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Zachman Framework Plus Six Sigma Yields Improved Architectures

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Introduction

- System/Enterprise Architecture practice has many tools and techniques to draw upon
- Six Sigma Process Improvement has its own tools
- Each tool and technique fits a particular use, situation or need
  - Use the proper tool for the job
  - Case in point: A hammer is not a screwdriver, but ….
- Can tools from these disciplines be used in combination?
  - And result in a more effective approach?

These are the questions that will be answered in this paper

Hypothesis

- Architecture and architecting is hard to do and "get it right"
  - Just like writing "good requirements"
- Combining the Zachman Framework with Raytheon Six Sigma voice of the customer techniques may lead to solutions that can:
  - Meet a broader spectrum of customers' needs
- This paper explores this hypothesis of tool/technique mixing and cross usage

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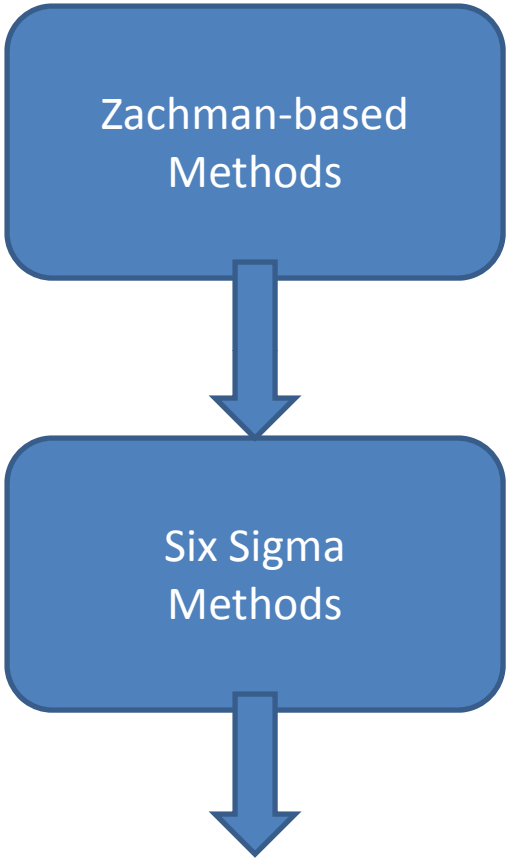
Example Problem

For a proposed product offering?

- Starting with enterprise goals, identify:
  - activities to be performed,
  - user roles performing these activities, and the needs of these users
- Identify the value that various users/customers place on needs/solution benefits
- Optimize the Offering to satisfy the greatest number of users



Optimized solution

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Architecting Tools and Techniques

Classical:

- Zachman Framework
- DoD Architecture Framework (DoDAF)
- The Open Group Architecture Framework (ToGAF)
- Federal Enterprise Architecture Framework (FEAF)

Others:

- Architecture Tradeoff Analysis Method (ATAM)
- …

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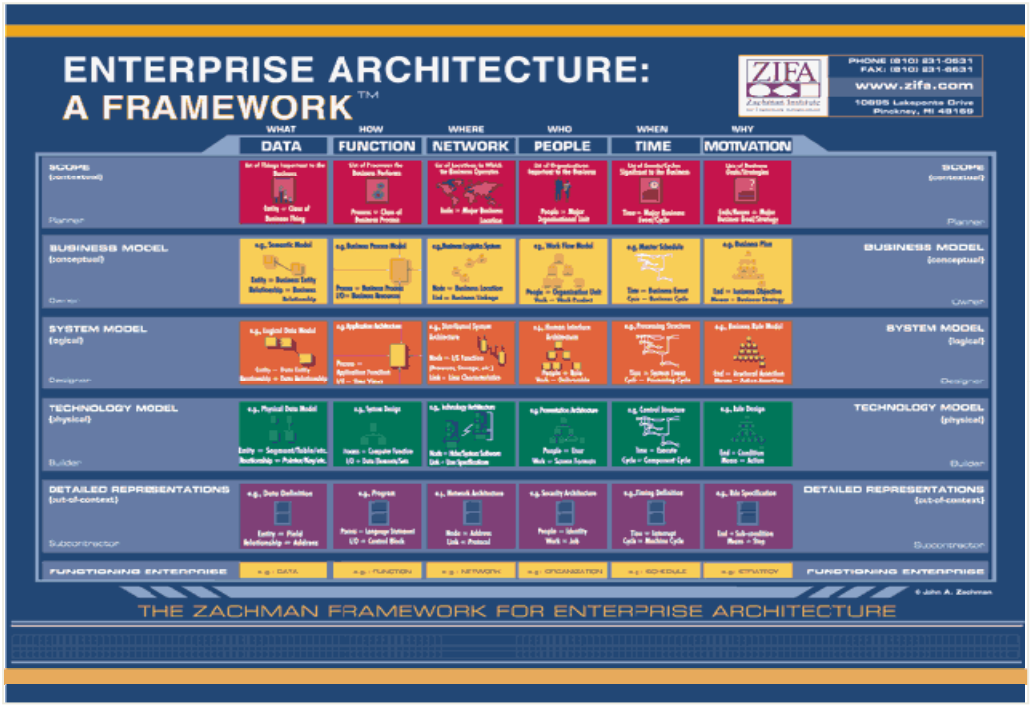
Zachman Framework Summary

