HKSAR Government Site Visit to Center for E-Commerce Infrastructure Development (CECID)

Organized by OGCIO

8 June 2007

Professor David WL Cheung

Director, CECID

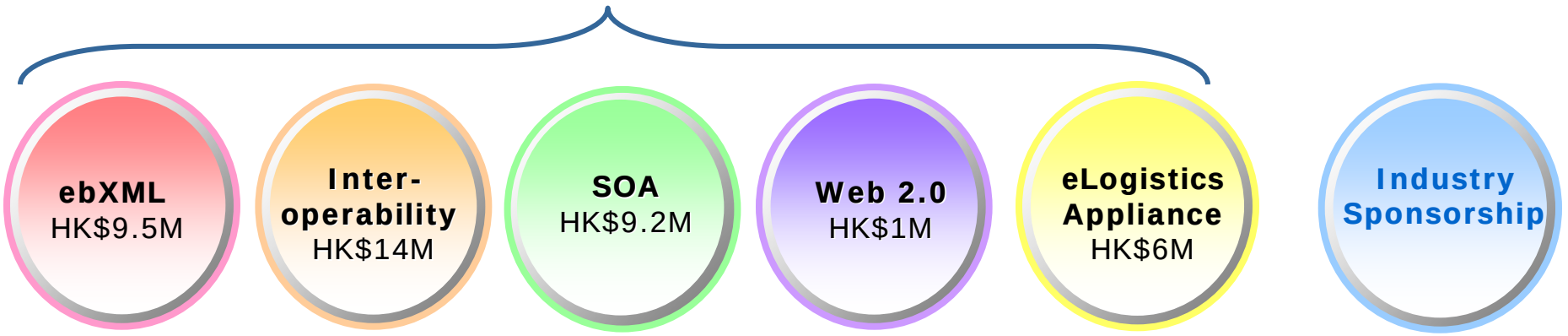
Head, Dept. of Computer Science

Center for E-Commerce Infrastructure Development

HKU E-Commerce R&D Center established since 2002

To create an infrastructure and environment that allows e-commerce to pervade large and small businesses through technology innovation, industry collaboration, and knowledge cultivation.

HK$40M Innovation and Technology Fund



Awards

Linux Business Award 2005

Asia Pacific ICT Awards 2004

6th HKCS IT Excellence Awards

ebXML Asia Interoperability Certificate

Hermes Users (Local)

- HKSAR Government (G2B document submission)
  - Dangerous Goods Manifest Submission (Marine Dept)
  - Notifiable Infectious Disease Information Messaging System (Health Dept)
  - E-Government Infrastructure Services (EGIS) (OGCIO)
  - Vehicle Insurance Data Exchange for License Renewal (Transport Dept)
  - T21 Contract Staff Administration System (OGCIO)
- MTRC (HK major subway operator)
- bigBOXX.com (office supplies vendor)
- OOCL (international shipping company)

中華人民共和國香港特別行政區政府
The Government of the Hong Kong Special Administrative Region of the People's Republic of China

地鐵公司 MTR Corporation

bigboXX.com

OOCL We take it personally

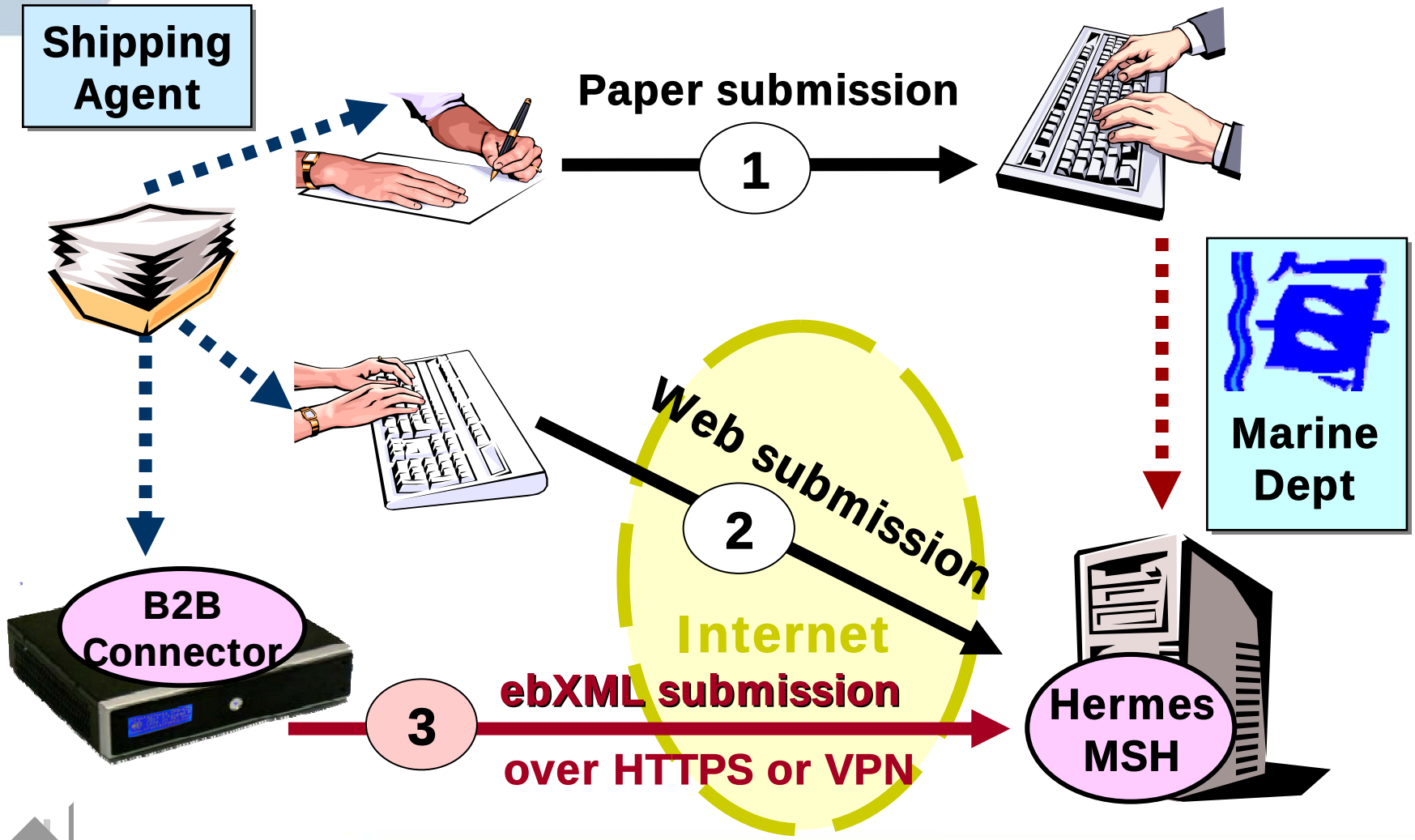
Hermes Users (Overseas)

