Business Transformation Project's Holistic Agile Management (BTPHAM)

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Abstract

This article proposes a Business Transformation Project (BTP), Holistic Agile Management (HAM), to support intensive agile transformations. A BTP assisted by HAM (BTPHAM) uses critical success factors and areas, natural programming language environment and a dynamic decision-making system to improve the enterprise's Time To Market (TTM). BTPHAM supports all phases of a transformation project, and its concept is mainly based on existing standards, methodologies, and conventional practices. Complex markets and high levels of competition forces enterprises to integrate agile product and services management, in all its value chains. A HAM approach forces the used transformation framework and the related set of existing frameworks, to synchronize all types of transformation activities, like the deployment of software components. Such a synchronization process may generate many problems, which are difficult to trace, and which can damage the cyclic development process. This framework's originality is that it can be used in any stage of the transformation project and for any type of problem, and to synchronize BTPHAM's coordination. The main limitations are the enterprise's capacity to restructure and unbundle its legacy environments; and to integrate the BTPHAM in all its environments and implementation processes; which need the optimal BTP manager.

Introduction

The BTP manager (or simply the *Manager*) has become a central issue in managing complex BTPHAM operations. Where BTPHAM's main concepts are based on: 1) Enterprise Architecture (EA) blueprints and patterns; 2) An Applied Mathematical Model for Business Transformation *Projects* (Trad, & Kalpić, 2020a); 3) Atomic services and architecture (Trad, 2015a, 2015b); 4) Various levels of patterns (Trad, & Kalpić, 2022a, 2022b); and 5) EA based agile project management (Spencer, 2016). In this article the authors will try to prove that BTPHAM can manage various BTP activities; and such an Agile Management (AM) process can be modelled by using the Applied Holistic Mathematical Model for HAM (AHMMHAM). The AHMMHAM is based on Critical Success Factors (CSF) and on a unique mixed research method (Trad & Kalpić, 2017a, 2018a, 2020a). The BTPHAM can be used to support all BTP's agile activities. The BTPHAM is supported by a Decision-Making System for HAM (DMSHAM), Knowledge Management System for HAM (KMSHAM) and an adapted agile EA methodology (Blackburn & Rosen, 1993). The Proof of Concept (PoC) uses various case studies from: 1) Agile project management; and 2) The insurance domain (Jonkers, Band, & Quartel, 2012a), where the focus is on AM used in BTPs (simply *Entities*). *Manager*s are normally supported by a transformation framework (simply the *Framework*) that can: 1) Manage all *Project* phases; and 2) Estimate the risks of failure of *Entities*. The *Project*'s initiation process identifies BTPHAM's main interfaces, phases and activities, and of course the optimal Manager. *Entity's* main issue lies in the transformation of a Monolithic Business System and Components (MBSC) into an agile and fully automated system, where the role of the BTPHAM is to manage and implement the architecture, design, and implementation phases of the *Entities*.

A BTPHAM capable *Manager* has to deliver a precise concept for managing *Entity's* Project Complex Implementation Phase (PCIP) that requires a set of in-depth agile methodologies, DMSHAM, KMSHAM, EA, and implementation integration concepts and skills. As already mentioned in previous articles, the PCIP is the major cause of *Projects*' high failure rates. The authors' previous works have located a gap in the existing project management methodologies related to *Entities* that offer no insight into BTPHAM-like concepts, and have concluded that the Architect of Adaptive Business Information System (AofABIS) is to be considered as the optimal choice, to manage *Projects* and its relevant agile processes. Unfortunately, *Entities* are managed by accountants' profiles which is one of the origins of their failures. BTPHAM requires an agile cross-domain specialized management skills and adequate education.

BTPHAM cross-domain specialized management skills

BTPHAM supports the transformation of MBSC's Information and Communication Systems (ICS) and to optimally exploit avant-garde technologies to successfully finalize *Projects for Entities*. The BTPHAM needs to interface standard methodologies, like The Open Group's Architecture Framework's (TOGAF). This article shows that the BTPHAM needs cross-functional capabilities. The BTPHAM can be used by the *Framework* that is based on the Research and Development *Project* (RDP) (Trad & Kalpić, 2018a); and it is agnostic to any specific application field and is based on the Architecture Development Method (ADM) (The Open Group, 2011a). The used EA methodology and its ADM are central to implement *Entities,* where the BTPHAM is used for enterprise-wide (or simply the *Entity*) synchronization of activities. The BTPHAM needs to be assisted by a DMSHAM to solve various types of problems. In general, *Entities* lack a holistic approach and have desynchronized activities, which need a BTPHAM to create synchronizer product creation. The *Framework's* interactions include three components: 1) DMSHAM; 2) KMSHAM; 3) BTPHAM; and 4) RDP.

The research development project

The Researched Literature Review and the Gap

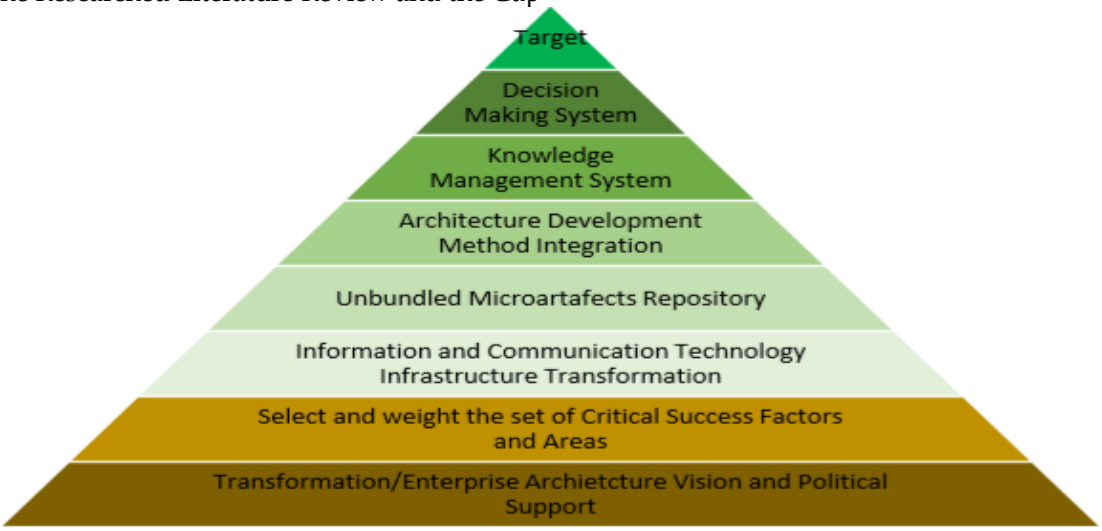

Figure 1. Levels of *Entity's* AM's interaction.

