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Architecture Development Methodology for Business Applications

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Topics

- Motivation
- Methodology Overview
- Language and Tool Overview
- Summary

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Motivation

Architecture Development Methodology is vital for enterprises running large number of application development projects

Illustrative Profile

(Reference Infosys 2003)

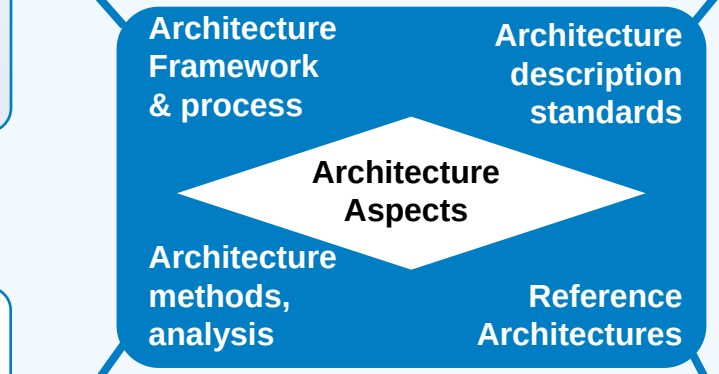
- 500 concurrent projects
  - 10-100 team size
- Projects have Requirements, Architecture and Development teams
  - 1-5 architects / team
- Architecture teams start with requirements team & handover to Development teams

Goals

1. Standardizing architecture process across the organization
   - Standard approach, vocabulary, work-products
2. Streamlining work assignments for multiple teams
   - Avoiding information loss, enforcing traceability
3. Strengthening architecture areas
   - QoS analysis, integration, architecture evaluation which are high-importance areas
4. Improving productivity through tools and automation

Different Aspect of Architecture

- TOGAF, Zachmann
- SEI ATAM, SAAM
- ISO 10746 RM-ODP
- IBM enterprise architecture standard
- C4ISR
- US Treasury Architecture Development process
- Bredemeyer architecture process



- Architecture description standards
  - ISO 10746 RM-ODP
  - IEEE 1471, 4+1 views
  - ISO/IEC 9126 – software quality
- Architecture modeling
  - UML, BON, MDA EDOC
  - Architecture description language
- Behavior modeling
  - BPML, BPELWS, Statechart, CSP, Petri-net, ASML, POSET, FSM

- Network Queuing theory, MVA
- Markov modeling for availability analysis
- Formal verification techniques
- Rule based system for applying architecture heuristics
- Engineering best practices

- Tools & Systems
- * C2SADL, RAPIDE, WRIGHT, DARWIN,
- Rational Rose, TogetherJ
- Ptech, Metis, System Architect (Popkin)
- Performance – Metron, TeamQuest
- Availability analysis – Meadep

- Patterns
  - Insurance Reference Architecture: IAA
  - IBM e-Business Architecture patterns
    - Business Patterns
    - Integration Patterns
    - Composite Patterns
    - Custom Design pattern
  - E++ architecture pattern for B2C and B2B systems
- Architecture Style

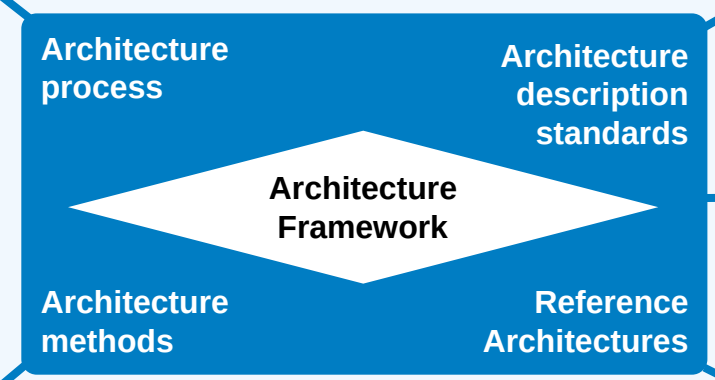
Scope of Methodology

Defining an architecture development methodology for business applications

InFlux™ Architecture framework

Formalize Process for Architecture definition
- Architecture track
- Flavors of process

Define standard architecture representation
- Viewpoints
- Meta-model & language
- Standard architecture doc



Tools to support the framework
- Modeling tools
- Automation – areas such as code generation

Strengthen architecture areas
- Methods/techniques for various areas (availability, integration, performance, variability etc.)

