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## Understanding IT Governance: Definitions, Contexts, and Concerns

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# Understanding IT Governance: Definitions, Contexts, and Concerns

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## Introduction

Organizations that wish to successfully reach their strategic goals need an explicit understanding of governance and their approach to it. A significant impediment to this understanding is that many individuals are confused about exactly what governance is, and what constitutes good governance. In this paper, we seek to remedy some of the confusion concerning what governance is. Before starting to focus on the definition of governance and its relationship to other organizational concepts such as management and process, we briefly discuss why organizations should care about governance, and why IT governance is becoming important.

Every organization makes decisions and has some form of governance – this may be done explicitly or implicitly. The governance style varies from organization to organization depending on the fundamental goal of the organization. An innovative cutting-edge business which wants to be very nimble might want few light-weight processes. On the other hand, a business where the IT needs to operate 24/7 may have more stringent processes. Good governance tends to be focused on achieving strategic goals. It helps an enterprise realize its goals, leading to business benefits and creating value. It also helps mitigate risks and improves team effectiveness by enabling good communication and effective measurement and control. While governance of entire corporations has been well studied and understood, we believe the challenges of governance of IT organizations is becoming more crucial and is not as well studied.

Modern technology and IT have evolved in recent years allowing companies to focus on core competencies. IT facilitates organizations to outsource non-core competencies and/or create larger enterprises composed of several companies. In these enterprises, each company focuses on its core competencies, leaving other functions / capabilities to other companies with different competencies. This increased focus on core competencies is increasing the interdependencies and intertwining between organizations resulting in a globalized workforce and sometimes the forming of virtual organizations. Modern technology and IT allow and encourage this interdependency by coordinating lots of dispersed people working together. For IT to be efficient, it must be developed and deployed with cognizance of a large number of inputs from many stakeholders spread

across the continents. Thus when an IT organization is governed it must deal with multiple organizations and sometimes with conflicting forces from across these organizations. Hence, many of the challenges of governing the corporation and governing its relationships get concentrated in the smaller IT organization making IT governance very important.

In 1937, Coase wrote a landmark paper titled "The Nature of the Firm." In this work, he discussed how the size of a corporation depends on the relationship of the cost of internal communication/coordination vs. the cost and value of external transactions. Internal communication and coordination costs grow at a super-linear rate as size increases, leading to diseconomies of scale. This factor (and other forces that come into play, such as market saturation and geographical distribution), often cause firms to move into multiple product areas, and create silos (often geographically distributed) of expertise for those products. If these silos are loosely coupled (as in the case of conglomerates such as General Electric), these strategies can be successful. If the products have more dependencies, then these strategies can actually aggravate the issue arising from diseconomies of scale.

Information technology can help address the situation of diseconomies of scale in two ways. First, within a firm it introduces efficiencies that reduce the costs of both internal and external coordination and communication. This is due the ability to communicate both synchronously (e.g. instant messaging) and asynchronously (e.g. email and collaborative workspaces.) It also provides a basis to standardize common business processes and communications from the executives leading the firm. Second, IT allows firms to outsource non-core competencies and/or create virtual enterprises composed of several companies. In these entities, each company focuses on its core competencies, leaving other functions / capabilities to other companies with different competencies. This in effect allows corporations to have smaller entities and alleviates the problem of diseconomies of scale facilitated by IT. Service-Oriented Architecture (SOA) is an emerging way to create and operate these virtual enterprises. A necessary condition for these enterprises to succeed is a mechanism for communicating and coordinating their activities. Just as it enhances this ability within traditional companies, IT can also help provide this ability to SOA-based enterprises.

Although IT helps ameliorate the diseconomies of scale effects within firms, IT itself suffers from diseconomies of scale. To address this, it is important for organizations to have effective IT governance procedures in place. These procedures should align closely with the business strategy of the firm, ensuring that their particular perspectives around basic high-level business goals (customer intimacy, operational efficiency, and innovations) are aligned with their IT strategies. Careful attention to the assignment of IT decision rights, measurement within the IT organization, and IT policies that shape the decisions an organization can make can mean the difference between successfully dealing with diseconomies of scale and succumbing to the inefficiencies they create.

