Architecture Governance for a Large Transformation Program

Enterprise Architecture is critical for organizations undergoing transformation to ensure their information technology initiatives and investments are aligned to the business objectives and deliver the expected business benefits. It provides principles and policies, current and target architecture views for business and information technology components involved in transformation. Architecture Governance is required to ensure the principles of Enterprise Architecture are well applied to both system architecture and design of the underlying information systems. It also ensures organizations meet business and IT objectives and standards. Architecture Governance enables effective alignment of business and information technology, manages risk by reducing probability of failures in transformation projects and incorporates elements of cost effectiveness and value.

Consider this example to better understand enterprise architecture and architecture governance: A large pharmaceutical company embarked on a transformation program without a well planned approach on Enterprise Architecture and Architecture Governance and ran into roadblocks early in the program. While Enterprise Architecture helped align
the transformation projects to a common business objective, it alone could not ensure projects implement solutions accurately and deliver the expected business and information technology benefits. The Architecture Governance framework and underlying components were setup and operationalized to ensure the transformation projects delivered the strategic business objectives of the program.

The aim of this paper is to demonstrate how the Architecture Governance framework was implemented to enable the success of the transformation projects in delivering the expected business benefits with help of a real life case study. The Architecture Governance framework demonstrated in this paper can be easily reused in other large transformation programs to fully realize the benefits of investing in Enterprise Architecture.
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**Introduction**

Enterprise Architecture (EA) and Architecture Governance (AG) as a practice have evolved over the past two decades but are often the most ignored elements especially within transformation programs. EA is critical for large transformations as it acts as a bridge between strategy and implementation \(^1\). The EA provides guiding principles, policies and standards that help in effective decision making to the transformation projects. It provides the current and target architecture views for various domains such as business, applications, information, integration, technology, security and infrastructure. These views are created depending on the needs of the stakeholders involved in the transformation including providers and most importantly the consumers of the architecture. Investing in EA definition and creating the artifacts alone does not ensure the implementation teams understand and deliver the expected target state within necessary standards. It is imperative to define an AG framework that ensures compliance of the transformation projects to the target architecture and enables delivery of the expected business and Information Technology (IT) benefits.

AG does not necessarily exist on its own and is, in fact, is a subset of the IT Governance (ITG) framework within the organization. ITG focuses on the broader IT effectiveness in the organization and AG focuses only on architecture effectiveness. ITG entails maximizing the value of IT investments and risk management of all IT components to ensure alignment with business. ITG further can be viewed as a subset of corporate governance as a whole. Corporate governance includes a set of processes, policies, customs, laws and management practices affecting the way an organization is controlled and managed\(^2\). Taking such an approach ensures participation of all levels required in decision making and shares the responsibility of key systems and underlying architecture along with business. It also ensures IT related decisions are driven by business goals. Each of these governance domains may exist at multiple levels - global, regional and local. In the context of a transformation program, having such a relationship ensures architecture decisions are made in line with the overall objectives of the program.

![Governance Hierarchy](image)
This can be achieved by creation of an effective organization structure for AG involving various stakeholders who can provide the required direction towards effective decision making and alignment. The AG framework suitable for the transformation program should be derived from the ITG framework followed by the organization and aligned to the IT and program/project governance practiced within the transformation program. Many industry standard ITG frameworks from ISACA, MIT CISR etc. exist and one or a combination of such frameworks may be used to derive the most effective AG framework required for the program.

AG is expected to ensure alignment of business with IT, enable effective risk management to reduce the likelihood of any design failures and optimize resource management by including cost effectiveness and value for money. AG can be effective only if senior management provide the necessary support and funding for creation and execution of necessary processes and controls. It also requires effective communication and collaboration among all the groups concerned.

This paper discusses how the AG framework was setup and operationalized for a large transformation program in a pharmaceutical company to help overcome the pre-existing issues.

**Customer Situation**

The clinical Research and Development (R&D) business unit of a global pharmaceutical company embarked on a large transformation program with a strategic objective to double its clinical productivity by 2015. The program was valued at £60M+ and was expected to transform the clinical R&D organization over 3-4 years.