Define prescriptive architectures
- Standard stereotypes and patterns for J2EE, .NET ..
- Reference Architecture for Domain problems

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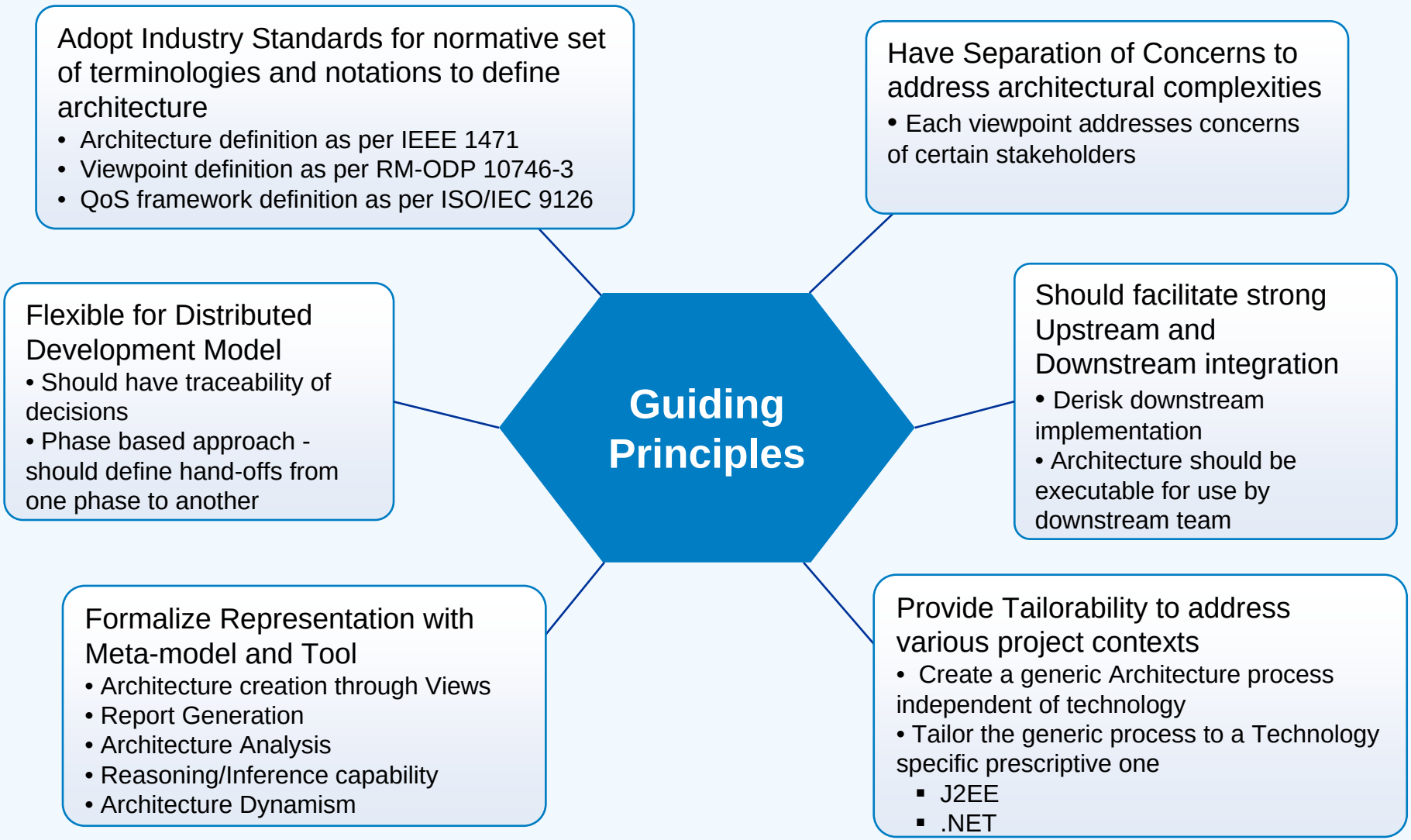
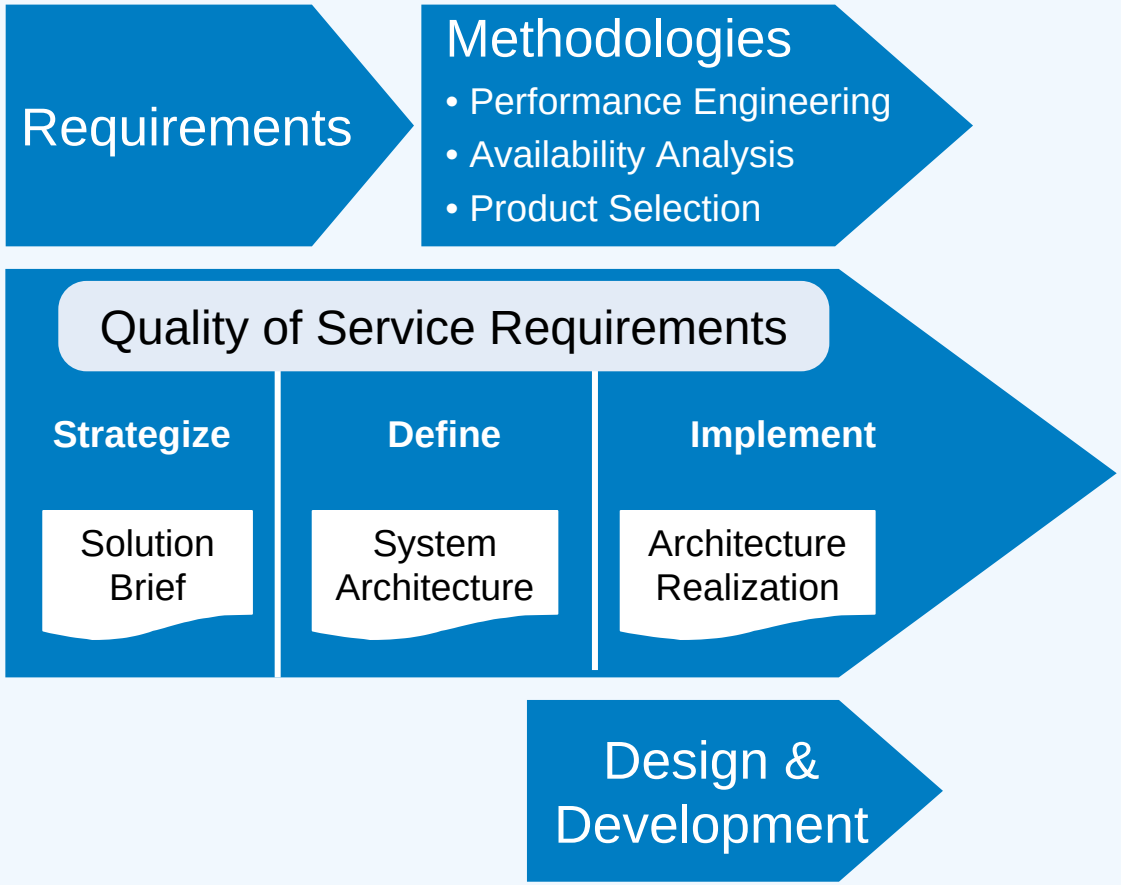
Methodology Overview

