Organizational and Digital Transformation Projects A Mathematical Model for Composite and Organizational Building Blocks

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CBB, OBB, BB, MA, Refinement, MDTCAS, Business Transformation Projects, Enterprise Architecture, Components, Agility, Development and Operations, Decision Making Systems, and Knowledge Management Systems.

Abstract

The organizational and digital transformation projects are very complex to finalize, because of many reasons, and they mainly depend on the initial project's phases. The initial phases depend on the critical Building Blocks (BB) based Reorganizational Process' (RP) success, knowing that the Unbundling Process (UP) success and the deliverance of pool(s) of extracted and refined BBs, is the most important phase. BBs are combined to offer reusable Composite BBs (CBB), which are used to (re)build and optimize Organization's Units (OU) Platform (OUP). The optimization of OUs takes into account mainly intangible and non-financial objectives. The Enterprise's (ENT) RP is a sequence (or a set) of RPs on the OUP (RPOUP), which goal is to disassemble ENT's: Legacy OUs' archaic structure(s), Organizational processes, Information system's administration, Resources/Artefacts, Applications/Modules, Working models, and Components; into dynamic reusable CBBs which can be (re)used in standardized or In-House-Implemented (IHI) Organizational BBs (OBB); where a OU is a set of OBBs and different OUs can share OBBs, and hence CBBs. The conversion of the legacy OUs and their subsystems need an IHI Methodology, Domain, and Technology Common Artefacts Standard (MDTCAS) that maps to existing BBs, CBBs and OOBs. In generating Micro-Artifacts (MA) the RP can face major difficulties because of the ENT's heterogenous human profiles/cultures, system parts, OU's Resistances (OUR), managers/stakeholders exaggerated financial ambitions, and project's limited time/budgets. In this chapter the author uses an adapted version of the Applied Holistic Mathematical Model (AHMM) for CBB (AHMM4CBB) (Trad, & Kalpić, 2020a) to support RPOUP's feasibility that uses the initial phase's pool of BBs that result from the Automated Refine Processes (ARP) based UP.

Introduction

The Organizational and Digital Transformation Projects (simply the *Project*) are very complex to finalize, and they depend on the initial *Project's* phase and the success of ARP/UP. CBBs are combined to offer reusable OBBs, which are used to (re)build ENT's OUs. The ARP/UP based *RPOUP* faces difficulties because of the ENT's heterogenous parts and the AHMM4CBB supports its feasibility and integrity. Unfortunately, the *RPOUP* is used to achieve immediate tangible financial profits, and such approaches make *Projects* fail at the rate of more than seventy percent. This article presents the possibility to implement an IHI *RPOUP* Strategy (*RPOUPS*) which avoids the financial-only locked-in strategies and ensures success. The main point is to define the levels of granularity and mapping concepts for the MDTCAS, which enables the reuse of existing or newly refined MAs, BBs, CBBs and hence OBBs. As shown in Figure 1, the *RPOUPS* follows the ARP/UP phase and if that step fails because of various types of resistances (like the OUR) and difficulties, then a new *RPOUPS* is to be implemented. Otherwise, the *Project* can move to the next step and can consider another major achievement was made. The *RPOUPS* can choose an initial OU's module to be converted by the ARP/UP, to prove that the *RPOUPS* is feasible and tries to convince the ENT to continue/proceed to the OBB phase, which is this chapter's scope; and the Process/collaboration Models (OPM) based Dynamic Organizational Models (DOM) will be researched in the author's next work.

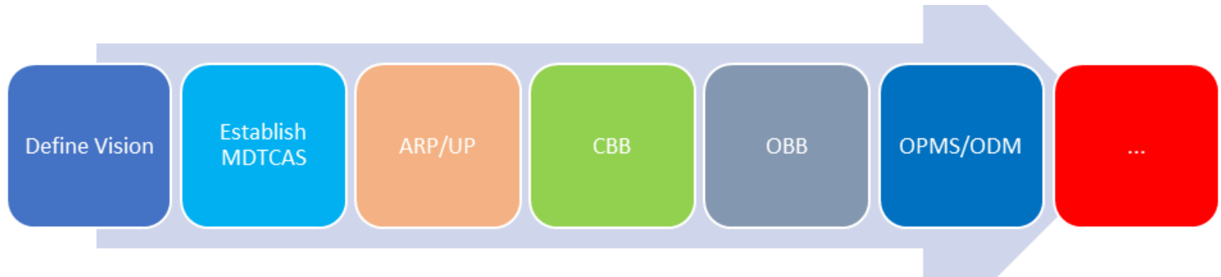
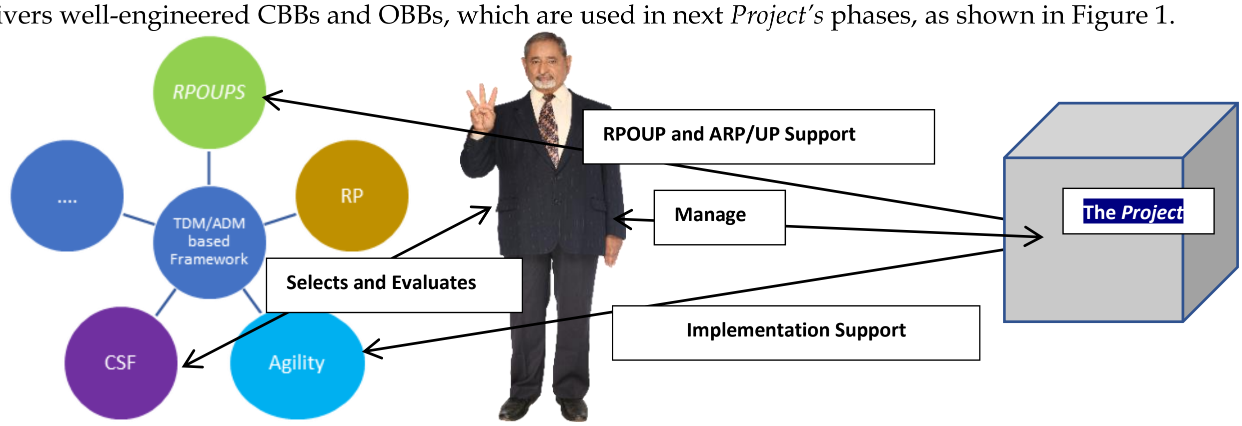


Figure 1. *Project's* phases.

Various application domains have critical *Projects'* requests and the hyper evolution of business needs, methodologies, and technologies, create fatal problems because of the gaps between the evolution and *Projects'* progress and take a long time to terminate, on the other hand business and technology domains have a hyper-evolution. That is why there is a need to find a transcendent MDTCAS to ensure that project's evolution is independent of all business and technological evolutions. The MDTCAS based *RPOUPS* is an important factor for the success of *Projects* because RPs unify CBBs and OBBs management to support the reorganization of OUs. CBB/OBB based *RPOUP* is a risky *Project's* phase, because of limited and complex RP. In this chapter, the author proposes that a *RPOUPS* supports *Project* Managers (or simply *Managers*) and his team, in extracting and reusing CBBs. RP is not only disassembling (and reassembling) of CBBs and OBBs, but it is a structural and coherent reorganization of OUs. A CBB reuses models diagrams/documents, MAs, BBs, Architectural BBs (ABB). RP is mainly a *reengineering*, which delivers well-engineered CBBs and OBBs, which are used in next *Project's* phases, as shown in Figure 1.



The *Manager* (an AofABS)

Figure 2. The *Project's* construction.

In many *Projects,* ARP/UPs and RPs operations are underestimated and ignored, and that causes *Project's* failure(s). Therefore, RP's success is mandatory for *Project's* next phases. RP's activities and its transformed/generated IHI CBBs and OBBs, are independent of a specific brand, methodology, tool, or other locked-in strategy. In this chapter the author uses an adapted version of the AHMM4CBB (Trad, & Kalpić, 2020a) to support the *RPOUPS* which uses ARP/UP to extract useful CBBs and OBBs. This chapter keywords show RP's complexity and the need for a holistic/Polymathic approach; that is achieved by using an Enterprise Architecture (EA) based *RPOUPS* that can be used in any APplication Domain (APD). RP's objective is to reengineer common System and/or Domain Components (SDC)... The *RPOUPS* are done in consequent steps and use the Polymathic-AHMM4CBB based ARP/UP and RP, to surpass the complexity of heterogenous approaches and ensures *Project's* continuity (Trad, 2022a, 2022b, 2023a). The AHMM4CBB supports iterative *RPOUP* of the legacy system, by using MDTCAS and Transformation Development Methodology (TDM) to integrate standard methodologies, like The Open Group's (TOG) Architecture Framework's (TOGAF) Architecture Development Method (ADM) (The Open Group, 2011a). Information and Communications Systems' (ICS) related *Projects* use cyclic/iterative implementation phases, which include *RPOUPs* and RPs. RPs are performed mainly for SDCs that include: 1) Organizational refinement technics; 2) Development and Operations (DevOps); 3) Automated tests and qualifications; 4) Extracting CBBs/OBBs based SDCs; and 5) CBBs/OBBs modelling activities. The

RPOUPS proposes an efficient use of RPs, which faces complexities due to 1) The implementation of complex, chaotic, and heterogenous CBB/OBB based SDCs; 2) Technologies' and methodologies hyper-evolution; 3) The incapacity to establish an MDTCAS; 4) Resistance for Change (R4C) or OUR, which should be checked with the Readiness to Transform (R2C); and 5) Maintenance difficulties (Koenig, Rustan, & Leino, 2016). In this chapter the *RPOUPS* uses a Proof of Concept (PoC) and a related Applied Case Study (ACS). The ACS describes a leading *European Bank's* (simply ***zBank***) ARP/UP and RP. The mentioned *Project* was mainly used to support an RP for ***zBank***'s legacy framework and organizational structure, which was based on EA/TDM/ADM, ArchiMate, Mainframe and Java environments. The ADM based TDM, managed underlying design, refinement, DevOps, and governance activities. As shown in Figure 2, such a *Project* needs a qualified *Manager* (or Architect of Adaptive Business Information System-AofABIS), RP specialists, and a capable team. And in this *Project*, the team was the main weakness and generated R4C and OUR, which proves that RP is a critical phase mainly because of the human incapacity factor. The TDM managed the implementation of the *ENT* refactored CBBs/OBBs/SDCs and storing them in the *ENT's Enterprise Continuum* (Trad, 2022a, 2022b). There were three types of CBBs: 1) Common CBBs/OBBs; 2) Mixed CBBs which include ABBs and Solution BBs (SBB), and create SDCs' libraries (The Open Group, 2011a); and 3) Imported CBBs/OBBs. As shown in Figure 2, *RPOUPS*' interaction includes: 1) Decision Making System (DMS) for CBB (DMS4CBB); 2) Knowledge Management System (KMS) for CBB (KMS4CBB); 3) Critical Success Factors (CSF) (and areas Critical Success Areas-CSA) Management System (CSFMS); and 4) An IHI *RPOUPS*. To prove *RPOUPS*' feasibility, the author uses his PoC and Research and Development Process (RDP) for CBB (RDP4CBB) concepts.

THE RDP FOR CBB

The Polymathic Model's Basic Elements

The *RPOUPS* identifies and assesses strategic and critical *Project's* risks to guaranty RP operations' coherency, by using the AHMM4CBB and its basic elements:

- ***m*** mapping operator
- ***i*** instance of
- ***R*** U of Requirements
- ***C*** U of Constraints
- ***H*** HDT/Heuristics function
- ***V*** Valuate function, U of ***H***
- ***St*** U of States
- ***T*** U of Sts
- ***S*** U of Solutions
- ***F*** Function
- ***A*** U of Actions/***Fs***
- ***P*** U of Problem
- *GID* *or GUID, is a **unique identifier** for all AHMM4CBB objects*
- *FTR* *is a **feature,** of an ENT, Enterprise, Project, ICS…*
- *ART* *is an **artefact**, …,*
- *CNT or **C's element*** *is a **constraint,** of an ENT, Enterprise, Project, ICS…*
- *RUL* *is a **rule,** of an ENT, Enterprise, Project, ICS…*
- *REL* *is a **relationship or association, …***
  - *Which can be three DIMS [TYPE][GID][CSA/APD]*
- *PRB or **P's element*** *is a **problem,** of an Enterprise, Project, ICS…*
- *REQ or **R's element*** *is a **requirement,** of an Enterprise, Project, ICS…*
- *CLS* *is a **structure**, class, method-part, …*
- *OBJ* *is a **CLS instance**, object, exec code, …*
- *SRV* *is a **service***

- *DIA* — *is a **Diagram**, UML, TOGAF, OOM, SA/SD, …*
- *APP* — *is an **application***
- *RFA* — *is a **Refinement Actions***
- *ARP* — *is an **Automated Refinement Process***
- *UPS* — *is an **Unbundling Process***
- *UPP* — *is an **Unbundling Phase***
- *OUS* — *is an **Organizational Unbundling Sub-Project***
- *BB* — *is a **Building Block***
- *ABB* — *is an **Architecture Building Block***
- *SBB* — *is a **Solution Building Block***
- *CMP* — *is an ICS **structure,** like application, server…*
- *WGT* — *is a **Weighting***
- *HDT* — *is a **heuristic based …***
- *SOL or **S's element*** — *is a **solution***
- *AIM* — *is an **AI models**, interaction, BPM, UML/Collaboration,*
- *GAP* — *is a **Project's gap analysis***
- *TSK* — *is a **Project task***
- *CLD* — *is a **Cloud or Distributed System***
- *EST* — *is an **Enterprise System***

ICS basics:

ART	= ***m*** SRV	(I1)
ART	= ***m*** DTB	(I2)
ART	= mcArtefact	(I3)
SRV	= $\underline{\cup}$ mcArtefact	(I4)
CLS	= $\underline{\cup}$ FUN ***or*** SRV + $\underline{\cup}$ VAR + $\underline{\cup}$ REL	(I5)
OBJ	= ***i*** CLS	(I6)
DIA	= $\underline{\cup}$ CLS + $\underline{\cup}$ REL	(I7)
DIA	= $\underline{\cup}$ OBJ + $\underline{\cup}$ REL	(I8)
SCR	= ***i*** DIA	(I9)
BB	= $\underline{\cup}$ DIA	(I9)
ABB	= $\underline{\cup}$ DIA	(I9)
SBB	= ***i*** SCR	(I9)
APP	= $\underline{\cup}$ SCR	(I10)
CMP	= $\underline{\cup}$ APP ***or*** IEL ***or*** DST	(I11)
ICS	= $\underline{\cup}$ CMP	(I12)
CLD	= $\underline{\cup}$ ICS	(I13)
EST	= $\underline{\cup}$ CLD	(I14)

Requirements:

mcREQ	= ***m*** KPI	(R1)
mcMapping mcArtefact/mcREQ	= mcArtefact + ***m*** mcREQ	(R2)
FTR	= mcREQ	(R3)
PRB	= ***m*** PRB	(R4)
REQ	= ***m*** CSF = $\underline{\cup}$ mcREQ	(R5)
REQ	= $\underline{\cup}$ FTR + $\underline{\cup}$ RUL + $\underline{\cup}$ CNT + $\underline{\cup}$ DIA + $\underline{\cup}$ REL	(R6)

Figure 3. The AHMM4CBB's nomenclature.

