Comparative study of COBIT with other IT Governance Frameworks

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Abstract

The meaning of Information Technology (IT) has changed from just being available to accelerating and facilitating processes to an integral part of the enterprise mission and strategy. Therefore, IT governance is one of these concepts that suddenly emerged and became an important issue in the information technology area. Benchmarking the standard frameworks in market place is one of important approaches for selecting appropriate standard frameworks used in IT governance in order to achieve the organization goal. This study proposes a benchmarking of the different standard frameworks used for IT governance in order to detect complementarities and intersection in order to facilitate the implementation.

Keywords: *IT Governance, IT Strategy, COBIT, ITIL, CMMI, PMBOK, TOGAF, Framework, Process.*

1. Introduction

IT utilization and a business goal of an organization is a foundation of efficient and effective IT governance. A company board and executives need to pay intention to IT as an important tool for business performance. Most enterprises attempt to organize high quality of information and IT readiness in order to support decision makings in business areas. IT investment is a track for generating business value. Setting up IT investment as a strategic goal of enterprises lead to gain more business benefits and achieve operational excellence. It is reasonable to point out that maintaining IT related risk at an acceptable level, optimizing cost of IT services and technology, complying with laws, regulations, contractual agreements and policy are good performances for handling IT governance.

Most enterprises need standard tools to assist their executives to perform good IT governance including the IT best practice management. A number of IT governance frameworks, such as ITIL, COBIT, CMMI, PMBOK, TOGAF, ISO/IEC involved IT, etc, are developed to provide guidance and tools for better IT governance. The enterprises intricately choose the appropriate frameworks because they have to spend long time for studying all standards in market places. A benchmark of each standard is an important key approach for making decision on selecting the standard tools for IT governance.

2. Definition

Governance is the framework, principles, structure, processes and practices to set direction and monitor compliance and performance aligned with the overall purpose and objectives of an enterprise [1].

IT Governance is an approach that enterprises arrange IT strategies within their business to ensure achievement with regards to the strategies including implementation of appropriate methods to evaluate IT performance [2].

All the governance principles and practices are generally top down and the IT governance is no exception to this hierarchical initiative and responsibility. IT governance, as a subset of corporate governance, also requires to be driven from the board level. The core of the IT governance is to create IT strategy that forms part of the effective corporate strategic planning process and thus ensuring alignment of IT design and its controls with the business goals. The basic objectives of the IT governance can be summarized as follows [3]:

- Aligning IT strategy with Business Strategy
- IT as strategic resource to deliver value
- IT risk management
- IT resource and financial management
- IT performance management

2.1 IT Governance / IT Management

Separating governance and management promotes accountability at all levels. It also provides a mechanism for good enterprise governance that focuses on stakeholder value by balancing performance and conformance [4]. Governance should:

- Evaluate to determine balanced, agreed-on enterprise objectives to be achieved
- Direct through prioritization and decision making
- Monitor performance, compliance and progress against agreed direction and objectives

This means that a key responsibility of governance is to evaluate, direct, and monitor. Management, on the other hand, plans, builds, runs, and monitors activities to align with and support the governance objectives.
Governance is a responsibility of the board, while management is a responsibility of the executive management.

Fig.1 IT Governance vs IT Management

2.2 The characteristics of IT Governance

The following characteristics have been adapted from Naidoo (2002) and are positioned here to highlight both the value and necessity for governance as an approach to be adopted within organizations and their dealings with all involved parties [5]:

- Discipline: All involved parties will have a commitment to adhere to procedures, processes, and authority structures established by the organization.
- Transparency: All actions implemented and their decision support will be available for inspection by 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 create unfair advantage to any one particular party.

3. IT Governance Frameworks

3.1 Scope of the study

The scope of the study is restricted to COBIT, ITIL, CMMI, PMBOK and TOGAF: five frameworks currently often mentioned in the IT Governance studies. Other frameworks, models and best practices gaining recent awareness are COSO, Six Sigma, Balanced Scorecard, ISO 17799, etc.

In the last version, COBIT 5 consolidates COBIT 4.1, Val IT and Risk IT into one framework, and has been updated to align with current best practices such as TOGAF.