- NetBay (Thailand)
- Spherion Technology (IT consulting in Australia/partner of Telstra)
- Tedis (IT consulting Australia)
- US National Institute of Health (NIH)
- Viatel (partner of British Telecom)
- Deutsche Betriebskrankenkasse (German health insurance company and its 15 partners)

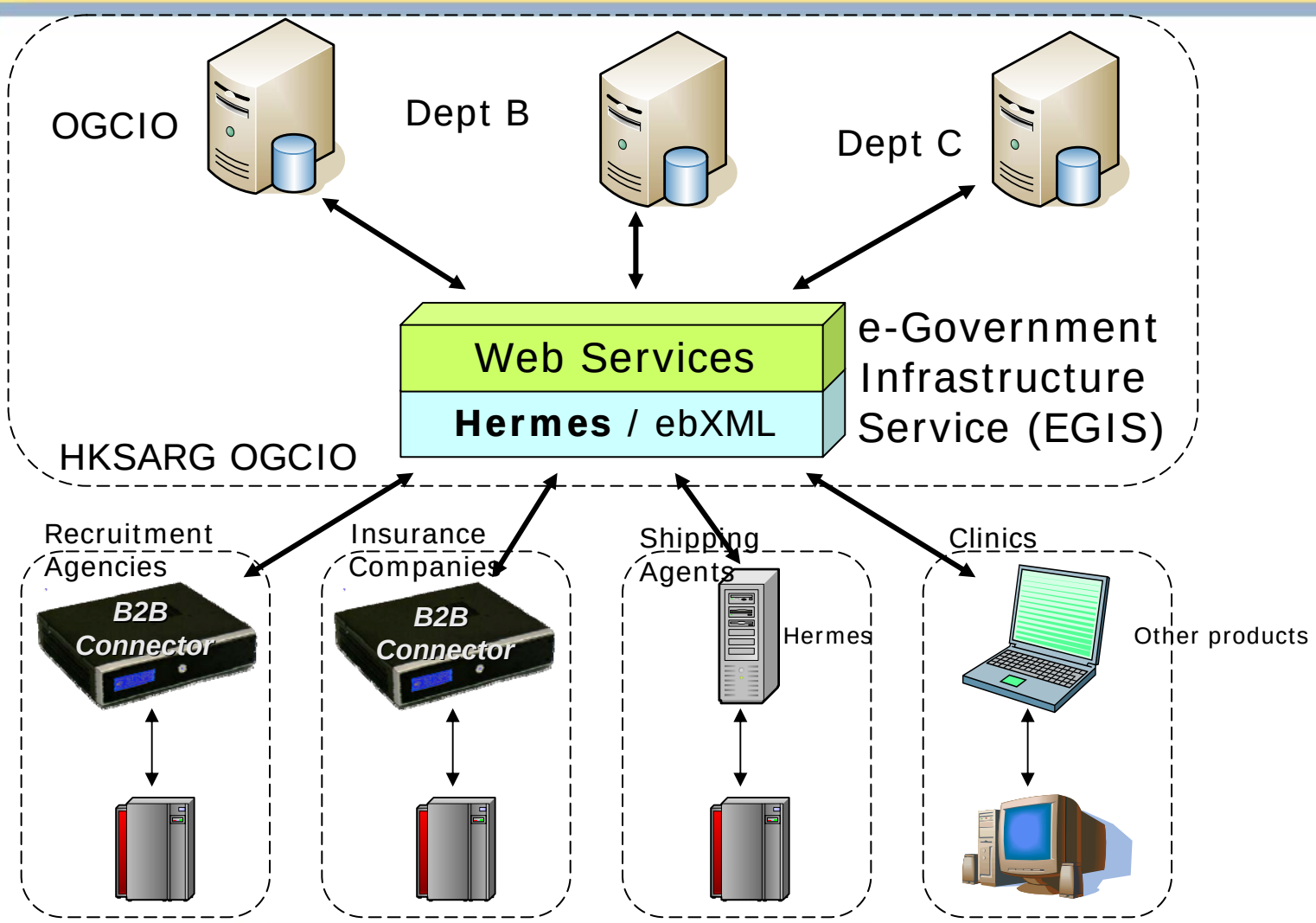
Global Penetration

Recorded over 13,000 downloads from 80+ economies

