The Enterprise Transformation Architecture (ETA)
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Executive Summary

The success of technology and innovation as drivers of disruptive business transformation, agility and competitiveness cannot be measured simply by IT architecture or its alignment to current business process and strategy. It must be measured by support for business agility, in response to anticipated and unanticipated change. Experience shows that acceptance of change is arguably riskier in terms of realizing business value of technology than the design of a good end-state solution. This Article provides a framework and toolkit for managing the risk of transformation. Experience shows that change in quantum leaps can be risky. Therefore the framework in this Article recommends evolutionary change that realizes business value from investment in information, technology and process. It envisions a step by step evolution of best practices to support acceptance of innovation and change. Current capability maturity models, such as the Capability Maturity Model Index (CMMI), focus on process stability. They do not explicitly map to business value. This Article closes that gap.

Introduction

Technology and innovation are the main drivers of value in the knowledge economy, in which business agility and resilience are critical for long term success (Mitra & Gupta, 2007, p. 15). Arguably, innovation adds significantly more value to organizations in knowledge eco-systems than mere increases in efficiency of production processes. Various frameworks for Enterprise Architectures have emerged as best practices for enabling alignment of technology with business process and strategy with the hopes of ensuring the highest return on technology investments. In parallel, various Capability Maturity Models have been developed for building IT and business process capacity, managing change and otherwise paving the way for successful IT deployments (Becker, Knackstedt, Pöppelbuß , p. 1). However, while Enterprise Architectures successfully enable the development of the correct technology solution, aligned with business needs and priorities at various organizational levels, they do not address implementation challenges, such as organizational change management. Capability Maturity Models provide mechanisms needed for consistent IT service delivery in changing conditions, but no single model provides reliable mechanisms for organizational change management, or maps successful change to business value. It is evident that existing approaches do not fully mitigate the significant risk organizations face during rapid transformation and fail to cultivate organizational agility.

The Problem

Current best practices in Enterprise Architectures – the Zachman Framework, the Federal Enterprise Framework (FEA) and The Open Group Architecture Framework (TOGAF) - promote operational efficiency and technology alignment, focusing on technology and process solutions that support business objectives (Kappelman & Zachman p.88). They do not address the challenges of change implementation and

acceptance (Kappelman & Zachman p.92), as they do not incorporate elements of Human Resource Alignment, Organizational Change Management or, in some cases, Governance, as demonstrated in Figure 1. Experience shows that failure to address these elements can result in exposure to significant risk in creating business value, even if a good solution has been developed. This happens because the organization cannot successfully adapt to the solution and vice versa (Mitra & Gupta, 2007, p. 46).

Enterprise Architecture Framework	Technology	Business Process	Business Strategy	Human Resources	Org. Change Management	Governance
Zachman	X	X	X			
FEA	X	X	X			X
TOGAF	X	X	X			X

Figure 1 — Enterprise Architecture Frameworks Elements Matrix.