Entities various levels of complexities and high failure rates that are mainly related to the PCIP, need the right qualified skills and a holistic *Framework,* which recommends the usage of AHMMHAM-based Heuristics Decision Tree (HDT), to all levels of *Project's* AM, as shown in Figure 1 (Agievich, 2014). The BTPHAM can be applied to various types of *Projects* activities and the Research Question (RQ) is: "Which transformation agile projects' management characteristics are optimal for the complex implementation phase of transformation and enterprise architecture projects?" This RDP acknowledges an important knowledge gap.

The Knowledge Gap

The knowledge gap was acknowledged mainly because the existing literature on *Projects'* failure rates, EA and AM methodologies treating *Entities'* transformation processes, offer minor and siloed insights into the usage of AM and BTPHAM, which are vital for the *Entities, Projects* and their PCIP. This RDP inspects the BTPHAM, which is mainly based on existing business, organizational and technology standards, and is enforced with newly discovered AM related findings. The uniqueness of this RDP promotes a holistic unbundling process, the alignment of standards, the usage of AM and EA strategies to support BTPHAM in agile manner (Farhoomand, 2004). This RDP uses a holistic agile concept that combines: 1) *Entities'* AM topics; 2) AHMMHAM and HDT based decision making; 3) Enterprise & architectural patterns, software modelling and implementation; 4) Business architecture and engineering; 5) Financial audit and analysis; 6) It offers a concrete cross-functional-methodology; 7) EA support for agile *Entities* management; 8) Integrating standard market business and technological standards; and 7) BTPHAM integration and success metrics, based on CSFs.

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

As already mentioned, the *Framework* promotes AM based transformation concepts that use 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 *Entity'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). *Project* starts with the first phase called the **feasibility phase,** that checks the basic CSFs (in the form of DMSHAM tables), to check if the *Projects'* objectives and roadmap make sense; which delivers a success or failure values. Based on the literature review and evaluation processes, the CSFs are used and evaluated using the following rules:

- HAM-related references must be credible and are estimated by the authors, DMSHAM and follow a defined classification process.
- *Projects'* iterations are the result of defined changes measured by CSFs.
- EA's modelling language, like Archimate, should be limited to make the *Entities* transformable.
- The AM-based ADM is mature and can be used to manage the PCIP.
- The AM-based 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 BTPHAM, or any other type of *Project's* problem solving that uses AM business cases, related to BTPHAM.

Agile management business cases

Business Cases' Basics

The PoC uses an AM-related Applied Case Study (AMACS), developed by the Open Group as a concrete study and other cases, which represent the possibilities to implement a *Project* which transforms the *Entity,* like ArchiSurance that is empowered by an AM case. These studies are suitable because they integrate cross-functional domains, in agile, synchronized, and glued manner. BTPHAM CSFs are measurable by a weighting concept that is roughly estimated in the 1st iteration and then tuned through agile sprint-oriented ADM iterations. In each iteration, the BTPHAM evolution is verified by using the DMSHAM; where CSFs are essential to support ADM's cycles (Felfel, Ayadi, & Masmoudi, 2017).

The Architecture Development Method and Projects

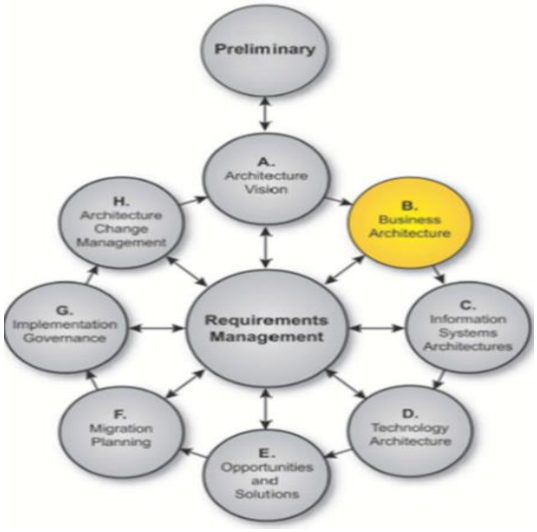

Figure 2. Business architecture phases (The Open Group, 2011b)

This RDP focuses on RQ's justification and on delivering design patterns for an *Entity's* AM integration and it also presents the influence of BTPHAM on concrete PCIP activities. In the actual age of distributed intelligence, complexity, knowledge, economy, and technology, the *Framework* offers a HDT that supports a set of BTPHAM problem types (Markides, 2011), where the DMSHAM offers a set of BTPHAM oriented solution types in the form of recommendations. The *Framework's* parts must synchronize with ADM's business architecture phase, as shown in Figure 2. BTPHAM activities are based on a proven mathematical model.

Mathematical model's support

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 AHMMHAM's basic element which is needed for the *Entities'* transformation's capabilities (Morrison, 2016). The BTPHAM uses a CSF/CSA based AHMMHAM, which uses a proprietary algorithm for *Entities*. The AHMMHAM nomenclature is presented in Figure 3, in a basic form, to be easily understood by the reader, on the cost of a holistic inter-related formulation of the dynamic and static models. AHMMHAM's application ***Domain*** is the **AM**, as shown in Figure 3:

- The symbol $\sum$ indicates summation of weightings/ratings, denoting the relative importance of the set members selected as relevant. Weightings as integers ranging in ascending importance from 1 to 10.
- The symbol $\underline{U}$ indicates sets union.
- The AHMMHAM defines the *Entities* 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 BTPHAM CSF, and a rating for each KPI.

The AHMMHAM applied a research mixed model, which is mainly a qualitative concept which uses specific quantitative method.

A Quantitative-Qualitative Research Mixed Model

A BTPHAM problem, RQ, CSF or phenomenon, are examined/analysed in iterations relating breadth and depth, using AHMMHAM's HDT, which is specialized for unknown problems or the ones that appear in the *Project's* preliminary phase or initial iteration(s). Then, the *Framework qualitative research module* inputs data stream(s), which consist of(s) of sets of numbers that are collected from channels

generated by using designed/structured and approved/validated statistically processed data object collection modules. Just analysing data is a partial, limited static solution, or a limited insight. There is a need for a dynamic proactive qualitative heuristic method like the proposed 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 to the defined AHMMHAM constraints. Possible violations can be modelled to deliver controlled access to *Entity's* internals through political backup, informational services, assigned roles, responsibilities & credentials, and defined standards; and to support the transformation 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)
EnityIntelligence	= ⋃ AI/Decision Making	(B11)
BMM(*Iteration*) as an instance	= EnityIntelligence(*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 3. The applied mathematical model's nomenclature (Trad, & Kalpić, 2020a)

The Applied Business Transformation Mathematical Model

The AHMMHAM for BTPHAM has a composite structure that can be viewed as follows: 1) The static view; 2) The dynamic or behavioural view; and 3) As the skeleton of the *Framework* that uses Microartefacts' scenarios. The AHMMHAM can be modelled after the following formula for Business Transformation Mathematical Model (*BTMM*) that abstracts the *Project*:

$AHMMHAM=Weigthing_1*AHMMHAM\_Qualitative+Weigthing_2*AHMMHAM\_Quantitative$ (B18).