In this paper, we start with the definition and discussion of governance, and clarify its relationships to management and process. We further discuss how these organizational

components are related. We then present our view on IT governance and its concerns. At the end of our paper, we have a glossary of terms. Throughout the paper, we use two examples to illustrate different aspects of governance and how they play a role together with management and process in achieving the organization goals. The first example is an IT Governance example - the Linux open source development project where we show how governance is used to achieve productive development in an environment which is often considered to have anarchic characteristics. The second example concerns an enterprise adopting a service orientation approach and how measurement is used to drive desired behavior across the organization management structure.

# Defining Governance and related concepts

## *Governance*

*Governance* is defined as:

- Establishing chains of responsibility, authority and communication to empower people (static or structural component of governance)
- Establishing measurement and control mechanisms to enable people to carry out their roles and responsibilities (dynamic or measurement component of governance)

The goal of governance is to ensure that the *results* of an organizations *business processes* meet the *strategic requirements* of the organization. Once the structural component of governance is established, good management and processes result in an organization that learns through measurement and control. While process doesn't explicitly appear in this definition, often decisions rights are conveyed only in the context of a process. That is to say someone might have the right to approve something only if someone else has first. So, processes are part of governance.

Sub-organizations within a larger organization may have varying sub-strategies. For example, an IT organization may have a more nimble and agile development sub-organization with less stringent processes and an operations sub-organization that needs to run 24/7 with tighter processes and control.

As an example of governance, consider the development of the Linux operating system. Linux is a Unix-like operating system created by Linus Torvalds in 1991 as a private research project and further enhanced as an open source project. Open source projects often start using the cathedral style of development which is done by a smaller closed group of people using common software engineering practices. Once projects are available for open source development, they typically follow the bazaar development style where a community of users and developers are allowed to review and modify the

code associated with a software system. In the early history of the project, Torvalds wrote most of the code himself. After several months of work, he managed to create a reasonably useful and stable version of the program and opened the code for open source development. To effectively govern the project, Torvalds set up chains of responsibility and authority. The following governance structure (see Figure 1) was used:

- Linus Torvalds serves as the leader of the project.
- There are a core set of developers called 'committers'. Although this group works asynchronously, it is highly collaborative. It also represents the broader Linux open source development community and is authorized to add functionality and announce new releases and follow up on bug fixes. The team is committed to the project and is very knowledgeable and elected by a democratic voting system to be part of the elite core set. This set of developers is referred to as ring of lieutenants surrounding Linus Torvalds, resulting in a star-shaped organization structure.
- The core set of developers is surrounded by their own set of developers who in turn may have their own developers, creating a cascade of hierarchies.

