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A Service and Functions-Based Reference Model for Data Privacy

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Critical Privacy Drivers and Issues

- **Networks and the PI Lifecycle**
  - Digitally-based personal information is networked and boundless

- **Principles/Legislation/Policies**
  - Security and Privacy Integration expected
  - Compliance - and increased international attention from regulators

- **Operational privacy management standards**
  - Technical standards and architectures for privacy management **not yet available**

- **Relentless Adoption of New Business Models and Infrastructures**
  - Social networking
  - Ubiquitous networked applications
  - Internet of Things
  - E-Government
  - Cloud Computing
  - Smart Grid
  - Health IT

- **What is Personal Information – Personally Identifiable Information?**

Complex Privacy Policy and Regulatory Landscape

- The Privacy Act of 1974 (U.S.)
- Council of Europe Convention 108
- OECD Privacy Guidelines
- UN Guidelines Concerning Personalized Computer Files
- Hong Kong Personal Data (Privacy) Ordinance
- EU Data Protection Directive 95/46/EC
- Health Insurance Portability and Accountability Act (HIPAA) Privacy Rule
- Canadian Standards Association Model Code (incorporated in the Personal Information Protection and Electronic Documents Act [PIPEDA])
- International Labour Organization (ILO) Code of Practice on the Protection of Workers' Personal Data
- US FTC statement of Fair Information Practice Principles
- US-EU Safe Harbor Privacy Principles
- Ontario Privacy Diagnostic Tool
- Australian Privacy Act – National Privacy Principles
- California Senate Bill 1386, "Security Breach Notification"
- AICPA/CICA Privacy Framework
- Japan Personal Information Protection Act
- APEC (Asia-Pacific Economic Cooperation) Privacy Framework

Global Privacy Principles/Practices - No Policy Standardization

OECD Guidelines – 1980

- Collection Limitation
- Data Quality
- Purpose Specification
- Use Limitation
- **Security Safeguards**
- Openness
- Individual Participation
- Accountability

Australian Privacy Principles – 2001

- Collection
- Use and Disclosure
- Data Quality
- **Data Security**
- Openness
- Access and Correction
- Identifiers
- Anonymity
- Trans-border Data Flows
- Sensitive Information

APEC Privacy Framework – 2005

- Preventing Harm
- Notice
- Collection Limitation
- Uses of Personal Information
- Choice
- Integrity of Personal Information
- **Security Safeguard**
- Access and Correction
- Accountability

Yet …Commonality Among Disparate Principles/Practices

- Accountability
- Notice
- Consent
- Collection Limitation
- Use Limitation
- Disclosure
- Access & Correction
- **Security/Safeguards**

- Data Quality
- Enforcement
- Openness

- Anonymity
- Data Flow
- Sensitivity

from ISTPA "Analysis of Privacy Principles: An Operational Study" (2007)

Security

- Well-Understood Security Services
  - Confidentiality
  - Data Integrity
  - Availability
- Examples of Standards
  - AES
  - SAML 2.0
  - PCI-DSS
  - ISO 27001/2….etc.
- Rich and Mature Discipline – Cryptography, Controls…
- Many Mechanisms/Technologies/Solutions/Products

Key Security Mechanisms Support Privacy…

- **Identity Lifecycle Management and Compliance**
  - critical to privacy – the correct people should have access to the correct information in a well defined identity system utilizing appropriate role model policies
- **Web access management, federation, Service Oriented Architecture security**
  - Trust among multiple entities to facilitate controlled sharing of information – strengthens security in complex infrastructures
- **Resource Protection**
  - Privileged users are high risk and must be controlled and monitored
- **Data Protection**
  - Data (at rest, in motion) must be monitored for improper leakage
- **Log management**
  - provides the ability to watch what is happening -monitoring is key to maintaining privacy

Privacy Management Challenges:

Cloud Computing

World Economic Forum 2009 Study on Cloud Computing..Deployment

- Economic Benefits
  - Entrepreneurship; create new businesses, jobs
  - Platform for innovation; accelerate innovation
  - Increase IT efficiency and IT flexibility
  - Business/technology leapfrogging opportunities in developing countries

- But…Major Barriers
  - Privacy (63%)
  - Data governance (e.g. data ownership, cross-border data transfer, etc. (56%)
  - Security (50%)

Source: The World Economic Forum - Used with Permission

Privacy Management Challenges:

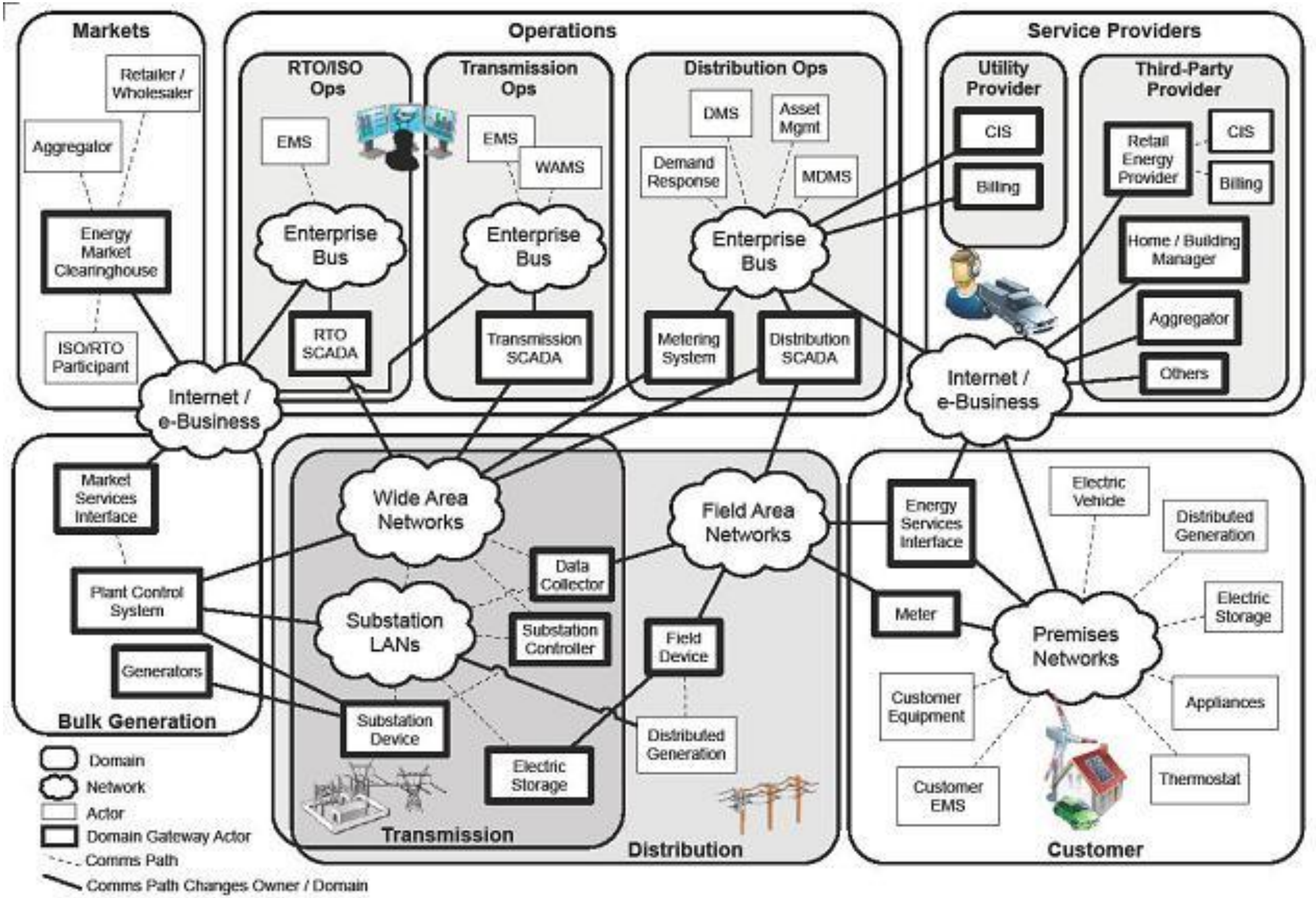
Smart Grid

Smart Grid – Sample Components with Privacy Implications

- *Digital information* and controls technology
- *Dynamic optimization* of grid operations and resources *with cyber-security*
- Deployment of `smart' technologies that *optimize the physical operation of appliances and consumer devices*
  - for metering, communications concerning grid operations and status, and distribution automation
- *Integration of `smart' appliances and consumer devices*
- *Provision to consumers of timely information and control options*
- *Two-way communications*
- **See www.nist.gov/smartgrid**

(Source: Energy Independence and Security Act of 2007)

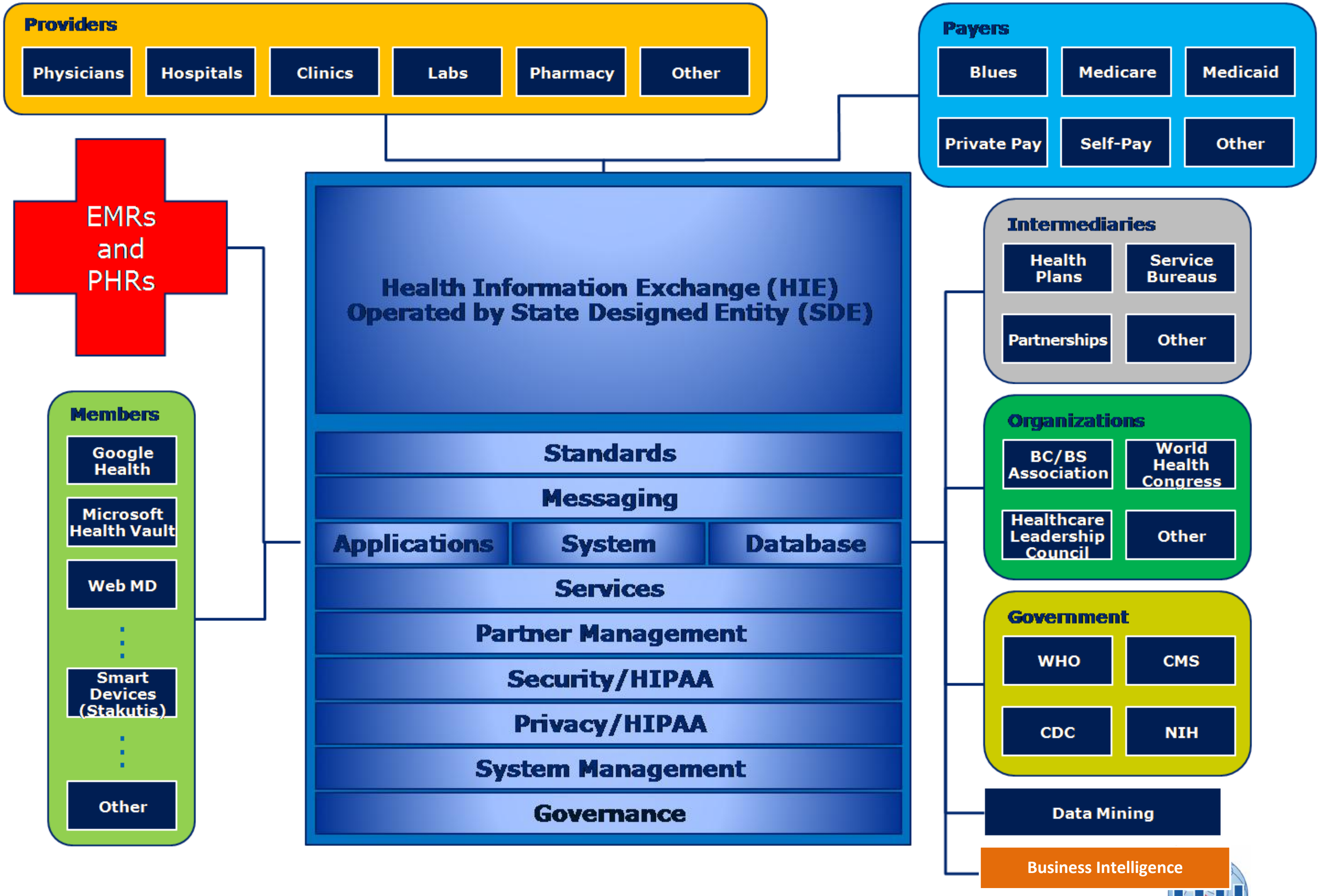
NIST Smart Grid Conceptual Model



Source: 27 NIST Framework and Roadmap for Smart Grid Interoperability Standards, Release 1.0