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

BTMM = ∑ AHMMHAM 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 AHMMHAM. The variable for maximization or minimization can be, for example, the *Entity's* success, costs, or another CSF. For BTPHAM's PoC the success will be the main and only constraint and success is quantified as a binary 0 or 1, where the objective function will be to minimize the risk for BTMM. The BTMM is a combination of *Entities* methodologies and AHMMHAM that integrates the *Entity's* organisational concept(s) and the ICS. The AHMMHAM is a part and is the skeleton of the *Framework* that uses Microartefacts' scenarios to support BTPHAM requests (Kim & Lennon, 2017). The BTPHAM components interface the DMSHAM and KMSHAM as shown in Figure 5, to evaluate, manage and map CSFs for BTPHAM's selection activities; if the aggregation of all the *Entity's* CSA/CSF tables exceeds the defined minimum, the *Entities* continues to its second part of the PoC. The initialization phase generates the BTPHAM types of AM problems to be analysed. The AHMMHAM is a part of the *Framework* to support the application domain's requests (Agievich, 2014).

The application domain

As already mentioned, the application domain is AM, which includes many *Entity*'s resources and cross-functional fields and features, like the Minimum Viable Product (MVP).

Minimum Viable Product

To support BTPHAM for the *Entity's* agile aspects, there is a need for swift and reactive activities related to change. Implementing various types of EA artifacts, like patterns and Building Blocks (BB), which can define all possible business scenarios and solutions. The located solutions correspond to all acquired requirements. At the *Project*'s initial phase, all the requirements might not be all well specified. For that goal, the MVP concept is in development. In such a case, the value of BTPHAM is to support the *Entities* in the PCIP, where the **Development Sprints** are planned, with the notion of highest-value services, which are implemented first. As the PCIP applies the **burn-down** phases, the *Manager* identifies the first release to be deployed. Therefore, BTPHAM supports all MVP's requests, which is not encompassing all requirements, but it will move to patterns through a transitional state(s) towards a target architecture (Spencer, 2016). Such an approach supports the Minimum Business Increment (MBI).

Minimum Business Increment

In the cases where the value of changes or enhancements (or new product/service) are known, the concept of MBI can be applied. MBI focuses on the realization of business value in the optimal manner. It is a guaranty not to deliver less; it is a concept to deliver sooner. An MBI is the smallest unit of functionality that can be delivered which has well defined value to the business. The MBI's main characteristics are (Shalloway, 2021):

- Adds long-term business and organizational values.
- Provides valuable *Return on Experience* (ROE) on the optimal functionalities to be implemented.
- Provides valuable ROE that the functionalities will be successful in the PCIP.
- Offers functionalities that can be delivered, and which can be useful.
- Enhances the *Entity*'s ability to deliver tangible and intangible value after the *Project*'s ending.
- Has a continuum of all the patterns and BBs that are needed for value realization; and that includes works like documentation, ops and marketing, and other.
- They are created by determining the target business architecture, which can be external or internal. Then, it the DMSHAM decides which scenarios are needed for a specific functional domain, where the focus is on the MBI.
- Various *Project* iterations are needed to evaluate the MBIs, which are required to implement the needed functionalities. Iterative PCIP supports value and ROE enhancements and offers business opportunities to capture. Such a business value is based on what is considered as various values for the *Entity* and its end-clients.

- Values for an *Entity* may include debts, enhancing BTPHAM, improving ICS' platforms, or other types of values. Values depend on the type of the functional domain.
- Since MBIs are focused on the realization of value and not merely on deploying a feature, they must also describe all that is needed for full value delivery. This includes what would be required for ops, marketing, support and anything else.
- An adverse effect of MBIs, which they may have on existing functionalities, must be integrated to be built-in and not thrown over. Determining how MBIs can affect each other, is the responsibility of the Manager or the EA specialist.
- For an AM of a *Project* and all its sub-domains, there is a need for a **Scaled Agile Framework (SAFe),** which can support the used *Framework* and other market products.
- The Scaled Agile Framework

As shown in Figure 4, the main complexity if not only in the transformation process, but also in that most *Entities*, are using project management frameworks and infrastructure models that are obsolete. Today things have changes with a frequency rate at which the monolithic systems, structures, and methodologies built previously cannot keep the pace with frequent transformation demands. The recommended approach is not to throw away the existing knowledge base, but instead to reintroduce a parallel system, which would be transformed and managed by a SAFe, which includes seven core competencies (Kersten, 2021).

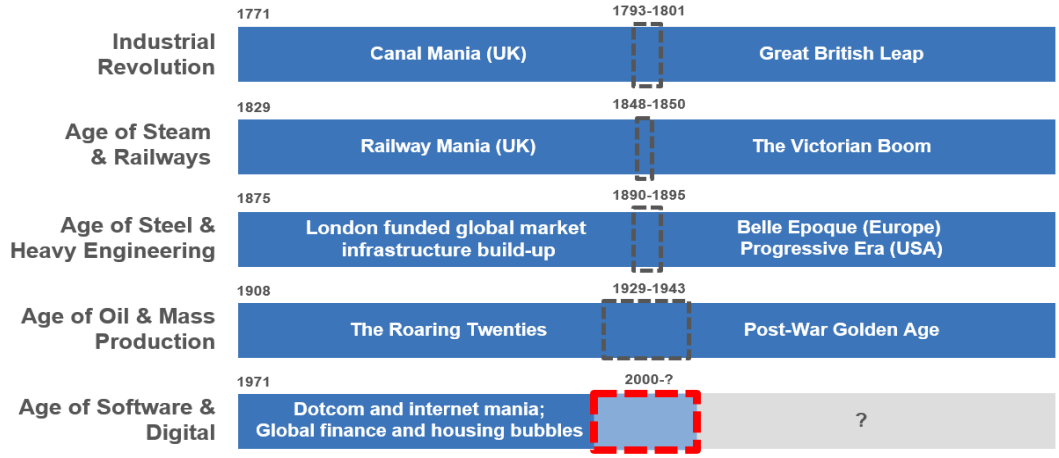

Figure 4. The main evolution phases (Kersten, 2021)

The Seven Core Competencies of Business and Organizational Agility

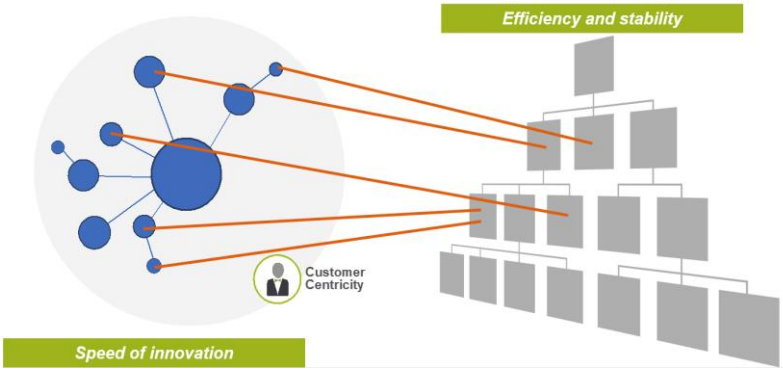

Figure 5. The relation between the speed of transformation and stability (Kersten, 2021).