The program aimed at transforming the clinical R&D organization in all dimensions - people, process and technology. It involved reorganizing the organization structure to empower employees at appropriate levels to improve decision making and bring in the required agility. There was also a drive to optimize the processes by removing redundancy and automating manual tasks as appropriate. The IT organization aimed at simplifying the clinical information systems then embarked on a number of initiatives delivered via 25+ projects over a period of 3-4 years in a set of 4 implementation releases.

The organization had never embarked on a transformation of such a large scale before and had no experience in program/ architecture governance and overall execution as a result. There was no integrated structure comprising of business and IT executives which meant that businesses were not involved in IT decision making creating a risk of the program not achieving its strategic objectives due to non alignment.

The program comprised of an architecture function called Information Systems (IS) Design and Solution Delivery function comprising 25+ transformation projects. The IS Design team focused on delivering the target enterprise architecture including transition state views for each release. The team comprised 4 work streams i.e. Integrated Process Mapping (IPM) aimed at delivering system processes; System Blueprint (SB) aimed at delivering target systems and functions to business process mapping and logical system interactions required for automation and efficiency; Information Blueprint (IB) aimed at delivering the target enterprise data model and Integration Analysis & Design (IAD) aimed at delivering integration use cases and interface specifications that help to identify reusable services and operations.
The solution delivery function comprised transformation projects that seek to deliver business benefits for various functions across the clinical R&D division mainly with help of Commercial Off The Shelf (COTS) products. There was also a Cross Stream Integration (CSI) team formed with an aim to deliver integrated solutions based on Service Oriented Architecture (SOA).

The architecture work streams within IS Design worked in isolation as there were no processes and governance structures in place. This resulted in inconsistent architecture views resulting in solution delivery teams that were not able to clearly understand the target architecture. Also there were no governance processes and controls in place to ensure the project architecture and design of various transformation projects were aligned to the target principles and architecture defined by the IS Design team. Additionally, there was a lack of traceability of project architecture with the EA and a huge risk of non compliance as a result. There were no monitoring and control processes and checkpoints in place and often architecture views were changed without proper configuration and change management and communication to the project teams. The solution delivery team comprising transformation projects trying to implement the COTS products involved multiple vendors with different perspectives. There was a lack of coordination and collaboration between solution delivery teams and IS Design teams. All the above mentioned issues led to misalignment, quality issues, increase in costs due to rework and a higher risk of programs missing its strategic objectives.

As a result it became necessary to establish an AG framework that would help in creating the necessary business–IT alignment and align transformation projects and design to the target EA.

**Architecture Governance Framework**

EA drives transformation and acts as a catalyst for change. While several organizations adopt EA for their transformations, each organization’s experience varies based on its inherent culture, EA maturity and IT landscape. AG is an integral part of IT Governance and imperative for both EA effectiveness and an organization to succeed in the transformation.
There are many definitions of IT Governance. IT Governance is defined as a structure of relationships and processes to direct and control the enterprise in order to add value while balancing risk versus return over IT and its processes.[9]

Another popular definition from the IT Governance Institute (ITGI), defines it as “… an integral part of enterprise governance and consists of the leadership and organizational structures and processes that ensure that the organization’s IT sustains and extends the organization’s strategies and objectives”.[9]

AG, according to TOGAF[7], is the practice and orientation by which enterprise architectures and other architectures are managed and controlled at an enterprise-wide level. It includes the following:

- Implementing a system of controls for the creation and monitoring of all architectural components and activities, to ensure the effective introduction, implementation, and evolution of architectures within the organization
- Implementing a system to ensure compliance with internal and external standards and regulatory obligations
- Establishing processes that support effective management of the above processes within agreed parameters
- Developing practices that ensure accountability to a clearly identified stakeholder community, both inside and outside the organization

AG helps oversee the effective creation and delivery of business value from architecture and implementation activities. In the context of an architecture function within a program or project, AG compliments the program or project governance framework to deliver expected business value. AG needs to be supported by a framework to guide and manage architecture decisions and activities.