While creating the Architecture Framework certain guiding principles have been followed



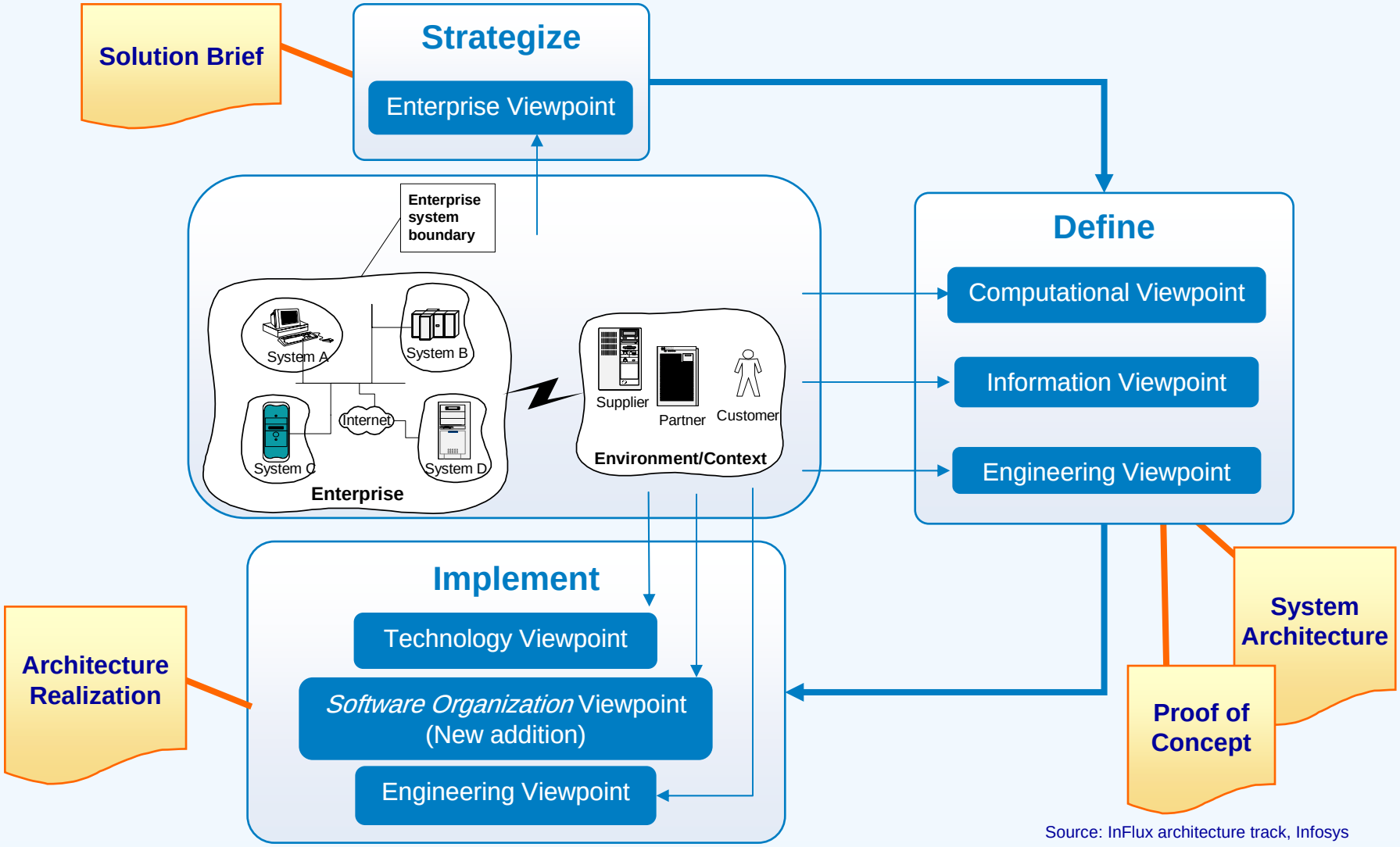
Architecture Process – Context

- Consists of 3 phases- each produces a deliverable