AHMM4CBB's basic elements are used to present RP artefacts:

- ***as*** for atomic, for the atomization of an element
- *MVC* = U DIA + U REL (A1)
- *MVC* = U MVC + U REL (A2)
- *aBB* = U SRV + U REL (A3)
- *sBB* = U ***i*** SRV + ***i*** U REL (A4)

In this chapter the Viewpoint "O" is the central section of the applied Polymathic approach.

A Polymathic Approach

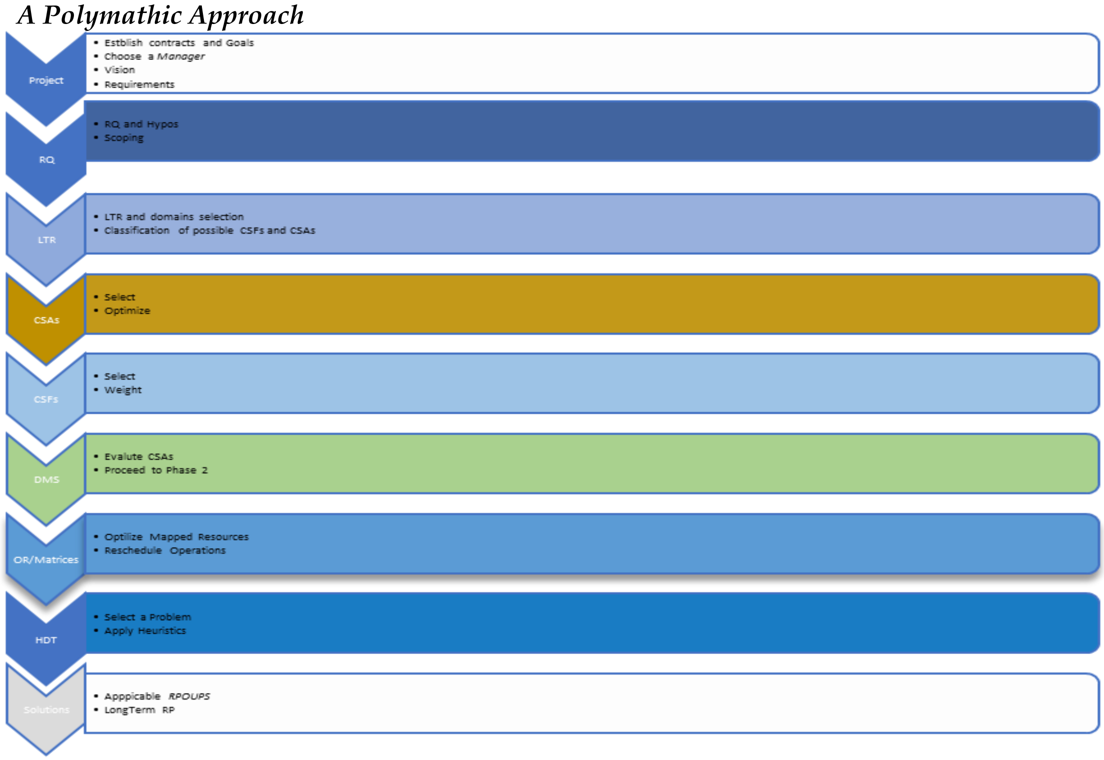


Figure 3. *Project's* Polymathic approach.

ARP/UP and RP for legacy OUs' components has created a paradigmatic shift in *Projects*, where these archaic components use sets of heterogenous structures, ICS/technologies, and methodologies. The transformation of such components in the form of CBBs/OBBs is supported by an adapted the *RPOUPS*. As shown in Figure 3 and Viewpoint "O", the *RPOUPS* focuses on refactoring of OU's components. The main Viewpoint: "O" or Organizational elements are:

- MA = ∑ aBB + ∑ sBB + ∑ aMVC (C1)
- BB = ∑ ARP/UP + ∑ MA + ∑ OPM (C2)
- CBB = ∑ BB + ∑ ABB + ∑ SBB (C3)
- OBB = ∑ CBB (C4)
- SDC = ∑ OBB (C5)
- OU = ∑ SDC (C6)
- RP = ∑ ARP/UP (C7)
- *RPOUP* = ∑ RP (C8)
- OU = ∑ *RPOUP* (C9)
- ENT(O) = ∑ OU (C10)

Transformed SDCs, CBBs/OBBs (objects, resources), and MAs are classified in repositories and are elements that interact using a unique and flexible GID; which identifies BBs/CBBs/OBBs/SDCs. The RDP4CBB proposes the *RPOUPS* to support *Managers* and *Project* teams in refining OU's components.

RP's main activity is to extract domain scenarios and relate them to CBBs/OBBs, and SDCs. The RDP4CBB presents the research methodology and the implementation and the ACS/PoC is based on the ***zBank***. Figure 4 shows the Polymathic-holistic approach used by the *RPOUPS* based *Project* for ***zBank***. For first RDP4CBB's step was to establish the Research Question (RQ) and achieve an in-depth Literature Review Process (LRP) for CBB (LRP4CBB).

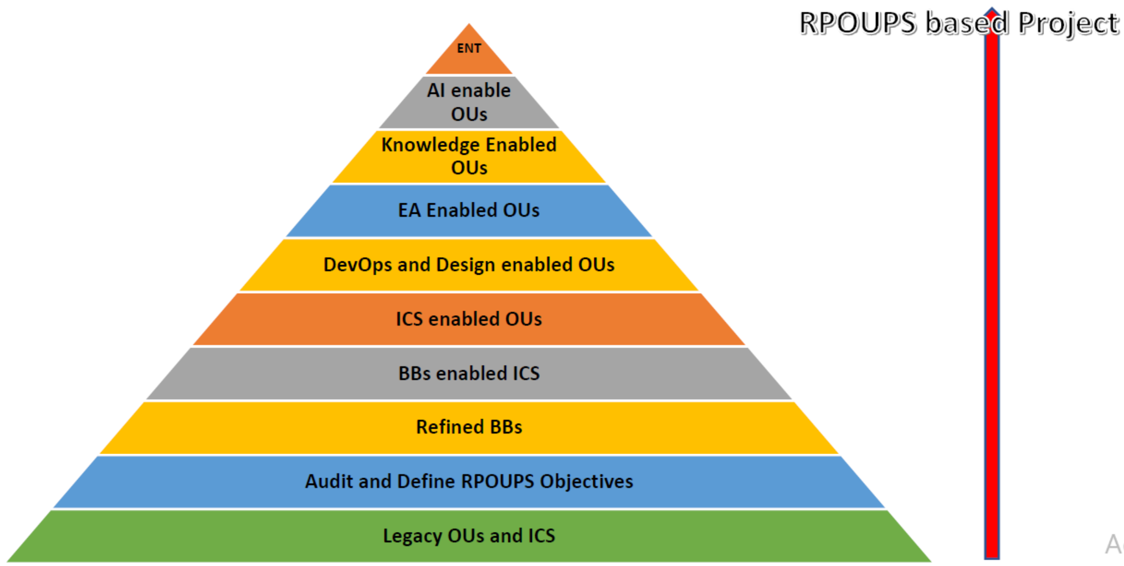


Figure 4. *RPOUPS* based *Project's* Holistic Approach.

The RQ and LTR4CBB

The RDP4CBB's RQ is: "Can the *RPOUPS* support the implementation of RP for OUs?". Where this chapter's auxiliary RQ is: "How can CBBs and OBBs support *Project's* SDCs?". Where the RDP4CBB uses EA/TDM, AHMM4CBB, CSFMS, and the DMS4CBBS. LRP4CBB's analysis showed that isn't any similar approach to Transformation Research Architecture Development framework (*TRADf), TDM,* ARP/UP, RP, and AHMM/RDP4CBB/RQ. And there is a small number of relevant scholar resources that are related only to OPM. Concerning TOGAF, which is a usable framework, but it is limited, simplistic cookbook, and tackles minor *Project* topics, like EA. Therefore, the AHMM4CBB based RDP4CBB related works, are pioneering, innovative and covers an important gap between RP and existing complex refinement solutions. *Project* related gaps and high failure rates were confirmed by the LRP4CBB (Bishop, 2009; Capgemini, 2011). There is a lack of a Polymathic-holistic approach to *RPOUPS* and its central RP operations, which today are done manually or by the use of commercial products. The LRP4CBB used the following resources: 1) Articles and resources related to RP, OPM, ICS reengineering, and *Projects*; 2) The author's RDP/LRP works, TDM, and *TRADf*; 3) *RPOUPS*' feasibility and capacities; 4) Initial sets of CSAs/CSFs; and 5) RDP4CBB's use of the Empirical Engineering Research Model (EERM). All the author's works are based on *TRADf*, AHMM, TDM, and RDP, which are today mature and can be applied in various domains like the *RPOUPS* and related *Project's* risk management. The RDP4CBB proved the existence of an immense gap and the necessity to deliver *RPOUPS* recommendations. The main gap is due to the fact that there is nothing similar to the *RPOUPS*; but there are some basic refinement approaches that concern exclusively code-sources, and which are manual processes. As shown in Figure 4, the next step is to select and classify the sets of CSFs and CSAs in the CSFMS.

CSAs, CSFs Management System

A CSA is a category (or set) of CSFs where in turn a CSF is a set of Key Performance Indicators (KPI), where a KPI maps (or corresponds) to a single common or *RPOUPS* requirement and/or *Project* feature, known as a MA.

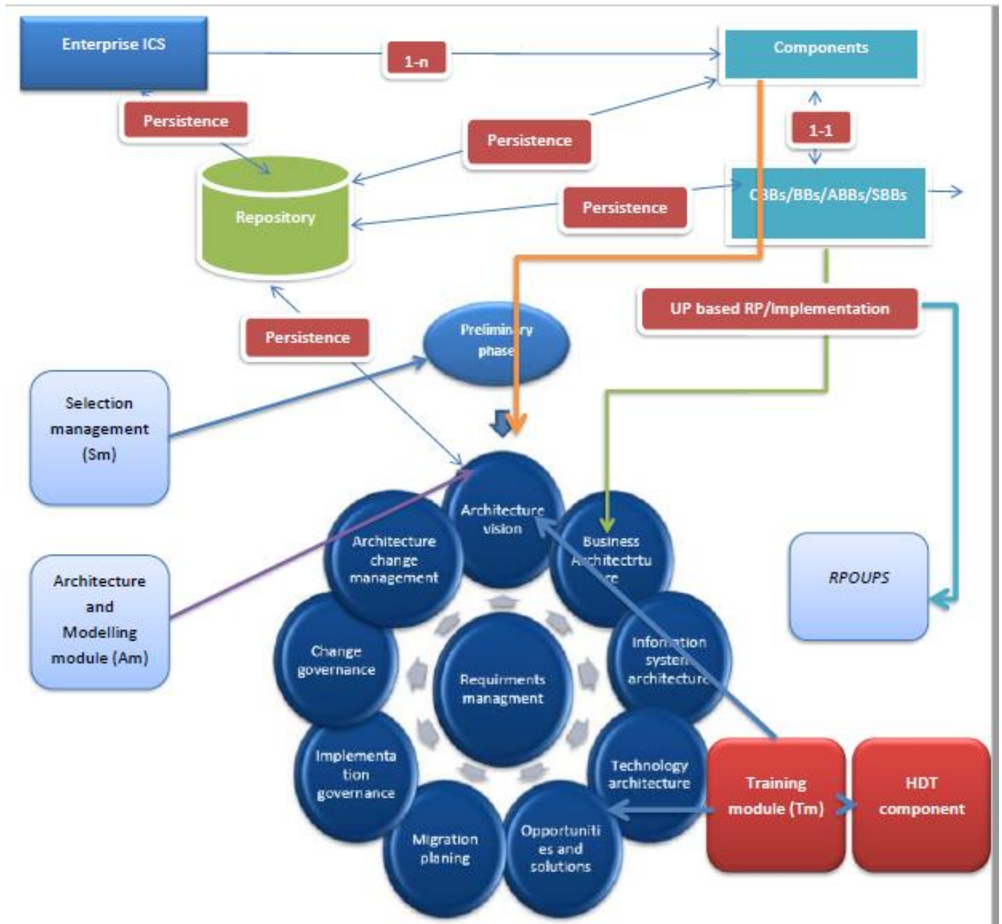


Figure 5. The RP and CSAs/CSFs integration with RDP4CBB (Trad, & Kalpić, 2020a).

