A Transformation Framework Proposal for Managers in Business Innovation and Business Transformation Projects-An information system’s atomic architecture vision

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Abstract

A fundamental architecture element in transforming a traditional business environment and its business information system into an innovative automated and lean business platform is the role of the information system’s building vision; that should be crafted in an applicable framework. This framework should include easy to integrate patterns. The proposed just-in-time framework can change the information system’s architecture and its implementation outcomes. The atomic information system architecture’s role and applied the patterns are of crucial importance for the implementation phase of the complex business transformation projects; where these patterns can be adapted in a just-in-time manner, using atomic building blocks. There is also a need to govern (or control) the atomic information system architecture’s patterns for business transformation projects; unfortunately an adaptable atomic information system architecture pattern for such projects is inexistent. An atomic information system architecture pattern can be also used in the enterprise’s production activities which comes after the finalization of the implementation phase of business transformation project (business transformation project), to control and govern the resultant business system. The atomic information system architecture’s pattern main component is the atomic building block that manages the implementation of autonomous business service transactions. In this article the author presents a set of atomic information system architecture recommendations in the form of reusable patterns to promote an optimal information system’s architecture.

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1. Introduction

In this research paper and phase, the author presents, an optimal atomic information systems’ architecture that conforms to fast business transformation projects’ execution. Most mechanistic organizations will be challenged to use business transformation or enterprise architect projects in order to change their routine business operations, re-engineer their business environment, or to re-schedule various existing business processes. Business transformation projects enable the automation of business tasks that were before performed manually and as shown in Fig. 1. such projects need an iterative process like the architecture development model to successfully implement it. As already mentioned the research topic is about managing complexity in business transformation projects using standardized methodologies; where all these methodologies have many abbreviation and terms that makes the reading of such topics difficult, but unfortunately that is the nature of such fields. There also a need that the valuable reader has extensive knowledge in enterprise architecture, modeling standards and business engineering.

Adaptive lean information systems’ environments, which are based on stateless business services in the form of atomic business services is a major business paradigm shift. Stateless atomic business services standards break-up the business systems’ nodes of an information system into independent components that can interact together over the network, with a global unique interface definition. This paper proposes the atomic information system architecture concept, to help business transformation manager’s, enterprise architects and system designers in building modern generic atomic business services based business transformation projects. This is of significance when knowing that a small percentage of business transformation projects succeed, hence the information systems’ projects activities, and the business transformation managers’ skills are the main prerequisite to enable success. This article is a part of a series of articles on business transformation projects and enterprise architecture that focuses on the role of information system’s building.

2. "The research model and Environment"

This clustered research project is based on the action research model and heuristics, where its main phases are: a) the proposal phase; b) the research question phase definition; c) the literature review phase; d) the research model phase; and e) the research project’s prototype. For this research part the prototype verifies the impact of an atomic information system architecture impact on the business transformation projects’ implementation phase.

2.1. The research question

The global topic's final research question (RQ) is: "Which business transformation manager characteristics and which type of support should be insured the implementation phase of a (e)business transformation project?". The
targeted business domain is any business environment that uses frequent transformation iterations. For this phase of research that is inspecting hypothesis #2 the sub-question is: “What is the impact of the architecture vision on enterprise architecture and business transformation projects?”

2.2. The Environment

The main characteristics of the research’s methodology and framework is the Selection, Architecture, Control, Decision making, and Training Framework (SmAmCmDmTmF, for simplification, in further text the author will use the term Environment) is the support for business transformation projects. The Environment’s aim is to convert the acquired relevant research and development outcomes into a set of managerial recommendations. The Environment is composed of the following modules:

- “Sm”: for the selection of the business transformation manager.
- “Am”: for the architecture and modeling strategy that can be applied by the business transformation manager.
- “Dm” for the decision making strategy that can be applied by the business transformation manager.
- “Cm” for the control and monitoring strategy that can be applied by the business transformation manager.
- “Tm” for the training of the business transformation manager.

In this research phase we are targeting the atomic information system architecture’s influence on business transformation projects that is a part of the Environment’s architecture module.

3. "The atomic information system architecture phases"

The atomic information system architecture presents how to interact between various enterprise architecture phases and it simplifies its integration with the open group’s architecture framework’s architecture development method’s phases.