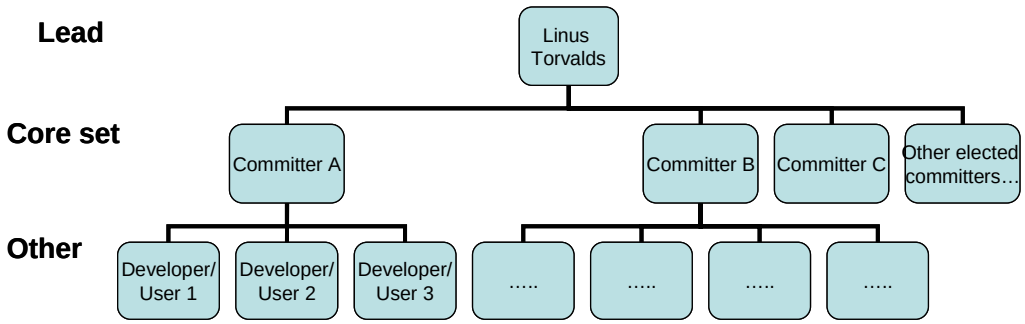


*Figure 1: Chains of responsibility for Linux.*

Torvalds also set up measurement and control mechanisms to help achieve behavioral change to improve the open source development effort. For example, he set up a policy for stable releases and bug fixes. This policy states that all major merges must happen within two weeks of a stable kernel release and all the rest of the time between releases should then be spent on fixing bugs. This policy is managed and controlled by the core set of developers who are responsible for the stable production of Linux code. This policy, in conjunction with others, leads to summary project level measurements such as growth of stable vs. development releases as illustrated in Figure 2. These types of measures are Torvalds way of managing the dynamic behavior of the community and exercising process control to effectively manage the Linux open source project.

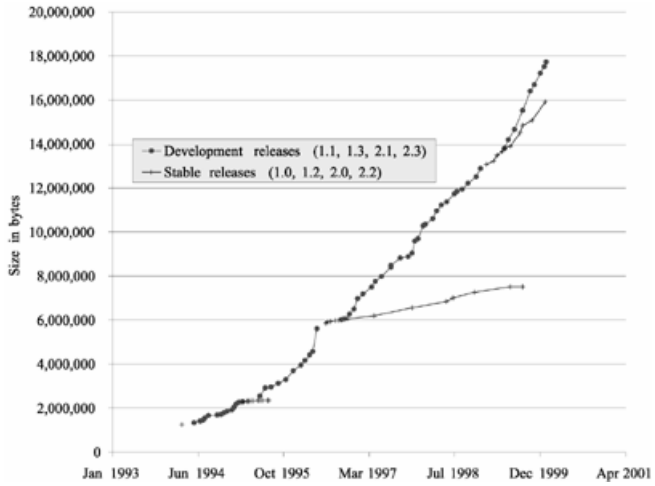


*Figure 2: Growth of the compressed tar file for the full Linux kernel source release.*

As a second example of IT governance, consider the case of an enterprise that wants to increase its business flexibility and enable the growth of the business into a new industry or geography. To address these business goals, the organization decides to adopt a service orientated approach (SOA) for business processes and the IT infrastructure as a means to increase business flexibility and growth capability.

The CEO decides to form a governance board that will be in charge of establishing the governance structure, and the control and measurements mechanisms that will provide the assurance that the SOA adaptation process is successful and that the business goals are achieved. The board, consisting of C-level executives decides to form an Enterprise Architecture (EA) team that will be responsible to create a service oriented blueprint for the organization and to manage the multi-year alignment of existing and new projects to the new EA.

The EA team is given the **authority** to review and approve/reject projects with respect to the long term to-be architecture and transformation plan. This change is **communicated** within the organization and is enforced by deploying an updated funding process which includes getting approval from the EA chief architect. The process also enables the project to appeal to the governance board in case of urgent business needs which cause a project to be non-compliant with the EA.

The Enterprise Architecture team comprising of a chief enterprise architect, business process owners, the CIO, and a group of senior IT architects is now in charge of the overall execution. The chief enterprise architect is given the overall responsibility and accountability to achieve the overall goals of understanding the as-is enterprise architecture, establishing the to-be service-oriented architecture, and building the long term roadmap and yearly execution plan for the service oriented transformation .

To measure the progress being made to meet the goals, the EA chief architect presents a quarterly report on the following metrics to the board:

- Alignment of current business processes and IT infrastructure with to-be architecture.
- Complexity and risk of the transformation
- Cost and time to value estimates
- Return on investment – measuring the value created through the new service oriented architecture and comparing it with the transformation costs

## *The impact of Governance on Management*

Managers are individuals who make decisions about hiring, firing and raises for other individuals. Since these rights are so important they tend to also be in charge of other decisions, but often those other decisions reside with non-managers. Managers are individuals who make decisions about people (human) resources or other resources such as servers, tools, etc. Managers have decision rights that are determined by a governance process. Additionally, managers monitor other individuals who may also have decision rights assigned to them in order to achieve a designated goal. Governance assigns decision rights to roles in the organization, whereas the act of managing is concerned with actually making decisions or monitoring those made by people that one manages. In its dynamic dimension, governance establishes the measurement and control strategy, whereas management is concerned with the collecting and interpreting the actual measurement and making decisions based on them. For example, governance determines who makes the decision about enterprise IT investments and management determines the actual dollar amount and resources invested.