For a given requirement or *Project's* RP problem, the *Manager* (or enterprise architect; or even a domain analyst) can identify the initial sets of CSAs, CSFs and KPIs, to be used by the Heuristics Decision Tree (HDT) based DMS4CBB and maps them to the sets of CBBs/ABBs/SBBs, MAs and requirements. Hence the CSFs are important for the mapping between the requirements, knowledge constructs, RP modules/CBBs, SDCs, organizational items/units, and DMS4CBB/KMS4CBB (Peterson, 2011). Therefore, CSFs reflect areas that must meet the main strategic *Project* and *RPOUPS'* goals and predefined constraints. Measurement's technics, which are provided by the author's *TRADf*, which can be used to evaluate performance in each CSA, where CSFs can one of the following: 1) *RPOUPS'* status; 2) Mapping levels of resulting CBBs/BBs and SDCs; 3) *Project's* gap analysis; and 2) DMS4CBB/KMS4CBB requests calls in real time, as shown in Figure 5. KPIs can be integrated in SDCs, so HDT's based evaluation processes can automatically estimate the values of CSAs, and CSFs (Dick, 2001; Quinlan, 2015). As shown in Figure 5, CSFs' and *Project*'s risks estimations have the following characteristics (Ylimäki, 2006): 1) Understanding RP activities related to *Projects*; 2) CSFs based EA/ADM/TDM implementations' fallouts; 3) *Project's* team(s) assigned mitigation strategy for each risk mapped to a CSF; 4) CSFs are key elements that are linked to KPIs which are SDC variables; and 5) CSAs/CSFs/KPIs are tuned by the *Project team* using the *RPOUPS*. Sets of CSFs/CSAs are weighted by the DMS4CBB/KMS4CBB to offer sets of solutions for a *RPOUPS* problem. The HDT-based DMS4CBB is used in all the *TRADf's* modules. RDP4CBBS' phases: Phase 1 (represented in decision Tables), forms the empirical part of the RDP4CBB; which checks the following CSAs: 1) The RDP4CBB, which is synthesized in Table 1; 2) The Methodology and MDTCAS, which is synthesized in Table 2; 3) The CBBs and OBBs based SDCs approach, which is synthesized in Table 3; 4) The Polymathic RP model, which is synthesized in Table 4; 5) The *RPOUPS* based *Project*, which is synthesized in Table 5; and 6) This chapter's RDP4CBB outcome, which is synthesised in Table 6. *TRADf* based *RPOUPS* delivers a set of (managerial and technical) recommendations and solutions, and a strategy for a *Project and OUP*.

RPOUPS' and RP's Integration with TRADf

As shown in Figure 6, *TRADf*, TDM, and its new module, the *RPOUPS* supports the transformation of legacy OUs and their OUPs into agile SDCs (or sets of CBBs/OBBs/MAs), which are designed, assembled, and implemented using MDTCAS, independently of the types of: 1) ICS/technologies; 2) APDs; 3) OU structures; and 4) Methodologies of formalisms. The MDTCAS ensures that *ENT's Projects* are not locked-in by global actors or the hyper-evolution of methodologies/technologies (Greefhorst, 2009).

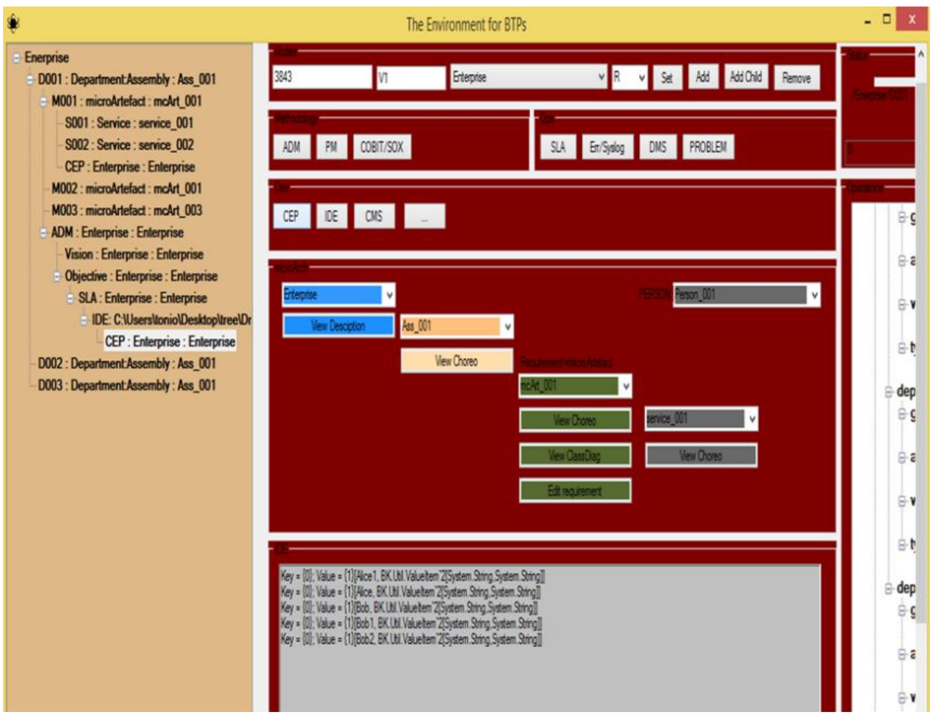


Figure 6. *TRADf's* implementation interface.

The *RPOUPS* is a complex concept and strategy, that is due to the unviable, heterogenous, and archaic OUP's and ICS' components formalisms which are mammothlike; that makes the RP very hard to extract MAs/CBBs/OBBs and SDCs. *RPOUPS*' Polymathic-holistic approach supports complex OU and OUP's integration activities (Daellenbach, & McNickle, 2005). In which the RP for various APDs, automates and refactors OU parts. The *RPOUPS* is a part of *TRADf's: Software engineering or the Implementation module* (Im), and *Architecture module* (Am); where it is recommended to build a similar IHI framework and TDM, which can be based on the ADM. The TDM based *RPOUPS* supports DevOps, to extract SDCs, CBBs/ABBs/SBBs, or MAs, which circulate through its phases. The elements contain their sets of CSFs and KPIs. The RDP4CBB reuses the author's works like *TRADf*, LRP4CBBs, MAs, and article to solve the RQ. So, it is an iterative research process, and all related topics are only referenced, because otherwise it would be tedious to understand this work. The RDP4CBB is a non-conventional and pioneering concept, in the field of *Project's* topics. The *RPOUPS* is Polymathic and is founded on a genuine and EERM that in turn is based on *TRADf*, HDT, RP, DMS4CBB/KMS4CBB, TDM/EA and ICS concepts (The Open Group, 2011a).

EERM's Usage

The EERM based RDP4CBB is optimal for *Projects* and uses *TRADf* (where it applies a multi-level mixed research by using the HDT) that can be considered as different from conventional research models (Easterbrook, Singer, Storey, & Damian, 2008; Dick, 2001: Quinlan, 2015), and it includes: 1) Heuristics-Basic reasoning; 2) Quantitative Analysis for CBB (QNT4CBB); 3) Qualitative Analysis for CBB

(QLT4CBB) research methodologies, to deliver empirical concepts as a possible approach for complex tuned mixed methods research; and 4) A learning process based on the HDT, which was inspired by Action Research learning process (Dick, 2001).

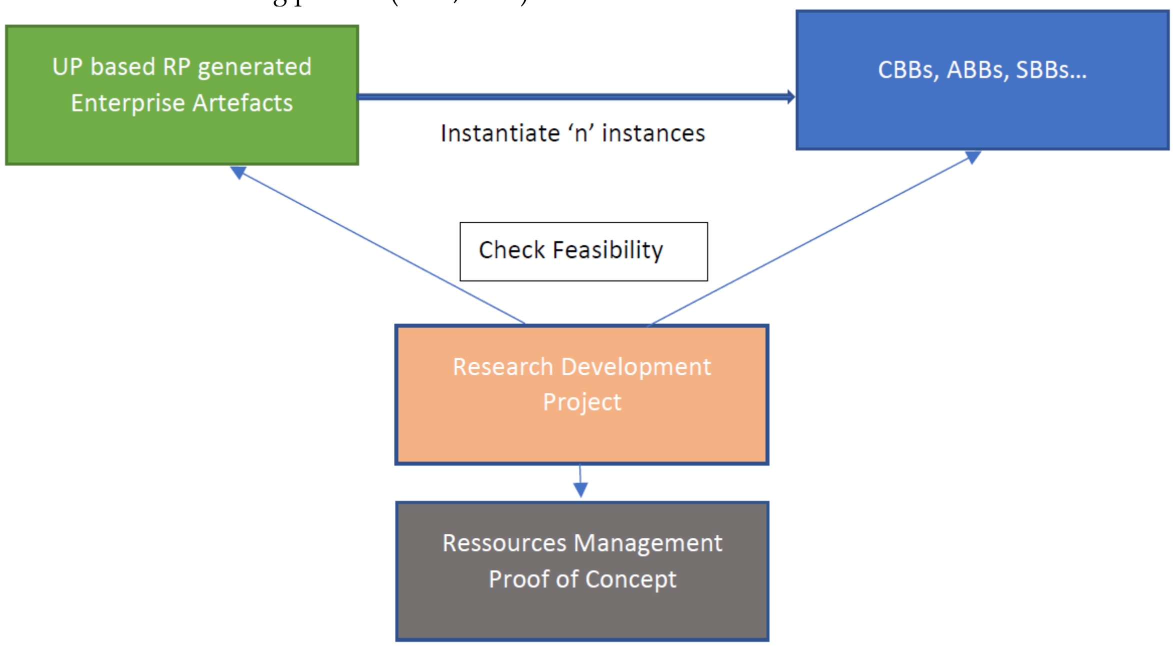


Figure 7. *TRADf's* RDP implementation environment.

TRADf can interface existing research methods, and the difference is just in the scope and depth of the RDP. Empirical research validity checks if the RDP, like the RDP4CBB, is acceptable as an important contribution to existing scientific (and engineering) knowledge and to convince the valuable reader(s) that the presented recommendations and PoC (or engineering experiment), are valid and reusable for various types of *RPOUP* activities. In engineering, a PoC is a software prototype of a testable RQ (and hypothesis) where one or more CSFs and KPIs (or independent variables, in theoretical research) are processed to evaluate their influence on RDP4CBB's dependent variables. As shown in Figure 7, PoCs support the evaluation with precision of CSFs/KPIs and if they are related, whether the cause–effect relationship exists between these CSFs and CSAs. The TDM and *RPOUPS* are transformation centric and use existing standards (The Open Group, 2011a). *RPOUPS'* author's related works are: 1) Using Applied Mathematical Models for Business Transformation (Trad, & Kalpić, 2020a); 2) Applied Holistic Mathematical Models for Dynamic Systems (AHMM4DS) (Trad, 2021a); 3) Business Transformation Projects-The Role of a Transcendent Software Engineering Concept (RoTSEC) (Trad, 2022a); 4) Business Transformation Projects-The Role of Requirements Engineering (RoRE) (Trad, 2022b); 5) Business Transformation Projects based on a Holistic Enterprise Architecture Pattern (HEAP)-The Basic Construction (Trad, & Kalpić, 2022c); 6) Integrating Holistic Enterprise Architecture Pattern-A Proof of Concept (Trad, & Kalpić, 2022d); 7) A Transformation Framework Proposal for Managers in Business Innovation and Business Transformation Projects-Intelligent atomic building block architecture (Trad, 2015a); 8) A Transformation Framework Proposal for Managers in Business Innovation and Business Transformation Projects-An Information System's Atomic Architecture Vision (Trad, 2015b); and 9) Organizational and Digital Transformation Projects-A Mathematical Model for Building Blocks based Organizational Unbundling Process (Trad, 2023a). But the *Project* should not underestimate *RPOUPS'* complexity, which is mainly due to a long and complex process, which needs R2C based transformation readiness checks.