Practically all today's systems are based software systems; and to achieve an advanced state of **Business Agility (BA),** means that the whole *Entity*, and not only its ICS department(s) must be engaged in continually and proactively delivering innovative business and organizational solutions quicker than their competitors. BA needs technical agility and a business-level commitment to support end-product,

service, and value stream approaches. These approaches require all *Project* members use lean and agile practices, by using SAFe. As shown in Figure 5, SAFe integrates the power of lean, agile, and Development and Operations (DevOps) into a comprehensive environment that supports *Entities* activities in the turbulent digital age by offering innovative products and services faster, more predictably, and with better quality (Kersten, 2021).As shown in Figure 6, to manage a dynamic environment and *Project,* needs a Manager with **Lean-Agile Leadership (LAL)** skills and an adequate team.

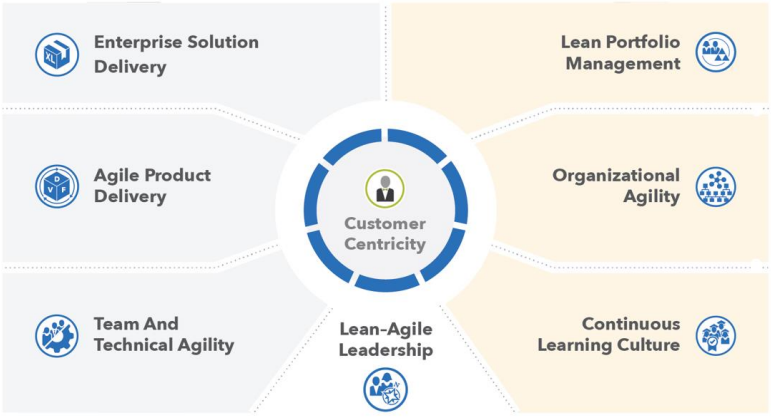

Figure 6. The seven core activities (Kersten, 2021)

Lean-Agile Leadership

Managers are responsible for the adoption, success, and ongoing improvement of lean-agile transformation iterations and the skills that lead to BA; they have the authority to continuously transform the *Entity*. The LAL set of competencies describes Managers should (Kersten, 2021):

- Drive *Projects* and operational activities by enforcing agile individuals and teams. Agile teams and teams of agile teams create and support *Project's* solutions that deliver value to end clients. The *Entity*'s ability to finalize a *Project* depends on the ability of its teams to respond to end-clients' needs.
- The team and technical agility competency describe the needed critical skills and defines the main lean-agile principles and practices, which agile teams use to create optimal solutions.
- To ensure BA, *Entities* must increase their ability to deliver innovative products and services. To verify if the *Entity* is delivering the optimal solutions, the focus must be set on the end client.
- Agile product delivery is an end client centric approach for defining, implementing, and releasing a continuous flow of valuable products and services.
- Major transformations require innovation, experimentation, and knowledge from various domains. *Project* members bring these innovations to end products, by designing and coordinating all the activities. The competency in delivery of enterprise solution specifies how to apply lean-agile principles and practices to the *Project*'s design, specification, development, deployment, operation, and evolution activities.
- Obsolete traditional approaches to portfolio management were not intended for a global and networked economy or for the impacts of massive ICS disruptions. These CSFs put immense pressure on *Entities* to implement with high risks' rate. The lean portfolio management competency aligns *Project*'s strategy and execution by applying lean system's thinking to support the strategy and investment funding, agile portfolio operations, and global governance.
- The lack of organizational agility means that *Entities* cannot respond to *Project* challenges and opportunities to rapidly respond to changing markets. Organizational agility competency, describes how lean system's approach and agile teams optimize their *Project*'s, define a strategy with clear and decisive objectives, and adapt the *Entity* to any emerging opportunity.

- To thrive in the actual very competitive environment *Entities* must transform into adaptive automated structures for continuous change, which should be supported by a habit of effective learning at all levels and in various domains. Learning *Entities* leverage their collective knowledge, decision-making, experience, and creativity of their teams, end-clients, and their ecosystem(s).

Complex *Project's* environment(s) need *AM's logic to be scaled*.

Scaling Agile Management

Today's ICSs are facing dynamic environments, where this dynamicity demands from Entitles to deliver software systems at faster pace and to be more tolerable to ever changing user requirements during the PCIP. Agile software development is an iterative and incremental concept for software development, which has emerged as an alternative to the traditional development concepts to address actual challenges; and proposes the following (Stojanov, 2015):

- Among the different agile methods is SAFe, which arose in the last decade, and can be used for implementing agile concepts at *Entity*'s scale. SAFe's main focus is to highlight the roles, activities and EA artefacts necessary to scale agile to teams, *Project* programs and *Entities*. Due to the lack of the optimal implementation strategy for SAFe, the proposed Framework can be used for process improvements and as a *maturity model*.
- Lean software development originated from the success of Toyota and its production system. This lean production system is based on preserving value while minimizing work. This is done by offering the right things to the right place at the right time, while reducing waste and being open to change. The success from the Toyota Production System initiated the lean movement towards applying the practices and principles of lean software development. SAFe incorporates several of these principles while applying the framework for lean software thinking.

The Portfolio Level, as higher level of abstraction, is required for large *Entities* which have many PCIP teams. In such cases SAFe introduces new governance and management models with new EA artefacts. The portfolio levels the focus on establishing balance between four potentially conflicting goals: 1) To maximize the financial value of the portfolio by identifying value streams using the Kanban system; 2) To link the portfolio to the *Entity*'s strategy through investment schemes; 3) To ensure that the scope of activities is feasible by using metrics, like CSFs/CSAs; and 4) To balance the portfolio on relevant levels by defining and managing business and EA objectives, which run across value streams. Such operations are to be supported by a *Framework and a competent Manager*.

Framework and the Manager

Meta-management and business integration require a *manager* who is also an agile innovation specialist. The *Manager* must be an excellent AM expert, who can implement a very light version of the disciplines of TOGAF and SAFe, related EA/AM, services, and processes. The use of AM processes will enhance the management of *Projects*. BTPHAM's specific characteristics require a special educational curriculum based on ICS and business engineering, for *Managers*. *Managers* need to have the ability to deeply understand *Entity's* unique EA/AM/BA paradigms, and to swiftly identify *Project* plans and to effectively implement them in the transformation process. 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/SAFe and to establish *Entity's* transformational patterns. Such transformational patterns structure the *Entity* and its PCIP; by executing the following tasks: 1) Unbundling through services, 2) Architecture, modelling and integration; and 3) Finding and aligning the needed experiences or ROE.

