Course: DPR Preparation
Day 2

Session 2
Solution Architecture
Agenda

• Elements of Project Scope
• Project Scoping (Functional and Geographical scope)
• Requisite Government approvals
• Concepts related to deployment architecture
Elements of Project Scope

• Primary Elements
  – Vision
  – Mission
  – Objectives

• Other Elements
  – Stakeholders
  – Service Levels
  – Re-engineered processes from GPR
Project Scoping

Functional Scope

• Answers the “what” question pertaining to system coverage
• Defining the process boundary covered by the envisaged software system
  – What will be the first activity carried out in the envisaged software & who will perform this activity
  – What will be the last activity carried out in the envisaged software & who will perform this activity
• Define the software as having various functional modules (i.e. blocks of functional requirements)
• Specify external 3rd party systems to be integrated with and define the integration points
• Identify process re-engineering requirements
Project Scoping

Geographical Scope

• Answers the “who” question pertaining to system coverage

• User categories / services / transactions/ departments / organizations covered by the software is defined herein (e.g.)
  – Number of offices connected by State Wide Area Network (SWAN)
  – One single system of Human Resource Management System to be used by all government departments / agencies etc.
  – Unified e-Procurement platform meant to be used by all government agencies

• Whether usage of envisaged system is mandatory or optional
  – If mandatory, how is the mandate derived (i.e.) from a Government Order or by change in Law
Project Scoping

System Access

• The media by which the system will be accessed has to be specified
• A diagrammatic (architectural) view of the envisaged system to be provided
  – This view will help communicate about the project as a whole to the intended audience
• A brief note explaining the envisaged system to be prepared
Geographical Coverage

FINANCE DEPARTMENT

Office at Secretariat

- Directorate of Treasuries & Accounts
- Directorate of Works Accounts
- PAO (W&P)
- Pension Payment offices
- Sub Treasury offices

INTERFACING WITH OTHER DEPARTMENTS (ONLINE/ OFF LINE)

Other State Departments


Accountant General - AP

Ministry Of Finance

RBI Hyderabad

RBI Nagpur

Agency Banks (SBH & SBI)

Citizens/ Employees/ Pensioners/ Businesses/ Financial Institutions
Sample Architecture

Indent Management → e-Tendering → Contract Management

→ e-Auctions → Catalogue Management

 Suppliers and Buyers Master Data

 e-Payment, Accounting and MIS

 Dept. 1 → Dept. 2 → Dept. n… → Supplier 1 → Supplier 2 → Supplier n
Sample Architecture
Sample Architecture

Laptops/Desktops, Human Interface Devices (WAP based/Mobiles, J2ME based, PDAs, Proprietary etc)

- Employees
- Partners
- Customers

Shared Business/Process Services

- Service Bus (Routing, Transformation, Transport), Service Bus Gateway
- Service Registry & Repository
- Orchestration & Choreography (BPEL Processor)
- Service Management

Channel Layer

- Interface integration and B2B layer
  - (1) Intermediate Services Layer
  - (2) Process Services Layer

Architecture, Security

- Service Mediation Layer
  - (1) Basic Services Layer
  - (2) ETL, EII, ECM

EIS Layer

SOA Foundation

Application and Data Services

- CRM, PeopleSoft, ERP etc.
- Business Rules
- Mainframe
- Custom
- Enterprise Databases, Directory Servers
- Unstructured Data

Legend:
- Service Infrastructure Components

Sample Reference Architecture using SOA Approach for TPDS Applications
Key Architectural Components

• Network connectivity to Government offices
  – Whether by broadband or by closed connection
  – Should a facility be created to enable private sector users to access the system (e.g. facilitation center)

• Data center and Disaster Recovery
  – Whether to host the servers in government owned State Data Centre or deploy the same in space rented from 3rd party data center

• Mode of access
  – Internet, Intranet and Mobile

• Software
  – Custom development or COTS based deployment
Requisite Government Approvals

• Approval of all key stakeholders to be obtained on the proposed TO BE solution

• Proposed solution architecture may require fundamental re-engineering of some processes (e.g.)
  − Centralized supplier registration
    • Register once, participate in all tenders
  − Electronic refund of Earnest Money Deposits (EMD)

• Underlying philosophy of the proposed solution to be approved (e.g.)
  − One single Wide Area Network to be used as a shared infrastructure by all Government departments
    • Implying laying of parallel department specific WAN’s would be discouraged
Concepts Related to Deployment Architecture

- n-tiered architecture
  - Presentation layer
  - Application / business logic layer
  - Database layer

- Redundancy to be built in:
  - Web, application and database layers

- Active-Active and Active-Passive

- Solution to be in load balanced mode

- Disaster Recovery
  - Recovery Point Objective (quantify acceptable data loss)
  - Recovery Time Objective (time taken to bring the service back online)
Cloud Computing
What is Cloud Computing?