3.2 COBIT

The Control Objectives for Information and related Technology (COBIT) provides a comprehensive framework that assists enterprises to achieve their objectives for the governance and management of enterprise IT. COBIT 5 integrates the knowledge previously dispersed over the three ISACA frameworks: COBIT, Val IT, and Risk IT. It covers the lifecycle of governance, strategic, and tactical management within the IT domain [3].

COBIT 5 principles:

- Meeting stakeholders needs
- Covering the enterprise End-to-End
- Applying a single integrated framework
- Enabling a holistic approach
- Separating governance from management

COBIT 5 processes:

- EDM (Evaluate, Direct, Monitor) domain:
  - Ensure Governance Framework Setting and Maintenance
  - Ensure Benefits Delivery
  - Ensure Resource Optimization
  - Ensure Stakeholder Transparency
- APO (Align, Plan, Organize) domain :
  - Manage the IT Management Framework
  - Manage Strategy
  - Manage Enterprise Architecture
  - Manage Innovation

- Manage Portfolio
- Manage Budget and Costs
- Manage Human Relations
- Manage Relationships
- Manage Service Agreements
- Manage Suppliers
- Manage Quality
- Manage Risk
- Manage Security

- BAI (Build, Acquire, Implement) domain:
  - Manage Programs and Projects
  - Manage Requirements Definition
  - Manage Solutions Identification and Build
  - Manage Availability and Capacity
  - Manage Organizational Change Enablement
  - Manage Changes
  - Manage Changes Acceptance and Transitioning
  - Manage Knowledge
  - Manage Assets
  - Manage Configuration

- DSS (Distribute, Service, Support) domain:
  - Manage Operations
  - Manage Service Requests and Incidents
  - Manage Problems
  - Manage Continuity
  - Manage Security Services
  - Manage Business Process Controls
  - Monitor, Evaluate and Assess Performance and Conformance

- MEA (Monitor, Evaluate, Assess) domain:
  - Monitor, Evaluate and Asses the System of Internal Control
  - Evaluate and Assess Compliance with External Requirements

3.3 ITIL

Information Technology Infrastructure Library (ITIL) describes Best Practice in IT service management. It provides a framework for the governance of IT and focuses on the continual measurement and improvement of the quality of IT service delivered, from both a business and a customer perspective. This focus is a major factor in ITIL's worldwide success and has contributed to its prolific usage and to the key benefits obtained by those organizations deploying the techniques and processes throughout their organizations.

The current version of ITIL (Version 3) provides a Service Lifecycle structure and is organized into five high-level core disciplines described in five core books [6]:

Fig.2 ITIL Lifecycle

- **Service Strategy processes:**
  - Strategy Management for IT Services
  - Service Portfolio Management
  - Financial Management for IT Services
  - Demand Management
  - Business Relationship Management

- **Service Design processes:**
  - Design Coordination
  - Service Catalogue Management
  - Service Level Management
  - Risk Management
  - Capacity Management
  - Availability Management
  - IT Service Continuity Management
  - Information Security Management
  - Compliance Management
  - Architecture Management
  - Supplier Management
  - Service Portfolio Management

- **Service Transition processes:**
  - Change Management
  - Change Evaluation
  - Project Management
  - Application Development
  - Release and Deployment Management
  - Service Validation and Testing
  - Service Asset and Configuration Management
  - Knowledge Management

- **Service Operation processes:**
  - Event Management
  - Incident Management
  - Request Fulfillment
  - Access Management
  - Problem Management
  - IT Operations Control
  - Facilities Management
  - Application Management
  - Technical Management

- **Continual Service Improvement processes:**
  - Service Review
  - Process Evaluation

- Definition of CSI Initiatives
- Monitoring of CSI Initiatives

3.4 PMBOK

The Project Management Body of Knowledge (PMBOK) is a collection of processes and knowledge areas accepted as best practice for the project management profession.

As an internationally recognized standard (ANSI/PMI 99-001-2008 and IEEE 1490-2011) it provides project managers with the fundamental practices needed to achieve organizational results and excellence in the practice of project management.