Submission of Dangerous Goods Manifest

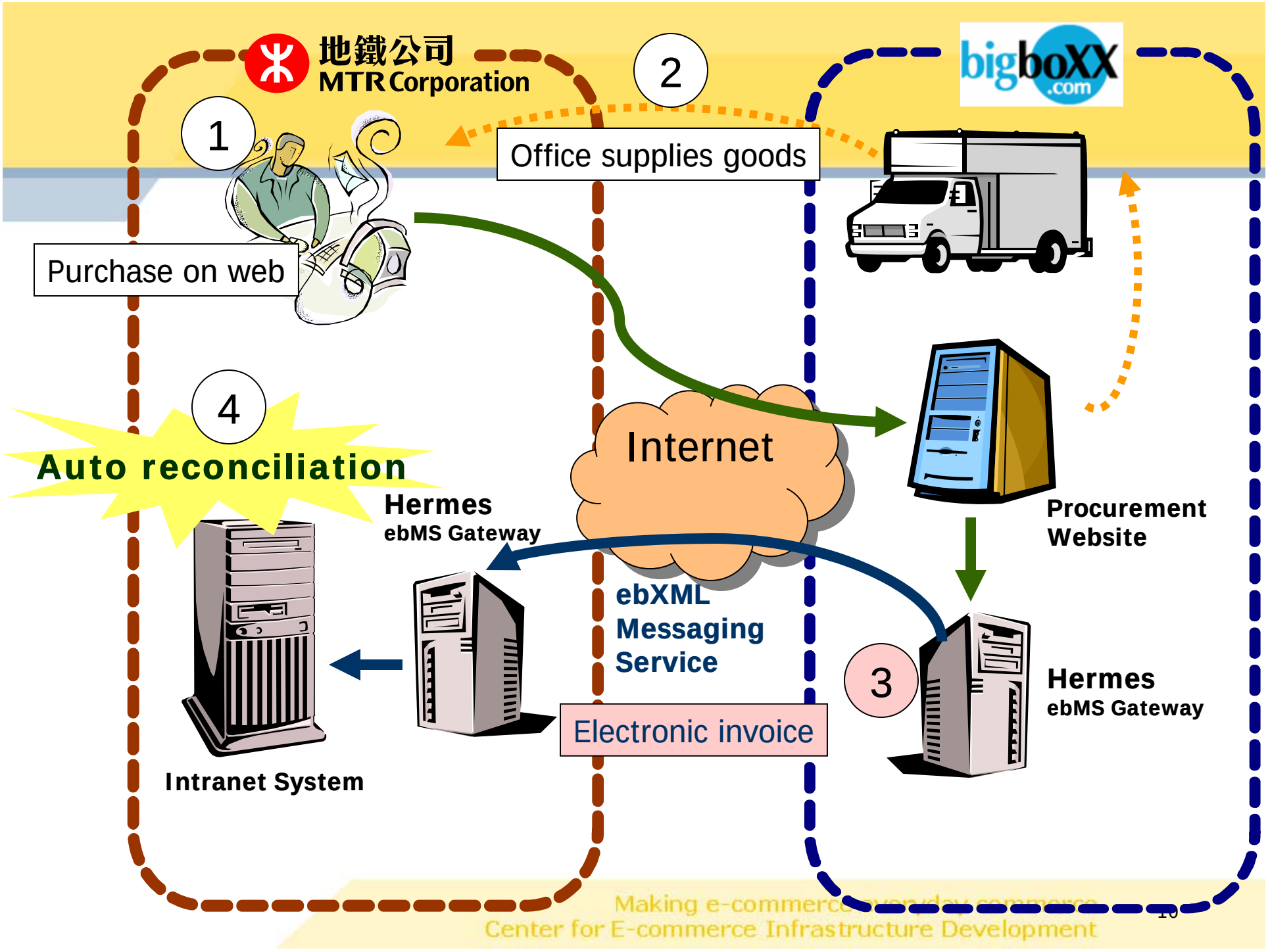


E-Gov Infrastructure Services (EGIS)
Benefits to Society & Scale of Deployment

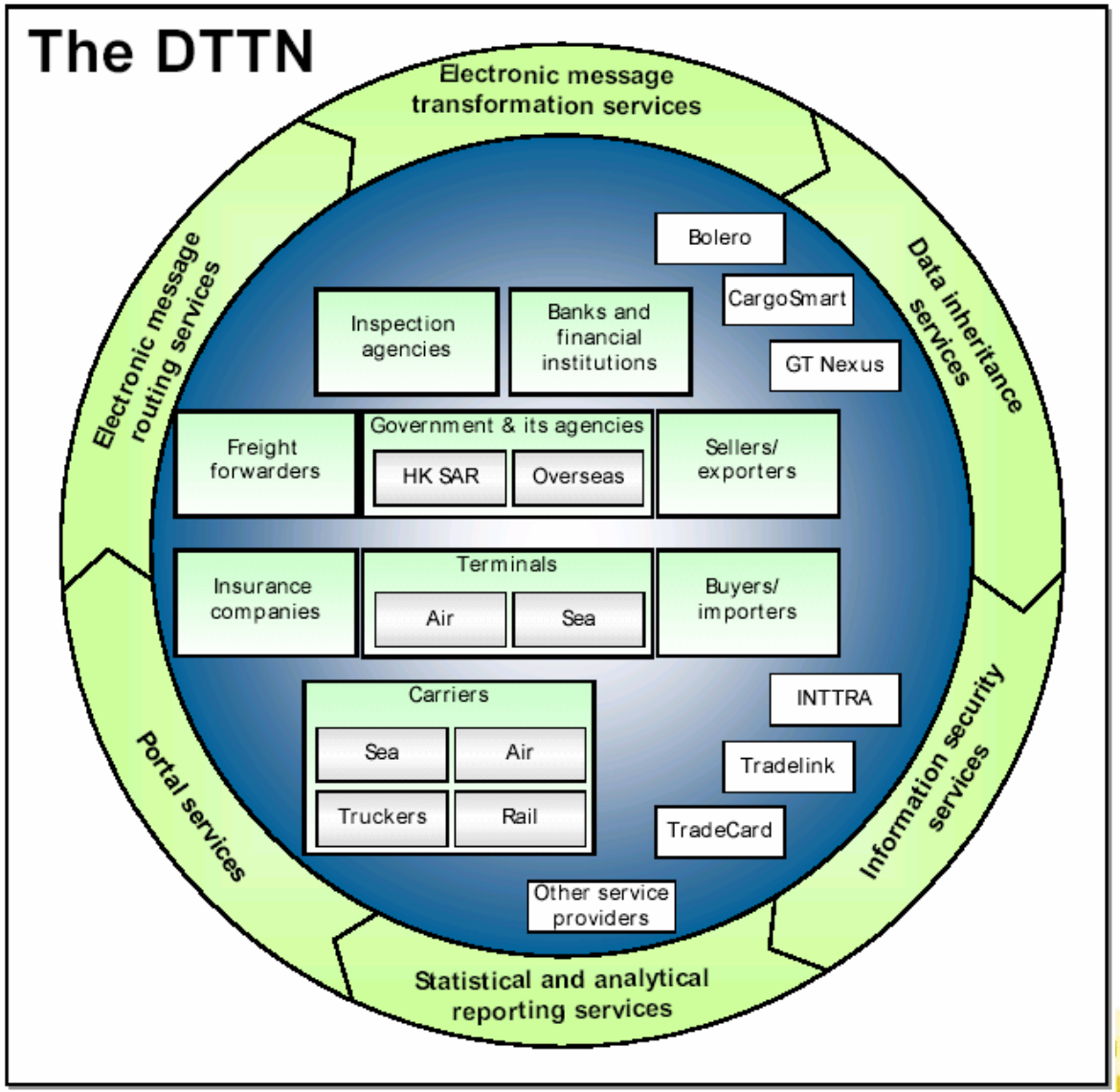


XML Schema Design and Management Guide

- XML schema modeling methodology for developing e-govt applications
- Based on ebXML Core Components & UBL approach
- Standardized Common Schemas
  - person's name, HKID#, address, etc.
- Central Data Registry
  - www.xml.gov.hk
- Part of the government Interoperability Framework
- One of OASIS eGovernment best practices
  - http://egovernment.xml.org


地鐵公司
MTR Corporation
bigboXX .com
1
2
Office supplies goods
Purchase on web
4
Auto reconciliation
Internet
Hermes
ebMS Gateway
Procurement
Website
ebXML
Messaging
Service
3
Hermes
ebMS Gateway
Electronic invoice
Intranet System