- Overlaps with requirement and development process
- Focuses on functional, information, technical and infrastructure aspects



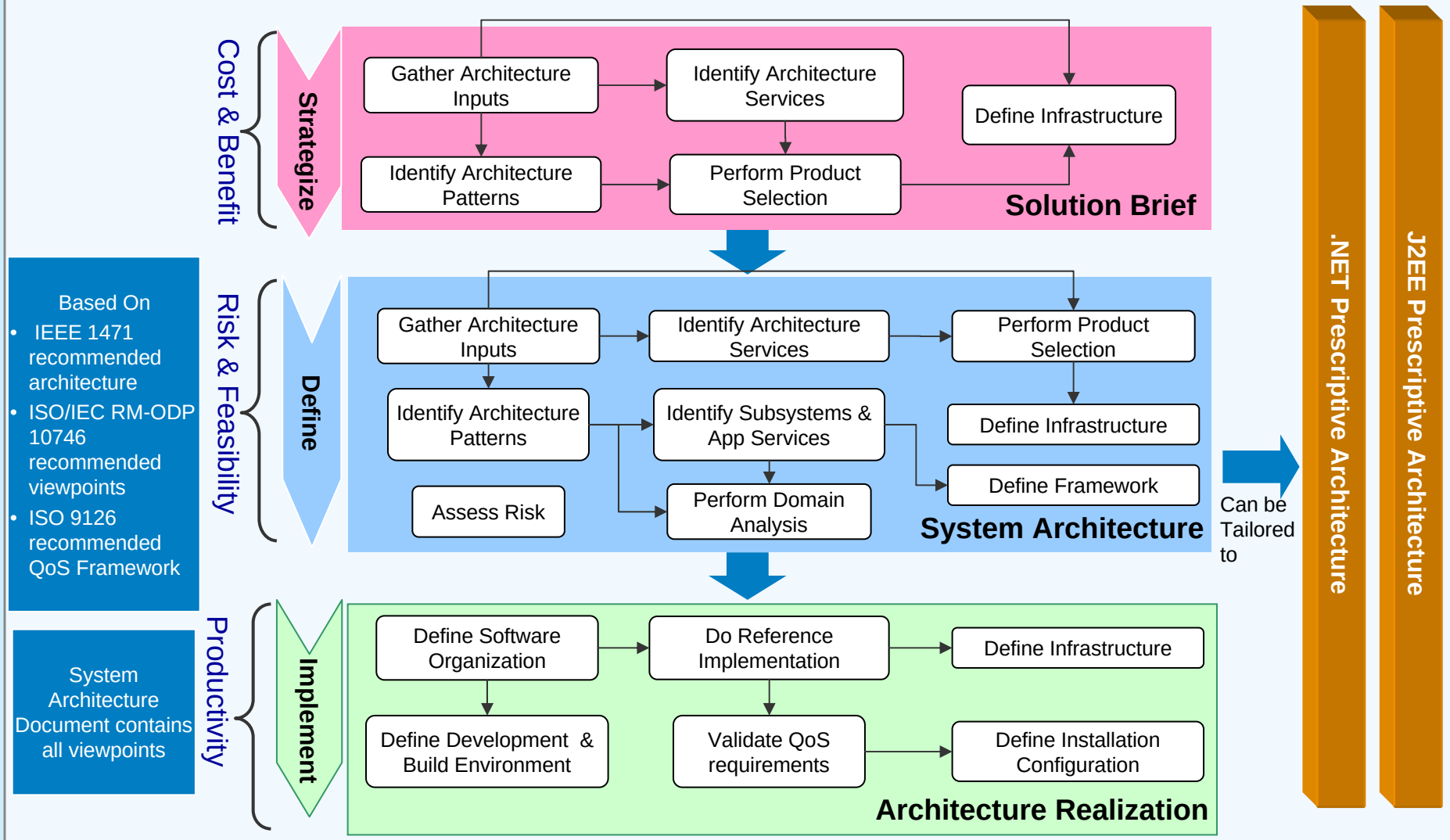
Source: InFlux architecture track, Infosys

