Architecture-Driven e-Government Development
- Royal Government of Bhutan

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Bhutan on Map

Located in the Himalayas and sandwiched between the two Global giants (India to South and China to the North)
Bhutan in Picture
Country Profile - General

Area Coverage (SQ.KM): 38, 394

Population: Approx. 800,000

GDP Per Capita (USD): 2656 (y.2015)

Source of Income: Energy (Hydropower) & Tourism

Political: Democratic Constitutional Monarchy

National Development Philosophy: GNH

Admin Units: 20 Districts & 205 Blocks
Country Profile - ICT

- **Internet Subscribers:** 81%
- **Mobile Services Coverage:** All 20 Districts & 205 Blocks
- **Mobile Penetration:** 676,033 (88%)
- **Community Centers:** 195 (188 Connected to Internet)
- **Services Stats:**
  - e-Services: 110+
  - Mobile: 20+
Bhutan is listed as one of the countries who have significantly improved the IDI ranking over the last year (122/193 in 2015 to 117th in 2016)


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RGoB’s Government Enterprise Architecture - Electronic Government Interoperability Framework (e-GIF) was awarded the Open Group Award on Excellence in Enterprise Architecture in improving Government Services in February 2017
Network Readiness Index 2016

**Networked Readiness Index**

- Rank: 87 (out of 139)
- Value: 3.8

**Networked Readiness Index**

- 2015 (out of 143): 88, 3.7
- 2014 (out of 148): 94, 3.7
- 2013 (out of 144): n/a, n/a

**Environment subindex**

- 1st pillar: Political and regulatory environment: 37, 4.1
- 2nd pillar: Business and innovation environment: 102, 3.9

**Readiness subindex**

- 3rd pillar: Infrastructure: 73, 4.1
- 4th pillar: Affordability: 45, 5.9
- 5th pillar: Skills: 103, 4.1

**Usage subindex**

- 6th pillar: Individual usage: 99, 2.9
- 7th pillar: Business usage: 111, 3.2
- 8th pillar: Government usage: 83, 3.6

**Impact subindex**

- 9th pillar: Economic impacts: 119, 2.6
- 10th pillar: Social impacts: 85, 3.8

**Source:** The Global Information Technology Report 2016 (www.weforum.org)
Enterprise Architecture

“At the highest level, EA is about organising an enterprise’s resources – its services, processes, information, applications, and technology infrastructure – and establishing technical choices and a supporting set of policies which help achieve desired business outcomes, technical standardisation and integration” [*]

[*] Queensland Government Enterprise Architecture 2.0, Australia
“Spaghetti” Architecture
Electronic Government Interoperability Framework (e-GIF):

1. Allignment of ICT initiatives to business goals and objectives
2. Improve coordination, reuse and sharing of assets among agencies and systems
3. Avoid duplications and maximise savings
4. Reduce departmental silos and realise integrated service delivery
5. Identification & prioritisation of ICT programmes and projects
6. Standardisation & integration of ICT systems and infrastructures
Without e-GIF

Government Policies and Strategies

Government Applications and Systems

Technologies (Networks, ICT Equipments & Infrastructures)

Government Data & Information

Government Functions & Services

Programme/Project Control & Management

Government Policies and Strategies

Government Applications and Systems

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With e-GIF

Policy & Strategy Architecture
(GNH Pillars & Visions, Policies, FYP Docs, MPs, NKRAs, SKRAs)

Business Architecture
(Business Areas, Functions, Services, Processes, Catalogs, & Taxonomies)

Data Architecture
(Dictionary, Metadata, Common Data - People, Vehicle, Business, Land, GIS)

Application Architecture
(Application Building Blocks, Application Portfolio, Common Systems, Capabilities)

Technology Architecture
(Networks, Equipments/Infrastructure, Standards, Specifications)

Architecture Governance & Management
(Dashboards, KPIs, Governance Structures)

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Architecture Work:

➔ Review of Bhutan Vision 2020 Document (Peace, Prosperity, & Happiness) + UN MDG + UN SDG (Now - 12FYP)

➔ GNH Pillars
- Sustainable and Equitable Socio-economic Development.
- Preservation and Promotion of Culture
- Conservation and Sustainable Utilisation of Environment
- Promotion of Good Governance

➔ Architecture Principles
- Citizen centric approach
- Digital by Default
- Whole-of-Government and Sectoral Perspective
- Effective Collaboration and Coordination
- Architecture domain specific principles
Programmes/Projects/Activities:

➔ Whole of Government Plan (11th Five Year Plan Document)
  ◆ National Key Result Areas (NKRAs) - 16
  ◆ Sector Key Result Areas (SKRAs) - 250

➔ ICT Sector Acts, Plans and Strategies
  ◆ BICMA Act and its revision
  ◆ e-Gov Masterplan
  ◆ Sector Specific ICT MP (Education, Health, Tourism, ICT Private Sector Development, Procurement)
  ◆ ICT Road Map
  ◆ WOG e-Government Policy encompassing all the principles from the e-GIF
Business Architecture

Architecture Work:

➔ Identification of Business Areas (BA), Line of Business (LOB), Government Functions (GF), & Services:
  • BA (2)
  • LOB (23)
  • GF (58)
  • Services (850+)