PMBOK fifth edition recognizes 5 basic process groups and 10 knowledge areas typical of almost all projects. The basic concepts are applicable to projects, programmes and operations. The five basic process groups are:

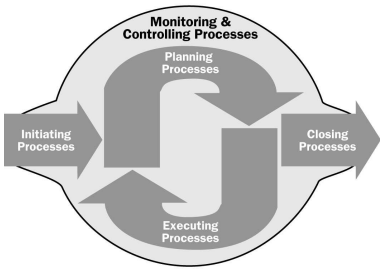

Fig.3 PMBOK process groups

The processes grouped by the10 knowledge areas are [7]:

- **Project Integration Management:**
  Develop Project Charter, Develop Project Management Plan, Direct and Manage Project Execution, Monitor and Control Project Work, Perform Integrated Change Control, Close Project or Phase.
- **Project Scope Management:**
  Plan Scope Management, Collect Requirements, Define Scope, Create WBS, Validate Scope, Control Scope.
- **Project Time Management:**
  Plan Schedule Management, Define Activities, Sequence Activities, Estimate Activity Resources, Estimate Activity Durations, Develop Schedule, Control Schedule.
- **Project Cost Management:**
  Plan Cost Management, Estimate Costs, Determine Budget, Control Costs.
- **Project Quality Management:**
  Plan Quality Management, Perform Quality Assurance, Perform Quality Control.
- **Project Human Resource Management:**
  Plan Human Resource Management, Acquire Project Team, Develop Project Team, Manage Project Team.
- **Project Communications Management:**
  Plan Communications Management, Manage Communication, Control Communication.
- **Project Risk Management:**
  Plan Risk Management, Identify Risks, Perform Qualitative Risk Analysis, Perform Quantitative Risk Analysis, Plan Risk Responses, Control Risks.
- **Project Procurement Management:**
  Plan Procurement Management, Conduct Procurements, Control Procurements, Close Procurements.
- **Project Stakeholder Management:**
  Identify Stakeholders, Plan Stakeholder Management, Manage Stakeholder Engagement, Control Stakeholder Engagement.

3.5 CMMI

The Capability Maturity Model Integration (CMMI) is a world-class performance improvement framework for competitive organizations that want to achieve high-performance operations [8]. Building upon an organization's business performance objectives, CMMI provides a set of practices for improving processes, resulting in a performance improvement system that paves the way for better operations and performance. Under the CMMI model, processes are rated according to their maturity levels, which are defined as: Initial, Managed, Defined, Quantitatively Managed, Optimizing. CMMI currently addresses three areas of interest:

- Product and service development (CMMI-DEV)
- Service establishment, management(CMMI-SVC)
- Product and service acquisition (CMMI-ACQ)

Depending on the CMMI areas of interest (acquisition, services, development) used, the process areas it contains will vary. Process areas are the areas that will be covered by the organization's processes. The table below lists the collection of sixteen CMMI core process areas that are present for all CMMI areas of interest in CMMI V1.3:

Name	Area
Causal Analysis and Resolution	Support
Configuration Management	Support
Decision Analysis and Resolution	Support
Integrated Project Management	Project Management
Measurement and Analysis	Support
Organisationnel Process Definition	Process Management
Organisationnel Process Focus	Process Management
Organisationnel Performance Management	Process Management
Organisationnel Process Performance	Process Management
Organisationnel Training	Process Management
Project Monitoring and Control	Project Management
Project Planning	Project Management
Process and Product Quality Assurance	Support
Quantitative Project Management	Project Management
Requirements Management	Project Management

Risk Management	Project Management
Supplier Agreement Management	Support

Table 1: CMMI core process areas

3.6 TOGAF

The Open Group Architecture Framework (TOGAF) is a framework, a detailed method and a set of supporting tools for developing an enterprise architecture. TOGAF is developed and maintained by members of The Open Group, working within the Architecture Forum [9].