Privacy Management Challenges:

Networked Health IT



Providers

- Physicians
- Hospitals
- Clinics
- Labs
- Pharmacy
- Other

Payers

- Blues
- Medicare
- Medicaid
- Private Pay
- Self-Pay
- Other

EMRs and PHRs

Members

- Google Health
- Microsoft Health Vault
- Web MD
- Smart Devices (Stakutis)
- Other

Health Information Exchange (HIE) Operated by State Designed Entity (SDE)

- Standards
- Messaging
- Applications | System | Database
- Services
- Partner Management
- Security/HIPAA
- Privacy/HIPAA
- System Management
- Governance

Intermediaries

- Health Plans
- Service Bureaus
- Partnerships
- Other

Organizations

- BC/BS Association
- World Health Congress
- Healthcare Leadership Council
- Other

Government

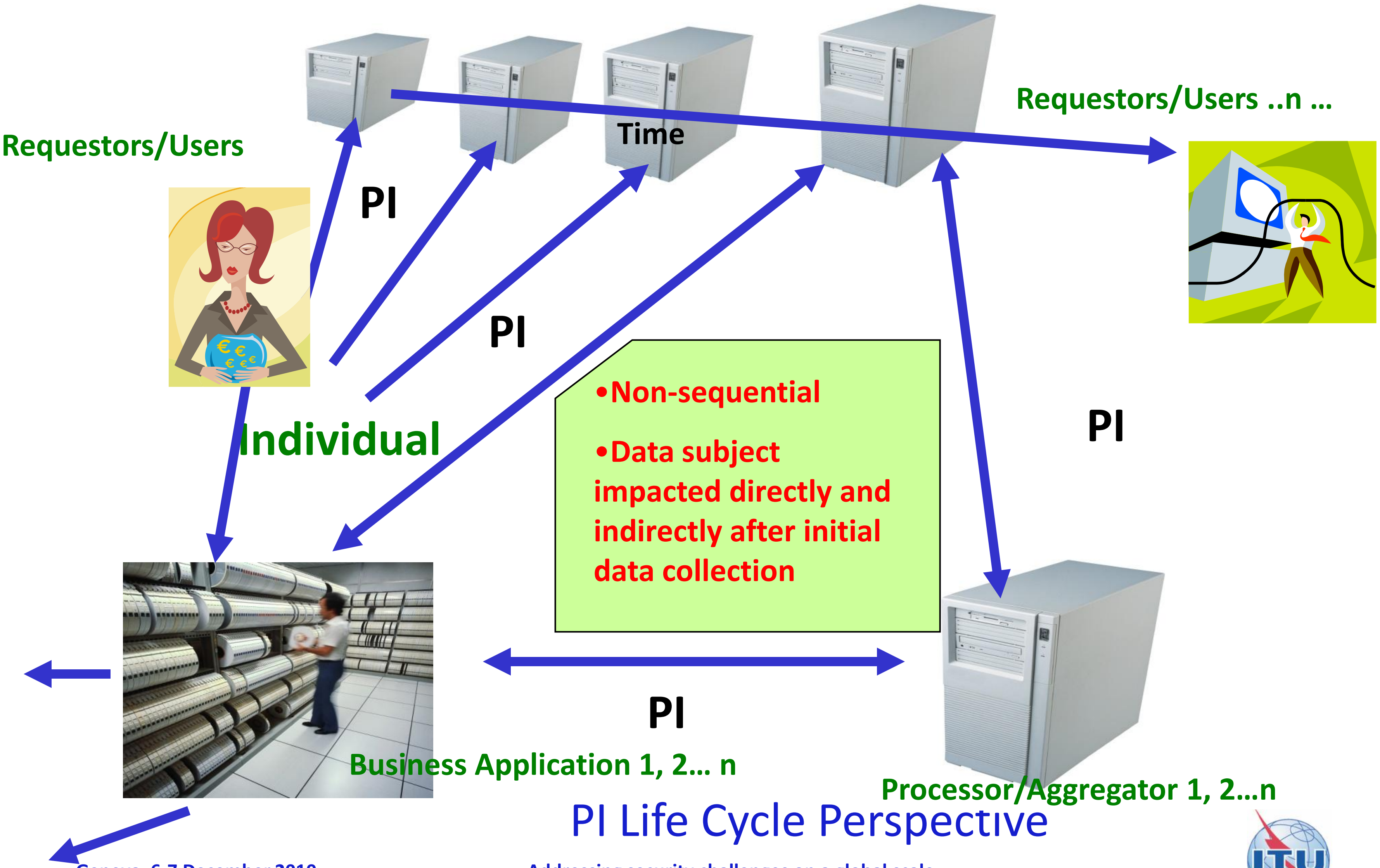
- WHO
- CMS
- CDC
- NIH

Data Mining

Business Intelligence

Health Information Exchange Functional and Roles Diagram

Managing Networked PI -Interactive Data Flows



Requestors/Users

Time

Requestors/Users ..n …

PI

PI

PI

Individual

- Non-sequential
- Data subject impacted directly and indirectly after initial data collection