Needed Experience

The RDP is also based on the authors' experiences and ROE sources, which have often encountered *Entities* 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 *Entities* and to offer a BTPHAM. The main

difficulty lies in the duration of *Projects* that take many years to be finalized. The complex activity of interconnecting the *Entity's* business processing nodes, which is known as unbundling, is extremely complex, and in general it causes major resistance. But to avoid such scenario(s) the use an AM based ADM can be applied.

Architecture development method and agile management

The ADM is a generic method and recommends a set of phases and iterations to develop the *Project*; it designs parts of the transformed end system interfaces, with other *Projects* deliverables and standard frameworks, like TOGAF and SAFe. The BTPHAM must be capable of defining the set of basic *Project's* requirements and use AM to synchronize architecture phases.

Architecture Phases

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

Business Architecture, Modelling and Integration

The *Project* uses the *Framework* (with TOAGF's and SAFe's support) to apply standards that deliver added value and robustness to *Entities*. In order to move towards a just-enough AM based BA that is known as the target or the final interaction architecture, where the important adjacent domains are clearly shown and the others are blurred, because of their low level of importance. The BTPHAM must be capable to align: 1) BA's traditional vision; 2) BA's principles; and 3) Standards management to support BA and EA. Traditional BA layers represent a silo model of the fundamental system, and it is very hard to merge its components into an AM based system. BA scenarios can be used to automate the *Entity's* value chains which rationalize the *Entity's* activities and enables them to communicate with external partners. The implementation of BTPHAM is done by training of the *Project* team, who should have the minimal experience in these domains. To support an AM based BA, CSFs are needed, to ensure the rationalization of the *Entity's* ICS platform nodes and to enable cloud enabled business communication. For various *Entities* that must be transformed using BTPHAM, the infrastructure is a crucial CSF, to link its ICS to partners and clients. The *Project* should implement performance CSFs to monitor its progress. All *Project's* BA, AM and EA artefacts are stored in the enterprise continuum.

Using the Enterprise Continuum

Complex *Projects* require efficient repository management to support AM based *Projects*. The different categories of artefacts are used to perform cross-functional tasks and business scenarios. The combination of foundation, systems, solutions, and architects' artefacts may be utilized, to create various types of patterns and BBs. Each *Project* member may have a specific task and focus, or a specific role and responsibility, within AM based ADM's phases of the PCIP. For a PCIP, the BTPHAM should assign, manage, and lead team members. The BTPHAM coordinates the Foundation Architecture activities, whose responsibility includes architectural design and documentation at a technical reference model level (The Open Group, 2011d). But all these AM activities there is a need for defining the Unit of Work (UoW) as a BB.

Unit of Work as the Building Block

The *Framework's* Microartefact granularity and responsibility for a given AHMMHAM 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 BTPHAM's activities. Such activities use Microartefacts bundles in the form of UoW, that facilitates the integration of various technologies and standards.

EA, SAFe, Technology, Services and Standards

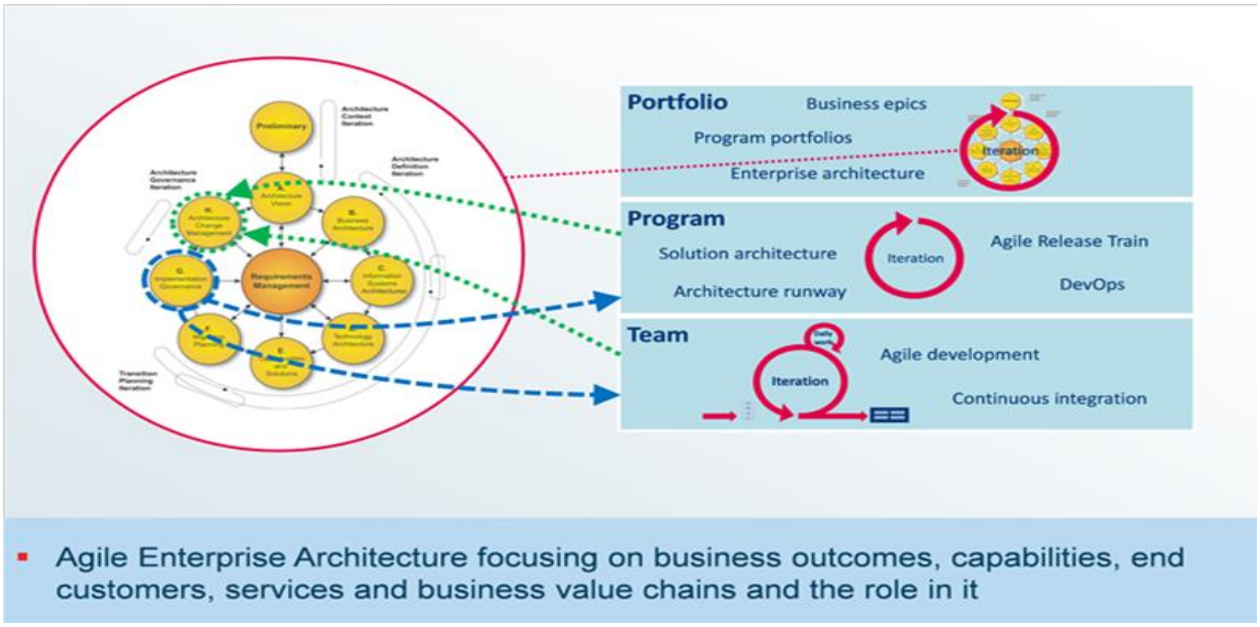

Figure 7. AM based EA using TOGAF (Lankhorst, 2016)

A *Manager* must have in-depth skills to manage AM based *Projects*; where adequate mapping and synchronization concepts can be used to integrate various types of standards like TOGAF, SAFe, Unified Modelling Language (UML)…; this coordination is BTPHAM's major responsibility. BTPHAM's strategy is enabled by the establishment of an ADM/SAFe based iterative model that can map *Entity's* Microartefacts in an "1:1" manner (The Open Group, 2011b). The scope of encountered complexities lies in capability of the BTPHAM to synchronize the *Entity's* transformational vision that encompasses its real capabilities (Trad & Kalpić, 2015b). The BTPHAM uses the *Framework by* using a mixed bottom-up approach that is based on services' architecture standards, which are the backbone of the *Entity's* unbundling process. AM based EA is a key ability of an *Entity*, because the pace at which end clients require innovative services and products, at which new governance rules, laws and regulations affect services and introduce new business processes, and the easiness at which business competitors can disrupt the *Entity's* business sustainability, drives to huge pressure.

Pressure to change frequently and quickly, to integrate Avant-Garde technologies, to generate growth, to scale up or to reduce costs. That is why for *Entities* being agile, is a crucial CSF which shows how able is the *Entity* to innovate. Innovation and agility are crucial competences for a sustainable business. As shown in Figure 7, EA and SAFe uses a layered, iterative approach, to support *Project* teams in the bottom layer. Such an approach delivers results with a typical agile frequency of 2-3 weeks. In the middle, the results of these teams are integrated and released using EA based patterns and BBs, like, the *Architecture Runway and the Agile Release Train*, which ensure the integration process. This layer iterates at speed that is a few multiples of the team layer, delivering quality products in each period. At the top part, the long-term PCIP is positioned; and this is where EA is used to deliver *Project* blueprints. The *Entity's* business strategy fills this layer, with principles and then provides the context for large-scale, high-impact EA decisions, priority setting and budget estimations (Lankhorst, 2016). BTPHAM, must consider all long-term aspects of the enterprise's security concept and strategies.

