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A FRAMEWORK FOR THE ARCHITECTS OF THE SUSTAINABLE FUTURE

HOW CAN ARCHITECTS DESIGN AND OPTIMIZE BUSINESS AND IT SOLUTIONS TOWARD A COMMON SUSTAINABILITY GOAL!

This article is part of Capgemini's Applications Unleashed 2022 Report which can be downloaded here.

HIGHLIGHTS

· Architecture frameworks provides principles and practices for the design and long-term decisions on the architecture of enterprises, business, and solutions.

· The version 6 of Capgemini's IAF adds the Sustainability perspective side by side with Security and Governance.

· IAF V6 enables IT and enterprise architects to design sustainable architecture solutions and drive governance on sustainability.

· The four abstraction levels of IAF ensure that sustainable initiatives are strategic and logically aligned to deliver positive environmental impact and business goals.

In a nutshell:

Integrated Architecture Framework (IAF) is a Capgemini comprehensive and flexible approach to undertaking Enterprise, Business, and IT/Solutions Architecture. It is based on inputs from many experienced architects since 1996. Launched in 2020, IAF version 6 – The Sustainability edition, adds Sustainability to the framework, side by side with Security and Governance perspectives.

Sustainability in an information technology context can be characterized by the application of IT practices and technologies for the benefit of customers and other stakeholders that ensure long-term well-being in economic, social, and environmental sustainability pillars

One can describe architecture as an ecosystem of manual and automated information processing systems that an organization uses to achieve business goals. An architecture framework provides principles and practices for creating and using the architecture of a system, business, or enterprise. It structures architects' thinking by dividing the architecture description into domains, layers, or views, and offers models. This allows for making systemic design decisions on all the components of the system and making long-term decisions to support organizations in reaching their strategic goals. The IAF version 6 is a major framework release as it now also incorporates key learnings and artifacts that are very relevant to an increasing priority of several organizations today, meaning sustainability.

Sustainability in an information technology context can be characterized by the application of IT practices and technologies for the benefit of customers and other stakeholders that ensure long-term well-being in economic, social, and environmental sustainability pillars. In a broad sense, sustainability means that the sourcing, operations, and disposal of IT equipment do not directly or indirectly have negative impacts on ESG (Environment, Social, and Governance) aspects. In practice, the IAF V6 can be used either by organizations seeking to design architectures to ensure that sustainability goals are met, or to apply 'sustainability glasses' on the design and improvement of business processes, information, information systems, and technology infrastructure.

IAF V6 has the framework to accommodate and foster these discussions at various levels of the organization with the key objective of explaining the facts behind architecture decisions, foreseeing the impacts, and anticipating changes in a direction of a Sustainable Future.

THE IAF V6 EXPLAINED

IAF defines the structure, content, approaches, and techniques to deliver Business, Enterprise, and Solution architecture on projects and with clients in a pragmatic whilst complete, and consistent manner. The Integrated Architecture Framework is used to structure the content from architecture work, and comprises several inter-related areas:

- Vertical **Aspect Areas** that describe a formal boundary between elements of the architecture solution: **Business, Information, Information Systems, and Technology Infrastructure.** Each Aspect Area comprises a set of Artifacts that describe the architecture in that aspect area.

- Horizontal **Abstraction Levels** that provide a framework for thinking and analyzing the objectives of the business, logically represented by **Contextual (WHY), Conceptual (WHAT), Logical (HOW), and Physical (WITH WHAT) layers.** This is the way that IAF deals with complexity and completeness.

- **Perspectives** that need to be considered across all aspect areas and abstraction levels, describing the specific attention paid to **Governance, Security, and Sustainability.**

Figure 1: The IAF V6 framework

Four *Abstraction* Levels

			Three *Perspectives* : : Sustainability, Security and Governance across all Abstraction Layers and Aspect Areas		
			Sustainability Perspective	**Security** Perspective	**Governance** Perspective
"Why" does IT need to be transformed? Context information and key principles that support the value proposition	Why	**Contextual** Abstraction Level			
"What" services / capabilities are required? "What" is required from each service?	What	**Conceptual** Abstraction Level			
"How" can customers needs be realized with technology components? "How" do technology components interrelate "How" do components "implement" services?	How	**Logical** Abstraction Level			
"With What" standards, products, guidelines will technology components be implemented?	With what	**Physical** Abstraction Level	**Business** Aspect Area / **Information** Aspect Area	**Information systems** Aspect Area	**Technology** Aspect Area

Four main *Aspect* Areas: Business, Information, Information Systems and Technology Infrastructure

The framework provides a repository model for the architecture elements, describing the format and content of each element and how they relate to each other.