The RPOUPS and Transformation Readiness Checks

RPOUPs are very complex and they are the major cause of *Projects'* failures; which are mainly due to ARP/Ups and RPs, which generate various types of problems, like (O'Riordan, 2021; Standish, 2011): 1)

RPs cannot be successfully finalized; 2) *Projects* have > 70% failure rates; 2) *Managers* use accountability justifications to select people to be accused, and to justify the failure's *only* financial aspects; where the main reason is *RPOUPS'* complexities; 3) OPM and ICS fields evolve very fast and business schools graduate *Managers* are submerged by such complexities; 4) In an Oxford study, 90% of *Projects* were stopped because of budgets overruns, especially ICS budgets which have a 200% overruns rate; 5) Failure rates are also due to the excessive demands of stakeholders to make excessive gains; 6) *…these failure facts and numbers represent a downtick in the success rates from the previous study, as well as a significant increase in the number of failures…*; 7) *They are low point in the last five study periods. This year's results represent the highest failure rate in over a decade…*; 8) Business transformation initiatives for change is a critical subject for ENTs; where various research show that the failure rates of such initiatives are around 70-80%, while other business organizations are struggling for their projects' and business survival; 9) The Chaos Reports, produced by the Standish Group over the last fifteen years; they assert that: … *only about 29% of transformations come in on time and budget…*; 10) It is hard to define the profile and to find an the needed skills. Using the various LRP4CBB references (O'Riordan, 2021; Standish, 2011) shows that in fact that the failure rates are dramatically increasing…; and 10) *So why continuing such Projects?* RPs use refactoring processes are the main ones, and they need skills, IHI tools, synchronized extraction processes, and EA/TDM/ADM capabilities. *Projects* with successfully finalized RPs, had similar: Strategies, Legacy organizational and ICS (by size and complexities), Structure/discipline, Skills, Decision model, and Roadmap for localizing external skills. These successful cases are labeled the *Enterprise Capacity to Execute (EC2E)*, which is the ability of *ENTs* to perform all *RPOUPS* tasks and to make optimal *Project* decisions. The *RPOUPS* supports various types of refinement action, to restructure legacy OU's structures, Application/Components portfolio, to align *Project's* management plan, and defined requirements' mappings. The *RPOUPS* needs the following types of skills (The Open Group, 2011a): 1) TDM/EA for CBBs and OBBs to support *Business Transformation Readiness Assessment* capacities; 2) To support RPs' executions; 3) To establish *EC2E* capacities; 4) DMS4CBB based learning concept, to build RP experiences; 4) To build a MDTCAS; and 5) Design and implement OPM System (OPMS) and DOM.

RDP4CBB's CSFs

Critical Success Factors	KPIs	Weightings
CSF_RDP4CBB_Polymathic_Approach	Proven	From 1 to 10. **10 Selected**
CSF_RDP4CBB_CSA_CSF_KPI_Integration	Proven	From 1 to 10. **10 Selected**
CSF_RDP4CBB_RP_Integration	Complex	From 1 to 10. **08 Selected**
CSF_RDP4CBB_EERM	Feasible	From 1 to 10. **09 Selected**
CSF_RDP4CBB_Transformatio_Readiness	Feasible	From 1 to 10. **09 Selected**
CSF_RDP4CBB_Needed_Skills_Profiles	Feasible	From 1 to 10. **09 Selected**
CSF_RDP4CBB_IHI_TRADf	Possible	From 1 to 10. **09 Selected**
CSF_RDP4CBB_LTR4CBB	Proven	From 1 to 10. **10 Selected**

valuation

Table 1. This CSA has an average of 9.25.

Based on the AHMM4CBB, LRP4CBB and DMS4CBB, this CSA's CSFs/KPI were weight, and the results are shown in Table 1. This CSA's result of 9.25, which is high, is mainly due to the fact that the iteratively used RDP4CBB is mature and that the ARP/UP to deliver BBs was successful (Trad, 2023a). But that does mean that the RP is feasible. As the RDP4CBB's CSA presented positive results, the next CSA to be analyzed the role and evolution of MDTCAS compatible methodologies.

THE ROLE OF MDTCAS FOR CBBs AND OBBs

The Role of Digital Transformation

As shown in Figure 1, the *RPOUPS* is mandatory and is the next critical *Project's* phase, and *RPOUPS'* goal is to create a common platform of CBBs/OBBs, services and resources for a sustainable *ENT's* OPMS, OUP, and ICS platforms. CBBs and OBBs are instantiated in SBBs for the support of Digital Transformations (DT), which improves Time-to-Market (TtM) pressures and adapts to changing APD requirements.

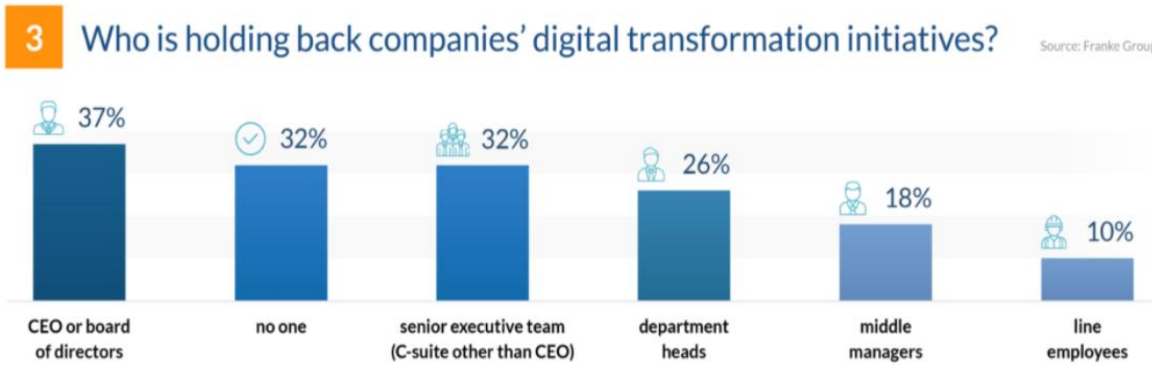


Figure 8. An APD viewpoint on the rejection of DTs (Eira, 2022).

ENTs, OPMS based DTs are strategic objectives and that implies the need for the high-adoption rate of ICS/digital technologies; but *Project* based digitization are complex and more than 70% fail, even if in general *Managers* are the accused, the main reason is the wrong *RPOUPS*. As shown in Figure 8, *Managers* consider that *RPOUPS*, business strategy, team members' concerns/R4C, and customer experience, are the cause for failures, which from APD's perspective are not the real reasons (Eira, 2022). The *RPOUPS* breaks down *ENT's* (mainly OUP and ICS) silos to enable DT that is the *Project's* main construct. DTs use TDM/MDTCAS/EA experts to model digitized APD models and to define DT's scope (Bizzdesign, 2022).

The Scope of OPMS based DTs

DT and OPMS managed by the TDM has benefits and many challenges, where the goal is to digitally transform OPMs, SRVs, and resources. The TDM synchronizes *ENT's RPOUPS,* OUP, and ICS, where DT profoundly changes the way the *ENT* acts and behaves (Möhring, Keller, Schmidt, Sandkuhl, & Zimmermann, 2023). DTs are difficult to scope because they depend on the APD, OPMS, and MDTCAS' incorporation capacities. A successful DT supports a *Project* and future APD's functions and (re)organization, which enhances functional performance. An agile CBBs/OBBs/ABBs/SBBs based APD models' development needs a DT to adopt a holistic approach to transform (Chaione, 2022): 1) Legacy OUP and OPMS; 2) To coordinated CBBs/OBBs/SBBs based choreography; 3) OPMS based DT based interfaces capable of entering new markets; 4) OUs structure, by redefining skills, OPMS/methodologies, and capabilities; 4) *EC2E* for RPs and for all APD's sub-domains; 5) Adopt an all-inclusive *RPOUPS* and MDTCAS/OPMS based DT, with an optimal *Project* plan; and 6) Legacy OUs' reengineering skills to enable DTs.

Legacy OPMS, Structured Concepts and MDTCAS

A *Project* must define an MDTCAS, which is a mix of existing methodologies and practices, which are used by the *RPOUPS*. MDTCAS includes Object Oriented (OO) Methodology (OOM) and legacy methodologies, like the Structure Analysis and Structured Design (SA/SD). In the case of 2nd generation legacy components and code, RPs can use the following phases: 1) RPs transforms legacy-components into SA/SD modelled components; 2) Implements MDTCAS based on OOM; 3) Adapts MDTCAS to be compatible with Unified Modelling Language (UML) models; 4) Interfaces MDTCAS with TDM/TOGAF-ADM-ArchiMate; 5) Offers an OPMS; and 6) Interfaces MDTCAS with the Decision-Making Notation (DMN). The *RPOUPS* recommends avoiding the costly and risky conversion from the 2nd generation legacy-code to integrate methodologies like TDM/TOGAF-ADM-ArchiMate, which was a major failure for the ***zBank***. Instead it should use an IHI MDTCAS and OPMS based non-locked-in approach that uses the following steps: 1) To convert Mainframe legacy-code/system to well-designed/mapped SA/SD models, where for the ***zBank***, a *structure* corresponded to an OOM/UML entity-class; 2) To transform existing OOM/UML models/diagrams based components into well-designed/mapped UML/Choreography models, using classes, sequences, communication models, Entity Relationship Diagrams (ERM), and OPMs/Business Processess (BP) and their Models (BPM) diagrams; 3) Implement a light-version of Spiraled/UML, TOGAF and TDM/ADM/DevOps development cycles; 4) Recycle processes in CBBs and OBBs; and 5) Adopt basic DMN like artefacts, such as requirements diagrams and Tables' evaluations done by the DMS4CBB. For all mentioned methodologies/disciplines OOM is central for the MDTCAS, CBBs, and OBBs.

OOM based MDTCAS, CBBs, and OBBs

MTCAS interfaces standard methodologies which are based on the OOM which have OO features, inherited from three OOMs, namely Rumbaugh, Booch, and Jacobson methodologies. The methodologies are the fundaments of the most known modelling/ICS standard, the UML (Liu, 2022). All methodologies like the ADM, are developed using a UML profile/metamodel. The first major paradigms that influenced MTCAS are: 1) Rumbaugh's Object Modeling Technique (OMT), which develops manageable OO based SDCs and supports OO Integrated Development Environments (IDE). OMT's allows class attributes, methods, inheritance, and association to be coherently open to implementers; 2) Booch's methodology, focuses on OO Analysis (OOA) and OO Design (OOD) phases, and has five activities: Conceptualization, Analysis, Design, Evolution, and Maintenance of requirements and their related SDCs. It is cyclical (or spiral) model, which uses incremental implementation processes, which are the origin of the ADM and DevOps. OOA/OOD phases, use six types of models/diagrams: Class, State transition, Object, Process, Module, and Interaction, which all are MDTCAS basic artefacts. Class and module are static diagrams, while state transition are dynamic ones (Liu, 2022); 3) Jacobson's methodology (OOSE) can be used to plan, design, and implement OO ICS components; and has five types of models: Requirements, used to specify Use Case (UC) diagrams, Analysis, Design, Implementation (used by *RPOUPS*), and Testing; they are also MDTCAS's basic artefacts; 4) CBBs, OBBs, and OPMs; and 5) UCs help the *RPOUPS* to analyze and extract CBBs, OBBs, and the interaction between them to create OPMs. Where a UC can include: OOM diagrams, non-formal code, Events flow, Pseudo-code, and Actors. OOM, UC are the basis of the actual EA modelling languages to support CBBs and OBBs to be used by the DOM.

EA Modelling Languages

Like ArchiMate, which has many artefacts, diagram types, views, and that is why in this chapter only its UC View (UCV), Business Process Interaction View (BIV), and Business Process View (BPV) will be presented, to show how MDTCAS can include common OPMS, EA/ArchiMate artefacts and diagrams. Combining the OPMS with TDM/EA in complex *Projects* can be supported by CBBs and OBBs. The *RPOUPS* uses CBBs and OBBs to support OPMS in the *Business Architecture* phase aspect of TDM/ADM (Rosing, Hove, Subbarao, & Preston, 2012).

UCV, BIV, BPV and the MDTCAS

ArchiMate's UCV, BIV, and BPV are incorporated in a CBB and OBB to be used for analyzing APD scenarios from the functional perspective. CBBs and OBBs can map to *Application Services* in the form of SDCs. A CBB has the following types of resources: Business, and System or non-functional. CBBs can be modelled with *Business Services*, and a subsequent set of diagrams, BBs, *Application Services*, and others. When CBBs are refactored/identified as MDTCAS artefacts like composite application services, which can be used to build OBBs as shown in Figure 9. These diagrams are elements of functionalities of the target SDC; and where refactored CBBs and OBBs (sets of BBs/MAs) represent the behavior (the functionalities) of an SDC (Hosiaisluoma, 2022). CBBs are heavily BPs, BPMs, and OPMs.