A Phase is a part of the architecture lifecycle. Each phase defines certain aspects of the architecture by creating the views associated with the viewpoints.



Source: InFlux architecture track, Infosys

Architecture Process is driven by 3 broad factors



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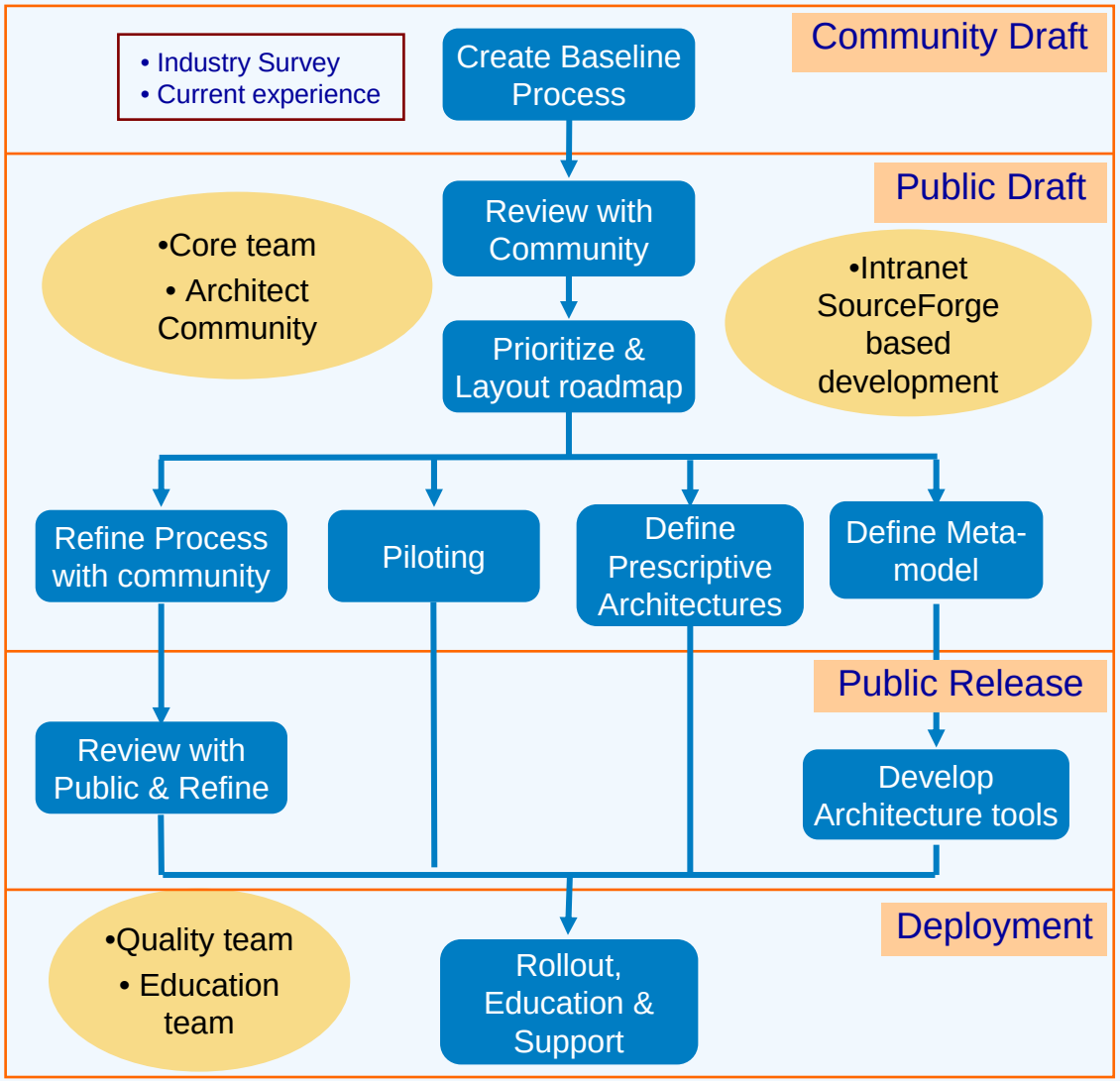
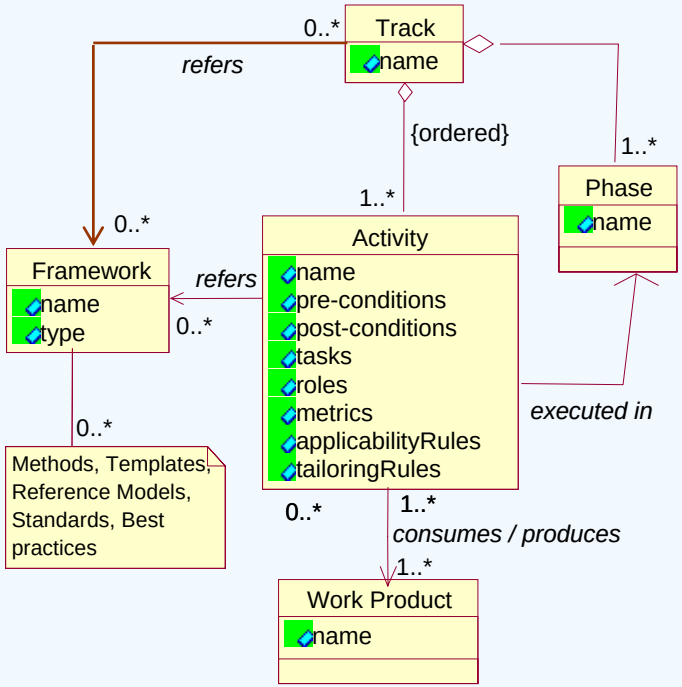
Process Development Approach