PI

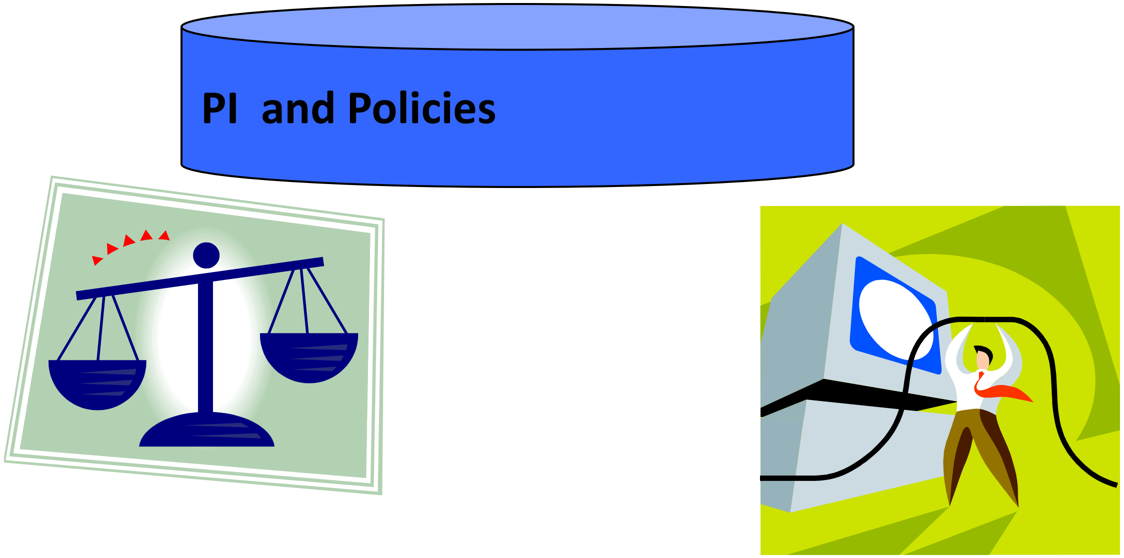
Business Application 1, 2… n

Processor/Aggregator 1, 2…n

PI Life Cycle Perspective

Challenge:

Making a Reference Model that is *PI* and *Policy*–Centric



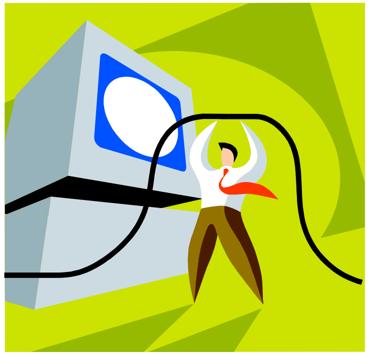
PI and Policies

Managing Multiple Policy Instances

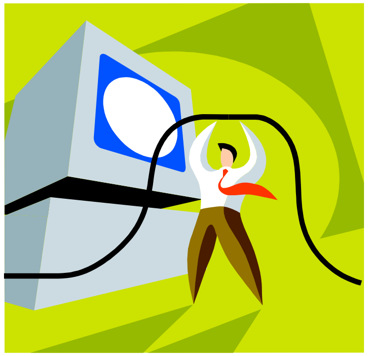
PI and Policies

PI and Policies

PI and Policies



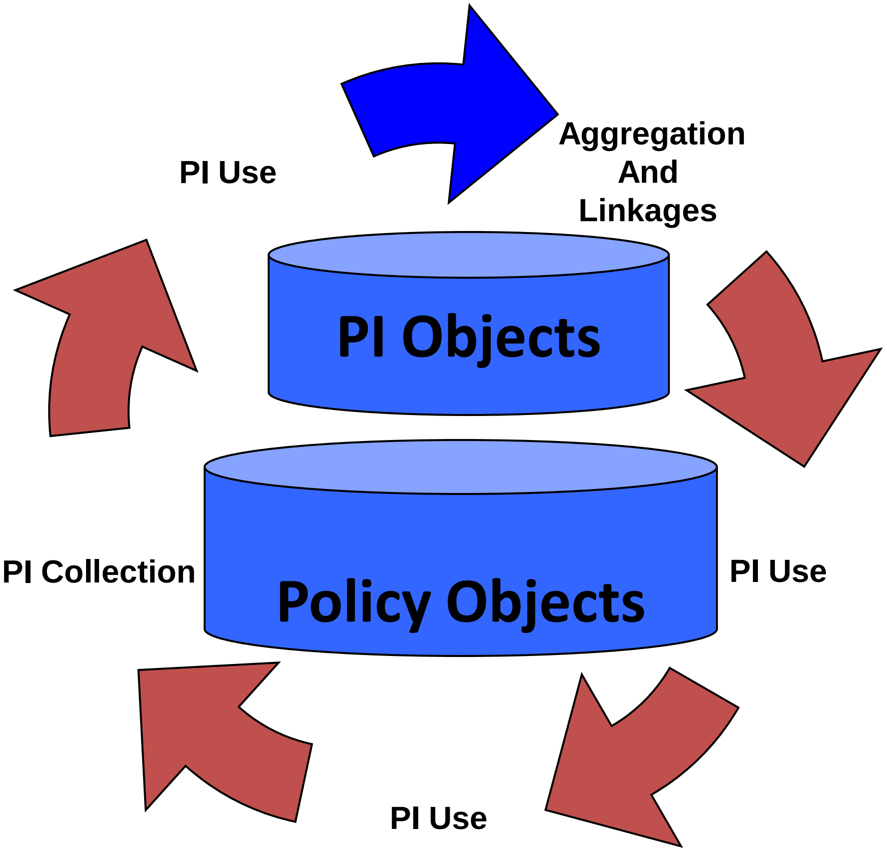
“PI” as Objects - Policies as Objects…



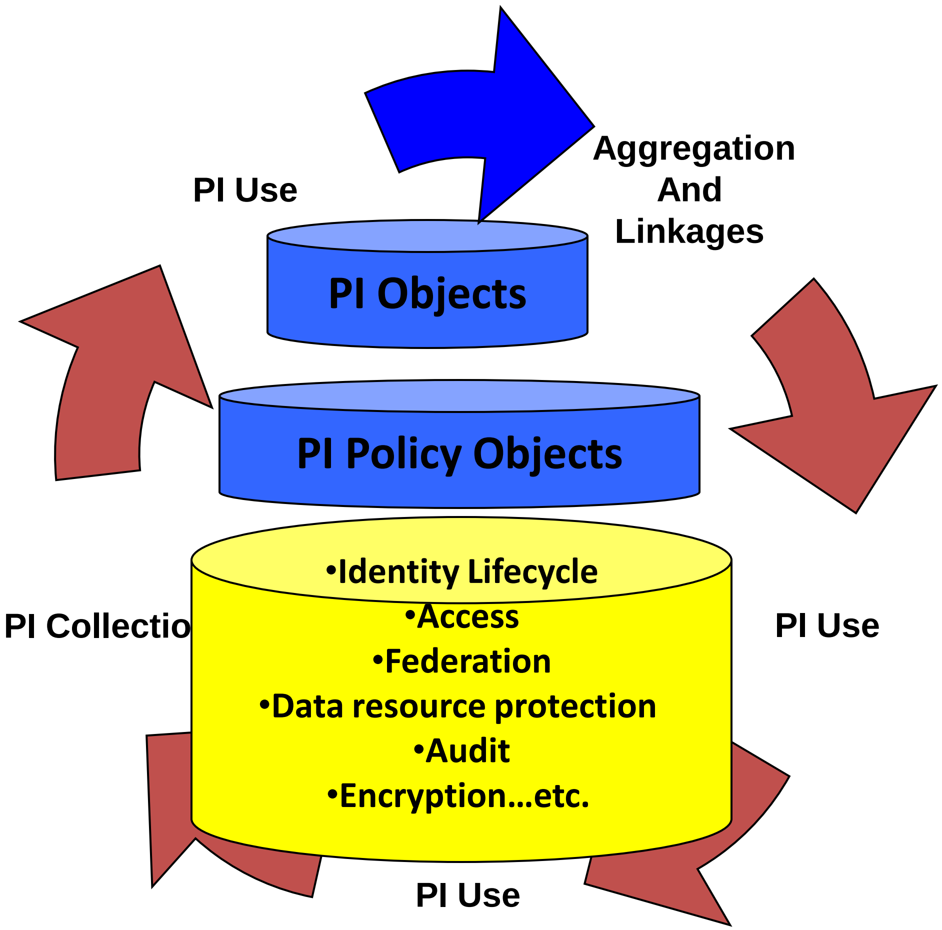
PI Objects

PI Policy Objects

… Managed in Networked "Lifecycle" Context



...with integrated Security Services



- Identity Lifecycle
- Access
- Federation
- Data resource protection
- Audit
- Encryption…etc.

Some Privacy Standardization Efforts

• W3C - P3P 1.1 Platform for Privacy Preferences

Grammar for expressing privacy preferences

• CEN/ISSS Data Protection and Privacy Workshop 2008-2009 Work Programme

Best practices management system guide; privacy audit tools

• ISO 29100 (privacy framework)