In the modern world, Sustainability is an increasingly important consideration that seeks to strike a balance between the needs of technical and economic development with the need to protect the environments and societies which are impacted. It is therefore a necessary and important component in both business and technology architecture and the motivation for having a specific sustainability consideration in IAF.

In 2020, the Sustainability perspective was added to the IAF side-by-side with Governance and Security, completing the following rational:

Governance Perspective

Governance Perspective adds knowledge to any or all aspect areas in terms of quality and manageability of the architecture. Governance can be considered as the balancing of quality against cost and in its broadest meaning, it includes everything from business governance (often driven by standards and regulation) compliance & privacy, business process management (supporting the measurement of business processes to ensure that they meet their agreed SLAs) and information governance through to IT governance (systems management, service reporting, etc.).

Security Perspective

Security Perspective adds knowledge to any or all aspect areas in terms of risk and integrity of the architecture. Security can be considered as the balancing of risk against cost, it covers the security of information and information systems (including Operational Technology) as well as that of the business, and it will be implemented not just by IT but by wider processes and controls. Security must also be measurable to allow assurance of the implemented risk mitigation controls to be obtained and provided to relevant stakeholders.

Sustainability Perspective

Sustainability Perspective adds considerations and knowledge to any or all aspects areas in terms of the context in environmental, social, and economic Sustainability and measures the sustainable outcome of the architecture. The Sustainability perspective typically considers resource sourcing, utilization and disposal, environmental impact, social impact and outcomes, and economic outcomes.

Besides of its complexity at the first sight, there are many simple and pragmatic ways to deploy the IAF V6 in practice. The next sessions will highlight some of these approaches, their environmental benefits, and business drivers.

SUSTAINABLE BY DESIGN IS THE NEW SECURE BY DESIGN

In practical terms, organizations should look to sustainable design practices in the same way they look to Digital Security. By doing that, enterprise and IT architects decide on how to design and reduce the environmental impact of solutions to all relevant aspect areas: business processes, information, information systems, and technology.

A real architectural decision example applied to one of Capgemini's customers on Intelligent Industry was to:

01 Deploy an EDGE solution to bring only the needed computing and connectivity power close to a production asset.

02 Transfer only the necessary asset data to a Cloud provider. The provider itself assures energy efficiency and a circular economy in its data centers.

A sustainable architecture solution ensures environmental benefits, such as a reduction of energy consumption in data transfers and computing power, and a reduction of the enterprise hardware footprint. Other important benefits are the engagement and empowerment of architects and IT/OT teams with sustainable design best practices, helping to develop a cultural change towards sustainability.

SUSTAINABILITY GOVERNANCE MECHANISMS

By looking beyond, the architecture and within the own organization, the entire ecosystem can be made more sustainable. After all, architecture, business processes, systems and data flows are interconnected to the environment through chains. Think of partners, suppliers, buyers, and customers. To maximize positive environmental impact organizations should govern sustainable IT initiatives from an ecosystem point of view.

4 STEPS APPROACH TO APPLYING SUSTAINABILITY PRINCIPLES TO ARCHITECTURE SOLUTIONS

IAF V6 uses a logical and sequential construction framework to create strategic alignment from business needs to technology and resources to be deployed. The proposed approach shows how enterprise and IT architects could apply sustainable IT principles to the IAF's four Abstraction Layers:

- The **contextual architecture** concentrates on the discovery and understanding of WHY the enterprise needs this certain solution and what the business and environmental objectives of the solution are

- The **conceptual architecture** focuses on **WHAT** the essential elements in scope to drive the business and sustainability objectives are
- The **logical architecture** is about **HOW** basic elements relate to each other and to the eco-system of the enterprise and what the requirements and interfaces are
- The **physical architecture** describes which elements of the structure will be realized and **WITH WHAT** technological, standard, and physical items the environmental objectives can be achieved.

"Sustainable development is the pathway to the future we want for all. It offers a framework to generate economic growth, achieve social justice, exercise environmental stewardship, and strengthen governance…"
(Ban Ki-moon).

ABOUT THE AUTHORS

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IN/2A-005.23b