*Note: **Community** refers to Infosys architects, **Public** refers to Infosys users and stakeholders*



Source: InFlux architecture track, Infosys

Source: InFlux meta-model specification

- Adopted concepts from SPEM, OMG
- Unique concepts based on Infosys experience
  - Track (collection of activities)
  - Building processes from disciplines
  - Formalization of framework types
  - Tailoring feature for project specific customization
  - Concept of reference work-products (knowledge elements)

Process Development Learnings

- Community based development approach for quick adoption
  - Involvement of key stakeholders ensures easy deployment by the practitioners
  - Involvement of Quality department ensures faster broad-basing
- Lightweight process to cover most aspects of architecture and tailor it to suite the context
- Global development approach by introducing phase based development
  - Strategize phase can be at the client location whereas the detailed architecture development can be performed off-shore

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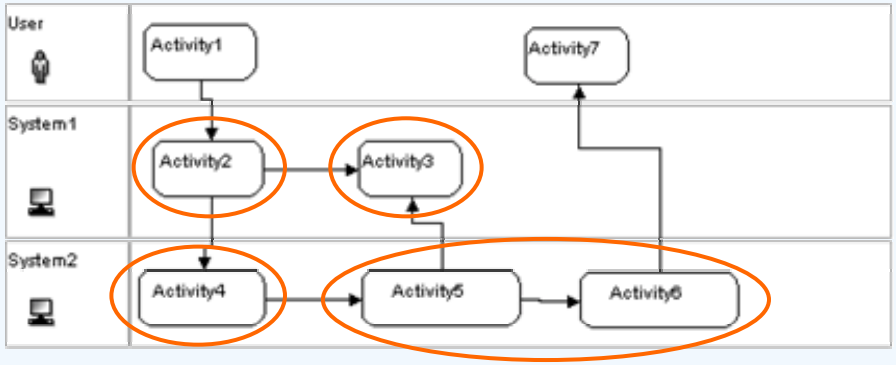
Language and Tool Overview