3.1. The atomic information system architecture’s resources

As shown in Fig. 4, this research part delivers concrete outcomes and the following real world artefacts: 1) the integration of atomic building blocks’ concept; 2) an atomic information system architecture pattern proposal (atomic information system architecture); 3) an atomic control and monitoring concept; and 4) an atomic model view control concept.

3.2. The vision’s capability and critical success factors

Business transformation managers have a technocrat’s profile and are domain specialists, who are capable of designing business transformation projects applicable patterns and storing them in the Environment. The Environment’s research and development model integrates research factors in the form of independent variables that are also used in the real-world’s business transformation project for: 1) the selection; and 2) the support of business transformation managers in the management of business transformation projects. Gartner studies provide an insight into the critical success factors for business transformation projects and these critical success factors can assist in estimating the risks related to the business transformation project’s implementation phase. Therefore the Environment research recommends, to improve the success rates, a set of managerial recommendations for the atomic information system architecture integration and the possibility to quantify the business transformation project’s capabilities by using the following set of critical success factors:

- Coalition to support the vision (VIS_CSV).
- Time for execution (VIS_T4X).
- Tooling adoption (VIS_TAD).
• Atomic building block adoption (VIS_ABB).
• Atomic Model-View-Control adoption (VIS_MVC).
• Atomic control and monitoring adoption (VIS_ACM).
• Atomic transaction capability adoption (VIS_ATC).
• Strategy for avoiding resistances (VIS_RES).
• Proof of concept capability (VIS_PCC).

Where this basic set of critical success factors is delivered by the Environment and this set can be extended by the business transformation manager to make the proposed vision easily adapted to the business transformation project implementation.

3.3. The vision, principles and pattern

The business transformation project’s vision phase has the duty to: 1) establish the enterprise’s business goals and architecture principles; 2) design an adequate strategy; 3) setup atomic based architecture principles. According to existing global and enterprise architecture standards, the proposed atomic information system architecture’s vision is mainly the jumpstart for a business transformation project and it puts forward the business benefits of the business transformation project to the higher management of the concerned business enterprise. The business transformation project’s starting point (or first iteration) is to design an atomic information system architecture based vision that has to include: 1) the business requirements’ management patterns and objectives; 2) the business transformation project’s strategic drivers and stakeholders; 3) governance’s principles; and 4) the design and development of the atomic resources patterns. In fact the proposed atomic information system architecture pattern defines a set of concrete atomic building blocks to assist the building of the business transformation project; that is the essence of the atomic information system architecture that is based on open architecture frameworks like the open group’s architecture framework. A well-defined atomic information system architecture pattern for a business transformation project should be a key solution of its implementation phase; where it builds on an existing framework like the open group’s architecture framework’s and where a key point to this atomic information system architecture pattern is the application of various viewpoints to abstract various solution components within the business transformation project. The atomic information system architecture viewpoints concept specifies: 1) the business transformation project’s requirements management phase; 2) the stakeholders risk reporting concept; 3) the sets of atomic business blocks to be used as design models; 4) the business and technology standards to be applied; and 5) the methodologies and tools to be used.

3.4. Role of existing standards and tooling

The nature of frequent business transformation projects forces the information technology to: 1) be more receptive to development of stacked standards, as shown in Fig. 2.; and 2) evolutionary practices usage; that opens the possibility to improve the integration and build of coherent and complex competitive business models.

Fig. 2. Standards based enterprise architecture.

The Environment interfaces various standards including the object management group’s: UML, SoaML, SysML, ...
Regardless of business domains, executive management understands the necessity of agile business systems and that a business transformation project may take many years to be successfully finalized. Technically, this agility is built on service oriented architecture standards\(^1\), as shown in Fig. 3.

4. "Transformation architecture development method"

Fig. 3. Business system’s services integration\(^4,20\).