- The ZFW is a classification schema to organize 'primitive' architectural information
- Does not prescribe specific models, modeling notation, or methodology
- Can be used to describe any complex entity



- Defines 6 perspectives of an architecture
  - Legacy: Planner, Owner, Designer, Builder, Subcontractor, Functioning enterprise
  - Latest: Strategists, Executive Leaders, Architects, Engineers, Technicians, Workers
- Defines 6 abstractions of an architecture [Interrogatives]
  - What, How, Where, Who, When, Why

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Zachman Framework Usage

- Order of attack from a practitioner perspective…
  - Column 6 – Goals
  - Column 2 – Processes
  - Column 4 – People (Roles)
  - Column 1 – Data
  - Column 3 – Location
  - Column 5 – Time

We see these two as interchangeable in sequence

- The row you are addressing is based on your role within the development of the Enterprise solution
- Build relationship mappings between the contents of cells when these mappings are of value

  Produce a list of the goals of the Enterprise
  Define a list of processes required to achieve those goals
  Define a list of personnel who must implement the processes

Answer

The list of goals…
mapped to the activities…
mapped to that person's position (e.g. role)

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Six Sigma Summary

- A business management strategy originally developed by Motorola, USA in 1986.
- Six Sigma seeks to improve the quality of process outputs by identifying and removing the causes of defects (errors) and minimizing variability in manufacturing and business processes
- Sigma (σ) is also called the standard deviation. It is a measure of variation around the average.
- The goal of Six Sigma performance is what they call 99.9997 percent "perfect". That is, all of the variability up to plus or minus six standard deviations around the mean is within the specification limits! Six Sigma is 3.4 Defects per Million Opportunities (DPMO)

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Listening to the Voice of the Customer

- Using a structured approach you can gather data about the customer's goals and activities
  - Start with the concept of operations, specification, etc.
- You then must identify which attributes a customer values: operator position (?)
  - Develop a set of questions that are designed to elicit information to understand the customer care-abouts
- From there you can begin to de-conflict competing goals
- For our example we will use the Kano model, which focuses on visually presenting customers' care-abouts or needs