Digital Trade & Transportation Network



Thank You

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http://www.cecid.hku.hk

B2B Connector

Information Exchange Device

CECID

OASIS MEMBER

RosettaNet PARTNER

ebXML Asia Committee

Challenges

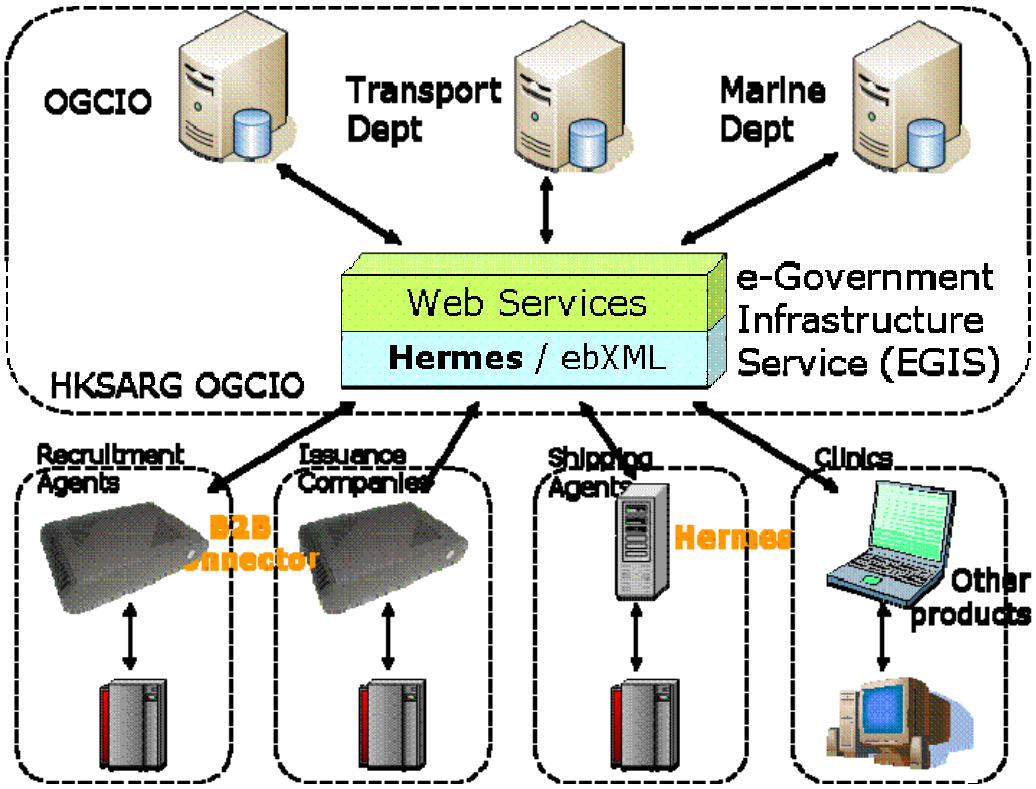
- Specific delivery mechanism
- Automation
- Large file transfer

Specific Delivery Mechanism

- Reason :
  - Ensure messages are sent reliably and securely
- Solution :
  - B2BC is capable to send ebMS and AS2 messages.

Project Reference

- E-Government Infrastructure Service (EGIS)



Service Integration Reference

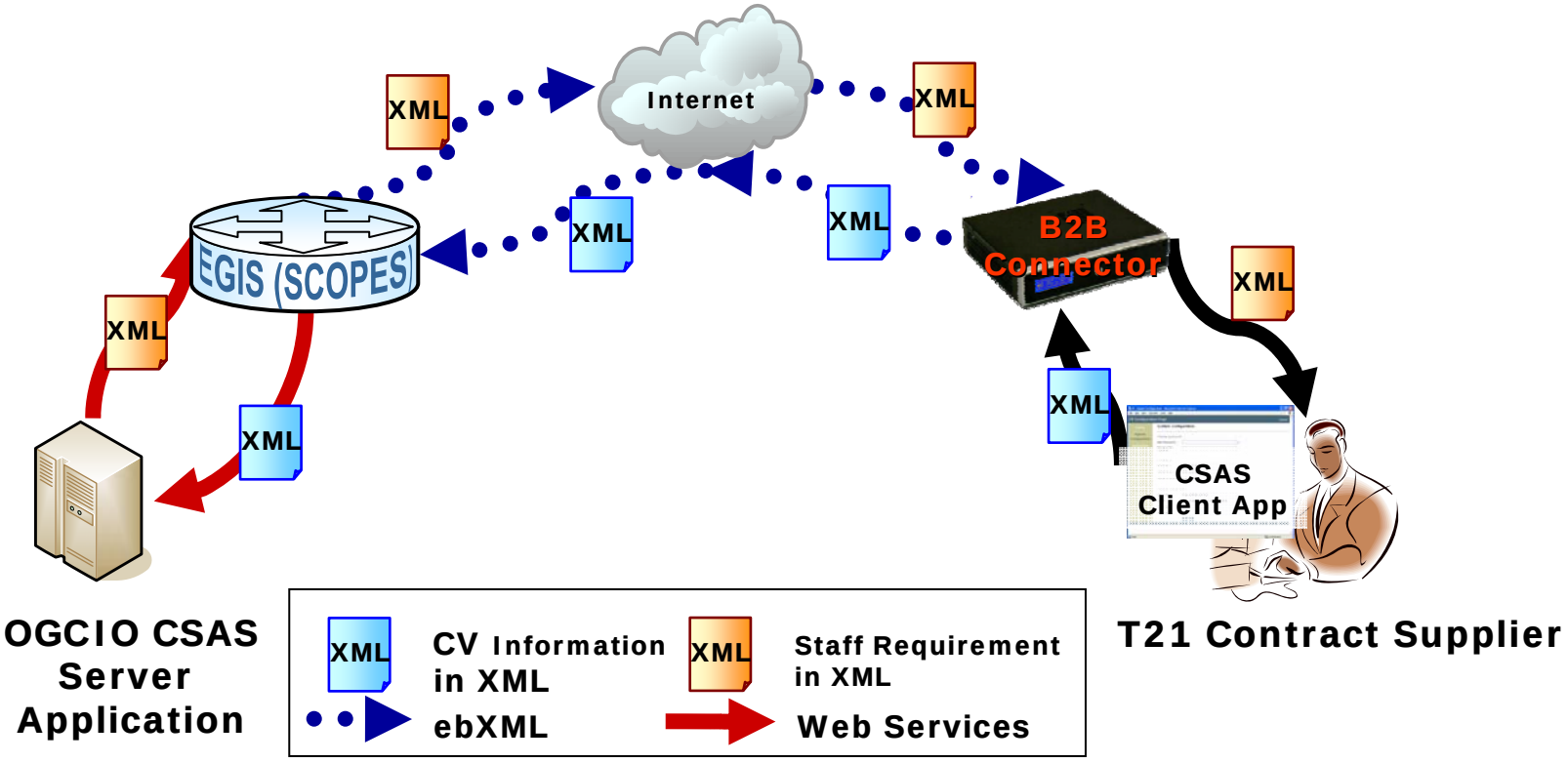
- T21 Contract Staff Administration System