Enterprise Security Strategies

Entities face a set of barriers and difficult situations, which need the AM of Entity's Security Risks (ESR), using a specialized framework to support their activities. ESR may include CSFs related to reputation, routine Secured Development Operations (SecDevOps) procedures, legal and human resources management, financials, the risk of failure of internal controls systems and Entity wide governance. The BTPHAM supports the capabilities to protect the *Entities* 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). Transformed *Entities* with an efficient ESR management automate this management by using the *Framework*, which is in turn supported by the ADM and SAFe. The *Entity* chooses an ESR strategy to achieve its goals and tries to find ways to avoid major problems. Evaluation of ESRs and the definition of the probability of hazardous events and the choice of solutions is specific to *Entity* and its eco-system. ESR are, in most cases, difficult to discover and classify, due to their diversity and complexity. There are various types of ESR that are related with each application domain. ESR's neutralization is a technical, financial, and mathematical process for the implementation of decisions for the transformation measures. The ESR's AM structures SecDevOps by using CSAs, weights them and uses delimiters to select the related CSFs. ESR's AM analyses the CSAs by applying scenarios for mitigation. ESR AM system's key principles are: 1) Principle of integration using a systemic and holistic approach; 2) Principle of continuity using a set of procedures; 3) Integration of SecDevOps; and 4) Principle of validity based on CSFs and qualification procedures (Kiseleva, Karmanov, Korotkov, Kuznetsov, & Gasparian, 2018).

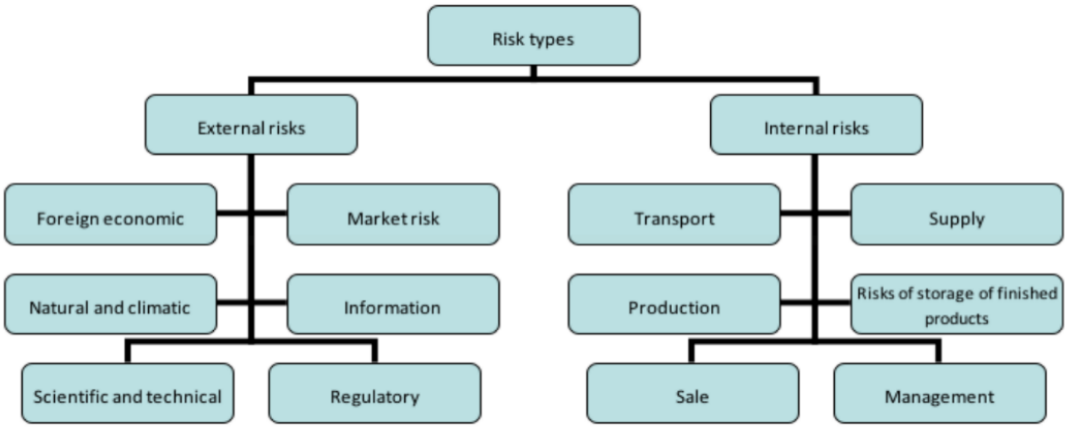

Figure 8. Types of economic risks (Kiseleva, Karmanov, Korotkov, Kuznetsov, & Gasparian, 2018).

Resources, Artefacts, Factors Management and Qualification Procedures

Actual design, development, qualification, and SecDevOps for *Entities* 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 an HDT similar concept. The BTPHAM manages the *Framework's* repository and continuum that map CSFs to various types of *Project's* resources. This mapping concept is supported by the ADM which associates CSFs, resources and Microartefact scenario instances to *Entity's* requests (The Open Group, 2011a). These requests are intercepting the *Entity's* decision making and knowledge management systems.

Decision making and knowledge management systems

A Highly Agile, Complex and Risky Process

BTPHAM is supported by DMSHAM and KMSHAM systems, which deliver sets of possible solutions to identified types of *Project* problems. The best selected solution(s) proposes transformational changes and minimize *Project* risks. DMSHAM and KMSHAM systems' integration may face possible problem types, due to complex HDT processing evaluation process, what implies that the analysis and AM of risk(s) is one of the important pre-requisites to ensure the success of BTPHAM activities (Hussain, Dillon, Chang & Hussain, 2010).

The Knowledge Management System

The BTPHAM must be capable of managing agility Knowledge Items (aKI); where aKIs and Microartefact scripts are responsible for the manipulation of intelligence, and they control various knowledge processes. The KMSHAM supports the *Entity's* underlying mechanics to manage aKI Microartefacts. The *Manager* is responsible for designing extraction of aKIs using holistic systemic

approach (Daellenbach & McNickle, 2005). The *Framework* interfaces the KMSHAM to enable an efficient aKI search process. The KMSHAM manages various types of information related to *Entities,* which helps the BTPHAM activities. A *Project* interfaces the KMSHAM/aKI, where sets of CSFs are stored (Trad & Kalpić, 2017a). KMSHAM's strategy is included in BTPHAM's roadmap that includes the DMSHAM.

The Decision-Making System

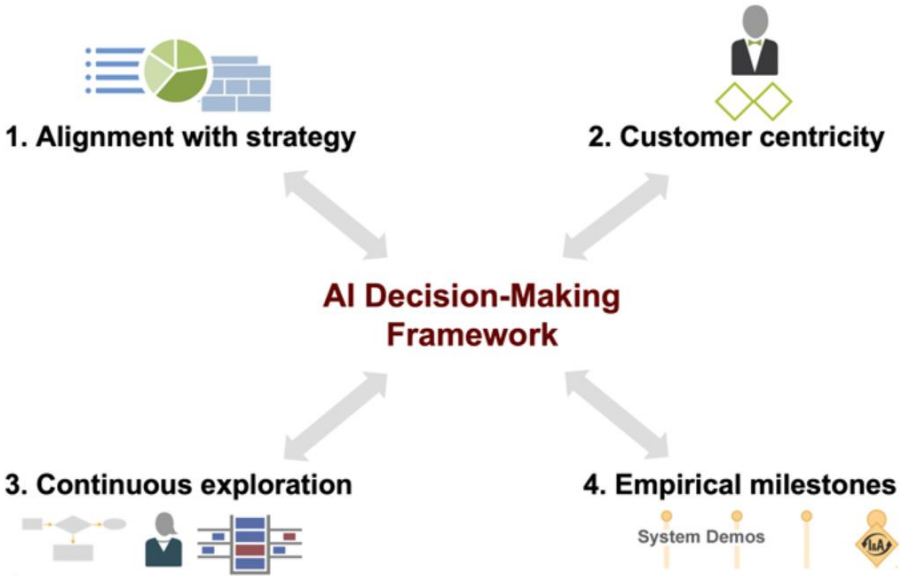

Figure 9. The decision-making framework enabled by SAFe (Scaled Agile, 2022).