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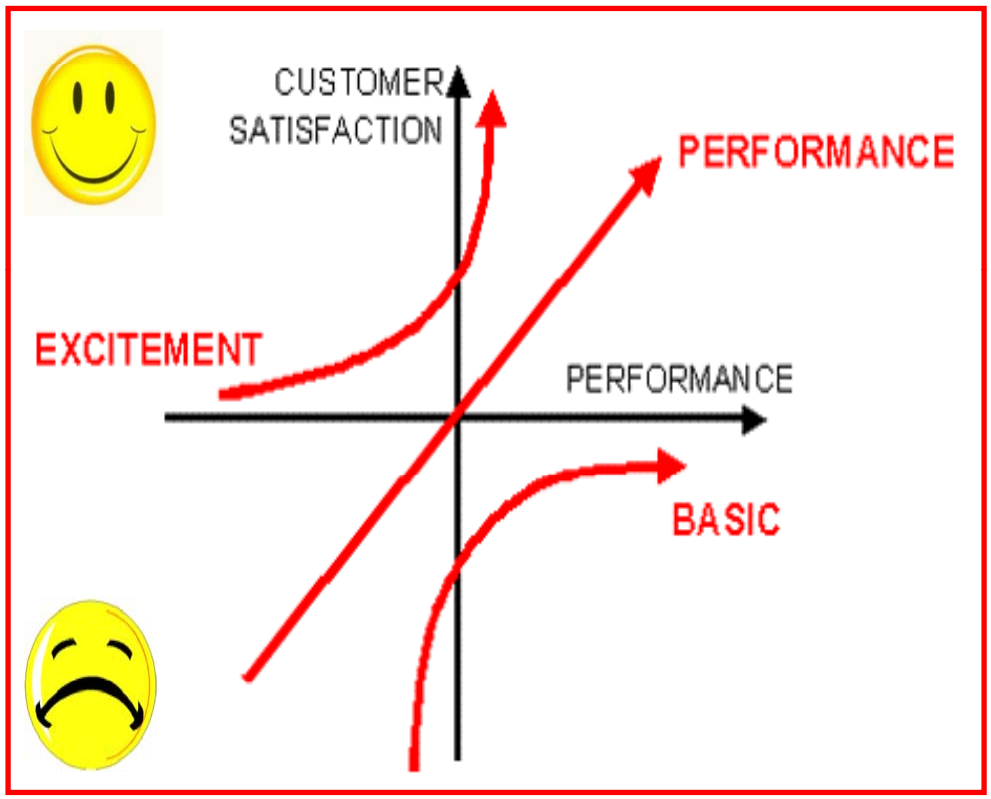
Kano Model – Customer Expectations



Amount of Characteristic Present →

A Basic factor is something that a customer simply expects to be there. If it is not present the customer will be dissatisfied.

A Performance factor can cause disgust at one extreme, but if fully implemented can result in delight.

An Excitement factor is something that customers do not expect, but if present may cause an exponential increase in delight.

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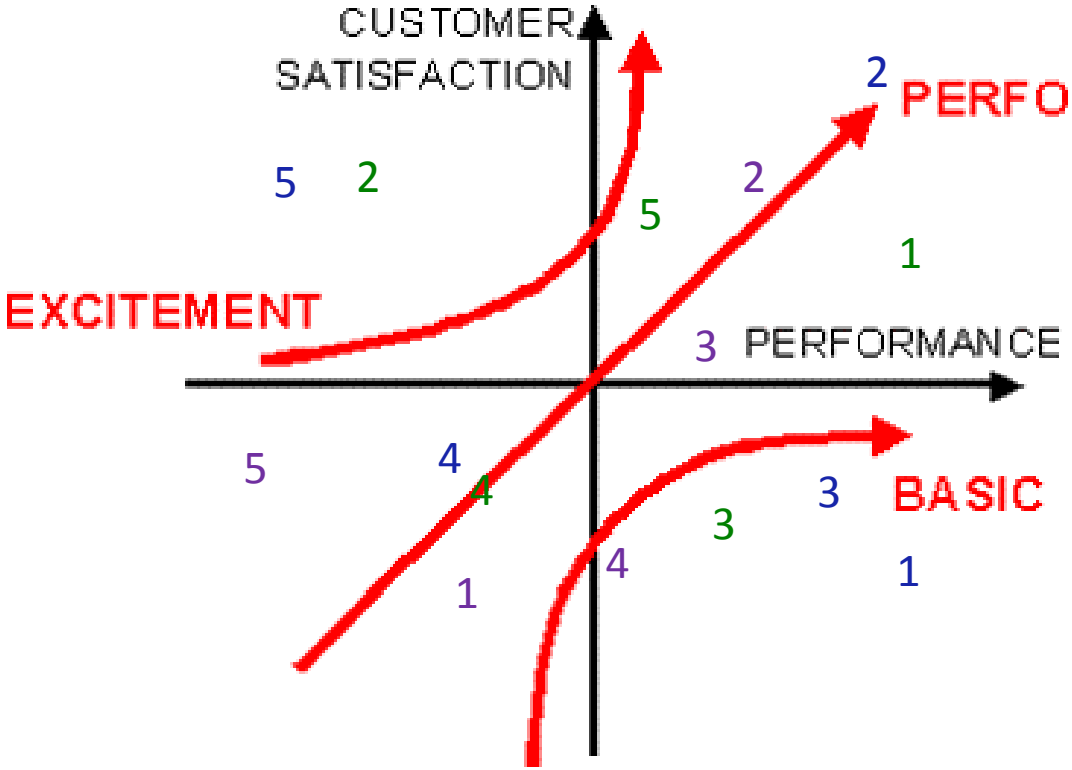
Customer Needs Sorted by Customer