As a separate set of best practices, Capability Maturity Models partially address the issue of organizational change management by providing capability building tools that help "derive and prioritize improvement measures and subsequently control the progress of their implementation" (Becker, Knackstedt, Pöppelbuß , p. 1). Their fundamental idea is to establish a common process and then monitor and improve its performance within expected ranges (Boehm & Turner, p. 201). As Figure 2 shows, existing capability maturity models – Business Process Maturity Model (BPMM), Information Technology Investment Model (ITIM), People Capability Maturity Model (PCMM) and Capability Maturity Model Index for Development (CMMI-Dev) - attempt to provide tools to minimize change disruptiveness at various levels of the organization by ensuring the process to be changed is understood and some monitoring/improvement standards exist in the organization. However, no model provides an end-to-end, direct value mapping as do Enterprise Architectures, making it difficult to justify the significant investment of time they require, including the creation and maintenance of extensive documentation. Furthermore, as also shown in the figure, there are different risks associated with each change level, the management of which yields an escalating return on investment (Mowbray and Malveau). No existing capability maturity model addresses solution acceptance and, therefore, agility in the face of change. The latter of the two has the highest value to the organization in terms of competitiveness, which exacerbates the lack of mapping to business value.
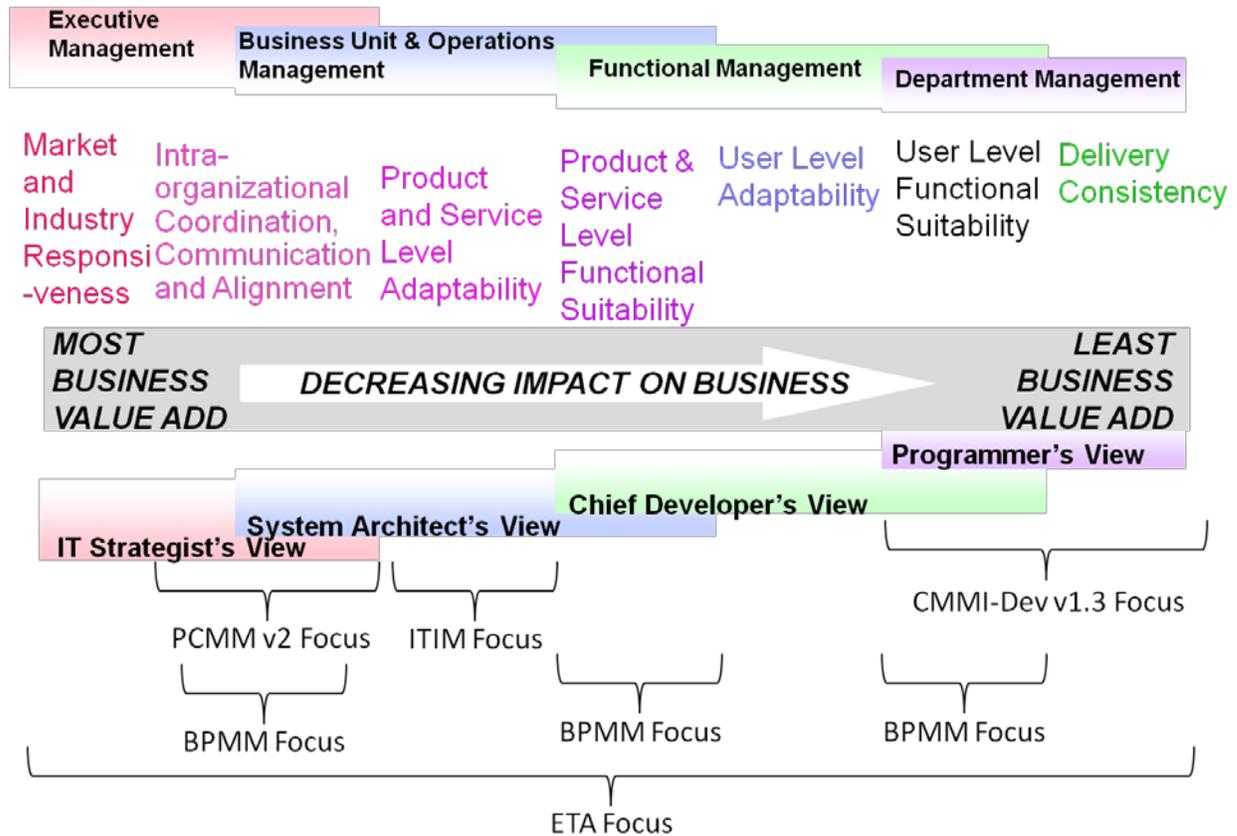
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Figure 2 – Maturity Models Alignment. Based on Mowbray and Malveau.

The Enterprise Transformation Framework and Toolkit

The Enterprise Transformation Architecture (ETA) builds on a number of existing capability maturity best practices and uses the five maturity level definitions of CMMI. Its business process goals and practices are based on Object Management Group's BPMM, but have been augmented by the authors to align with business value and to fit into the overall framework without redundancy. The Human Resources /Organizational Change Management goals and practices are primarily based on Software Engineering Institute's People-CMM Version 1.2. However, some elements have been simplified to facilitate implementation, thereby ensuring user adaptability to technology and process change. IT Project Management goals and practices originate from CMMI-Dev Version 1.3. However, these have been tuned to foster agility rather than pure process consistency. This facilitates market and industry responsiveness through technology alignment. Finally, the Program/Investment Management/Governance component utilizes the framework developed by the Department of Defense (DoD) in ITIM. The baseline framework has been expanded to support technology, change and service-oriented programs. This facilitates product and service level adaptability. Unlike its underlying capability maturity models, the ETA focuses on change and capacity building process alignment with *business* issues (Mitra & Gupta, 2007, p.16). This approach, as demonstrated in Figure 2, yields the highest business value, which, in today's market often flows from organizational agility in response to rapid changes in the business ecosystem.