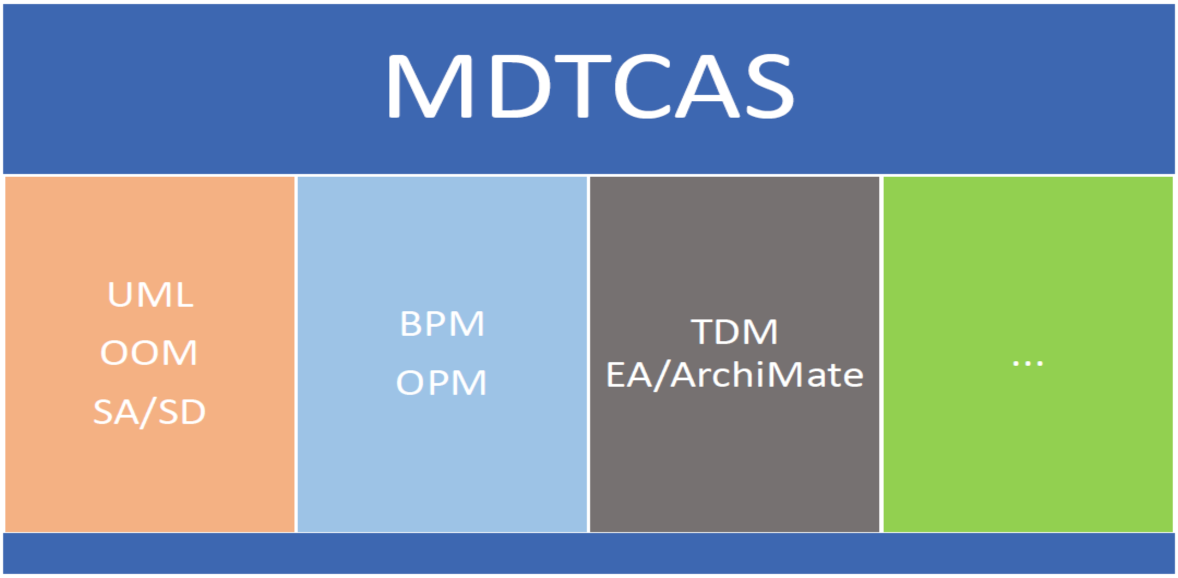


Figure 9. MDTCAS' Implementation.

A *Project* needs a well synchronized TDM, in which the OPMS provides the support business, EA models, to enable the *RPOUPS*. That all needs a Polymathic approach to enable structured OPMs. Automated and non-automated OPMs have a key role in developing APD competencies, and where *Business Architecture* and ICS architecture are vital. As shown in Figure 10, the key to linking these two architectural domains are BPs, OPMs, and BPMs which are subsets of process architecture(s). Implement a complex process architecture in APDs like finance, HR, or supply chain, are a major part of the *Project* and has interdependencies with other OUs and external *ENTs*. Analyzing APDs requirements in a siloed manner can have negative impacts on the *Project* and there a need to have a holistic approach to capture interdependencies, and for that goal the *RPOUPS* has to build CBBs and OBBs with various elements that influence the OPMS. A Polymathic-holistic overview/visibility across all APD's CSAs, helps *Project Managers* and teams, to predict the *butterfly effects* (how actions can have huge effects on the course of a major event) (Rosing, Hove, Subbarao, & Preston, 2012). Where BPs, OPMs, and BPMs are incorporated in CBBs and OBBs.

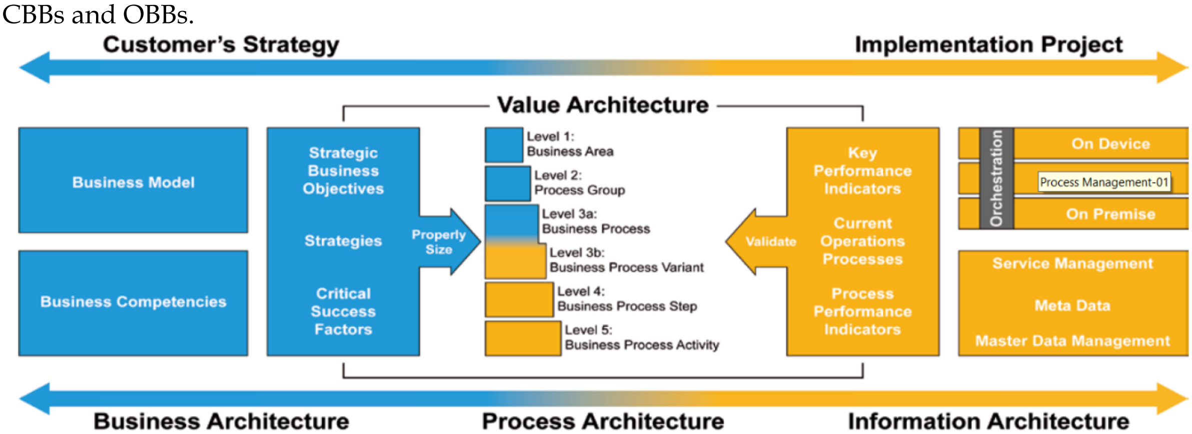


Figure 10. BPs fit into TDM/ADM/EA (Rosing, Hove, Subbarao, & Preston, 2012).

BP, BPM, and OPMS' Incorporation

To align BPs, OPMs, and BPMs (simply *Model*) with: TDM, CBBs/ OBBs/SBBs, and OUs, there is a need to use TDM/ADM's life cycle, where a CBBs includes: MAs, ABBs, SBBs, and Governance. The *RPOUPS* establishes: Common MAs for the MDTCAS, Business Process Architecture (BPA), *Models'* tools and management, DevOps, Test scenarios, Best practices, and OUs' control (Luyckx, 2015).

Methodologies' CSFs

Based on the AHMM4CBB, LRP4CBB and DMS4CBB, for this CSA's CSFs/KPI were weight and the results are shown in Table 2. This CSA's result of 8.0, which is low, and that is due to the fact that the RP and MDTCAS are difficult to integrate. And that does mean that it is impossible.

Critical Success Factors	AHMM4CBB enhances: KPIs	Weightings
CSF_MDTCAS_CBB_DT_Implementation	Complex	From 1 to 10. **08 Selected**
CSF_MDTCAS_OPMS_OOM_UML_Usage	Complex	From 1 to 10. **08 Selected**
CSF_MDTCAS_TDM/ADM/EA	Complex	From 1 to 10. **08 Selected**
CSF_MDTCAS_Legacy_Conversion	Complex	From 1 to 10. **08 Selected**
CSF_MDTCAS_DevOps	Complex	From 1 to 10. **08 Selected**
CSF_MDTCAS_*RPOUPS*	Complex	From 1 to 10. **08 Selected**
CSF_MDTCAS_CBBs_SBBs_Link	Complex	From 1 to 10. **08 Selected**
CSF_MDTCAS_OUs_Control	Complex	From 1 to 10. **08 Selected**

valuation

Table 2. CSFs have a rounded average of 8.0.

To organize various types of generated CBBs (and SBBs) there is a need to adopt the RP and CBB based approach.

RP AND CBB BASED APPROACH

CBBs based Vision

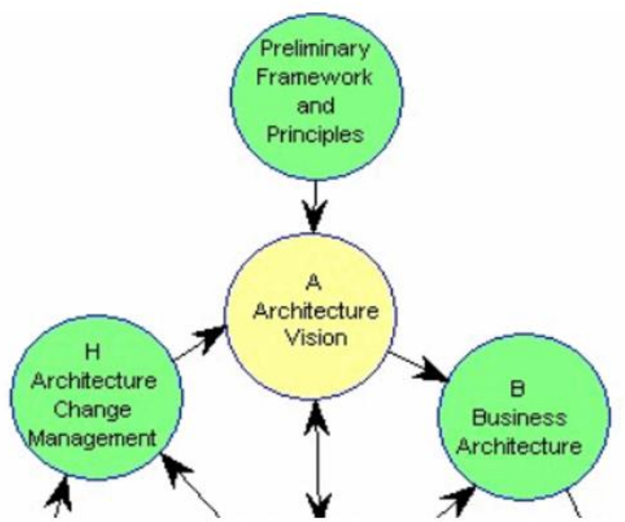


Figure 11. ADM based TDM's vision phase.

The TDM needs a directed vision on how to integrate generated CBBs and OBBs; and the *Project* must establish a CBB/OBB based Architecture Vision (CAV), as shown in Figure 11, to support: *RPOUPS*, ABBs, and to reuse CBB's CAV principles. An adaptive OUP/ICS is based on various RP generated atomic resources like aBBs, sBBs, Services (SRV), Model View Control (MVC) which are managed in various TDM phases to support: 1) CBBs/SBBs integration; 2) To apply CAV patterns; 3) Control and monitoring activities; 4) Interaction of MVCs (Palermo, 2012); 5) Relate CAVs to CSFs, 5) Viewpoints, like: OU, Process management, Stakeholders reporting, CBBs' usage in TDM models, and ICS' standards application; and 6) DMS4CBB to quantify vision's applicability by using the following CSFs:

- Coalition to Support the Vision (CSF_VIS_CSV).
- CAV's Adoption (CSF_VIS_CVA).

- RP's Capacities (CSF_VIS_RPC).
- Time for Execution (CSF_VIS_T4X).
- Tooling ADoption (CSF_VIS_TAD).
- CBB's concept adoption (CSF_VIS_CBB).
- MVC's concept adoption (CSF_VIS_MVC).
- Process Control and Monitoring adoption (CSF_VIS_PCM).
- Transaction Capability Adoption (CSF_VIS_TCA).
- Strategy for avoiding REsistances (CSF_VIS_SRE).
- PoC's capabilities (CSF_VIS_PCC).

The CAV supports the interaction of the ICS, SRVs, CAVs and CBBs; where the TDM manages CAVs and uses the following TDM/ADM's phases: 1) Preliminary that aligns *Project's* vision with CAV; 2) Phase "A", establishes the CAVs and relates them to CBBs/OBBs and OUP/ICS; 3) Requirement ensures that requirements are managed accordingly to CAV, where a requirement is linked to an instance of a CBB(s) and its SBB; 4) Phase "B" develops APD DIAs based on CBBs/OBBs and SBBs; 5) Phase "C", develops implementation DIAs based on MVC, CBBs/OBBs and SBBs; 6) Phase "D" develops technical DIAs based on MVC, CBBs/OBBs and SBBs; 7) Phase "E" uses the HDT based DMS4CBB to estimate the iteration's GAP value and offer possible solutions/opportunities; 8) Phase "F" delivers migration plans; 9) Phase "G" analysis the *Project*'s plans and defines governance mechanisms; and 10) Phase "H" manages requested changes. A TDM iteration generates sets of refined CBBs/OBBs.

Refined CBBs/OBBs

A CBB is a set of BBs that has a CAV that is based on mapping-patterns that are managed by the TDM/EA (Greefhorst, 2009). *Projects* apply CBBs driven implementation which needs specific implementation skills and a CBB/OBB based model-first or a Pseudo-Bottomup-Approach (PBA), where CBBs are built on IHI and standard BBs; to support OPMs' integration, modelling strategy, methodology, and productivity environment.

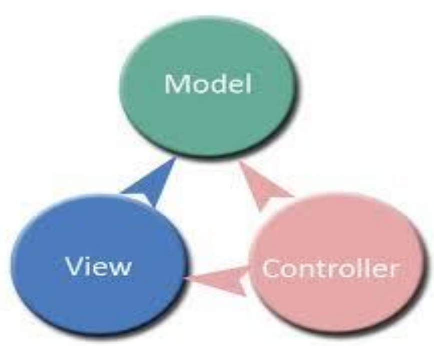


Figure 12. The Model-View-Control pattern (Palermo, Bogard, Hexter, Hinze, M., & Skinner, 2012).

RPOUPS supports upstream CBBs/OBBs that are generated by the RP and coordinated by the MVC pattern, as shown in Figure 12. TDM/EA manages RPs in which CBBs are templates for instantiating SBBs. The TDM manages CAVs which provide conceptual and logical views of SRVs across various APDs (Gartner, 2005). EA like TOGAF has generic BBs, and a set of BBs correspond to a CBB, where a CBB has the following characteristics (The Open Group, 1999):

- Packages requirements, functionalities, and artifacts to meet APD's needs.
- Standardizes interfaces to access all its resources and functionalities.
- Interoperable with other CBBs and BBs.
- Defines functionalities that will be implemented and captures requirements.
- It is technologically aware and is standardized and is used as a template to build SBBs.
- Aggregates with other CBBs.
- Has a GID, respects the "1:1" mapping concept and enables interoperability.

- An OBB is a set of CBBs.

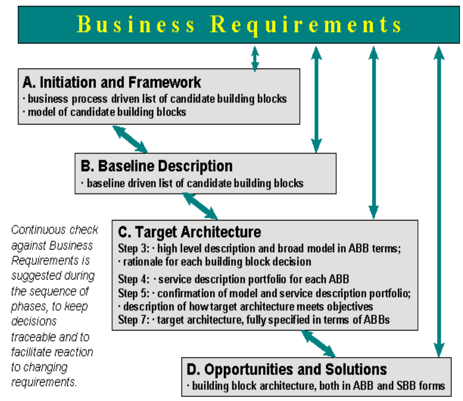


Figure 13. ADM's key phases at which CBBs are managed (The Open Group, 1999).

CBB sets are used by an OBB which can correspond to an APD Transaction (ATR). The way in which ATR's functionalities and resources are combined into an OBB vary between APDs. The TDM/ADM manages the implementation CBBs as shown in Figure 13, to serve SBBs (The Open Group, 1999). An SBB has the following characteristics:

- Defines which SRVs and CBBs will implement APD's functionality.
- Uses implementations of CBBs.
- Fulfills ATR's requirements.
- Is traceable and interoperable.
- Enables dynamic implementations and supporting CBBs Reference Models (CRM).

The TDM/ADM/EA depends on requirements, CBBs, and ATRs architecture which supports the related SRVs, interfaces, and standards that satisfy APD needs (The Open Group, 2011c). The *RPOUPS* follows technology trends which are driving the *Project's* vision. The *RPOUPS* tries to reengineer CAVs, this approach ensures that the *Project* succeeds. Because it aligns: Requirements, (re)Structure/governance OUs, and OUP/ICS. *RPOUPS* uses the RP for:

- SUBKING down legacy OU components into a set of classified unique CBBs/OBBs based ATRs; a CBB *is just another business brick in the wall*... Resulting CBBs are offered as templates to instantiate SBBs.
- To align on the base of the "1:1" mapping concept as shown in Figure 14, which needs an IHI format or a standard one, like eXtensible Markup Language (XML) Interchange (XMI).
- All the mentioned features enables the development of IHI CBBs based OBBs.