•ISO 29190 (privacy capability assessment framework)

•ISO 29101 (privacy reference architecture)

• OASIS Cross-Enterprise Security and Privacy Authorization (XSPA) Technical Committee

Exchange privacy policies, consent directives, and authorizations within/between healthcare organizations

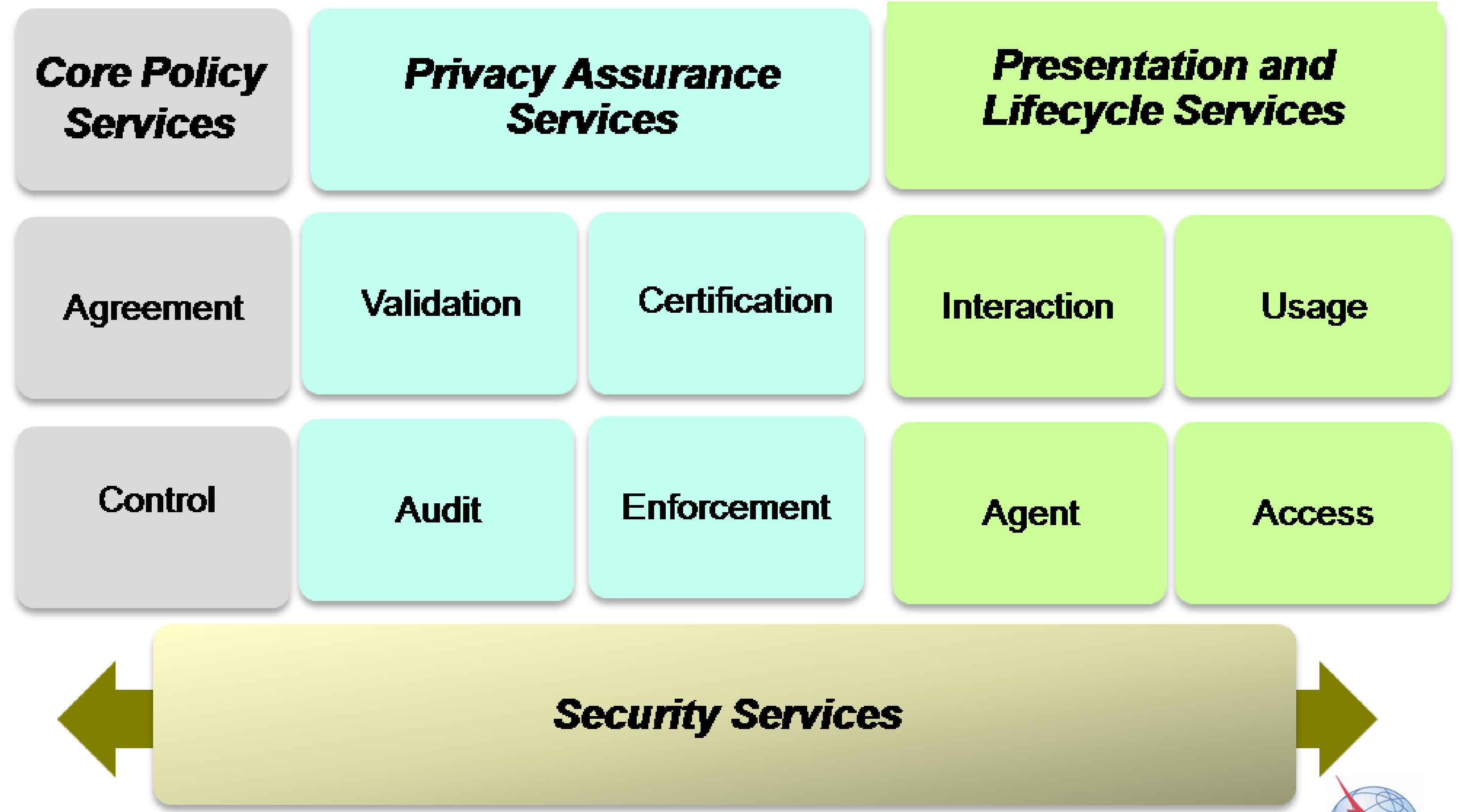
What is Needed

- **An Operational Model supporting:**
  - **the assured, proper, and consistent collection, processing, communication, use and disposition of personal information (PI) throughout its life cycle**
  - **consistent with data protection principles, policy requirements, and the preferences of the individual**
- ***Proper* and *consistent* apply throughout the PI life cycle**
- **Applicable to all actors, systems, and networks that “touch” the information**
- **An abstract model enabling networked, full lifecycle privacy management**