As shown in Figure 3, the Enterprise Transformation Architecture provides an integrated and evolutionary roadmap to organizational agility. Its initial focus is on

business process, followed by focus on the capability of the people implementing the process, then on underlying technology and, finally, on governance. The shifting emphasis promotes business alignment and transformation based on sound business requirements. It ensures input of accurate and forward-looking business requirements into software development projects with business process maturity leading software process maturity and human capability. Project Management and Human Capability, in turn, lead Program Management, since it is not be possible to stabilize programs without stabilizing management of projects that constitute the program, and the capabilities of the people implementing them. Thus, the ETA addresses the gaps created by existing, disparate capability maturity models by engaging the whole organization from the technology group (Information Technology Project Management), to operations (Business Process), to people (Human Resources/Organizational Change) to the top decision makers (Program/Investment Management/Governance). "Bite off only what you can chew" and "centralize only that, which absolutely must be centralized" (Boehm & Turner, p. 201) are driving principles of the ETA. The framework guides evolution from the lowest capability level to an integrated and flexible organizational change standard. From the unit level, to the organizational level, change processes emerge. At the same time authority for their implementation and the capacity to implement successful change are driven down to the lowest level of the organization. Thus, the framework engages the whole organization in fostering agility, enabling every participant to drive it appropriately.
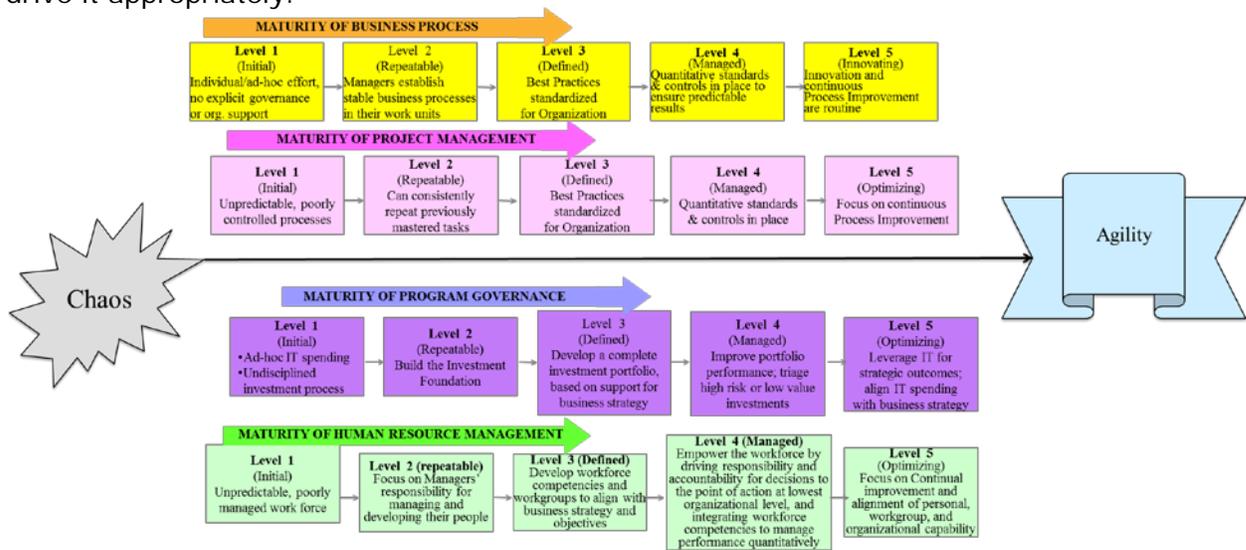

Figure 3 – Enterprise Transformation Architecture.

At each level, each process area has a set of key processes that must be established to create business value. These key processes drill down to goals, the completion of which maps to the completion of a given level, but can be prioritized based on business goal alignment. Goals link to key execution and change institutionalization activities, which institutionalize best practices. Thus, the framework focuses on building and documenting core processes, and also on ensuring that the process is adopted and institutionalized by impacted organizations (Mitra & Gupta, 2008, p. 265).

Institutionalization activities support the completion of each goal and are based on the Kotter Change Model as well as other well-known models for organizational change as they are represented in the CMMI standards. They ensure that execution

of Key Processes becomes a part of the organizational body of knowledge rather than being merely a blip on the organizational radar. For this reason, institutionalization goals are very similar across various capability levels and process areas and include the following:

- Describe and document the process
- Plan the work to complete the process
- Provide people, budgets, tools, and other resources which will perform, support, or be affected by practices, needed knowledge, skills and information
- Measure, monitor and control performance and results
- Verify and address non-conformance with laws, regulations, standards, policies, business rules, processes, and procedures
- Manage, and make informed decisions on exceptions to these (Mitra & Gupta, 2007, pp. 264-265).