ID	aBB's artefact	Naming convention	Atomic Class	Interoperability
GUID_xxx	CAV's Artefact	GUID_ATR-Name_CAV	Class_ATR_CAV	XMI or IHI format
	Contract	GUID_ATRName_CBB_SBB	Class_ATRName_SBB	XMI or IHI format
	CBBs and UC(s)	GUID_ATRName_UC	Class_ATRName_UC	XMI or IHI format
	…	…	…	…

Figure 14. MDTCAS "1:1" mapping.

CBB based OBBs

The MDTCAS includes common and coherent sets of IHI CBBs to compose OBBs. The *RPOUPS* drives the use of RPs to generate feasible CBBs/OBBs, which can also emerge from *the best architecture & modeling practices*. RPs has to apply *architecture & modeling extraction techniques*, which can fail because it causes: 1) Bad design, and is unmaintainable; 2) Lacks evolution and scalability; and to 3) OBBs and SDCs are un-usable. *RPOUPS*' sets of CBBs/OBBs for modeling, designs, and implementation activities, and the PoC checks their feasibility. OBBs instances can be used to create generic types of *Models*. OBB instances are stored in an SBB, which is suitable for implementing various *Project* architectures to interface standard methodologies like TOGAF, UML... CBBs-based OBBs map to different types of RP constructs (The Open Group, 2011a), which need the reduction of silos complexities and the adoption of a PBA. The PBA is based on a *1:1/1: n* mapping concept. The MDTCAS needs CBBs-based OBBs to interface existing standard OPMS by using (The Open Group, 2021; Trad, 2023a; Trad, & Kalpić, 2022c, 2022d): 1) Quick support by offering sets of CBBs to be used by the TDM/ADM, Enterprise continuum, CRM, Catalogs, ….; 2) Domain logic patterns; 3) Data-source architectural patterns; 4) Enterprise Service Bus (ESB) patterns; 5) Enterprise Application Integration (EAI) patterns; and others… There are many redundant categories of standard and internal CBBs, which makes the *RPOUPS* difficult to implement. That is why the MDTCAS must support a set of transcendent patterns-based CBBs, like the MVC and intelligent OBB-based Data BBs (DBB).

OBBs and DBBs Interaction

RPs redesign by extracting various types of complex data structures/patterns to form DBBs, like 1) Business Data or Interaction Modeling Patterns, that extract business data and offer interaction models, which are indepenednt of the databases types. Atomic data services for business activitities and focuses primarily on the encapsulation of data and behavior schemas and is the basis of the *Business Knowledge Management Pattern* (Pavel, 2011); 2) Business Knowledge Management Pattern, includes *Models*, which persist forms of knowledge classes; and 3) A combination of IHI CBBs to support OBBs' assembling model.

OBBs Assembling Model

OBBs' assembling model includes: 1) The Requirements Integration Pattern (RIP) that is used by RPs to extract types of common OBBs to be used and mapped to the *Project's* requirements and the needed OBBs/SBBs. The extracted OBBs are orchestrated by the AHMM4CBB actions that process the refinement processes. RP actions map requirements to the various OBBs and *Models*, which are located in repository (The Open Group, 2011a); 2) The Code Blocks Integration Pattern (CBIP) is complex to use. To use CBIP based RP, it is recommended to use the MDTCAS approach, which minimizes OBBs overhead. The CBIP based RP determines critical process/resources regions, and then applies refinement processes (Stitt, Stitt, Vahid, & Najjar, 2006); 3) Supports of implementing DOMs; and 4) The *RPOUPS* supports IHI predefined RP models.

Predefined RP Models

ARP/UPs generate basic BBs and RPs extract standard/common CBBs/OBBs, *Models*, and BBs/MAs to be included in the MDTCAS. As there are many standards and types of artefacts, the Object Management Group's (OMG) DMN will be presented; and it is used for modeling operational decisions. DMN's decision models are shared between different systems and the MDTCAS interfaces DMN's implementation environments to: 1) Refine and map DMN patterns which are similar to *Models* (RedHat, 2022); 2) Use diagrams and artefacts like the: Decision Requirement Diagrams, CBBs/OBBs, *Models*, Business Knowledge Model, and Decision Tables, similar to *TRADf's* Tables that are used in this RDP4CBB; 3) RPs processing results in a set of MDTCAS artefacts and *Models*; 4) RP models include the following steps: Defining MDTCAS main artefacts and basic *Models*, Transforming legacy-code-base to deliver CBBs by using BPM, UML, TDM/TOGAF/ADM, and to integrate DMN; and 5) *RPOUPS* has to avoid that RP delivers a CBBs' hairball, and it uses the PBA to offer a set of CBBs to be included in MDTCAS (The Open Group, 2021).

CBB-based OBB's CSFs

Critical Success Factors	AHMM4CBB: KPIs	Weightings
CSF_CBBs_OBB_Vision	Feasible	From 1 to 10. **09 Selected**
CSF_CBBs_OBB_RP_Models	Complex	From 1 to 10. **08 Selected**
CSF_CBBs_OBB_Generate	Complex	From 1 to 10. **08 Selected**
CSF_CBBs_OBB_SBB_DBB	Complex	From 1 to 10. **08 Selected**
CSF_CBBs_OBB_Assembling	Complex	From 1 to 10. **08 Selected**

valuation

Table 3. CSA's average is 8.20.

Based on the AHMM4CBB, LRP4CBB and DMS4CBB, for this CSA's CSFs/KPI were weight and the results are shown in Table 3. This CSA's result of 8.20, which is low, and that is due to the fact that the CBBs-based OBBs concept is difficult to integrate. And that does mean that it is impossible. To implement *RPOUPS* the author will propose a Polymathic RP approach.

A POLYMATHIC RP APPROACH

Evolution and Risk of RP based Project

Figure 15. Quadrant for risk management (Pratap, & Predovich, 2020).

The refinement and evolution of *Project's* BBs based components and the extraction of common MAs take a very long time, and OUP's ICS evolution is extremely fast, therefore there is a need to find a Polymathic median *RPOUPS*. The AHMM4CBB based *RPOUPS* uses various mathematical domains to deliver a unique AHMM (Trad, & Kalpić, 2020a). As shown in Figure 15, a *Project* must select the optimal *RPOUPS*' risk mitigation concept, which is based on the following types of risks: 1) Risk avoidance and prediction; 2) Risk reduction; 3) Offers AHMM4CBB actions to reduce risks; 4) Actions to transfer risks to third parties; and 5) Risk acceptance, like in the case of R2C. *RPOUPS*' risk estimations include (Pratap, & Predovich, 2020): AHMM based analysis, Remediation, Compliance, Coherent/Synchronization, User experiences, Reporting, Basic-advanced integration, Digital asset discovery, and Real-time control based assessments. Risk mitigation artefacts are linked to the Polymathic AHMM4CBB basic elements. AHMM4CBB's nomenclature is presented in a basic form to be understandable by the readers. The AHMM4CBB based *RPOUPS*, and its main artefacts and characteristics are:

- RP actions = supports ARP/UP operations, DevOps activities, for finalizing the *RPOUPS*.
- *Project* parts = ∑ *RPOUP*(S) (for the OUP, ICS, SDCs, and its infrastructure/networks).

- *RPOUPS* = transformation of *Project's* parts + the defined goals of *Project* operations.
- *RPOUPS* = includes *Project's* parts + ∑ *RPOUPS*.
- APD's AHMM (AHMM) = ∑ *RPOUPS*.

ENT's RPOUPS based Model

As shown in Figure 16, the symbol ∑ indicates summation of all the relevant named set *RPOUPS* related members, while the indices and the set cardinality have been omitted. The summation should be understood in a generic sense, more like a set. The AHMM4CBB uses services model to support the *RPOUPS* and is represented in a simplified form. The *RPOUPS* interfaces are based on the TDM and uses services to enable the Polymathic transformation model. The AHMM4CBB based TDM is the combination of TDM and AHMM4CBB looks as follows:

The Generic AHMM's Formulation

TDM	*is a **Transformation Development Method**, which can be ADM based…*	
AHMM	$= \bigcup$ TDMs + $\bigcup$ DMMs	(G1)

AHMM's Application and Instantiation for a Domain

Domain	$= \bigcup$ APD	(G2)
AHMM4(*Domain*)	$= \bigcup$ TDMs + DMMs(*Domain*)	(G3)

Figure 16. The AHMM4CBB main formulas.

The Polymathic Transformation Model

The AHMM4CBB based TDM model:

AHMM4CBBbTDM = AHMM4CBB(TDM) (G4).

The *RPOUPS* transformation model is the combination of an AHMM4CBBbTDM and *IterationGap* that can be modelled using the following formula:

Project = AHMM4CBBbTDM (*Iteration Gap*) (G5).

The *Project's* model is based on the extraction of choreographies or *Models*.

Extraction of CBBs and OBBs based Choreographies/Models

The *RPOUPS* depends on the results of RPs' operations, which extract *Models* (or BPM/choreography). The extracted *Models* are based on the HDT that uses CBBs and OBBs to support DOMs. The AHMM4CBB is composed of a large number of interconnected nodes, to solve *RPOUPS* types of problems. *RPOUPS* MAs are connected to each other, like nodes of the HDT and there is a WGT (a real number) and CSFs.

The Model's CSFs

Based on the AHMM4CBB, LRP4CBB and DMS4CBB, for this CSA's CSFs/KPI were weight and the results are shown in Table 4. This CSA's result of 9.60, which is high, and that is due to the fact that the Polymathic RP approach is based on the AHMM which is a mature model; and that it can be used.

Critical Success Factors	HMM enhances: KPIs	Weightings
CSF_AHMM4CBB_RP_Elements	Proven	From 1 to 10. **10 Selected**
CSF_AHMM4CBB_RP_Risk	Possible	From 1 to 10. **09 Selected**
CSF_AHMM4CBB_RP_Models	Proven	From 1 to 10. **10 Selected**
CSF_AHMM4CBB_RP_TDM	Possible	From 1 to 10. **09 Selected**
CSF_AHMM4CBB_RP_Choreography	Proven	From 1 to 10. **10 Selected**

valuation

Table 4. CSA's average is 9.60.

The AHMM4CBB and MDTCAS' artefacts are used to support the *RPOUPS* based *Projects*.

RPOUPS BASED PROJECTS

The Strategy and Evolution and a Decision Model

RPOUPS is supported by a predictive the KMS4CBB based DMS4CBB that depends on the selected CSFs, like the types of RPs activities, types of *Project* risks, R2C, financial situation, types of BPMs, skills, … A *Project* should be adapted to a *RPOUPS* that can offer complex designs and eventual problems, which can be the source of risks and failures... *RPOUPS*' problems can be measured and weighted, where the *Project's* risks are not easy to measure. This explains the difficulty of estimating *Project's* risks related to consequential sets of RPs operations. The DMS4CBB and selected weightings are used to deliver a set of possible *RPOUPS* actions. Weightings' DMS4CBB concept supports the *RPOUPS* to deliver solutions in the form of *RPOUPS* recommendations. The DMS4CBB used the HDT to solve *RPOUPS* types of problem(s). The *RPOUPS* adopts a holistic-systemic approach, which makes the *Project* robust and the CBBs/MAs management subsystem the basis of a successful *Project*. *RPOUPS*' CBBs/OBBs/SBBs are managed .by the MDTCAS based TDM. The MDTCAS provides support for refined CBBs and the *RPOUPS* synchronizes *Project's* plans with the TDM. The TDM supports interactions between strategies, global processes, services, and ICS' platform. The DMS4CBB controls *RPOUPS* risks to implement CBBs and OBBs pools to support the implementation of DOMs. *RPOUPS* contains the following concepts: 1) Agile DevOps for CBB, OBB, and SDCs extractions; 2) MDTCAS sets of artefacts; 3) TDM's interfacing capabilities; 4) Mapping MDTCAS artefacts; 5) CBB's and OBB's granularity; and 6) Requirements mapping to CBBs. *RPOUPS*' capabilities to integrate emerging avant-garde domains, like *Models*, AI, EA, Refine techniques, and scalable OUPs/ICS platforms (Sargent, 2021).