Specifically, use of TOGAF will:

- Enable users to implement and gain the benefits of genuinely open systems solutions at reduced cost
- Simplify the related processes of open systems design, planning, product procurement, and implementation
- Help the IT function to better communicate its goals and strategy to corporate management

TOGAF topics:

- Enterprise architecture domains
  TOGAF is based on four pillars, called architecture domains:
  - Business architecture or business process architecture which defines the business strategy, governance, organization, and key business processes of the organization
  - Applications architecture which provides a blueprint for the individual application systems to be deployed, the interactions between the application systems, and their relationships to the core business processes of the organization with the frameworks for services to be exposed as business functions for integration.
  - Data architecture which describes the structure of an organisation's logical and physical data assets and the associated data management resources
  - Technical architecture or technology architecture which describes the hardware, software and network infrastructure needed to support the deployment of core, mission-critical applications

- Enterprise Continuum

The Enterprise Continuum may be viewed as a "virtual repository" of all the architecture assets available to an organization. These include architectural models, architectural patterns, architecture descriptions, and other artifacts. These artifacts may exist within the enterprise and also in the IT industry at large. The Enterprise Continuum consists of both the Architecture Continuum and the Solutions Continuum. The Architecture Continuum specifies the structuring of reusable architecture assets, and includes rules, representations and relationships of the information system(s) available to the enterprise. The Solutions Continuum describes the implementation of the Architecture Continuum by defining reusable solutions building blocks.

- Architecture Development Method

The Architecture Development Method (ADM) is applied to develop an enterprise architecture which will meet the business and information technology needs of an organization. It may be tailored to the organization's needs and is then employed to manage the execution of architecture planning activities.
The process is iterative and cyclic. Each step checks with Requirements. Phase C involves some combination of both Data Architecture and Applications Architecture. Additional clarity can be added between steps B and C in order to provide complete information architecture.

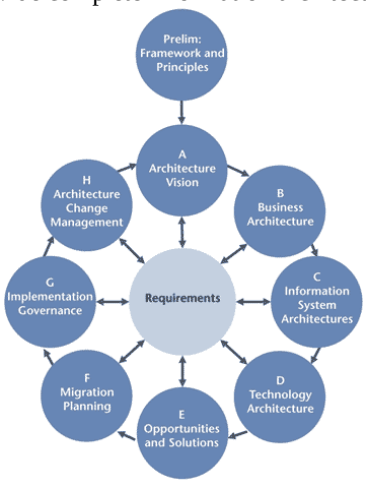

Fig.4 TOGAF Architecture Method (ADM)

4. Frameworks mapping and complimentarily

4.1 COBIT and ITIL

Both ITIL and COBIT help organizations to manage IT from a business perspective and achieve business goals while measuring progress and ensuring effective IT governance. Because of this, there is often confusion about whether they do the same thing or contradict each other. In reality, the two frameworks are complementary. Indeed, ITIL is more focused on service management and provides guidance on how to develop and implement effective solutions. COBIT provides an overall, high level governance framework which is applicable to most organizations but is not specific about certain aspects of

the business like IT service management or information security. As ITIL covers particular areas in more detail, it can be mapped to COBIT to enhance the framework and build a hierarchy of processes. This means that COBIT can be used to shape ITIL processes to the business needs and measure the success of ITIL implementation.

	EDM	APO	BAI	DSS	MEA
Service Strategy	3	7			
Service Design		7	5	2	
Service Transition			8		
Service Operation				5	
Continual Service Improvement		3			3

Table 2: COBIT and ITIL mapping [10]

When used together, the power of both approaches is amplified, with a greater likelihood of management support and direction, and a more cost-effective use of implementation resources.

4.2 COBIT and CMMI

"CMMI for services and CMMI for acquisitions are complementary to COBIT, in that these aspects are not adequately covered by COBIT. Both CMMI and COBIT include a maturity model, however the CMMI standards include goals and procedures which are not part of the COBIT maturity model" [11].
CMMI covers these aspects in detail, even though it is focused on system development having limited coverage of IT governance and management issues.