Typical Implementation

- Setup environment
- Deploy ebMS server
- Develop program in sending ebMS message

T21 Implementation

- Deploy B2B Connector



Automation

- Reason :
  - Reduce manual error
  - Streamline business process
- Solution :
  - B2BC can work in peer to peer mode
  - Shared folder on B2BC allow easier integration

Large File Transfer

- Reason :
  - Allow file exchange that is too large to send as email
- Solution :
  - SFRM (Simple File Reliable Messaging) to the rescue

There's more from B2BC

- Setup Wizard
- Multiple Message Protocol
- Document Conversion
- Integration Interface
- E-certificate Management
- System Update and Backup
- And much more ...

Improving Data Interoperability/Quality in e-Business Collaboration

Wellwin Kwok

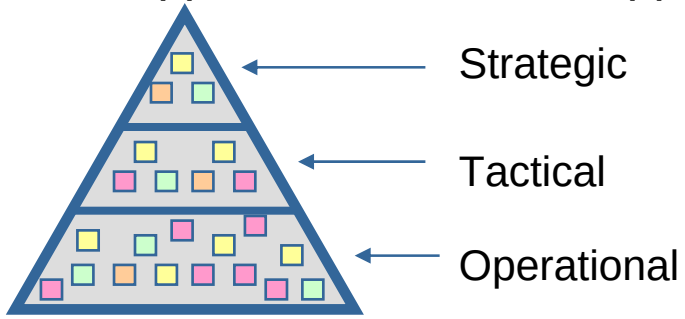
Chief Technology Officer, CECID

Agenda

- 10 minutes on Enterprise Information Architecture
- Case Sharing

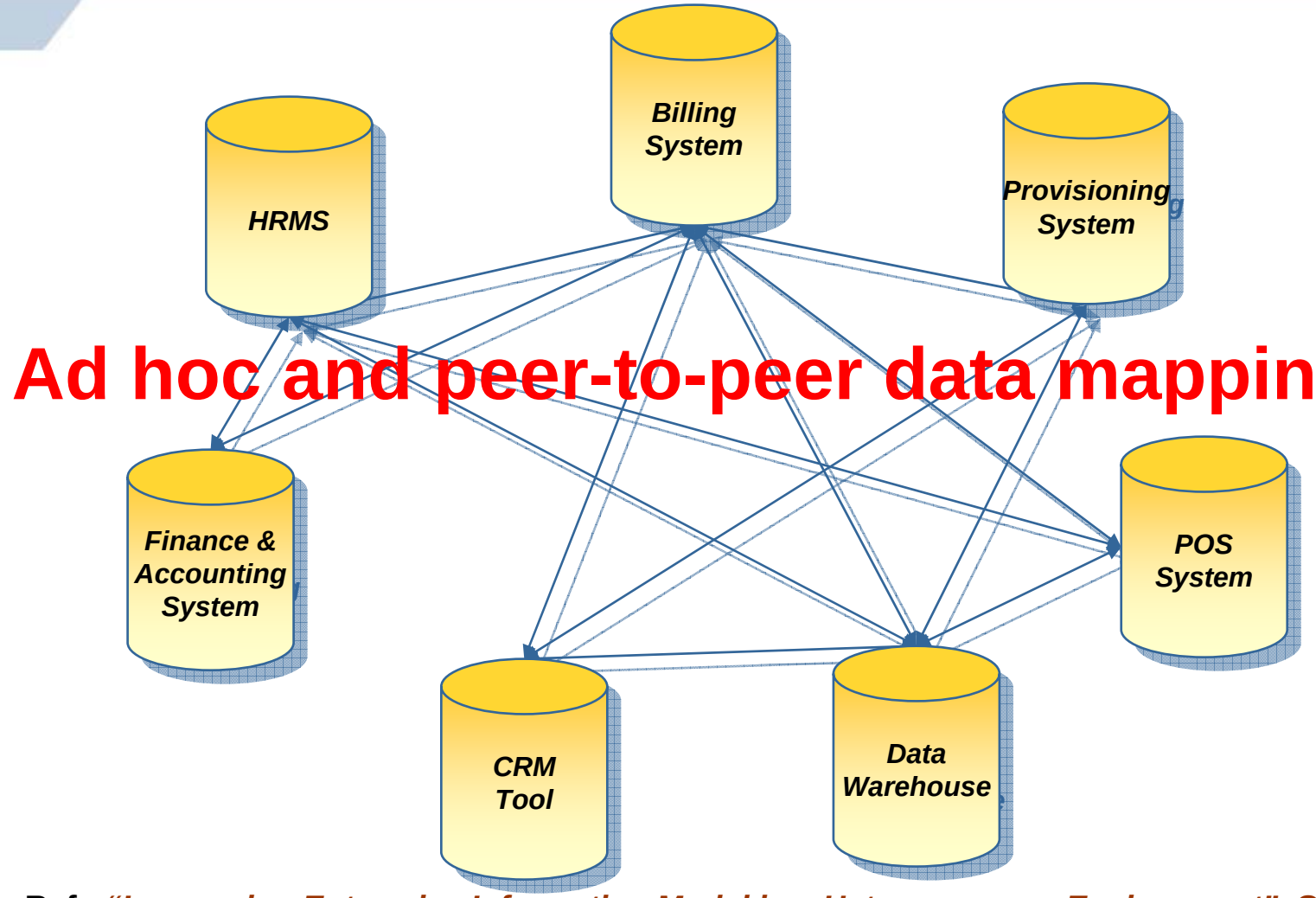
Importance of Information

- Important asset – presents strategic values in supporting business objectives
- Expansion, Mergers and Acquisitions, Join-up Services ➔ information consolidation
  - reduce business costs in different operations