The Role of MDTCAS and Avant-garde Domains

MDTCAS supports the *RPOUPS* and its capacity to refine legacy *Models*. Refined CBBs/OBBs can be used with existing standards by implementing the MDTCAS and its TDM. The *RPOUPS* uses CBB-based OBBs to deliver ABBs that instantiate SBBs. *RPOUPS* offers RP to be able to reuse refined CBBs. Existing *RPOUPS* initiatives have the tendency to *reinvent the wheel* when creating CBBs and OBBs. The *RPOUPS* delivers refined CBBs for architecture/modeling, designs, and implementation constructs for the reengineering of DOMs. Mixing CBBs that can be mapped by the TDM and the *Project,* must implement a generic OBB (The Open Group, 2011a). Using MDTCAS enables the reduction of complexities and the adaptation of a PBA cycle based on a "1:1" mapping approach. *RPOUPS* applies standardized: 1) Methodologies; 2) Business or APD architecture; 3) *Models*' choreography; and 5) Mapping *Models*. Applying the mentioned standards and the classification of behavior and interoperation of CBBs has positive impacts on *Projects*. The *RPOUPS* relies on the mentioned standards to deliver an adequate MDTCAS which is based on: 1) The evolution and stability of *Models* and enables TDM based agile management activities; 2) BP Integration (BPI) enables the integration of refined *Models* by the use of EAI's infrastructure; 3) APD's documents standards, like XML; 4) Governance standards are important for control operations; 4) Avant-garde methodologies, applications and technology standards: 5) *RPOUPS* stack standard that includes various levels of APD and ICS resources and SDCs; and 6) The IHI TDM supports the *RPOUPS* to implement DOMs. Technology evolves faster than *a Project's* evolution, and it is difficult to finalize the *Project* with the initial goals and defined OUP/ICS structure. That is why it is important to define MDTCAS artefacts that are transcendent to time and to all *Project's* iterations. As already mentioned, the MDTCAS for avant-garde domains includes: 1) *Models,* UML/OOM basics and other; 2) DIAs, like OPM/collaboration, UC or DMN diagrams; 3) Delimiters, actors, and interfaces; 5) Circular implementation methods, like DevOps or TDM; and 6) SRVs' technologies, abstracted by CBBs and OBBs. TDM's integration with the *RPOUPS* enables the automation and auto-generation of MDTCAS' artefacts and CBBs, which go-through TDM's phases which uses cyclic iterations. The *RPOUPS* is generic and its interface with the TDM supports legacy-components refinement, mapping, and integration. That all enables APD's integration and interoperability.

APD's Integration and Inter-operability

CBBs' integration and inter-operability capacities have the following characteristics: 1) Supports the integration of refined CBBs and installs long-term compatibility, by using the following artefacts: *Models'* inter-operability, TDM's interfacing, An anti-locked-in strategy, MDTCAS' artefacts exchange, A generic inter-operable APD communication layer; 2) APD's inter-resources operability that is supported by the XML based on XMI or any *Model* format which can be IHI; 3) *Project* management and *Models* serialization in standardized or IHI format files, like the *business interaction matrix* shown in Figure 17, which shows the mapping between APD's services and functional domains.

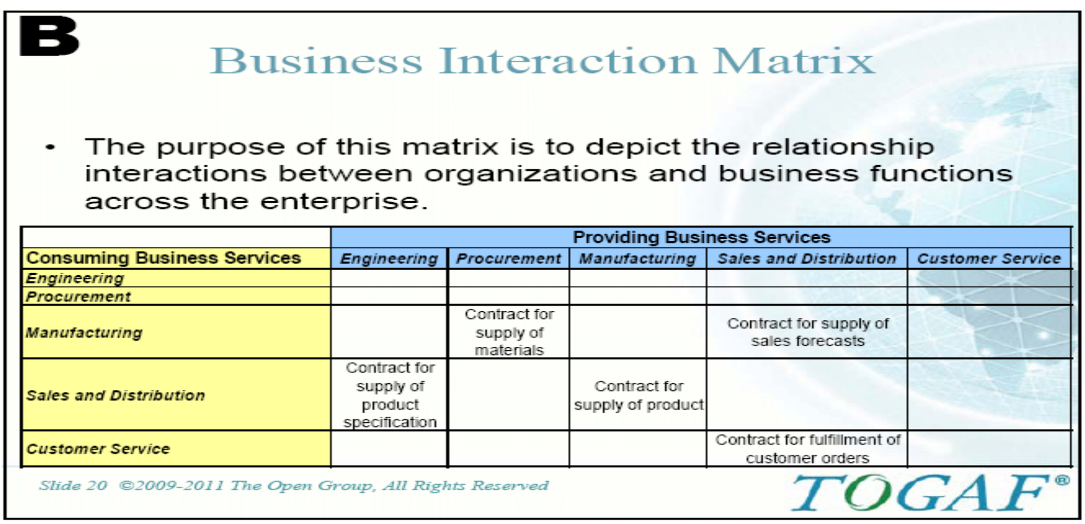


Figure 17. TOGAF's Business Interaction Matrix (The Open Group, 2011b).

APD's integration/inter-operability depends on CSFs, like APD's OUPs. Managing OUPs by the *Project* team implies that they transform it into an agile cloud platform. The *RPOUPS* manages CBBs to create *Models* which are deployed on OUPs. This is needed for the management of CBBs and OBBs repository that are to be used by the *Project* to use OPMS/DOMs for OU's reorganization.

OPMS based OU Reorganization

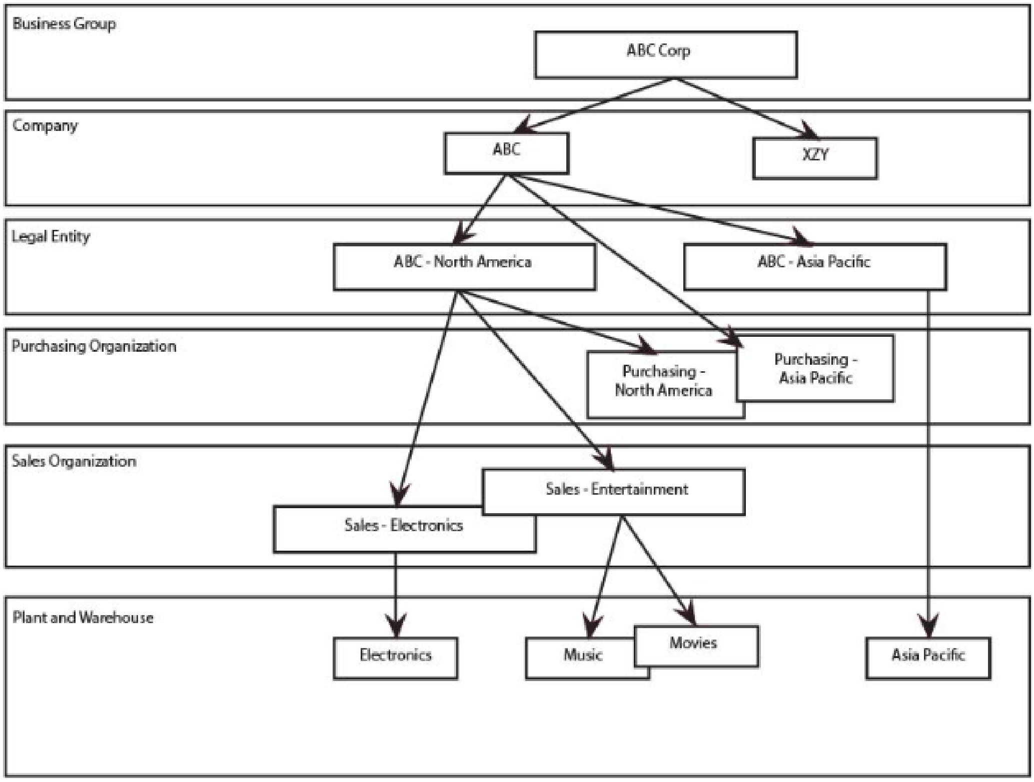


Figure 18. Typical organization model (IBM, 2021).

The OPMS explains various types of inconsistencies and uses the AHMM4CBB based DMS4CBB to take the decisions to deliver optimal actions on how to reorganize OUs. Using the right sequence of *RPOUPS* actions can determine the *Projects* success. Such actions are based on *organizational routines* or *known actions*, knowing that there are various types of reorganizational *Models* (Kuwashima, 2014):

- The Rational Actor *Model* (RAM), in which decisions (or sets of actions) of a large *ENT,* are under central control. RAM presupposes the rationality of *Managers*, where rationality refers to consistent, value maximization and the respect of defined constraints. It is used in the sense direction of *rational choice* or *rational decision* in various domains. The RAM can be an OPM actor.
- The OPM examines *ENT's* actions of an *ENT* as a whole and these actions are considered as an output of a subsystem that is based on organizational routines, which are packaged in CBBs to be used in OBBs, and eventually in DOMs. The OPM focuses on routine operations of subsystems and considers how these subsystems interact in DOM's context. The OPM depends on the critical Management's Political *Model* (MPM).
- The MPM focuses on the group of important decision makers, and it considers actions as bargaining activities to take policy decisions. These *Managers* involved in policy decisions do not engage in common *Project* issues, but manage various critical problems, which not divert strategic objectives. The MPM decisions are a result of negotiating among stakeholders.

The ARM, OPM, and MPM support organizational modelling (org DOM) of an *ENT. ENT's* (re)organization represents an enterprise, department, cost-center, division, sales-unit, or any other OU. As shown in Figure 18, typical *ENTs* are as follows: Business Group, Company, Legal ENT, Sales Organization, Purchasing Organization, Plant and Warehouse (IBM, 2021). CBB based OBBs supports DOMs' building or (re)assembling.

DOM's Building or (Re)Assembling

The *RPOUPS* support *ENTs* to work efficiently and there are various manners to implement DOMs, and they depend on the *Project's* goals. A DOM has the following characteristics (Nicholas, 2023):

- It visualizes an *ENT* and distinguishing between its *operating* and *support* activities; it also clarifies relationships between OUs *support* functions and implemented DOMs.
- It shows how employees report to their management and helps depict how DOM based OUs are structured.
- *ENT's* goal is to bring together employees with a common objective and DOM can help it with defining: 1) The scope of the group of employees and predict R2C; 2) The formal relationships between employees and reporting lines; 3) The functional role for each employee; and 4) The interfaces between OUs' functions.
- Has the following DOM elements: 1) Types like value chain, units, matrix, functionally oriented, market-oriented; 2) Roles which define skills and responsibilities; 3) Interfaces (interactions) between OUs; 4) Organizational or DOM charts; and 5) Influencers are employees who manage information, direct, and generating advice/recommendations.
- Support work includes: 1) Policy that has sets rules and governs OUs; 2) Champion that proposes work DOM actions' optimizations; 3) Shared DOM services support customer/supplier relationships; and 4) Core-resources provide support for OUs.
- There are different ways to structure the OU's operating work that include the following DOM types: 1) Value chain; 2) Matrix; 3) Functionally oriented; and 4) Market-oriented.
- DOM based OUs are a form of *ENT's* robotization which may provoke R2C.

R4C and Related Topics

Projects in general and *RPOUPS* especially can face OUR and/or R2C, that is why the *Manager* must implement an R4C in the *Project's* vision. R4C can be evaluated in all TDM's phases. All the presented CSAs can be verified in the PoC's implementation.

RPOUPS Project's CSFs

Based on the AHMM4CBB, LRP4CBB and DMS4CBB, for this CSA's CSFs/KPI were weight and the results are shown in Table 5. This CSA's result of 7.20, which is very low, and that is due to the fact that the *RPOUPS* is very complex to implement and would probably fail.

Critical Success Factors	KPIs	Weightings
CSF_RPOUPS_Project_DMS4CBB_Integration	Complex	From 1 to 10. **08 Selected**
CSF_RPOUPS_Project_MDTCAS_Domains	VeryComplex	From 1 to 10. **07 Selected**
CSF_RPOUPS_Project_APD_Inter-Operability	Complex	From 1 to 10. **08 Selected**
CSF_RPOUPS_Project_OPMS_OU	VeryComplex	From 1 to 10. **07 Selected**
CSF_RPOUPS_Project_DOM_Assembling	Complex	From 1 to 10. **08 Selected**

valuation

Table 5. CSA's average is 7.20.

And the next step is to implement *RPOUPS*' PoC.

THE PoC's IMPLEMENTATION

RPOUPS' Basic Preparations

As shown in Figure 10, the first step is to prepare the PoC's environment by setting-up the Vision, MDTCAS/TDM, and extracted BBs from the ARP/UP (Trad, 2023a).

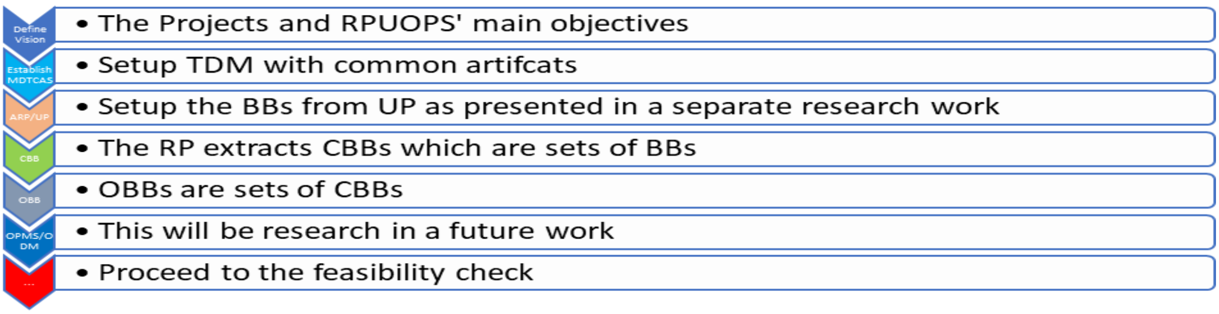


Figure 19. PoC's basic preparation.