The DMSHAM is supported by the AHMMHAM formalism that uses a holistic approach for delivering a set of BTPHAM suggestions in form of *Project* enhancements (Daellenbach & McNickle, 2005). The BTPHAM interfaces the DMSHAM, in which various AM solution templates are stored; these solutions are selected, enhanced, and tuned, using selected CSF sets, then this process is orchestrated by the AHMMHAM's HDT, used to select the optimal BTPHAM set of actions. The HDT is a form of Deep Learning in the domain of Artificial Intelligence (AI). AM oriented *Entities* have today, efficient environments to support DMSHAM; like the ones shown in Figure 9 (Scaled Agile, 2022):

- *The alignment* with the *Project* strategy which ensures that DMSHAM pursue beneficial business results. Aligning the AI activities and DMSHAM roadmap with *Portfolio strategy* is an essential iteration in the *Project*. Some AI-based initiatives may require substantial financial support; where others need to be reoriented or stopped; such decisions are based on an economic viability. *Projects*' financial activities need *Lean Budgeting*. Environments like the *Portfolio Kanban System* and a *Lean Business Case* support in establishing the alignment with EA/SAFe strategy. Program Increment (PI) planning provides the foundation for the alignment of AI based DMSHAM strategy with the PCIP.
- *Customer centricity* is critical for ensuring that an AI initiative can solve a problem type. Explicitly defining the customer problem is an important step and hugely benefits from applying *Design Thinking to AI capabilities*.
- *Continuous exploration* supports AI-enabled solution(s); where solution development contains a high degree of uncertainty. In *Project's* case(s) of AI, the level of uncertainty is very high in finding the optimal solution and its possible implementation. Such an implementation is supported by EA and SAFe *Lean Startup Cycle*. Defining clear business objectives/hypotheses, implementing an AI based MVP, and validating it by using an HDT and CSF/CSA are at the essence of a successful *Project*.
- *Empirical milestones* direct the PCIP to achieve successful AI-based solutions. *Project's* AI capabilities need to be continuously integrated with the other *Project's* artefacts and are

managed by an AM-based ADM. *Project's* increments and gap analysis are used to elicit important end clients' feedbacks. The *Project* organizes to *Deliver AI Solutions Organizing* around delivered value that is a critical enabler of flow and is one of SAFe's DevOps principles. AI-powered solutions have specific implications for EA and SAFe managed *Entities*.

BTPHAM usage and integration, and other related topics like EA, SAFe, DMSAHM, where presented and the next section presents the PoC.

THE PROOF OF CONCEPT

The already mentioned AMACS has an archaic and legacy ICS, based on a mainframe, various types of files service, end client service department. The main goal is to show how BTPHAM can support agile *Project,* with the application portfolio rationalization scenario.

Application Portfolio Rationalization Scenario, ICS Unification and CSFs

The PoC will try to select the needed set of BTPHAM pool of CSFs to satisfy the *Project's* requirements. The AMACS has already *Entities* goals as shown in Figure 10, which can be considered as the base sets of CSAs. The BTPHAM's needed actions in ADM phases, are: 1) In EA's Phase A or the Architecture Vision phase, to setup a global roadmap; 2) In Phase B or the BA phase, it needs to setup *Entity's* target architecture and the set of *Project* requirements definition(s); 3) In Phase C or the Gap Analysis phase, there is a need for modelling a target application landscape; 4) Phase D or the Target Technology Architecture and Gap Analysis phase needs the final *Entity's* infrastructure design; 5) In Phases E and F, (verifies the PCIP), Implementation and Migration Planning, one needs to define the transition architecture, proposing possible intermediate situation, and evaluate the *Project's* status.

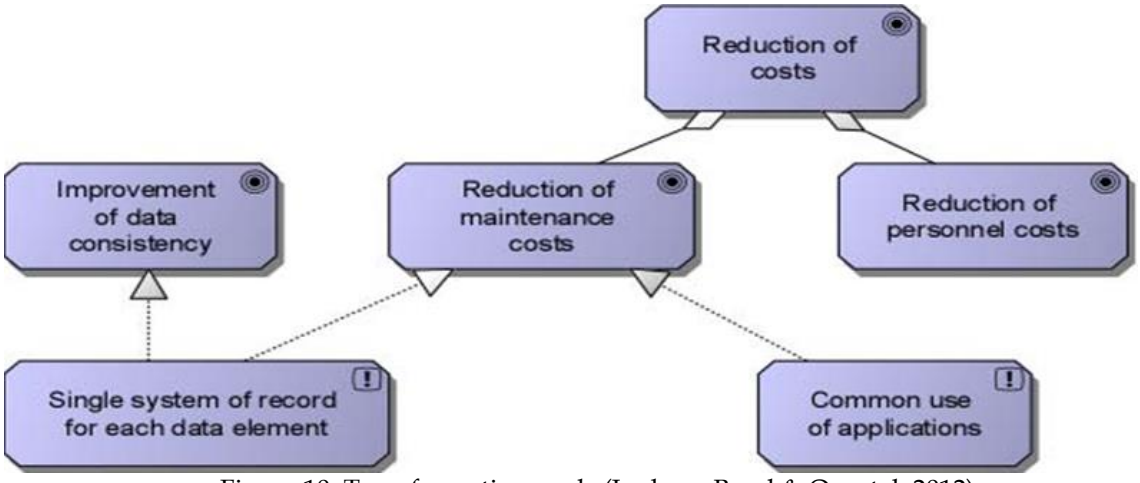

Figure 10. Transformation goals (Jonkers, Band & Quartel, 2012)

The first step is to design the Entity's Meta Model (EMM) which is a composite construct.