Fig. 4. The atomic information system architecture interaction with the atomic building blocks and the architecture development method.
The architecture development method is a generic method for the implementation of an architecture that can be used with any type of: 1) business system (re)design; 2) business transformation project architecture; and 3) organizational restructuring and transformation. Frequent transformation iterations need a specific integration of an architecture development method to suit granular unbundling needs and that is why the Environment tailors the architecture development method to adopt the atomic resources based atomic information system architecture pattern. Where the atomic information system architecture pattern’s architecture development method’s integration inputs and outputs the following artefacts:

4.1. The preliminary phase

This phase defines the business transformation project’s architecture approach and its outputs help to: 1) define the business transformation project’s key drivers; 2) defines the requirements for an atomic information system architecture based on atomic modeling; 3) define the architecture principles; 4) select the auxiliary frameworks to be adopted and to define the relationships between these frameworks; and 5) evaluate the business transformation project’s architecture maturity level.

4.2. The vision phase “A” - Atomic mapping

The vision phase’s outcome is the design of the major atomic business blocks and their relationship to the atomic information system architecture pattern, where one atomic information system architecture pattern uniquely identified by a global and unique identifier (GUID) can contain many atomic business blocks, as shown in Table 1., this is basically an alignment that is based on the “1:1” of all of business transformation project’s artifacts.

Table 1. The atomic archive for the vision phase.

<table>
<thead>
<tr>
<th>ID</th>
<th>atomic business blocks archive</th>
<th>Naming convention</th>
<th>Managed Artefacts</th>
<th>Tool/Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUID_xxx</td>
<td>atomic business block set</td>
<td>GUID_xxx_aISA</td>
<td>Archimate/Sparsystem</td>
<td></td>
</tr>
<tr>
<td>aSB_arch_xxx</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3. The requirement engineering phase

Upon a concrete business or infrastructure requirement, the business transformation project body issues a business transformation work contract to resolve this requirement. The requirement’s management ensures that new requirements are managed accordingly to the business transformation project records. The requirement is linked to an instance of a newly created atomic business block and its instance (an atomic solution block, aSB), as shown in Table 2. The atomic business block is a part of an atomic information system architecture pattern.

Table 2. The atomic archive for the requirement management phase.

<table>
<thead>
<tr>
<th>ID</th>
<th>atomic business block’s archive</th>
<th>Naming convention</th>
<th>Managed Artefacts</th>
<th>Interoperability Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUID_xxx</td>
<td>atomic business block set</td>
<td>GUID_xxx_aISA</td>
<td>XMI/UML/SysML</td>
<td></td>
</tr>
<tr>
<td>aSB_arch_xxx</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.4. The business architecture phase “B”

The business architecture phase inputs the newly created atomic business block and its instance (aSB); then the business architects (or business analysts) develop the phase’s outputs, as shown in Table 3. These outputs are: 1) the use case diagram; 2) the business process model diagram (BPM); 3) business rules component; 4) the activity...
and 5) the atomic business services diagram. When finalized this atomic business block/aSB resources are stored in the business transformation project’s repository.

<table>
<thead>
<tr>
<th>ID</th>
<th>atomic business block’s archive</th>
<th>Naming convention</th>
<th>Modified Artefacts</th>
<th>Interoperability Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUID_xxx</td>
<td>atomic business block set</td>
<td>GUID_xxx_aISA</td>
<td>INPUT: atomic business block/aSB archive. OUTPUT: modified: Use Case, BPM, Business Rules, Class Diagram, Activity diagram, Business service</td>
<td>XMI/BPMN/RuleML/UML</td>
</tr>
<tr>
<td>aSB_arch_xxx</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.5. The information system architecture phase “C”

The information system architecture phase inputs the atomic business block and its instance (aSB); then information systems’ architects (or system analysts) develop this phase’s outputs, by modifying some of its artefacts, as shown in Table 4. These outputs are: 1) the update of the activity diagram; 2) the development of the atomic business services; 3) the development of the service oriented architecture web service; 4) the deployment diagram; and 4) the development of the atomic Model-View-Control (aMVC) concept. When finalized the atomic business block resources are stored in the atomic information system architecture pattern in the business transformation project’s repository.