RPOUPS' Feasibility Check

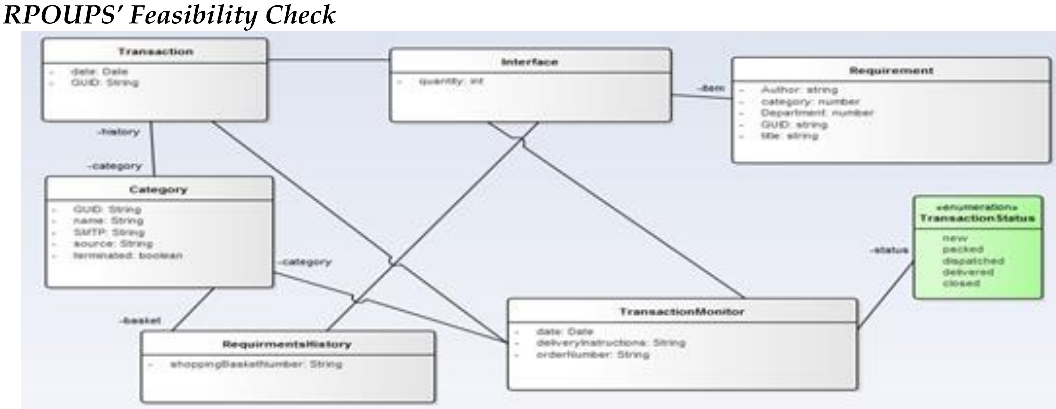


Figure 20. PoC's OBBs' based ATR design.

This PoC uses the PoC from the author's previous work that is related to ARP/UP, which presents the extraction of BBs as shown in Figure 19 (Trad, 2023a). BBs are assembled to build CBBs. And another PoC's part was used from a previous PoC, in which a BB and ATR based Transaction was experimented as shown in Figure 20, it also proved that the granularity level/approach can be used to refine the "1:1" mapping (Trad, & Kalpić, 2014; Yalezo, Thinyane, 2013). A logical view of a series of OBB based ATRs is presented in Figure 21, and their consumption of SRVs, in the form of an activity diagram in which all the events are exchanged between various nodes, require encryption which is defined in the TDM.

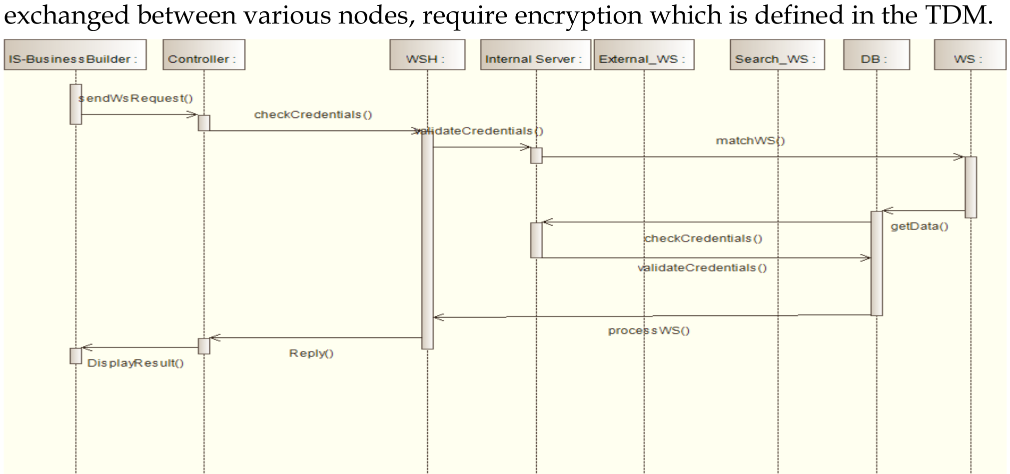


Figure 21. The ATR's activity diagram.

The ATR uses a set of CBBs which are assembled in an OBB as presented in Figure 22. The TDM uses ADM's phases B and D to implement the needed OBB based ATRs.

OUP-APD Environment	Provide APD OBBs
Controller	Passes a SRV request
Find OBBs/SRVs	Execute
Data Source	Return information

Figure 22. ATR's elements.

RPOUPS' Design and Implementation

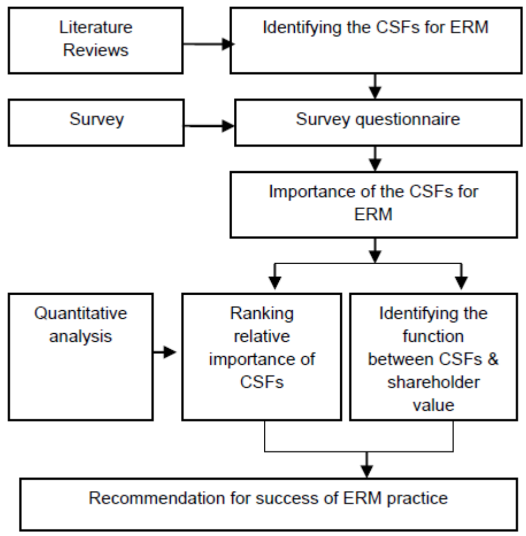


Figure 23. RDP4CBB's similar flow (Quang Phu, & Thi Yen Thao, 2017).

An essential constraint for the PoC is to use of existing standards in a reduced form, what corresponds to the MDTCAS. In this case MDTCAS transcendent CBBs, OBBs, and diagrams are used. These standards include CBBs to be used to integrate OBBs and SDCs in the existing *Project*. To identify the initial sets of CSAs' CSFs and test whether the RQ's of CSFs affect *RPOUPS*' integration. The PoC uses the HDT based mixed qualitative and quantitative method. The CSF's analytical process is illustrated in Figure 23. The PoC in the beginning uses Phase 1 that is mainly based on the HDT tables, which use WGTs. Phase 1 is used to weigh the relative importance of CSAs and CSFs for the usage of *RPOUPS* and that is done using a decision table (Quang Phu, & Thi Yen Thao, 2017).

PoC's Phase 1

CSA Category of CSFs/KPIs	Transformation Capability	Average Result	Table
The RDP4CBB's Integration	Usable-Mature	From 1 to 10. 9.25	1
The Methodology/MDTCAS usage	Transformable-Possible-Complex	From 1 to 10. 8.00	2
The CBBs based OBBs	Transformable-Possible-Complex	From 1 to 10. 8.20	3
The Polymathic RP Approach	Transformable-Possible-Mature	From 1 to 10. 9.60	4
The RPOUPS based Project	Heterogenous-VeryComplex	From 1 to 10. 7.20	5

Evaluate First Phase

Table 6. The *RPOUPS* PoC's phase 1 outcome is (rounded) 8.50.

LRP4CBB's outcome proves the existence of a major knowledge gap and it's (or Phase 1's) outcome supports the RQ's credibility, by the use of the LRP4CBB and *TRADf*'s archive or knowledgebase, of an important set of references, previous author's works, documents, and links. After selecting the *RPOUPS*' CSA/CSFs, they are linked to various HDT scenarios. The PoC is based on the

CSFs' binding to specific RDP4CBB resources, where the *RPOUPS* was prototyped using *TRADf*. The HDT represents the relationships between this RDP4CBB's RQ/requirements, CBBs/OBBs/MAs, and selected CSAs/CSFs. PoC's interfaces were achieved using Microsoft Visual Studio .NET environment and *TRADf*. The *RPOUPS* uses calls to resulting CBBs, to execute HDT actions related to RP requests. CSFs were selected and evaluated (using WGTs, HDT, and DMS4CBB) and the results are illustrated in Table 6, which shows that the *RPOUPS* is a central phase and not an independent one. In fact, it is essential for the *Project's* risk concept. HDT's main constraint is that CSAs having an average result below 7.5 will be ignored. This fact leaves the *RPOUPS*' CSAs (marked in green) effective for RDP4CBB's conclusion(s); and drops the CSAs marked in red. Phase 1, shows that the RP part of the *Project* will probably fail and is a very complex one because of the *RPOUPS*' extraction operations. The PoC can proceed to Phase 2.

PoC's Phase 2

MDTCAS/TDM's Setup and CSFs' Selection

The Phase's 2 setup includes: 1) Sub-phase A or the Architecture Vision phase's goals, establishes a RP approach and goals; 2) Sub-phase B or the Business Architecture phase establishes *RPOUPS*' target TDM/EA and related RPs' activities; 3) Sub-phase C shows and uses the Application Communication Diagram to describe RPs activities; 4) Sub-phase D or the Target Technology Architecture shows the needed *RPOUPS*' optimal infrastructure landscape; and 5) Sub-phases E and F, or the Implementation and Migration Planning, presents the transition CAV based architecture, which proposes intermediate situation(s) and evaluates *RPOUPS*' statuses. CBBs and HDT based DMS4CBB has mappings to *ENT's* resources and the *RPOUPS* defines relationships between CBBs, OBBs, MDTCAS' artefacts, and Requirements/PRBs.

PRBs Processing Control in a Concrete HDT Node

The DMS4CBB solves *RPOUPS*' PRBs, where CSFs link to specific RP PRB type and has a set of actions that are processed in a concrete HDT node. For this goal, the action *CSF_RPOUPS_Extraction_Procedure* was called and delivered SOL(s). Solving PRBs involves the selection of actions and possible SOLs for multiple *Project* activities. The HDT is on mixed quantitative/qualitative and has a dual objective that uses the following steps:

- In Phase 1, *TRADf's* interface implements HDT scripts to process the selected CSAs. And then relates PoC's resources to *CSF_RPOUPS_Extraction_Procedure*.
- The DMS4CBB is configured to weight and tuned to support the HDT.
- Link the selected node to HDT to deliver the root node.
- The HDT starts with the *CSF_RPOUPS_Extraction_Procedure* and proposes SOL(s) in the form of RP actions/improvements.

SOL Nodes

HDT scripts support AHMM4CBB's instances that are processed in the background to deliver *RPOUPS* risk value(s). The hAHMM4CBB based DMS4CBB uses BBs to deliver *recommendations*, which are a set of RPs actions.

SOLUTION AND RECOMMENDATIONS

The set of *RPOUPS*' architecture, refinement, technical and managerial recommendations:

- This chapter presents the possibility to implement an IHI *RPOUPS* which avoids the financial-only locked-in strategies and ensures success.
- RP like the ARP/UP, is a *Project's* critical phase.
- A *Project* must build a holistic TDM and MDTCAS to support the RPs activities.
- The RP unbundles the legacy-OPMS to support OU's OUP, which can face problems in the alignment of various refined OBBs and SDCs.
- Each *ENT* constructs its own IHI *RPOUPS*.

- The *RPOUPS* replaces legacy-OPMS using conversion concepts in order to ensure *Project's* success.
- *RPOUPS* interface *ENT's* TDM and delivers the pool of CBBs based DIAs.
- The ADM based TDM, manages design, RP, DevOps, and governance activities.
- TDM's and DevOps' integration with the *RPOUPS* enables the automation of all *Project's* RP activities.
- *ENT's* CBBs and OBBs stability and coherence are crucial for its evolution.
- CBBs can be (re)used in an IHI OBBs; where an OU is a set of OBBs and different OUs can share OBBs, and hence CBBs.
- OBBs are used in OPMs based ODM.
- OU's transformation needs an IHI Methodology, Domain, and MDTCAS that manages BBs, CBBs and OOBs.
- Avoid consulting firms and to build internal RP mechanisms.
- *RPOUPS* is very complex and will very probably face failure.

Future research directions

Based on the conclusions *TRADf's* future research will focus on the process model the OPM based Dynamic Organizational Models (DOM), and how it can support transformation projects.

Conclusion

Monolithic systems' unbundling is the major cause of *Projects'* failures and success rates can be improved by using CBBs, OBBs and CAVs based strategies (IBM, 2014). CAVs uses a just-enough approach and the PoC proved its application's complexities (Greefhorst, 2009). The *RPOUPS* support CBB based CAVs concept to facilitate the OUPs. The proposed PBA is an optimal approach for the *RPOUPS* which supports *Project's* unbundling activities; and the LRP4CBB presented a knowledge gap, that is mainly due to the fact that are no similar research approaches and that there is a lack of a holistic approach. There are limited-manual refinement technics for legacy-OPMS, but the *RPOUPS* presents the possibility to implement an IHI concept (Koenig, Rustan, & Leino, 2016). The RDP4CBB is a part of a series of publications on *Projects*, RP, TDM/EA, Polymathic models… The *RPOUPS* uses the HDT and CSFs/CSAs to support *RPOUPS* activities. The *RPOUPS* focuses on evaluating the complex RP and synchronizes a structured relationship between: RP, risks, TDM/EA, constraints, and HDT based SOLs. *RPOUPS*' most important recommendation, is that the *Manager* must be skilled in managing *RPOUPS'* activities. The PoC's Table 6 result of (rounded) 8.50 that used CSFs' binding to a RDP4CBB resources, the DMS4CBB/KMS4CBB, RQ, and CBBs, shows that the *RPOUPS* is very complex due to the risky ARP/UP and RP operations. The *RPOUPS* should be an IHI process, methodology and framework. In this chapter, the author proposes the following set of managerial recommendations:

- The RP supports the *RPOUPS* to ensure the unbundling of legacy-OPMS.
- The MDTCAS based *RPOUPS* fits in the *ENT's* TDM/EA framework.
- TDM's integration in the *RPOUPS* enables the automation of all its RP activities.
- RP constraints are controlled and monitored by the OUP and ICS.
- *ENTs'* sustainability is orthogonal to its RP capacities.
- To avoid any form of locked-in scenario the *ENT* must build its own *RPOUPS*.
- The *RPOUPS* can face OUR or R4C, which should be predicted by using R2C.
- APDs high demand for *Projects'* and the hyper evolution of technologies, create fatal problems because of the differences in their evolution's rate.
- All author's works are based on *TRADf*, AHMM, TDM, and RDP, which are today mature and can be applied in various APDs.

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