Customer Needs
Example:
1. Interoperability
2. **Mobility**
3. Ease of Use
4. **Reduce Maintenance**
5. Innovation

Needs through Different Customer Eyes
1. Blue Customer
2. Purple Customer
3. Green Customer

Mobility is the customer need that delights all 3 customers
Reduced Maintenance is a basic performance need for all 3 customers

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Kano and Zachman Framework

- Zachman Framework
  - Is a two dimensional classification matrix based on the intersection of six communication questions (What, Where, When, Why, Who and How) with six rows according to reification transformations
  - is a formal and highly structured way of viewing and defining an enterprise, system, product, activity, etc.
  - organizing architectural artifacts that takes into account both whom the artifact targets and what particular issue is being addressed.
- Kano Model
  - Focuses on evaluating multiple customers needs to identify leverage points to determine product needs that appeal to the broadest customer set
  - Offers insight into the product needs that are perceived to be important to customers
  - Supports product specification and discussion through better development team understanding

Summary

- Zachman and Kano model could have been used in combination to discover and uncover architecture characteristics and properties
- This cross-domain usage may lead to other tools and techniques being used from other methods to improve architecting
  - Provides more tools in the toolbox
- When architecting, think “outside of the box” and consider using other tools and techniques

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Questions

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Acronyms

- ANSI — American National Standards Institute
- ATAM — Architecture Tradeoff Analysis Method
- DoD — Department of Defense
- DoDAF — DoD Architecture Framework
- DPMO — Defects per Million Opportunities
- FEAF — Federal Enterprise Architecture Framework
- IEC — International Electrotechnical Commission[
- IEEE — Institute of Electrical and Electronics Engineers
- ISO — International Organization for Standardization
- MDA — Model Driven Architecture
- SEDC — Systems Engineering in Washington DC
- ToGAF — The Open Group Architecture Framework

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Architecture Defined ?

- What is the *architecture of a system? Some definitions include:*
  - **U.S. Department of Defense Architecture Framework:** An architecture description is a representation of a defined domain, as of a current or future point in time, in terms of its component parts, what those parts do, how the parts relate to each other, and the rules and constraints under which the parts function. [DoDAF-04a]
  - **ISO/IEC 42010:2007 (formerly ANSI-IEEE 1471-2000):** The fundamental organization of a system embodied in its components, their relationships to each other, and to the environment, and the principles guiding its design and evolution. [ISO42010-07]
  - **Object Management Group's Model Driven Architecture (MDA) Guide, Version 1.0.1:** The *architecture of a system is a specification of the parts and connectors of the system and* the rules for the interactions of the parts using the connectors. [MDA-03]

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Author's Biography

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Is a Systems Engineering Fellow at Raytheon and has an extensive background in computer based systems, software, and networking technologies. Presently, he is the System Architect and lead Systems Engineer on the VoIP enterprise project. John principal duties are lead technical engineer, system architect, security architect and technical subcontract management. Recently he was the systems engineer for an embedded network-oriented project, conceptual development of system and network architecture for the delivery of real-time data over homogeneous links, including evaluation of VoIP-based implementations, trade studies on cryptographic algorithms and devices. John has a M.S. in Software and Systems Engineering from George Mason University, John is an adjunct professor at GMU where he teaches Computer Security and Privacy, and Network Security and Cryptography in the Telecommunications program in the Electrical and Computer Engineering department.

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Author's Biography

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