• Cloud computing is a model for enabling convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

• Cloud model promotes availability and is composed of five essential characteristics, three service models, and four deployment models.
5 Essential Cloud Characteristics

- On-demand self-service
- Broad network access
- Resource pooling
  - Location independence
- Rapid elasticity
- Measured service
3 Cloud Service Models

Cloud Software as a Service (SaaS)
• Use common/multi-tenant applications over a network

Cloud Platform as a Service (PaaS)
• Deploy customer-created applications to a cloud

Cloud Infrastructure as a Service (IaaS)
• Rent processing, storage, network capacity, and other fundamental computing resources
Cloud computing models

PRIVATE CLOUD
Operated solely for an organization.

COMMUNITY CLOUD
Shared by several organizations and supports a specific community that has shared concerns.

PUBLIC CLOUD
Made available to the general public or a large industry group and is owned by an organization selling cloud services.

HYBRID CLOUD
Composition of two or more clouds (private, community, or public) that remain unique entities but are bound together by standardized or proprietary technology that enables data and application portability.

NIST: Definition of Cloud Computing, Draft version 14

Slide 18
Putting the pieces together

Visual Model of NIST’s Working Definition of Cloud Computing

- Measured Service
- Rapid Elasticity
- On-Demand Self Service
- Broad Network Access
- Resource Pooling

Service Models

- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

Deployment Models

- Public
- Private
- Hybrid
- Community

http://www.csrc.nist.gov/groups/SNS/cloud-computing/index.html
Objectives

The objectives of the cloud based delivery system are:

• Faster Roll-Out of Services
• Infrastructure & cost Optimization
• Increased usage and acceptance of SDCs
• Sharing of applications within and across States to optimise cost and infrastructure
• To be able to share IT resources across State Clouds
Advantages of Cloud Computing

• Faster Roll-Out of Services
  – *CAPEX to OPEX model*

• Infrastructure & cost Optimization
  – Less no of servers, AMC, power, cooling cost etc

• Sharing of applications within and across States to optimise cost and infrastructure

• Allows IT to Shift Focus: No longer having to worry about constant server updates and other computing issues, government organizations will be free to concentrate on innovation.
Public sector cloud computing challenges

The public sector faces some particular challenges in moving to cloud computing:

- Avoiding vendor and technology “lock in”
- Competition laws and policies
- Effects of national legislative and regulatory framework
- Current lack of open standards and interoperability
- Security & privacy
- Sovereignty risks
- Governance and management
- Business continuity
Objectives of Cloud based delivery

Facilitating rapid rollout of successful citizen centric applications across states

• Moving from Capex to Opex model
• Configurable & multi tenant applications

Creation of an “e-Gov AppStore”

Providing a secured, unified cyber space for shared government services and infrastructure on demand

Setting up proper Governance & Institutional mechanisms

Multi tenancy is best suited to India given the diversity, size and needs
Key challenges - Applications

• Standardization and Replicability
  • Multiple solutions, issue of ownership, hosting, language, processes etc)

• Building Multi tenant applications
  • Existing – challenge
  • New – framework and Policy direction
Key challenges - Infrastructure

- Connectivity
- Cloud Interoperability
- Disaster Recovery
- Deployment architecture
  - Single instance
  - Multiple instances
  - Location of Databases
Key challenges - Governance & Policy aspects

- Guidelines, Policies, Framework for collaboration & sharing
- Aligning the IT Procurement Policy with the Cloud setup
- Contractual Relationship & Commercials
- Roles & Responsibilities
- Organizational Structure
- Legal framework
- Issues of privacy, Security and Jurisdiction to be addressed before moving to Public Cloud
End of Session