Over the past few years a number of best practice governance frameworks have been defined and adopted by organizations. These include COBIT for controls and overall use, PRINCE2 and PMBOK for project management, MSP for program management, ITIL for service delivery and management, ISO17799 for information security, BSC for measurement and communication, Six Sigma for processes and Zachman, TOGAF, FEA and Gartner for enterprise architecture. Most of these frameworks complement each other and are most effective when used in combination with each another. Organizations leveraging these industry standard frameworks in the context of their needs in an incremental manner will benefit the most.

The following governance characteristics have been adapted from Naidoo (2002) by TOGAF[9] and included here to highlight both the value and necessity for governance to be adopted within organizations:

Discipline: All involved parties will have a commitment to adhere to procedures, processes, and authority structures established by the organization.

Transparency: All implemented actions and their decision support will be available for inspection by an authorized organization and provider parties.
**Independence:** All processes, decision-making, and mechanisms used will be established so as to minimize or avoid potential conflicts of interest.

**Accountability:** Identifiable groups within the organization - e.g., governance boards who take actions or make decisions - are authorized and accountable for their actions.

**Responsibility:** Each contracted party is required to act responsibly to the organization and its stakeholders.

**Fairness:** All decisions taken, processes used, and their implementation will not be allowed to offer an unfair advantage to any one particular party.

It is well accepted that synergies between people, process and technology is the key to success. The AG framework depicted in Fig. 3 was defined and successfully implemented in the transformation programs and was derived from IT governance elements, leveraging the industry defined norms and best practice governance frameworks. This AG framework can be reused for other transformation programs albeit in the context of specific program needs.

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**Figure 3. Architecture Governance Framework**

**Organization** includes the people and structures that collaborate to deliver the transformation program objectives and comprises of the following core elements:

- Program Steering Committee
- Program Architecture Board
- Program Architecture Team
- Architecture Stakeholders
- Architecture sub groups & forums

**Processes** includes:

- Approach and plan
- Change control
- Configuration management
- Release Management
- Compliance
- Risk Management
- Communication

**Tools** includes:

- Architecture Modelling Tools
- Collaborative Tools
- Architecture Repository
- Project Management Tools
- Supporting Tools
The program steering committee that provides executive sponsorship; The program architecture board, which oversees the development of the architecture and manages and controls change; The program architecture team comprising business and IT components and is responsible for addressing integration aspects;

The architecture program/project management team that brings discipline into the architecture work; The project architects and business analysts that are responsible for addressing project architectural aspects; The architecture stakeholder groups that provide inputs required to perform architecture activities, receive outputs arising out of performed architecture activities and receive information about architecture activities and perform related activities; The program stakeholder groups and forums that involve architecture team participation; The architecture forums that build the collaborative mechanisms for the stakeholders and ensure alignment; The architecture audit teams that ensure adherence to the architecture framework.

**Processes** provide the delivery mechanisms for the architecture team and comprises the following core elements: An approach to develop the program architecture; The architecture plan which translates the approach into an actionable work breakdown structure; The change control process that refines the architecture based on various inputs; The review processes to ensure the quality and acceptance of the architecture outputs; The compliance process that enforces adherence to the architecture; The configuration and release management processes that control the issue of architecture documents for consumption by intended audience; The risk management process that lays out the architectural risks and mitigation strategies; The reporting process to track and report the work being delivered; The communication processes to align the stakeholders and enable decision making; The program/project management processes that ensure program alignment while managing architecture work.

**Tools** enable the organization and processes to deliver with reduced effort and comprises the following core elements:

Comprehensive modeling tools that allow creation of holistic EA artifacts; Collaboration tools that support and enable interactive ways of working; Architecture repository that provides a structure for cataloging and managing the various design components; Project management tools to plan and manage EA tasks; Supporting tools such as survey tools to capture Voice of Customer (VoC), blogs to foster discussions etc.

**Architecture Governance Implementation**

The key factors influencing the implementation of an AG framework are program needs; the organization culture; the program/project management maturity; the architecture function maturity; the need for speed; assortment of people from various vendors in addition to customer staff; the mindset of the architects vs project managers; reusability of current processes and tools.