Revisiting our Linux example, development is managed by the trusted, elected, core set of developers. Each member (or groups of members) has their own set of trusted developers that they manage to implement new functionality, produce documentation, fix bugs, etc. Ongoing collaboration is decentralized and developers work independently and autonomously. The developer's output is integrated to the base code by the core set of developers. Torvalds, the lead, maintains conceptual integrity, relying on trust earned through competence. Participants communicate asynchronously, and are motivated to contribute for reasons such as opportunity, community, and status.

In the SOA transformation example, governance is observed through the establishment and communication of the authority of the chief EA architect to approve/reject projects and the board to approve exemptions, whereas the day-to-day activities of approving/rejecting projects is part of management.

## Process

A *process* is a naturally occurring or designed sequence of operations or events that produces some outcome, possibly taking up time, space, expertise or other resource. A process may be identified by the changes it creates in the properties of one or more objects under its influence.

Managers often achieve results by implementing or using processes that practitioners follow to get work done within the enterprise. Support by tools can automate the process and increase efficiency.

Returning to our Linux example, the entire Linux development community follows a light-weight process for the development activities. Table 1 presents an example of a typical change management request process and the steps that practitioners follow to achieve the goal of incorporating a change.

*Table 1: Typical change request.*

| |
|---|
| 1. *Volunteer.* Accept responsibility for a given task, typically a bug fix or enhancement. |
| 2. *Implement change.* Obtain a working copy of the source code and make necessary changes. Create a patch representing the differences between the old copy and the new one. |
| 3. *Submit source.* Post the patch and a brief description explaining its relevance to the developer mailing list. |

Returning to our SOA transformation example, the board established a process for reviewing and approving IT projects. Because the EA team had to constantly report on cost and risk, it was especially important to measure the cost/time sizing for IT projects and reduce the variance in their estimates. In order to do so, they decided to introduce a control point after completion of each major phase in the project. At that control point, the overall project sizing would be adjusted based on the actual sizing for the competed phase. If the overall sizing deviated more than 7% from the original estimate, the entire project would need to be re-examined and re-approved by the CIO and EA team.

In addition the CIO decided to adopt a portfolio management process as a mean to prioritize his IT investments and balance between strategic and non-strategic investments and short-term and long-term needs.

## *A Unified View of Governance and its Related Concepts*

Governance starts at the senior executive level and extends via the management structure to the practitioner level where projects are implemented. The governance process starts with the senior executives assigning decision rights and authority and determining measurement and control policies. Managers allocate available resources and deploy effective processes to achieve the established goals. Depending on the size of the organization, a cascading effect of assigning decision rights and deploying processed may occur illustrating the fractal nature of governance.

Starting with an understanding of the enterprise strategy and goals, governance policies establish chains of responsibility and authority and setup measurement and control mechanisms. This determines the management structure that makes decisions about directing resources and assigning decision rights to them. Management also deploys processes to implement governance policies and work toward the strategic goals of the enterprise. Practitioners then participate in executing the processes. Figure 3 illustrates these relationships.

To illustrate the unified view, let us revisit our Linux example. In the Linux world, several distributions (distros) exist. A Linux distro is a Unix-like operating system comprising software components such as the Linux kernel, the GNU toolchain, and assorted free and open source software. Some proprietary software is found in certain distros and is not free software. A Linux distro is created by individuals, groups and organizations from around the world. The governance for the entire Linux community is varied. Each distro has its own strategy and governance policies, with its own management and processes in place. But as the distros move higher up in the chain the governance policies get more constrained. For example, the kernel is at the highest level having maximum control by Linus Torvolds and the assorted free software distros have varied approaches. These rather different strategies give the distros freedom to develop based on their local strategies.