Privacy Management Reference Model Services

- Core Policy Services
  - **Agreement**- agreements, options, permissions
  - **Control** – policies – data management
- Presentation and Lifecycle Services
  - **Interaction** - manages data/preferences/notice
  - **Agent** - software that carries out processes
  - **Usage** - data use, aggregation, anonymization
  - **Access** - individual review/updates to PI
- Privacy Assurance Services
  - **Certification** - credentials, trusted processes
  - **Audit** - independent, verifiable accountability
  - **Validation** - checks accuracy of PI
  - **Enforcement** - including redress for violations

Privacy Reference Model



Core Policy Services

Agreement

Control

Privacy Assurance Services

Validation

Certification

Audit

Enforcement

Presentation and Lifecycle Services

Interaction

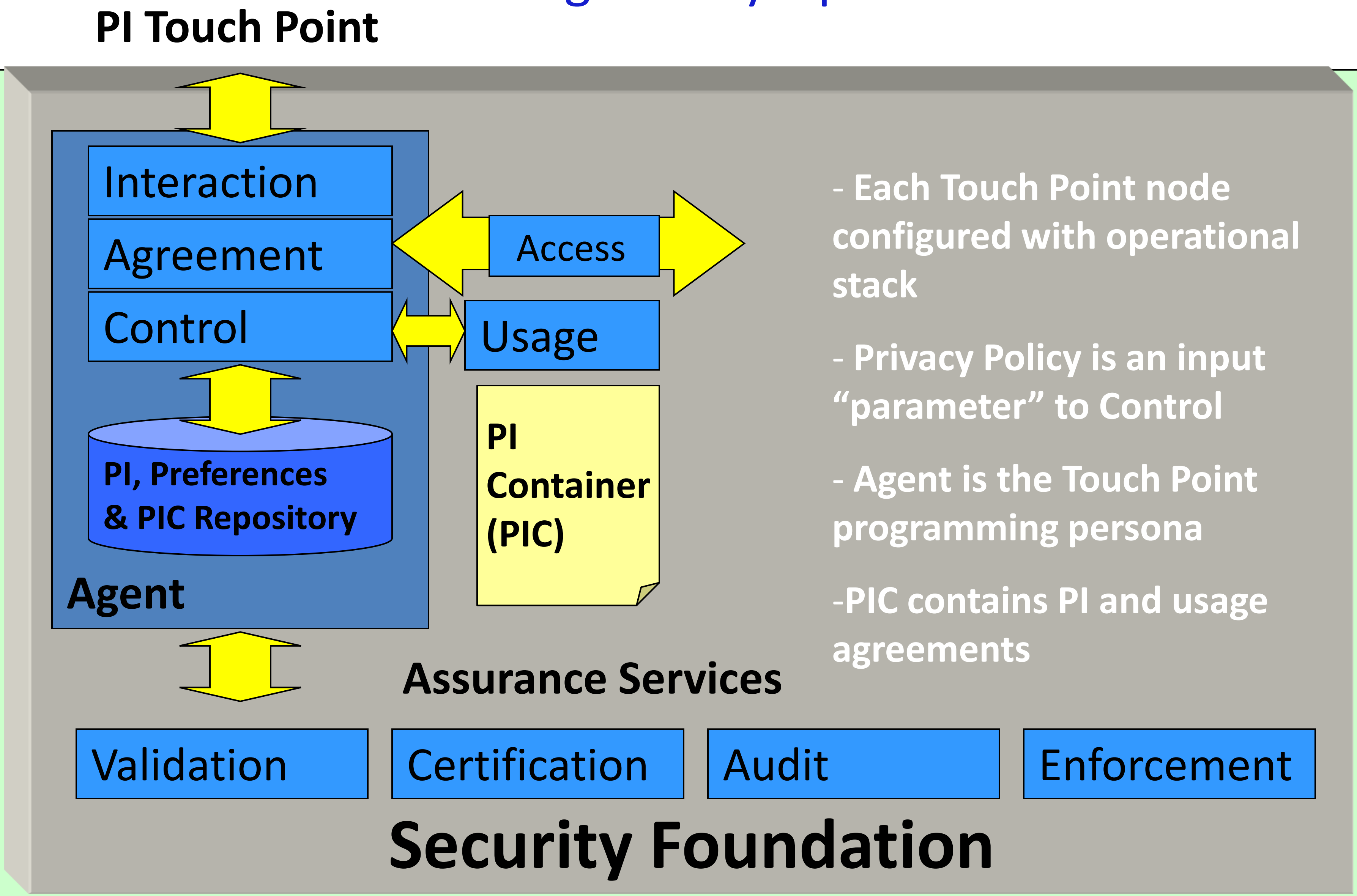
Usage

Agent

Access

Security Services

Making Privacy Operational



- Each Touch Point node configured with operational stack

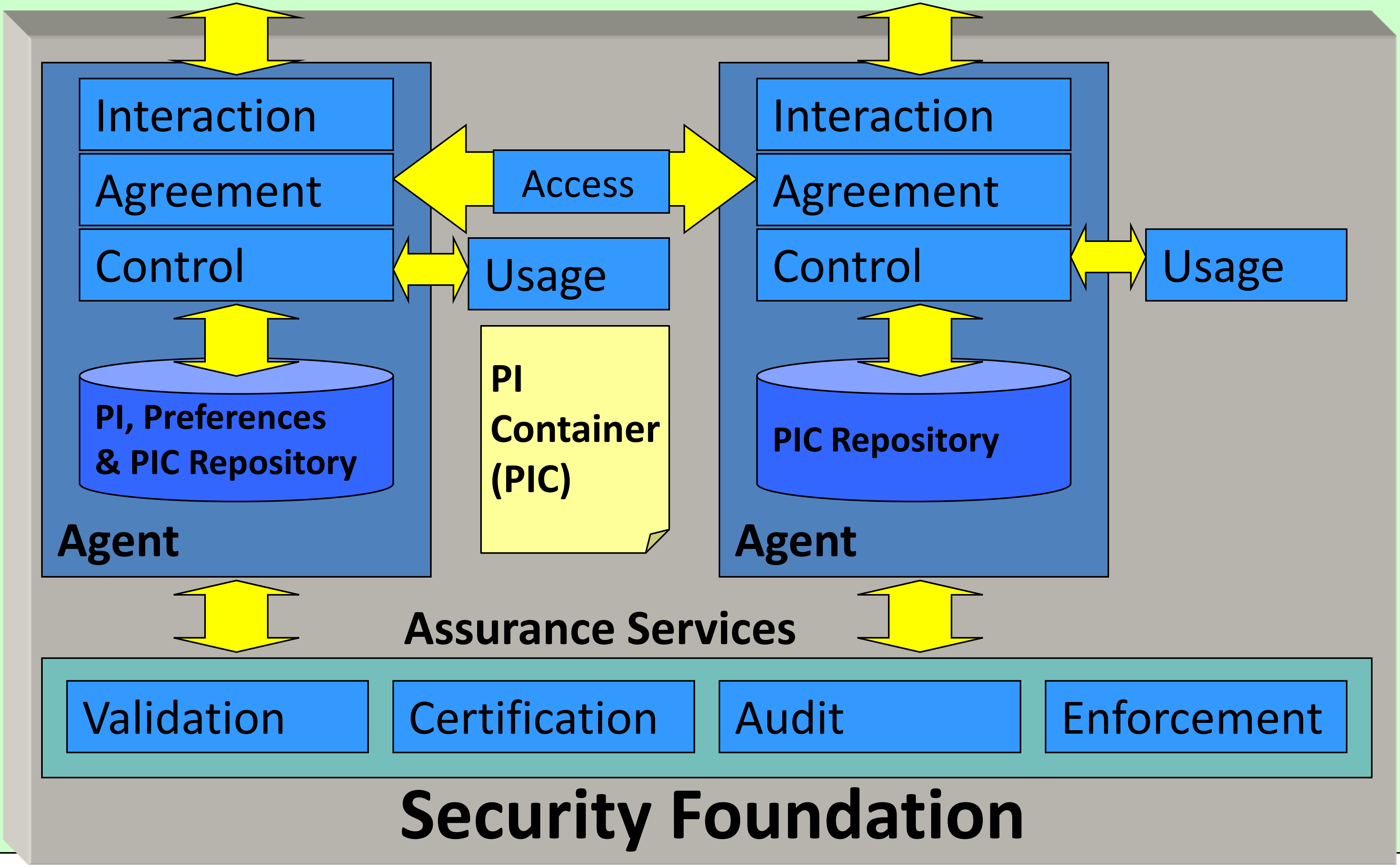
- Privacy Policy is an input “parameter” to Control