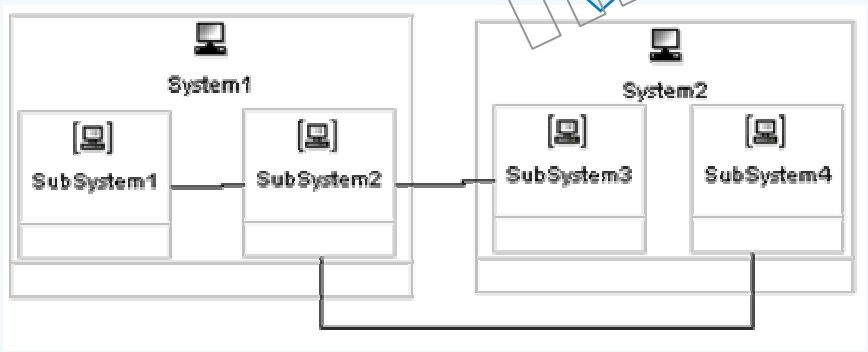
Architecture is captured using a graphical modeling language – EAML

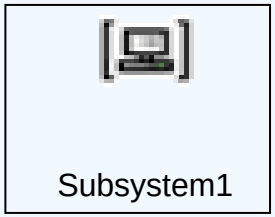
- Uses IEEE 1471 Conceptual Framework as the basis.
- Defines notations for all the views and viewpoints.
- Facilitates traceability among various views
- Uses OMG MOF to organize the metamodel notations
- Introduces component-connector concepts in modeling
- Provides notations for design rationale

Overview of some modeling concepts

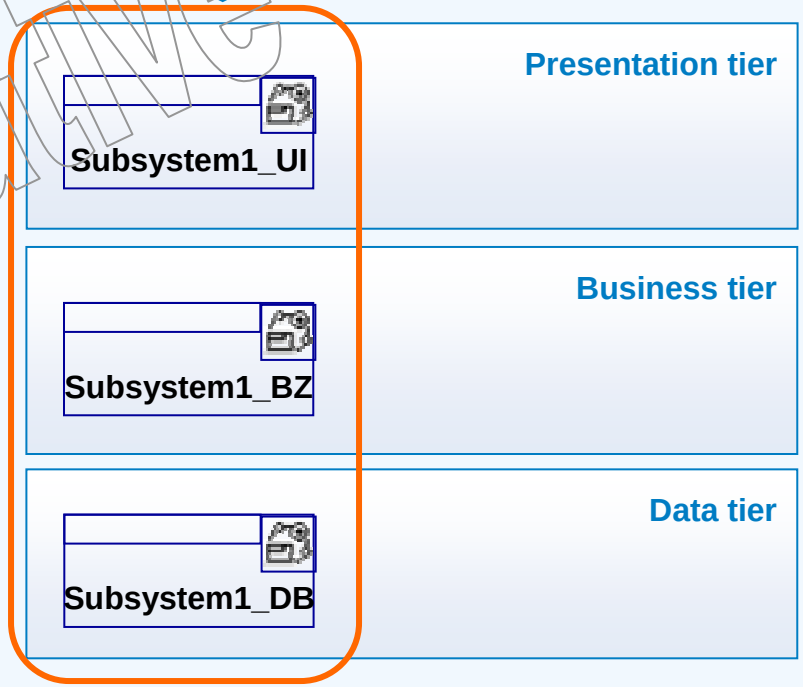


- Models business processes
- Facilitates creation of functional architecture from business processes
- Allows functional decomposition
- Maintains traceability





- Maps functional subsystems to n-tier architecture
- Associate architecture services required by a subsystem
- Associate COTs products



Illustrative

Source: InFlux architecture track, Infosys

Architecture Modeling tool allows to draw views associated with viewpoints. Each view is a diagram.

Viewpoint	View	Elements
Computational	Context Diagram	System, interconnection, protocol, service
	Functional Diagram	System, subsystem, interface, messages
Engineering	Logical Diagram	Subsystems, components mapped into tiers
Technology	Application Diagram	Tier with COTS product and application mapping
	Deployment Diagram	Hardware, devices, networks for production, QA and Development environment
Information	Domain Diagram	Domain entities and Relationships
Software Organization	Realization Diagrams	Application frameworks, patterns
	Layer Diagram	Packages, layers, dependencies

Source: InFlux architecture track, Infosys

Illustration: *The Unified Billing Solution is a global effort to create a single billing solution applicable to all regions*