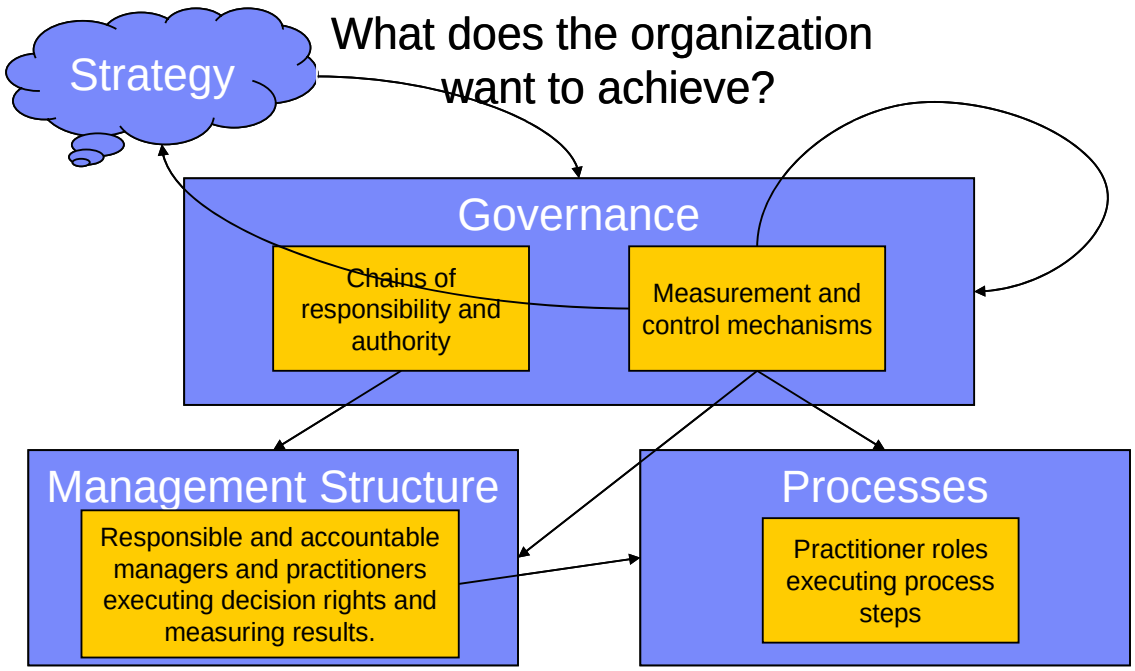


*Figure 3: Governance, Management, and Processes*

## IT Governance

Within IBM, a widely accepted definition for IT governance is:

- Governance that pertains to an organization's information technology activities and the way those activities support the goals of the business
- Decision making rights associated with IT as well as the mechanisms and policies used to measure and control the way IT decisions are made and carried out within the organization

There are several forms of IT governance: SOA governance, data governance, governance of development, operational governance, etc. Each of these forms of IT governance has a fundamental goal with varying governance styles, as well as dependencies and complex relationships with other forms of IT governance (i.e. they are not silos but are inter-related). For example, an innovative cutting-edge business focusing on governance of development may want to be very flexible and want few light-weight processes. On the other hand, a business where the IT needs to operate 24/7 (operational governance) may have more stringent processes and control mechanisms.