➔ Government Services
  • Catalog (Profile & Description)
  • Categorisation & Prioritisation
  • Rationalisation
  • Organisation (Service Patterns)
  • Classification
Programmes/Projects/Activities:

➔ Whole of Government Agency Service Catalog Preparation along with SDS, SOP, and SLA
➔ Public Service Charter development initiated by G2C Office, PMO
LoB, BF, Service Example

- Business Area (2 BA)
  - Represents the highest level of Business operation of the government

- Line of Business (23 LOB)
  - A broad category of service in the government

- Government Function (58 GF)
  - A logical grouping of similar services offered by the government

- Agriculture
  - Service to Public

- Services (854)
  - A government activity to serve the need of the public
    - Supply of Seeds to farmer
    - Mechanization of farming
    - Research on agriculture production and marketing
Data Architecture

Architecture Work:

➔ Conceptual Data Model
  • Data Entities & Relationships
  • Data Elements (Service I/O)

➔ Data Dictionary
  • Data Naming Conventions & Design Best Practices

➔ Data Ownership
  • Data Access Model
  • Agency Data Owners, Roles, and Governing policy

➔ Data Security Classification
  • Classification (Public, Internal Use Only, Confidential)
  • Security Model (Control Types - ISO 27005)

➔ Meta Data
  • Dublin Core Standard

➔ Common (Core) Data
  • People, Vehicle, Business, Land, GIS

➔ Master Data
Data Architecture

Programmes/Projects/Activities:

→ Development of WoG Data Entity/Element Owner/Source and Consumer Matrix
→ Data Hub Project
  ◆ Middleware for Shared Data/Information Service
  ◆ SOA infrastructure (WS Creation, ESB, API, Analytics, SSO)
→ Center for GIS Coordination (CGISC)
  ◆ GIS Portal
Datahub - Information Exchange Platform

Data Service Providers
- DCRC
- RBP
- RCSC
- Agency - N can share data...

Data Consumers
- G2C Portal
- Agency S:
- Agency App
- N - Systems can consume ....

Datahub - Data Exchange Layer
- Service Creator
- ESB - Routing
- API MGR

Agency - N can share data...
Datahub Security - SSO

Datahub- Data Exchange Layer
- Service Creator
- ESB - Routing
- API MGR

G2C Portal

Agency

Agency App

SSO - Digital Identity Platform

CITIZEN USERS

BUSINESS USERS

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Application Architecture

Architecture Work:

➔ Government Application/Information Systems Portfolio
  ● Applications: 166+
  ● Classification (Departmental, Cluster, Common, Crosscutting/Orchestrated)
  ● Alignment to BF/Services

➔ Application Architecture Principles and Building Blocks
  ● Principles - Fit for use, Interoperability, Usability, etc.
  ● ABBs (Functional and Technical)

➔ Critical WoG Common Systems

➔ Common Application Capabilities
  ● Reusability
Programmes/Projects/Activities:

→ Whole of Government Application Portfolio Management

→ Common Systems
  ◆ Civil Service IS
  ◆ Govt Email & Collaborative Suite
  ◆ Asset and Inventory Management System
  ◆ Electronic Government Procurement (e-GP)
  ◆ GPMS, PEMS, MYRB
  ◆ G2C Portal (Transactional, e-Services)
  ◆ National Portal (Information)
  ◆ GovCMS (Ongoing)
  ◆ e-Payment Gateway
Architecture Work:

➔ Technology Architecture Domains
  • Access
  • Integration
  • Platform
  • Network
  • Data Center and DR
  • Security
  • Monitoring and Management

➔ Technology Standards & Specifications
  • Access, Integration, Platform, Network, Protocol, Security

➔ Security Architecture
  • Domains
  • Access & Identity Management
Target Technology Architecture

Technology Architecture Vision
- End User Computing: Desktops/Laptops, Pads/Tablets, Smart phones

Technology Architecture Principles
- Directory Service
- Collaboration
- Middleware
- Gateways
- Infrastructure Applications

Technology Architecture Standards
- Virtualization
- Server
- Storage
- Backup and Archival

Network
- LAN/Wireless-LAN
- WAN (TWAN)

Data Center
- Structured Cabling & Racks
- Data Centre and Disaster Recovery Center Facility

Security
- Monitoring and Management
  - Call Centre, NOC, Tools, Service Desk

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Technology Architecture

Programmes/Projects/Activities:

➔ Government Hardware/Infrastructure Clearance through e-GIF Standard & Specs
➔ Government Data Center
➔ Government WAN
➔ Nation-Wide Fiber N/W - National Connectivity
➔ International Connectivity - 2 gateways from India
➔ DR Site (Coming soon)
➔ BtCIRT
Architecture Governance & Management

Architecture Work:

➔ Decision taking body for implementation of EA Programmes and Projects
➔ e-Gov PMO & Governance Structure
➔ Dashboards - KPIs related to NKRAs & SKRAs
➔ Cross Domain Views and Analysis through Domain Matrices
  ● Service to Data, Service to Application, Data to Application, Application to Technology.
➔ e-GIF Portal (EA Repository System)
Programmes/Projects/Activities:

➔ WoG Review of all ICT projects by e-Gov PMO & Governance Structure
➔ ICT Project proposal (Compliance Check)
➔ Government Performance Management System (GPMS) through measurement of Ministry/Department/Division APA’s KPIs (Baseline -> Target)
Thank you for your attention