F. (2010). Transactional risk-based decision-making system in e-business interactions. International Journal of ComputSystSci & Eng (2010) 1: 15-28. CRl Publishing ltd Computer Systems. Science & Engineering.

Felfel, H., Ayadi, O., & Masmoudi, F. (2017). Pareto Optimal Solution Selection for a Multi-Site Supply Chain Planning Problem Using the VIKOR and TOPSIS Methods. International Journal of Service Science, Management, Engineering, and Technology (IJSSMET). IGI Global. DOI: 10.4018/IJSSMET.2017070102.

Jonkers, H., Band, I., & Quartel, D. (2012a). ArchiSurance Case Study. The Open Group.

Kim, J., & Lennon, Sh. (2017). Descriptive Content Analysis on E-Service Research. International Journal of Service Science, Management, Engineering, and Technology (IJSSMET). IGI Global. DOI: 10.4018/IJSSMET.2017010102.

Kiseleva, I., Karmanov, M., Korotkov, A., Kuznetsov, V., & Gasparian, M., (2018). Risk management in business: concept, types, evaluation criteria. Revista ESPACIOS. ISSN 0798 1015.

KPMG (2014). Over 90 Percent of U.S. Companies Are Changing Existing Business Models: KPMG Survey.

Krigsman, M. (2008). Business change failures: 9 success tips. Reviewed from
http://www.zdnet.com/blog/transformationfailures/business-change-failures-9-success-tips/1080. USA.

Markides, C. (2011). Crossing the Chasm: How to Convert Relevant Research into Managerially Useful Research. *Journal of Applied Behavioral Science, March 2011 vol. 47 no. 1 121-134*. London, UK.

Morrison, M. (2016). Critical Success Factors – Analysis made easy, a step-by-step guide. rapidBI.

Neumann, G. (2002). Programming Languages in Artificial Intelligence. Bidgoli (ed) Encyclopaedia of Information Systems, Academic Press, San Diego, CA, ISBN 0-12-227240-4, 2002, pages 31-45.

Neumeier, M. (2009). *Innovation Workshop: Brand Strategy + Design Thinking = Transformation*. UK: Pearson.

Peterson, S. (2011). Why it Worked: Critical Success Factors of a Financial Reform *eProjects* in Africa. Faculty Research Working Paper Series. Harvard Kennedy School.

Putri, N., & Yusof, SM (2009). Critical success factors for implementing quality engineering tools and techniques in malaysian's and indonesian's automotive industries: An Exploratory Study. Journal Proceedings of the International MultiConference of Engineers and Computer Scientists. Volume 2. Pages 18-20.

The Economist (2000). Inside the machine. A survey of E-management. *Special report: E-management. The Economist. UK.*

The Open Group (2011a). Architecture Development Method. The Open Group. USA. The link was reviewed and extracted in February 2018, http://pubs.opengroup.org/architecture/togaf9-doc/arch/chap05.html.

The Open Group (2011b). TOGAF 9.1. The Open Group. USA. The link was reviewed and extracted in August 2018, http://www.opengroup.org/subjectareas/enterprise/togaf . The Open Group. The Open Group. USA. 2011.

The Open Group (2011c). *Enterprise Architecture Standards*. http://www.opengroup.org/standards/ea. The Open Group. USA.

The Open Group (2011d). Architecture Skills Framework. https://pubs.opengroup.org/architecture/togaf8-doc/arch/chap30.html . The Open Group. USA.

Trad, A., & Kalpić, D. (2013a). The "Selection and Training Framework" (STF) for Manager's in Business Innovation Transformation Projects" / The Profile. IEEE, ITI Conference. Croatia.

Trad, A., & Kalpić, D. (2013b). The Selection, and Training framework (STF) for Managers in Business Innovation Transformation *eProjects* - The Literature Review. *IEEE 2013, Centeris. Portugal*.

Trad, A., & Kalpić, D. (2014a). The "Selection and Training Framework" (STF) for Manager's in Business Innovation Transformation *eProjects*" / The mathematical model. EUROPMENT, Conference. Switzerland.

Trad, A., & Kalpić, D. (2014d). The Selection and Training Framework (STF) for Managers in Business Innovation and Transformation *eProjects* - The Profile of a Business Transformation Manager. *IMRA, USA*.

Trad, A., & Kalpić, D. (2014e). The Selection and Training Framework (STF) for Managers in Business Innovation and Transformation Projects – The TOGAF recommendations. *EUROPMENT, Venice, Italy*.

Trad, A., & Kalpić, D. (2014f). The Selection and Training Framework (STF) for Managers in Business Innovation and Transformation Projects - Integrating the restructuring process of the global economy, IMRA, Cambridge, UK.

Trad, A., & Kalpić, D. (2015b). The Selection, Control, Decision making and Training Framework for Managers in Business Innovation and Transformation *eProjects*- Managerial Recommendations for enterprise architecture. EUROPMENT, Conference. Switzerland.

Trad, A., & Kalpić, D. (2016a). The (e)Business Transformation Framework for (e)Commerce Architecture-Modelling Projects. Encyclopaedia of E-Commerce Development, Implementation, and Management. IGI-Global. USA.

Trad, A., & Kalpić, D. (2017a). An Intelligent Neural Networks Micro Artefact Patterns' Based Enterprise Architecture Model. IGI-Global. USA. 2017.

Trad, A., & Kalpić, D. (2018a). The Business Transformation Framework and Enterprise Architecture Framework for Managers in Business Innovation-Knowledge and Intelligence Driven Development (KIDD). Encyclopaedia, IGI-Global. USA.

Trad, A., & Kalpić, D. (2020a). Using Applied Mathematical Models for Business Transformation. IGI Complete Author Book. IGI Global. USA.

Trad, A., & Kalpić, D. (2021a). An Applied Mathematical Model for Business Transformation and Enterprise Architecture: The Holistic Profile Management System (HPMS)

Uppal, M., & Rahman, T. (2013). Business Transformation Made Straight-Forward. QR Systems Inc. Canada.