## *Concerns of IT Governance*

The existing literature on IT governance by the Center for Information Systems Research (CISR) at the MIT Sloan School of Business, the IT Governance Institute (ITGI), the Information Systems Audit and Control Association's COBIT infrastructure and Information Technology Infrastructure Library (ITIL) present different concerns of interest for IT governance. In addition, the Sarbanes-Oxley (SOX) Act of 2002 which focuses on accounting and reporting standards has a section on IT in its internal controls that recommends COBIT. SOX qualifies that certain aspects of COBIT may not be needed and may be outside the boundary of SOX regulations. Legal/ regulatory forms of governance and compliance often differ remarkably from internal forms of governance that corporations use to ensure they are meeting their strategic goals.

When exploring these sources, it became apparent that more work needs to be done to develop an accepted IT governance approach. We believe that most of the concerns could be organized in a 2-dimensional matrix view with the phases of the IT process in one dimension and the governance goals in the other dimension as shown in table 2. We would like to point out that many of these concerns are cross cutting and not independent of each other.

*Table 2: IT Governance Concerns.*

| Phase / Goal | Planning and Organization | Acquisition | Development | Delivery & Support |
|---|---|---|---|---|
| **Strategic alignment** | • Identify business priority<br>• Align with EA<br>• Define organization and process | • Identify, acquire, develop and maintain automated solutions | • Define SLAs | |
| **Value delivery** | • Allocate IT investments to maximize ROI | • Balance risk and return<br>• Enable operation and use | • Define and manage SLA<br>• Ensure continuous services | |
| **Risk management** | • Determine resource availability and staffing to mitigate risks identified through checklists and assumption analysis<br>• Perform risk measurement and analysis with performance models, cost models, etc.<br>• Perform risk prioritization by analyzing risk exposure (for example, perform statistical control) and determine go/no-go<br>• Assess, evaluate and minimize IT risks<br>• Plan for compliancy | • Identify acquisition vs. build risks<br>• Identify M&A team and assign responsibilities for different parts (decompose risk and allocate appropriate people)<br>• Measure acquisition + ongoing costs<br>• Perform risk measurement and analysis for potential solutions and determine winner<br>• Track acquisition value to determine success criteria for future acquisitions<br>• Reduce risk (variance)<br>• Control change | • Identify development team through staffing models<br>• Do prototyping and simulation to minimize risk exposure<br>• Measure and reassess risk with different stakeholders based on initial prototyping results<br>• Measure ongoing cost and effort | • Identify team to do risk prioritization to determine agreed service levels to minimize risk exposure and leverage risks<br>• Identify team based on staffing models to meet service levels<br>• Minimize risk exposure from 3rd party services<br>• Measure allocated costs and resources<br>• Prioritize operational risks and mitigate t minimize exposure<br>• Track service levels success rate to enable future planning<br>• Meet compliance needs |
| **Efficient and flexible use of resources** | • Define an information architecture<br>• Create framework for technology planning<br>• Define organization and processes<br>• Define IT investment framework | • Use available resources anywhere (global)<br>• Buy/ build / reuse<br>• Source/resource<br>• Identify business goals and | • Identify business goals and requirements<br>• Design and develop resource<br>• Validate and measure quality | • Define required service levels<br>• Monitor and manage performance and capacity.<br>• Identify and allocate costs<br>• Manage |

| | | | | |
|---|---|---|---|---|
| | • Manage human resources<br>• Develop quality management system<br>• Develop project management framework | requirements<br>• Analyze potential solutions and determine winner<br>• Manage deployment to maximize efficient use of resources<br>• Measure acquisition + ongoing costs<br>• Measure / estimate value | • Measure development + ongoing costs<br>• Measure / estimate value | operational problems<br>• Manage infrastructure, applications and information to maximize usage and flexibility<br>• Measure IT performance and internal controls |

## Conclusions

Understanding and implementing IT governance is critical for gaining competitive advantage. In this paper, we provide an overview of governance, and discuss its relationship to management and process selection. We also present IT governance and give an overview of the major concerns of IT governance. Our goal was to provide a clear understanding of what governance is, define how it relates to management and the processes used to run an enterprise, and to discuss IT governance and the concerns that it addresses.