- Starts with understanding Architecture Principles, IT Gaps, IT Strategy….
- Uses business stereotypes to characterize the application
- Enterprise viewpoint is captured through a set of business processes
- Defines Computation, Information, Technology and Engineering viewpoints
- Software organization viewpoints for downstream integration

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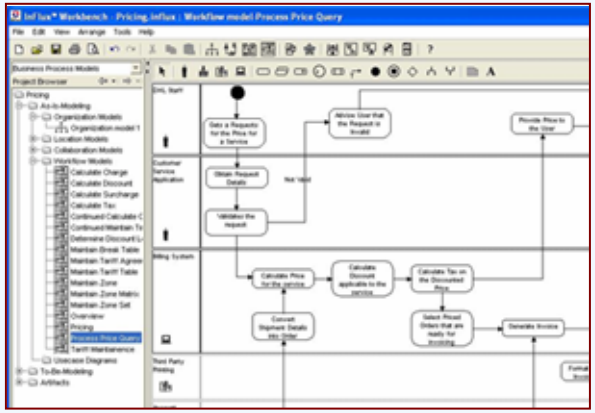

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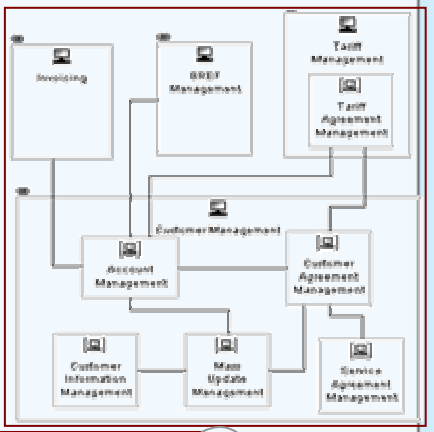

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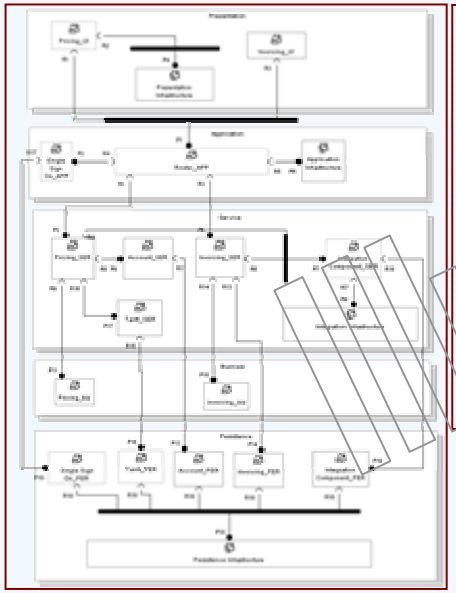

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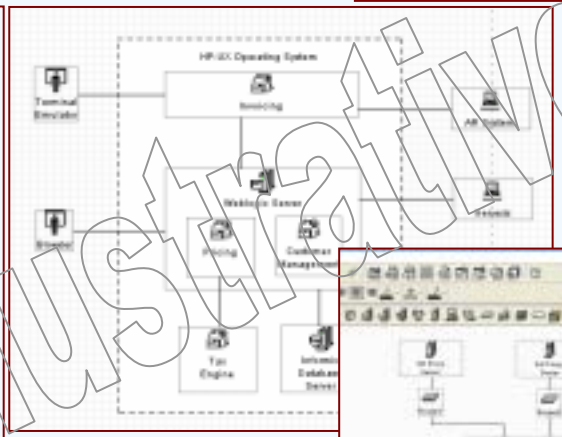

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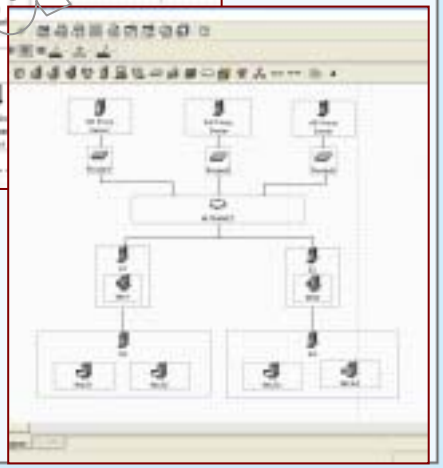

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Summary

- Architecture methodology is vital for enterprises running large number of application development projects
  - To enforce standardization of work-products and process
  - To promote reuse, automation
- InFlux Architecture track is based on certain guiding principles –
  - separation of concerns
  - upstream and downstream integration
  - using community standards development model
- InFlux meta-model has semantics for representing architecture
  - combination of industry standards
  - use of views and viewpoints