The Composite Construct

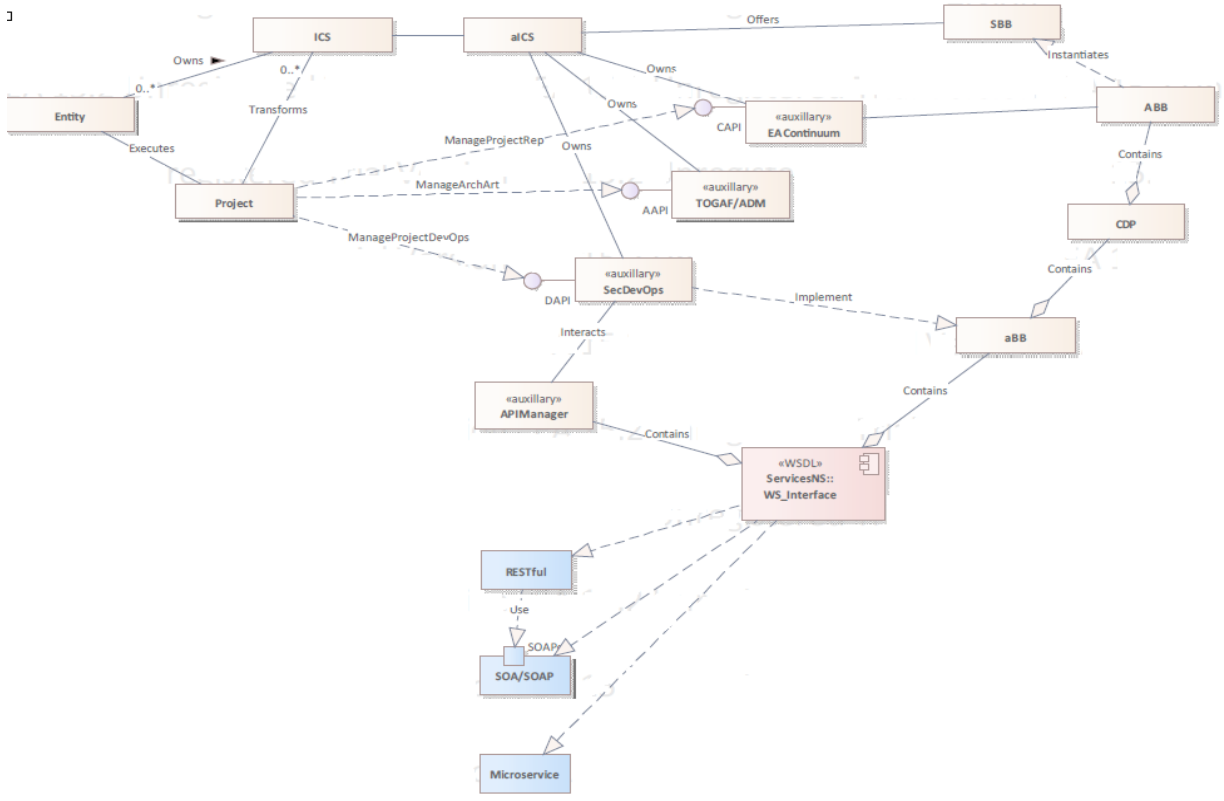

Figure 11. The EMM.

The EMM, which is Shown in Figure 11, depends on various types of patterns, and the BTPHAMM coordinates the optimal manner to integrate patterns in a coherent *Project* architecture that would use:

Implementation patterns, consists of a family of patterns that have composite structures, like 1) Classical design patterns; and 2) Services patterns.

The integration and enterprise patterns: These types of patterns understand patterns that have a component structure, like 1) Integration patterns; 2) the EA patterns; and 3) the business process patterns.

To deliver an EMM that delivers the *Project's* main artefacts:

- This PoC focuses on BTPAHM capabilities to support the PoC's execution process.
- The Execution
- The PoC is implemented using the *Framework* and is based on the AHMMHAM's instance.

The BTPHAM interfaces the DMSHAM that uses the selected sets of CSFs which are presented and evaluated in Table 1. The BTPHAM-required skills have mappings to specific *Entities* resources like CSFs and the used microartefacts are designed using EA/AM/BA methodologies. The BTPHAM also defines relationships between the AM (managed by SAFe) main artefacts like the original set of requirements and pattern microartefacts. The PoC was implemented using the *Framework* client's interface, where the starting activity is to setup BTPHAM 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 AHMMHAM instance to the set of actions that are processed in the background. The AHMMHAM-based HDT uses services that are called by the DMSHAM actions. The BTPHAM instance and its related CSFs, AM actions, 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 BTPHAM can be used in *Projects*. BTPHAM is not an independent component and is bonded to all the *Project's* overall EA and AM concepts. The *Framework* and hence the AHMMHAM's main constraint to implement the BTPHAM is that CSAs for simple *Entities* 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 8.80 implies that BTPHAM's integration is feasible for all types of *Projects*, where the complexity is integrating the BTPHAM in *Entities* that must be done in multiple agile transformation iterations, where the first one should try to integrate EA and SAFe, then to define *Project's* initial node to reach the final state.

CSA Category of CSFs/KPIs	Influences transformation management	Average Result
The Applied Case Study Usage	Complex & CredibleStable	From 1 to 10. 8.00
Agile base 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 BTPAHM Feasibility	Implementable	From 1 to 10. 8.00

Evaluate First Phase

- Table 1. The BTPHAM's research's outcome is 8.80.

Conclusion and recommendations

In this article, the focus is on the optimal BTPHAM coordinates the design and PCIP *Projects*. There has been a lot developed and written on enabling success in transformation projects and AM, but the authors propose to inspect the agile aspects of PCIP. That is mainly due to silos concepts and the *Manager*'s lack of knowledge in AM and the non-existence of adequate EA/SAFe integration for such initiatives. This RDP proposes a set of recommendations on how to proceed with the *Projects* where BTPHAM attempts a holistic implementation approach. The usage of the EMM considers that the ICS is a commodity used to glue the various business components of an *Entity* (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 AM to improve these rates. The managerial recommendations are offered to help *Project* members decrease the high failure rates and are a result of the resources review, surveys outputs, interviews, simulation, and prototyping.

BTPHAM managerial recommendations, and the *Framework*, round up the approach needed for the BTPHAM, and the roadmap for integrating a coordinated BTPHAM with: EA, AM, SAFe... 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 BTPHAM 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 BTPHAM's capabilities, coordination, and AM effect. These characteristics and prerequisites are needed to holistically manage the design of PCIPs. The RDP tries to define the optimal BTPHAM, which should be capable to synchronize various types of *Project* activities. There has been a lot developed and written on enabling success in *Entities*, but the authors propose to inspect why they fail in the PCIP. Because of the satisfactory score, above 8.8, Table 1 shows that BTPHAM's usage in *Project* is possible and that today the *Framework* is ready and is practically the only methodology that can in parallel construct *Projects*, SAFe/AM, EA/BA blueprints, KMSHAM, DMSHAM and other. The resultant technical and managerial recommendations are:

- As BTPHAM was established, the PoC checked its feasibility, and it replaces traditional project management technics.
- The PCIP is the major cause for failure, therefore there is a need for the optimal AM concept.
- The *Manager* must be an AM expert, who can implement EA blueprints.
- The literature review proved the existence of a knowledge gap between the traditional project management.
- An evolutionary HDT supported by the RDP is used to create the initial BTPHAM concept.
- The RDP proposes a concrete *Framework* on how to support AM.
- Traditional business environments can hardly cope with complexity of heterogeneous business and technical systems.
- The PoC proved the research feasibility and delivered the recommendations on how to integrate BTPHAM.
- BTPHAM coordinates EA to deliver architectural blueprints, patterns, and BBs.

BTPHAM, uses an AM like SAFe, to coordinate all *Project's* activities.

The *Framework* supports the *Entities* by using the BTPHAM and delivers a set of managerial recommendations.

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