Institutionalization goals are complemented by specific goals related to key activities in each process area. A full set of goals can be found at our website – http://seidenberg.pace.edu/ETA.

Level 2
As shown in Figure 3, all four process areas should mature in lock step to achieve, at each level, the type of capability that will manage disruptions caused by change. This balances business value realized at each level, against the risk of transformation. Level 2 activities lay the groundwork for ensuring that change is successfully integrated into the fabric of the organization and establishes the basis for building enterprise level agility. The first step in the Enterprise Transformation Architecture is to institute executive support for business process management by establishing business process governance and accountability. Second initial business process, human resource and project management process are established. Based on that, the organization can establish an investment governance board to manage improvement projects. At this level, executive sponsors are kept informed of the initiative and its progress.

Level 3
After completing the initial groundwork at Level 2, the organization can start aligning disparate unit-level change processes into a global organizational architecture, which strikes a balance between centralization and decentralization. The business process, human resource management, project and program management sequence for this was articulated earlier. Establishing organization-wide process architecture allows the organization to plan strategically for change, fosters economies of scale and magnifies the business impact of positive change. This enables the development of a business-aligned investment portfolio and enables return on investment in Service Oriented Architecture. At this level, executive sponsors are engaged in resolving cross unit issues and reaching the optimal balance between centralization, decentralization and exception management.

Level 4
The overall goal of Level 4 in the Enterprise Transformation Architecture is to put into place the quantitative measures and controls that will allow the organization to balance centralized versus decentralized governance, in order to be nimble, while aligning with strategic goals and business values. Thus, the organization can ensure the overall quality and consistency of its business architecture in the face of unpredictable changes and target investments by measuring performance quantitatively. At this level, executives are not only engaged, but also drive goal oriented process improvements based on objectively measured results.

Level 5

At Level 5, support for change and innovation become routine. The organization that has met the Level 5 ETA goals will have business processes that are flexible, configurable and reusable, its people will have learned how to continuously improve their work and do not view change and innovation negatively and its governance model will support business value alignment and business agility. Its business process will be strategically aligned and continuously improving. Responsibility and accountability will be driven to the point of execution and staff will readily respond to change and adapt to improved processes and systems, proactively feeding back issues and forward looking suggestions for improvement. Its information systems processes will be able to consistently accommodate evolving services required by the business and the organization's investment management practices will support business-aligned continuous improvement. This will make the organization nimble and innovative. At this level, not only are executives involved, but they also participate in fostering innovation and improvement in an organization where change and improvement have become routine.

Critical To Quality (CTQ) Trees

Critical To Quality (CTQ) Trees identify a hierarchy of factors that are essential to achieving the goals articulated by the Enterprise Transformation Architecture. These trees can be useful implementation tools. They not only identify adoption and governance bottlenecks, but also provide a framework for prioritizing and resolving these as the organization evolves. The tool is based on Mitra and Gupta's published and unpublished work. As implemented in the ETA, each key process area is mapped to a series of activities that map to goals. CTQ Trees may be used to assess missing, or inadequate practices that are hurdles to transformation at any given level of maturity and capability. Thus, the organization can better target its investment in transformation by focusing on the areas that need improvement. Moreover, they provide activity checklists that map capabilities needed to support the strategic goals of the organization. A full set of the CTQ Trees can be found at http://seidenberg.pace.edu/ETA.

Quality Function Deployment (QFD) Matrixes

The ETA also provides a set of Quality Function Deployment (QFD) Matrixes that facilitate strategic and investment planning by mapping ETA goals to business value. The QFD Matrix maps goals for each process area, articulated in each CTQ Tree, to the following types of business value:

- Growth
    - Increase Customer Value
    - Expand Revenue Opportunities
    - Business Agility
- Productivity
    - Reduce Cost
    - Reduce Defects/ Rework
    - Improve Asset/ Resource Utilization
- Safety
    - Security
    - Compliance
    - Risk Management[1]

The QFD Matrixes produce a pattern of goals that will add value to the business. These matrices may be used for prioritizing and demonstrating the business value of

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[1] Business Value Definitions are adapted from Mitra/Gupta works and presentations provided by Mitra.

projects in the portfolio. Goals can be prioritized and scored based on expected impact on value.