<table>
<thead>
<tr>
<th>ID</th>
<th>atomic business block’s archive</th>
<th>Naming convention</th>
<th>Modified Artefacts</th>
<th>Interoperability Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUID_xxx</td>
<td>atomic business block set</td>
<td>GUID_xxx_aISA</td>
<td>INPUT: atomic business block/aSB archive. OUTPUT: modified: Use Case, BPM, Business Rules, Class Diagram, Activity diagram, Business service</td>
<td>XMI/BPMN/WSDL/UML/ArchiMate/SooML/SysML</td>
</tr>
<tr>
<td>aSB_arch_xxx</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.6. The technology architecture phase “D”

The technology architecture phase inputs the targeted atomic business block and its instance (aSB); then the technology architects develop this phase’s outputs, as shown in Table 5. These outputs are: 1) the sequence diagram; 2) the service oriented architecture web service deployment concept; 3) the deployment diagram; and 4) an atomic Model-View-Control (aMVC) concept. When finalized the atomic business block/aSB resources are updated in the atomic information system architecture pattern and then stored in the business transformation project’s repository.

<table>
<thead>
<tr>
<th>ID</th>
<th>atomic business block’s archive</th>
<th>Naming convention</th>
<th>Modified Artefacts</th>
<th>Interoperability Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUID_xxx</td>
<td>atomic business block set</td>
<td>GUID_xxx_aISA</td>
<td>INPUT: atomic business block/aSB archive. OUTPUT: modified: Sequence diagram, web service, aMVC</td>
<td>XMI</td>
</tr>
<tr>
<td>aSB_arch_xxx</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.7. The opportunities and solutions phase “E”

This phase’s inputs the created atomic business block and its instance (aSB) to be developed; then the business transformation manager (or enterprise architect) develops this phase’s outputs, as shown in Table 6. The outputs in the form of atomic business block/aSB resources are stored in the atomic information system architecture pattern in
the business transformation project’s repository. This phase compares two consecutive iterations and verifies the gaps and possible solutions.

Table 6. The atomic archive for the opportunities’ and solutions’ phase.

<table>
<thead>
<tr>
<th>ID</th>
<th>atomic business block’s archive</th>
<th>Naming convention</th>
<th>Modified Artefacts</th>
<th>Interoperability Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUID_xxx</td>
<td>atomic business block set GUID_xxx_aISA</td>
<td>INPUT: atomic business block/aSB archive</td>
<td>OUTPUT: modifies: All aSB artefacts.</td>
<td>XMI/UML</td>
</tr>
</tbody>
</table>

4.8. The migration planning phase “F”

This phase inputs the created atomic business block and its instance (aSB); then the project management office develops this phase’s outputs, as shown in Table 7. These outputs are: 1) the use case diagram; 2) the business process model; and 3) the project plan. When finalized the atomic business block/aSB resources are stored in the atomic information system architecture pattern in the business transformation project’s repository.

Table 7. The atomic archive for the migration and planning phase.

<table>
<thead>
<tr>
<th>ID</th>
<th>atomic business block’s archive</th>
<th>Naming convention</th>
<th>Modified Artefacts</th>
<th>Interoperability Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUID_xxx</td>
<td>atomic business block set GUID_xxx_aISA</td>
<td>INPUT: atomic business block/aSB archive</td>
<td>OUTPUT: modifies: Use case diagram, BPM, project plan, XP, PMXML.</td>
<td>XMI/PMXML/BPMN/XPDL</td>
</tr>
</tbody>
</table>

4.9. The implementation governance phase “G”

This phase inputs, processes and audits the atomic business block/aSB resources. The project management office defines this phase’s outputs, in the form to project management requests, as shown in Table 8. These outputs are: 1) the use case diagram; 2) the business process model; and 3) the business transformation project’s project plan. When finalized the atomic business block/aSB resources are stored in the atomic information system architecture pattern in the business transformation project’s repository.

Table 8. The implementation governance phase’s inputs and outputs.

<table>
<thead>
<tr>
<th>ID</th>
<th>atomic business block’s archive</th>
<th>Naming convention</th>
<th>Modified Artefacts</th>
<th>Interoperability Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>GUID_xxx</td>
<td>atomic business block set GUID_xxx_aISA</td>
<td>INPUT: atomic business block/aSB archive</td>
<td>OUTPUT: modifies: project plan, PMXML, architecture development method, XP.</td>
<td>XMI/PMXML/BPMN/XPDL</td>
</tr>
</tbody>
</table>

4.10. Change governance phase “H”

This phase inputs the created atomic business block and its instance (aSB) and then the business transformation manager develops this phase’s outputs, as shown in Table 9. These outputs are: 1) the use case diagram; 2) the business process model; and 3) the project plan. When finalized the atomic business block/aSB resources are stored in the atomic information system architecture pattern in the business transformation project’s repository.