Based on the above factors and after a quick health check of the program environment the following AG essentials were identified and either defined or modified or reused and rolled out applying a lean and pragmatic outlook.
Implementation of Organization Related Elements of AG Framework

The organization related elements from the AG framework were implemented in the following ways:

Design representation in the program steering committee to ensure business and IT alignment and in the solution delivery steering group to understand and address the voice of delivery, share design status updates, communicate design messages, participate in release/project change control decisions. There also needs to be a Design Authority comprising the program business design lead, IS design lead and IS design program coordinator to oversee the development of the design work and control design changes.

Establishment of the IS design team with a program/project management layer and design layer comprising of four workstreams with clear roles, responsibilities and deliverables to define and perform the design work.

Identification and segmentation of the design stakeholders groups with providers and consumers for communication and stakeholder management purposes; align meetings with the release coordinators for information sharing and planning. This helped provide consistent status updates in the solution delivery steering group meetings and participation in the release level project managers meetings. This provided an insight into the field level matters related to design and projects and an opportunity to address them upfront and reduce/avoid escalations and align meetings with the program testing team for design support related to integration testing. This enabled the test team to develop integration level test plans and test cases which were subsequently validated with the projects.
Design decision meetings which were subsequently replaced with the design outstanding meetings to discuss, prioritise, action and provide decisions on design outstandings. Attendees include the design team, technical leads and business analysts;

Design X team meeting for design team activity planning and management. Attended by the design work stream leads; Design catch up meetings for information sharing and team building. Attended by the design team members; Design team 1:1 meetings with the design program coordinator to discuss individual matters;

Adhoc meetings and workshops on a need basis to perform the design work. This includes the formal review sessions with a large audience comprising design team members, tech leads, IT leads, business analysts and project managers; setup of verification and validation (V&V) SWAT teams to audit the projects to ensure adherence to the design

<table>
<thead>
<tr>
<th>AG Framework Elements</th>
<th>Implementation Details</th>
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</thead>
<tbody>
<tr>
<td>Program Steering Committees</td>
<td>Program Steering Committee; Solution Delivery Steering Group</td>
</tr>
<tr>
<td>Program Architecture Board</td>
<td>Design Authority; Project Review Board</td>
</tr>
<tr>
<td>Program Architecture Team</td>
<td>Business Design; IS Design [IPM, IB, SB, IAD Workstreams]; Architecture Audit; Program/Project Management</td>
</tr>
<tr>
<td>Project Architects &amp; Business Analysts</td>
<td>IT Leads; Technical Leads; Business Analysts; CSI Architects</td>
</tr>
<tr>
<td>Stakeholder Groups</td>
<td>Business, Program Office; Program Management, CSI, Release Triage, Project Managers, Project Architects; Testing team, Design team</td>
</tr>
<tr>
<td>Program Forums</td>
<td>Program Steering Committee meeting; Solution Delivery Steering Group meeting; Release Level Project Managers meeting</td>
</tr>
<tr>
<td>Architecture Forums</td>
<td>Design Decision meeting; Design Outstanding meeting; Design X Team meeting; Design Catch Up meeting; Design Workstream meetings; Design Review workshops; Design V&amp;V meetings</td>
</tr>
</tbody>
</table>

Table 1. Organization Framework Implementation

Implementation of Processes Related Elements of AG Framework

The process related elements from the AG framework were implemented in the following manner:

Principles and Obligations were defined to guide the design decisions and work activities; planning workshops to establish a multi tiered approach for architecture and design development were conducted. The approach defined and demonstrated in Fig. 5 clearly identified the deliverables of IS design work streams and their interdependencies. It also demonstrated how the project architecture and design are aligned to the program release architecture elements and how this was, in turn, aligned to the consolidated E2E Architecture.
Product descriptions defining the design artifacts and intended use of the same were created for all design artifacts;

Monitoring and control process was established through the design project plan which details the design tasks and feeds into the overall program plan;

Funnel approach to capture, allocate and address all comments was adopted thus creating a structured way of working providing traceability. These comments are then categorized and addressed as clarifications/issue/risks/change triggering the respective processes; Document versioning mechanism at an artefact level was devised considering mutiple document repositories having their own versioning features; Quality alignment to the customers iQMS framework was done which includes process reviews with iQMS program quality coordinator for identified design processes and artefacts;