In COBIT 5 the Maturity Model is changed, assigning more importance to the processes. The task of the new Process Capability Model is the same as the Maturity Model, but the structure of the framework is modified. The number of levels for assessing a process is the same compared to the Maturity Model, although the name, the meaning, and especially the attributes for assessing a process are different. According to [10] the two frameworks could seem similar, but there are differences in scope and intents. The difference of intents between levels is linked to the significant focus on the achievement of the IT processes purposes and a more formal assessment brought by the new framework. According to [10], the six levels of the COBIT 5 Process Capability Model are:

- **Level 0**: Incomplete process. The process is not placed or it cannot reach its objective. At this level the process has no objective to achieve. For this reason this level has no attribute.
- **Level 1**: Performed process. The process is in place and achieves its own purpose. This level has only "Process Performance" as process attribute.
- **Level 2**: Managed process. The process is implemented following a series of activities such as planning, monitoring and adjusting activities. The outcomes are established, controlled and maintained. This level has "Performance Management" and "Work Product Management" as process attributes.
- **Level 3**: Established process. The previous level is now implemented following a defined process that allows the achievement of the process outcomes. This level has "Process Definition" and "Process Deployment" as process attributes.
- **Level 4**: Predictable process. This level implements processes within a defined boundary that allows the achievement of the processes outcomes. This level has "Process Management" and "Process Control" as process attributes.
- **Level 5**: Optimizing process. This level implements processes in the way that makes it possible to achieve relevant, current and projected business goals. This level has "Process Innovation" and "Process Optimization" as process attributes.

In COBIT 5 to achieve a given level of capability, the previous level has to be completely achieved

The following COBIT 5 areas and domains are covered by CMMI:

- Application-building-and acquisition related processes in the BAI domain
- Some organizational and quality-related processes from the APO domain

4.3 COBIT and PMBOK

PMBOK defines best practices and techniques for project management and does not cover aspects of IT management and IT governance. COBIT and PMBOK cannot be directly related as they are not many similar objectives.

Only a handful of features are common between PMBOK and COBIT. PMBOK address these features of COBIT relatively well as illustrated below:

COBIT	PMBOK
EDM	Knowledge Areas
Ensure stakeholder transparency	Project Integration Management Project Scope Management Project Time Management Project Cost Management Project Quality Management Project Human Resource Management Project Communications Management Project Risk Management Project Procurement Management Project Stakeholder Management
APO	
Manage portfolio Manage budget and costs Manage human resources Manage suppliers Manage quality Manage risk	
BAI	
Manage programmes and projects Manage requirements definition Manage changes	

Table 3: COBIT and PMBOK mapping [12]

4.4 COBIT and TOGAF

The following COBIT 5 areas and domain are covered by TOGAF [12]:

- Resource-related processes in the EDM (governance) domain – The TOGAF Components of an Architecture Board, Architecture Governance and Architecture Maturity Models Map to resource optimization
- The enterprise architecture in the APO domain. In the core of TOGAF is the Architecture Development Method cycle, which maps to the COBIT 5 practices of developing an architecture vision (ADM phase A), defining reference architectures (ADM phases B, C, D), selecting opportunities and solutions (ADM phase E), and defining architecture implementation (ADM phases F, G). A number of TOGAF components map to the COBIT 5 practice of providing enterprise architecture services. These include:
  - ADM Requirements Management
  - Architecture Principles
  - Stakeholder Management
  - Business Transformation Readiness Assessment
  - Risk Management
  - Capability-based Planning
  - Architecture compliance
  - Architecture contracts

5. Conclusions

IT governance frameworks helps boards and management understand the issues and strategic importance of IT, and assists in ensuring that the enterprise can sustain its operations and implement the strategies required to extend its activities into the future. It provides assurance that expectations for IT are met and IT risks are addressed. In summary, IT governance ensures that IT goals are met and IT risks are mitigated such that IT delivers value to sustain and grow the enterprise. However, because of their plurality, choice or integration of multiple IT Governance frameworks can be very difficult.

In this paper the popular frameworks for the IT Governance have been introduced and evaluated based on the EDM, APO, BAI, DDS and MEA parameters (the important parameters of COBIT 5). For future work integrating other parameters for evaluating such as agility, ethic and environment will be constructive.

Based on the literature review and the analysis performed, it is apparent that frameworks subjects of the study are complementary. Most companies go with COBIT or ITIL, but others can make other choices. For operations, try ITIL. For application development and lifecycle issues, try CMMI. COBIT is also a great umbrella framework. But combining frameworks can also make sense. COBIT can be used as an overall framework; then ITIL for operations, CMMI for development, PMBOK for project management and TOGAF for enterprise architecture.

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