Table 9. The change governance phase’s atomic business block’s archive.

<table>
<thead>
<tr>
<th>ID</th>
<th>atomic business block’s archive</th>
<th>Naming convention</th>
<th>Modified Artefacts</th>
<th>Interoperability Standards</th>
</tr>
</thead>
</table>
5. "The prototype and proof of concept"

This research project’s part proof of concept assesses the steps for the atomic information system architecture’s integration and has the following requests: 1) to promote the optimal atomic information system architecture’s strategy, vision, willingness, and persistence to finalize the difficult implementation phase; and 2) to prove the business benefits of a business transformation projects. The proof of concept was evaluated through the implementation of an application using Microsoft’s .Net and java development environments. The proof of concept proved that the atomic information system architecture is feasible and that it is optimal for frequent business transformation project iterations. The proof of concept is a business transaction that is based on an atomic business block’s instance and is used to verify the atomic information system architecture’s concept. The concrete phases’ artefacts, activities and tools are shown in table 10.

<table>
<thead>
<tr>
<th>Activity(s)</th>
<th>Architecture phase(s)</th>
<th>Tool(s) and standard(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A vision concept</td>
<td>phase A</td>
<td>UML/Archimate-Modellio</td>
</tr>
<tr>
<td>A generic GUID artefact and a “1:1” concept</td>
<td>phase A</td>
<td>WSDL</td>
</tr>
<tr>
<td>A transaction business use case</td>
<td>phases R/B/C</td>
<td>UC/BPM-Modellio</td>
</tr>
<tr>
<td>A basic business transaction in the form of BPM</td>
<td>phases B/C</td>
<td>BPM-Modellio</td>
</tr>
<tr>
<td>A set of business services</td>
<td>phases B/C</td>
<td>SoaML-Modellio</td>
</tr>
<tr>
<td>A corresponding set of modelling artefacts</td>
<td>all phases</td>
<td>UML/Archimate-Modellio</td>
</tr>
<tr>
<td>A tracing and identification pattern</td>
<td>phase F</td>
<td>Syslog+Client/SysML</td>
</tr>
<tr>
<td>A tracing platform and interface</td>
<td>phases F/D</td>
<td>Syslog/TcpMon/SoapUI-WS</td>
</tr>
<tr>
<td>A decision aggregation interface</td>
<td>phases F/E</td>
<td>syslog tool</td>
</tr>
<tr>
<td>A program plan generator</td>
<td>phase H</td>
<td>PMXML</td>
</tr>
</tbody>
</table>

6. "Conclusion and recommendations"

In this article the author proposes a pattern and a set of managerial recommendations to develop an atomic information system architecture pattern for an atomic information system’s vision for business transformation projects’; that will assist business transformation managers in the information system’s implementation process. The outcome of building an avant-garde information system centric business transformation projects, heavily depends on the use of patterns and existing standards like the open groups architecture framework. Where the use of generic patterns like atomic business blocks and their solution blocks instances in transforming a traditional business environment into a lean and automated business environment simplifies and insures the success of the implementation phase. The most important managerial recommendation that was generated by this research part is that the: atomic information system architecture pattern is based on the atomic business blocks and that the “1:1” mapping approach, this fact simplifies the manipulation of the architecture artefacts, through the various phases of the architecture development method.

Acknowledgements

In this clustered research project, technical, typographical, grammatical, or other kinds of errors are bound to be missed. Ultimately all mistakes are the author’s responsibility. Nevertheless, the author encourage feedback from readers identifying errors in addition to comments on the work in general. It was our great pleasure to prepare this work and now our greater hopes are for readers to receive some small measure of that pleasure.
References

This research’s references are sorted order.

7. MID, ArchiMate. "Enterprise Architecture Modeling with ArchiMate". MID GmbH. Germany. 2014.