Architecture change control process as depicted in Fig. 6 using a change log to manage and communicate changes was created. The design change control process is triggered by a request from a change initiator, which then goes through impact analysis by the design and project teams followed by approval to the design authority and then either gets rejected, approved or actioned for detailed analysis. Post detailed analysis the change is again presented to the Design Authority. The Design Authority may request the change to be shared with a wider audience; after approval the change is actioned for implementation. The change log and CMDB is updated regularly and relevant stakeholders are informed. Also, project change control is triggered if required.
Design configuration management mechanism used a design catalogue to track and manage design artefacts. This is a one stop shop for information on all design artefacts; Design release mechanism used multiple libraries, tools and communication around the same; Design risk management process was defined in alignment with the program risk management process;

Formal review mechanisms were defined with stakeholders to review design and secure approvals. This includes templates to capture review comments and responses, review workshops and relevant communication.

Compliance and audit mechanism to ensure design adherence of project level design and architecture to IS design architecture artifacts which included reporting any non compliances at project and IS design levels. This was performed using two different mechanisms. One mechanism involved allowing Verification and Validation (V&V) checks of the project architecture and design. The other mechanism was to perform an end-to-end walkthrough covering architecture and detailed components in workshops involving all project business analysts and designers and IS design architects using wiring diagrams.
For the V&V tasks, first map all IS design artifacts with various project artifacts based on the iQMS process to establish the basis of verifying traceability. Conformance was checked in four different perspectives—scope confirmation, implementation guidance, design compliance and post-deployment support as demonstrated in Fig. 7.

Scope conformance was necessary to ensure the project level business and system requirements documentation captured all the requirements related to integration as defined by the IS Design artifacts. Design Compliance was needed to align the project design with the program architecture as defined in the various IS Design artifacts. Also the decisions were documented and verified for compliance with existing principles and obligations as part of the architecture definition. Implementation guidance was performed on a continuous basis to guide the project teams and make them work towards implementing the big picture defined by the architecture team. Post deployment support was provided to support teams to ensure decommissioning plans were aligned with the architecture. Gaps were identified in project architecture and design by verification and validation of iQMS documentation against the corresponding IS Design artifacts for conformance checks by the independent V&V SWAT teams. Gaps were shared with the relevant project and IS design teams and actions were identified to bring them to a closure. Such a mechanism to ensure early identification of non-conformances in project architecture and design, reduced the risk of rework and exceeding timelines. It also enabled traceability of project design within the program architecture and thereby enabled the required alignment to ensure the program objectives were met by the implementation.
Accomplishing planning and driving workstream level workshops with large stakeholder groups to discuss, define and secure buy-in for design; end to end walkthrough with the help of wiring diagrams created to establish a common understanding between all project and IS design teams involved. Wiring diagrams were created to demonstrate how each business event was realized with specific use cases. It also demonstrated how the use cases were implemented by projects and CSI with clear identification of the components involved. Each of the project teams involved were asked to explain their components and provide the necessary evidence for the detailed specifications in workshops. This mechanism helped uncover many gaps in understanding different projects in terms of expectation mismatch and also helped in ensuring the end to end design worked as expected by the business users. It also helped involve the early visibility of the use cases and solutions to system testers and helped reduce the test preparation phase timelines as a result.

Mechanism to log, track and report design outstandings with automated status updates was devised; Mechanism to capture and communicate lessons learnt and incorporate process improvements was also devised; Structured mechanism to capture ideas and thoughts arising from various forums using team site was put in place.

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<tbody>
<tr>
<td>Architecture Approach</td>
<td>Planning workshops; Cluster based approach; COPIS methodology;</td>
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<tr>
<td>Architecture Approach</td>
<td>Project/CSI/Test team post release reviews; Project/CSI/Test team walk through reviews; Wiring Diagram driven reviews</td>
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<tr>
<td>Architecture Change Control Process</td>
<td>Design Change Control process linked to Program Change Control process</td>
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<tr>
<td>Architecture Review Process</td>
<td>Project/CSI/Test team post release reviews; Project/CSI/Test team walk through reviews; Wiring Diagram driven reviews</td>
</tr>
<tr>
<td>Architecture Compliance Process</td>
<td>Verification and Validation process</td>
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<tr>
<td>Architecture Release Management Process</td>
<td>Release planning workshops; Design document collation; Approvals and signoffs; Release communication</td>
</tr>
<tr>
<td>Architecture Actions &amp; Issues Management Process</td>
<td>Design Actions and Issues Management process</td>
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<tr>
<td>Architecture Communication Processes</td>
<td>Architecture Communication Processes</td>
</tr>
<tr>
<td>Program/Project Management processes</td>
<td>Integration Management; Program Planning; Scope Management; Requirements Management; Risk/Issues/Change management</td>
</tr>
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</table>