- Agent is the Touch Point programming persona

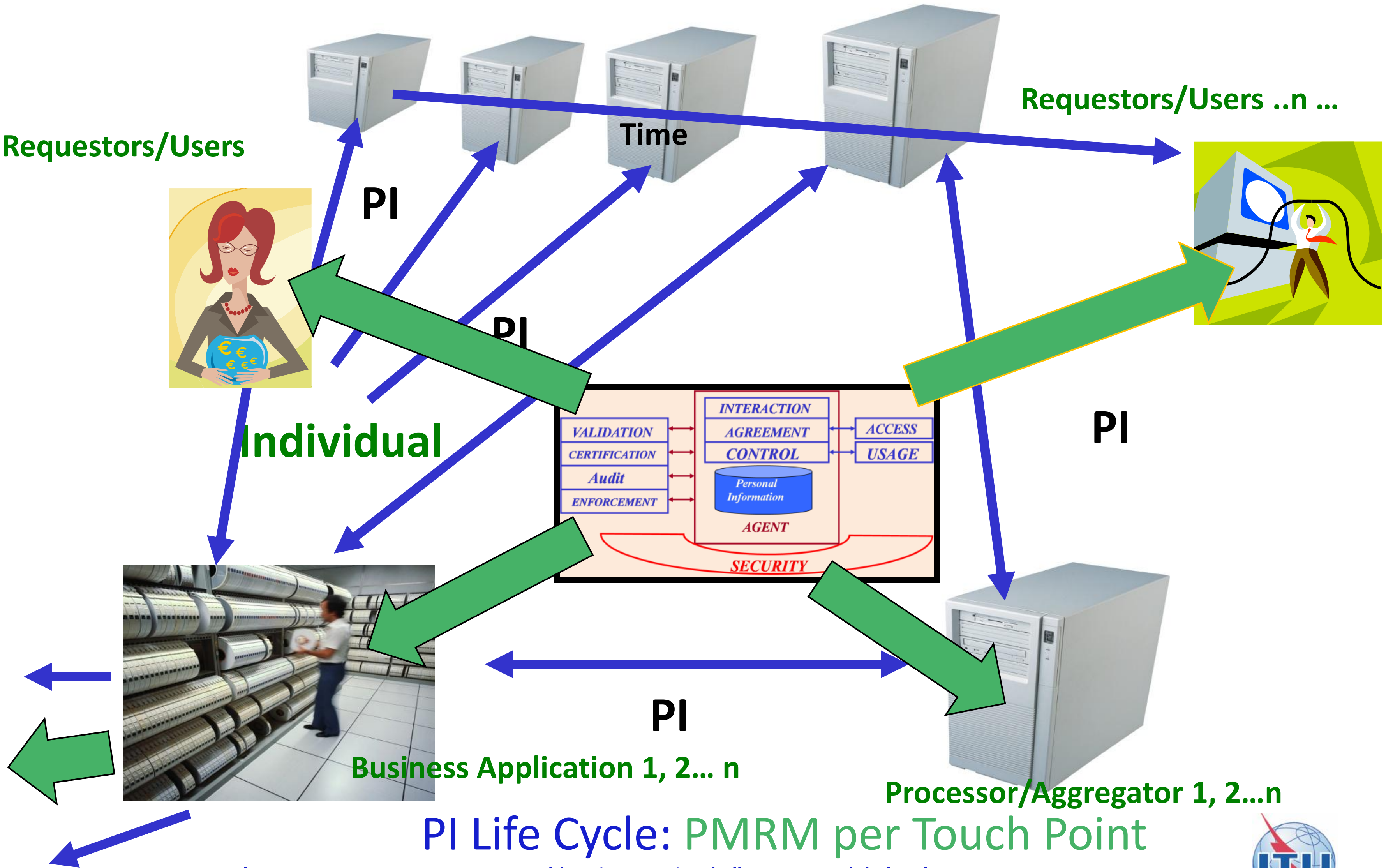
-PIC contains PI and usage agreements

Privacy SERVICES

Any two touch points in the PI life cycle



Support for Networked-Interactive Data Flows



PI Life Cycle: PMRM per Touch Point

Syntax for each Service: Functions

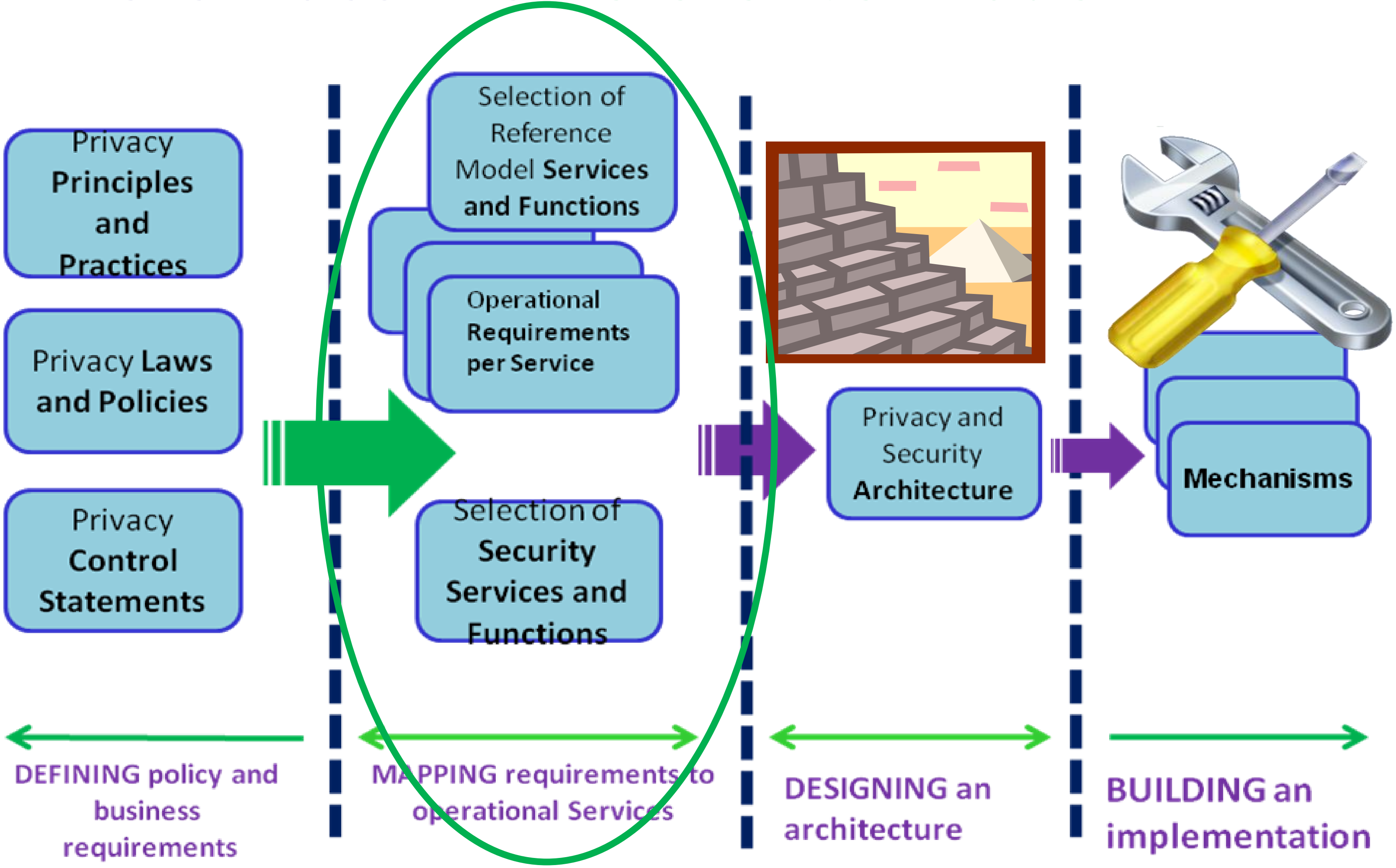
- **DEFINE [SVC]** operational requirements
- **SELECT [SVC]** (input, process, and output) data and parameters
- **INPUT [SVC]** data and parameter values in accordance with Select
- **PROCESS [SVC]** data and parameter values within Functions
- **OUTPUT [SVC]** data, parameter values, and actions
- **LINK [SVC]** to other (named) Services
- **SECURE [SVC]** with the appropriate security functions

•Each USE CASE invokes a sequence of Service “calls”

•Each Service call executes a sequence of Functions (drawn from these seven Functions)

TWO EXAMPLES

Where Does the Reference Model Fit?



Privacy Principles and Practices

Privacy Laws and Policies

Privacy Control Statements

Selection of Reference Model Services and Functions

Operational Requirements per Service

Selection of Security Services and Functions

Privacy and Security Architecture

Mechanisms

DEFINING policy and business requirements

MAPPING requirements to operational Services

DESIGNING an architecture

BUILDING an implementation

Current PMRM Activities

- OASIS Privacy Management Reference Model (PMRM) Technical Committee
  - First meeting September 8, 2010
  - Deliverables include
    - the Reference Model
    - use cases utilizing the PMRM
    - formal methodology for expressing use cases
    - profiles of the PMRM applied to selected specific environments such as Cloud Computing
    - linkages to security services
- Seek liaison relationships to test the Reference Model against use cases and privacy scenarios
- Coordinate as much as possible with other standards efforts
- Charter includes specific reference to international standards bodies such as ITU and ISO

Questions?

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Contributed PMRM available at www.oasis-open.org