## Acknowledgements

We would like to thank Bob Dill and John Morar for their invaluable comments, discussion, and guidance as we wrote this document.

## Glossary

1. Governance: *Governance* is defined as:
   - Establishing chains of responsibility, authority and communication to empower people (static or structural component of governance)
   - Establishing measurement and control mechanisms to enable people to carry out their roles and responsibilities (dynamic or measurement component of governance)

2. Management: Managers are individuals who make decisions about hiring, firing and raises for other individuals. Managers also make decisions about people (human) resources or other resources such as servers, tools, etc. Managers have decision rights that are determined by a governance process. Additionally, managers monitor other individuals who may also have decision rights assigned to them in order to achieve a

designated goal. Governance assigns decision rights to roles in the organization, whereas the act of managing is concerned with actually making decisions or monitoring those made by people that one manages.

3. Process: A *process* is a naturally occurring or designed sequence of operations or events that produces some outcome, possibly taking up time, space, expertise or other resource. In addition, a business process has the rights for certain people to take actions and arrive at decision points to advance the process to the next step. Processes may be characterized by specifying their control points: artifact control point and lifecycle control point:

- Artifact control point – The process will entail the creation of and/or modification by of artifacts such as product specifications, release orders, charge requests, etc. These artifacts change status. Each of those status changes requires a decision with associated rights.
- Lifecycle control point – The process itself may contain control points such as iteration boundaries and phase transitions (e.g. inception, elaboration, etc.) Moving through these control points requires a set of decisions (such as 'phase complete?') which again require associated rights.

The artifact control points may or may not align with the lifecycle control points.

4. IT governance: IT governance is defined as:
   - Governance that pertains to an organization's information technology activities and the way those activities support the goals of the business
   - Decision making rights associated with IT as well as the mechanisms and policies used to measure and control the way IT decisions are made and carried out within the organization

5. Enterprise architecture (EA): Enterprise Architecture is the practice of applying a comprehensive and rigorous method for describing a current and/or future structure and behaviour for an organization's processes, information systems, personnel and organizational sub-units, so that they align with the organization's core goals and strategic direction.

6. Service-oriented architecture (SOA): The term SOA has many interpretations. We and are our customers agree on the following interpretation. SOA is a mechanism for ensuring that a company's technical infrastructure is flexible and responsive to business transitions, as epitomized by the following quote from IBM's SOA website http://w3.ibm.com/news/w3news/top_stories/2005/09/igsswg_soa.html:

"SOA helps clients create business value by helping them develop a more on demand IT infrastructure. But the demands of an increasingly competitive global marketplace – driven largely by the networked world – are driving companies to find new ways to grow their businesses, while at the same time they must operate as efficiently as possible. Responding to competitive pressures and market opportunities requires business

systems – and supporting technology infrastructures – to be quickly adaptable and flexible in structure. (If this sounds familiar, it should: IBM introduced the idea of On Demand Business)."

Another widespread but incorrect interpretation of SOA is as an infrastructure for facilitating the integration of heterogeneous or legacy applications.

7. Strategy: Strategy is defined as the art of devising or employing plans toward a goal.

8. SOA governance: SOA governance is the extension of IT Governance that addresses SOA considerations. SOA governance is specifically focused on the lifecycle of services and composite applications in an organization's SOA.

9. Data governance: Data governance is the extension of IT Governance that addresses data considerations Data governance refers to the overall management of the availability, usability, integrity, and security of the data employed in an enterprise.

10. Governance of development: Governance of development is the extension of IT Governance that addresses development considerations. Governance of development has 3 main concerns:

- Manage value: Align the business and the software. At the organizational/project levels, balance risk and return and provide clarity and accountability.
- Develop flexibly: Leverage global resources by enabling agile development choices and the use of iterative processes to reduce risk.
- Control risk and change: Continuously measure to reduce risk, enable lifecycle change management and meet internal and external compliance needs.

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