Table 2. Processes Framework Implementation
Implementation of Tools Related Elements of AG Framework

The tools related elements from the AG Framework were implemented in the following manner:

Design, setup and security of the newly adopted sharepoint team site as the primary collaboration tool for the IS Design group in line with program directives; Configuration of the customers document management tool and team site as the design repository for storing the design documentation; Use of Enterprise Architect, Visio, MS Office products as standard tools for designing; Adoption and customization of MEGA for next release. Dedicated tools such as MEGA provide the ability to create consistent architecture artifacts and share information seamlessly with stakeholders reducing the design effort; Design change log, risk log; comments register; decision database; outstanding log setup in team site to enable the processes; Use of in house survey tool to capture VoC.

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<tr>
<th>AG Framework Elements</th>
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<tbody>
<tr>
<td>Architecture Modeling Tools</td>
<td>MEGA; EA</td>
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<tr>
<td>Collaboration Tools</td>
<td>Sharepoint</td>
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<tr>
<td>Architecture Repository</td>
<td>GCMS/ICE; Sharepoint; LOTUS DB; Microsoft Office</td>
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<tr>
<td>Program/Project Management Tools</td>
<td>Microsoft Project Plan; Microsoft Office</td>
</tr>
<tr>
<td>Supporting tools</td>
<td>In house Survey Tool; Meeting Manager, Team site blogs</td>
</tr>
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</table>

Table 3. Tools Framework Implementation

Benefits Of Architecture Governance

Defining an AG framework and implementation of the same for a transformation program helped in establishing alignment of all stakeholders involved towards a common objective. It also brought in effective controls and enabled a structured way of working among stakeholders.

Organization elements of the framework enabled visibility of the architecture decisions and ensured business heads were involved in making some of the key decisions. This enables business – IT alignment that is critical for the success of the transformation program. Creation of various architecture working groups and forums ensured collaboration between IS Design architecture teams and project teams, created consistency in the artifacts created and enabled early buy-in from the consumers. It encouraged open participation of various stakeholders and created an environment of transparency and team bonding.

Process elements incorporated the required structure and methodology for creation and management of architecture artifacts. It also ensured the architecture changes were controlled, analyzed for impact from a holistic perspective and communicated in a structured manner. The compliance processes ensured the project architecture was aligned to the program architecture and delivered the expected business benefits. It created a culture of being process driven rather than people driven and ensured the quality of architecture artifacts delivered.
Tools enabled effective creation, collaboration and communication of architecture artifacts. The SharePoint team site was created as a one-stop shop for all architecture updates. Architecture tools like MEGA & Enterprise Architect ensured the views were consistent and conformant to industry standards. Various logging and tracking mechanisms helped in tracking the comments, risks or outstanding items with rigor and focus.

In summary, implementing an effective architecture governance framework ensured that the projects delivered the expected business benefits in alignment with the enterprise architecture defined by IS Design teams.

**Conclusion**

The key element in Architecture Governance is the business-IT alignment that helps achieve value for the organization while properly managing the resources, risks and performance. This can be achieved by adopting architecture governance as an integral part of Information Technology Governance and by setting up an appropriate Architecture Governance framework based on industry best practices. Such a framework and practices should be composed of a variety of appropriate contextual based structures, processes, and tools. While Architecture Governance framework can be reused for other large transformation programs, it must be considered that one hat does not fit all and customization in the context of the organization is the recipe for success.

**References**

[6] ITGI, Board Briefing on IT Governance, 2nd Edition, Figure 3 - Focus Areas of IT Governance.
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