The goal to business value mapping is pre-populated as a part of the tool. This template is based on authors' business experience, SEI and OMG best practices, as well as the works of Jeffrey Moore (*Crossing the Chasm*), Paul Harmon (*Business Process Change*), and Artie Mahal (How Work Gets Done) . However, they can be adjusted to create customized score sheets for application in a given industry. The full set of matrixes is provided at http://seidenberg.pace.edu/ETA.

Conclusion

The Enterprise Transformation Architecture enables organizations not only to develop technology solutions that are aligned with its business processes and strategy, but also facilitates their acceptance by enabling a change-ready culture. It provides tools to drive necessary urgency by mapping best practices and governance to business value. The uniqueness of the framework lies in its ability to integrate Enterprise Architectures with Capability Maturity Models and the mapping of the latter to business value. The ETA provides the solution acceptance enablers that are missing in EA and the end to end organizational change engagement, including business value mapping, which is missing in capability maturity models. The ETA fills a critical gap in Enterprise Architecture Frameworks, because while EA provides a blueprint for the organization, ETA enables its continuous and timely alignment with change. Where EA provides the "what" of the enterprise, ETA provides the "how".

Thus, the ETA complements extant frameworks that provide architectural solutions to unpredictable, innovative, and disruptive changes in business models and practices. One such framework is the Metamodel of Knowledge, developed by Amit Mitra and Amar Gupta. It provides a solution for flexibility and extensibility of businesses by addressing management and creation of business concepts on the plane of meaning and integrating shared business knowledge with reasoning, business rules and processes. Further, it provides a tool set for defining classes of organization-specific meanings based on an ontology derived from universal property categories. Concepts and business rules can extend, change and reason in support of agility. The ontology enables innovation and self-aware processes. It can be used to minimize the disruptive impact of change on processes and systems.

However, to be effective, the Metamodel of Knowledge must be enabled by a change architecture like the ETA that fosters acceptance, adoption, and use, and thus realizes business benefits.

Appendix A — List of Abbreviations

BPMM	Business Process Maturity Model
CMMI	Capability Maturity Model Index
CMMI-Dev	Capability Maturity Model Index for Development
CTQ	Critical To Quality
DoD	Department of Defense
EA	Enterprise Architecture

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ETA	Enterprise Transformation Architecture
FEA	Federal Enterprise Architecture
ITIM	Information Technology Investment Model
PCMM	People Capability Maturity Model
QFD	Quality Function Deployment
TOGAF	The Open Group Architecture Framework

References

1. (2012). The Common Approach to Federal Enterprise Architecture. Retrieved from: http://www.whitehouse.gov/sites/default/files/omb/assets/egov_docs/common_approach_to_federal_ea.pdf.

2. Becker, J., Knackstedt, R. and Pöppelbuß, J. "Developing Maturity Models for IT Management - A Procedure Model and its Application." *Business and Information Systems Engineering.* Volume 1 (2009): 213-222. PDF.

3. Boehm, B. and Turner, R. (2003). *Balancing Agility and Discipline: A Guide for the Perplexed.* Boston, MA: Pearson Education, Inc.

4. CMMI Product Team (2010). *CMMI for Development, Version 1.3*

5. Curtis, B., Hefley, W.E. and Miller, S. (2001). *People Capability Maturity Model (P-CMM).*

6. Kappelman, L. and Zachman, J. "The Enterprise and Its Architecture: Ontology & Challenges." *Journal of Computer Information Systems* Summer (2013): 87-95. PDF.

7. Mitra, A. and Gupta, A. (2005). *Agile Systems with Reusable Patterns of Business Knowledge: A Component-Based Approach.* Norwood, MA: Artech House.

8. Mitra, A. and Gupta, A. (2007). *Creating Agile Business Systems with Reusable Knowledge*. Cambridge, MA: Cambridge University Press.

9. Mitra, A. and Gupta, A. (2008). *Knowledge Reuse and Agile Processes, Catalysts for Innovation*

10. Mowbray and Malveau, *CORBA Design Patterns*, 1997

11. OMG. (2008). *Business Process Maturity Model (BPMM).*

12. Stojanovic, Z. and Dahanayake, A. (eds). (2005) *Service-Oriented Software System Engineering: Challenges and Practices*. Hershey, PA: Idea Group Inc.

13. The Open Group. (2011). *TOGAF Version 9.1.* Retrieved from http://pubs.opengroup.org/architecture/togaf9-doc/arch/.

14. Thomsett, M. (2005). *Getting Started in Six Sigma.* Hoboken, NJ: John Wiley & Sons.

15. United States General Accounting Office. (2004). *Information Technology Investment Management: A Framework for Assessing and Improving Process Maturity.*

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