  - speed up business response and time-to-market
- Different hierarchy levels have different information views but
  - understanding in all levels must align with business strategies
  - view in lower level must be projected to support those views in upper levels



Information Hierarchy

Typical Integration Problem – Data Spaghetti



Ref : ***"Leveraging Enterprise Information Model in a Heterogeneous Environment"*****, CECID**

Need Information Architecture

- Quality
  - Top down and holistic view of enterprise information architecture
    - c.f. individual & non-interoperable views by uncommunicated teams
  - Alignment with business need
    - c.f. minor untracked tunings by programmers
- Reusability
  - Reusable & documented understanding in information
    - → reduce learning curve & misunderstanding due to ambiguity of multiple sources
  - Reduce redundancy
    - → reduce mistakes due to integrity problem
- Maintainability
  - Factored models ensure consistent propagation of changes, e.g. change in length or format in phone numbers

Enterprise Information Architecture (EIA)

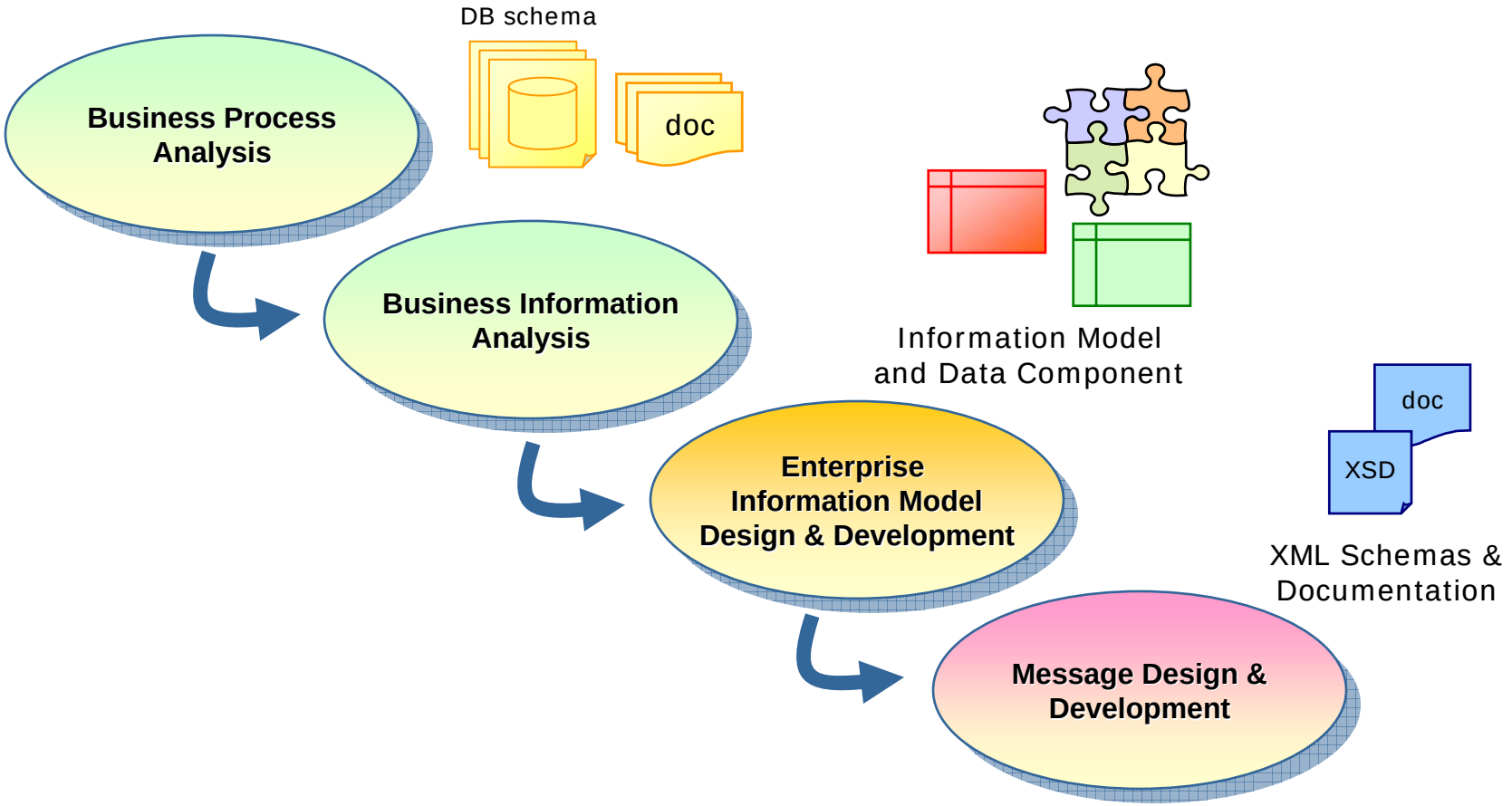
- An integrated set of:

- To complement traditional technique such as Entity-Relationship (ER) modeling
- To provide a high-level view of business activities
- To identify the information needs that align with the business strategies

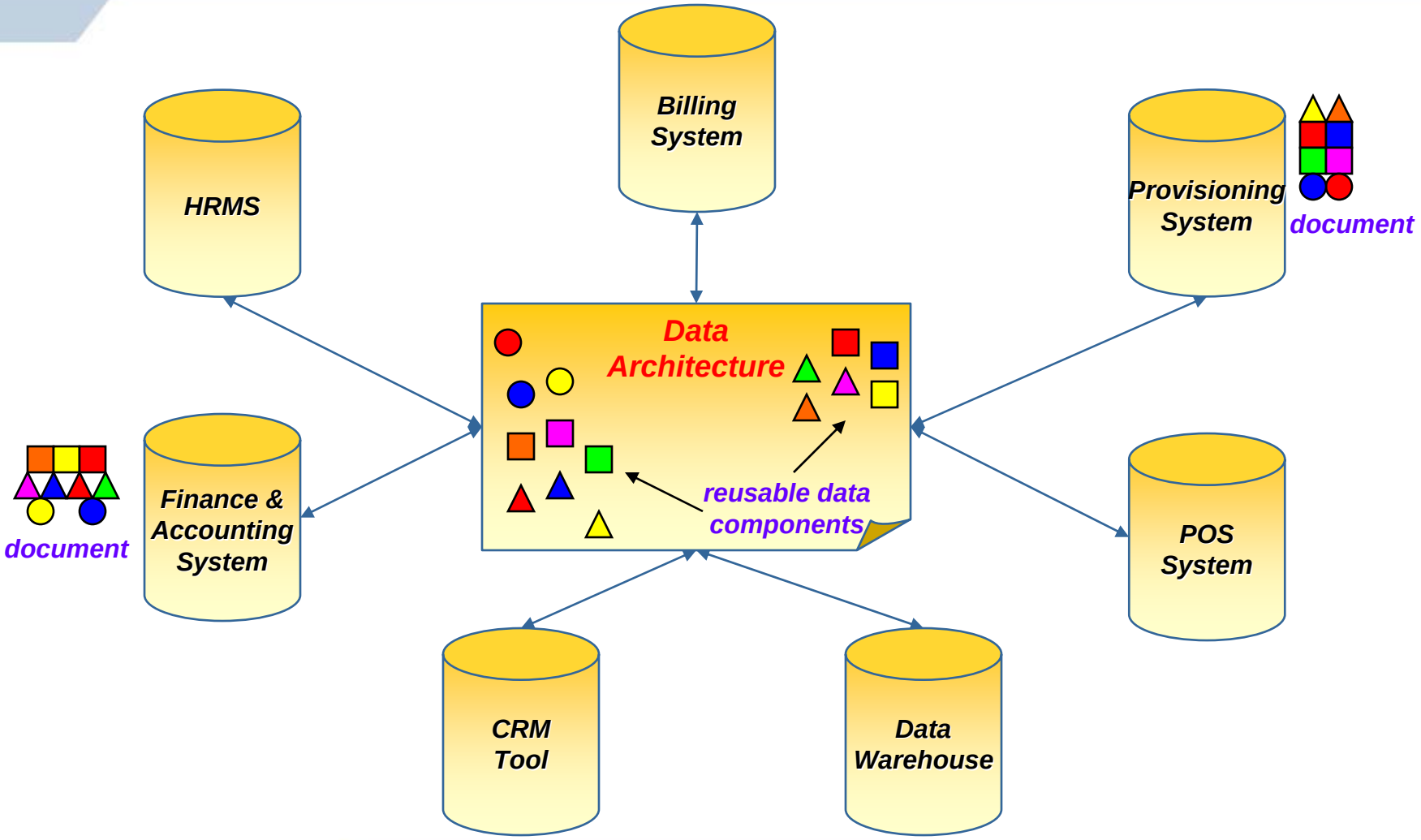
Deliverables

- To support the development of business systems and applications
  - A centralized enterprise information architecture
    - to project a holistic view of an enterprise
  - Documentations of information models
    - to facilitate easy and harmonized business understanding
  - Technical artifacts, e.g. document schema
    - to facilitate business systems development

Enterprise Information Architecture Step-by-Step



A Neat and Controlled Way



cf. : ***peer-to-peer mapping complexity in Data Spaghetti***

Case Sharing 1

Airport Operation Database

CECID

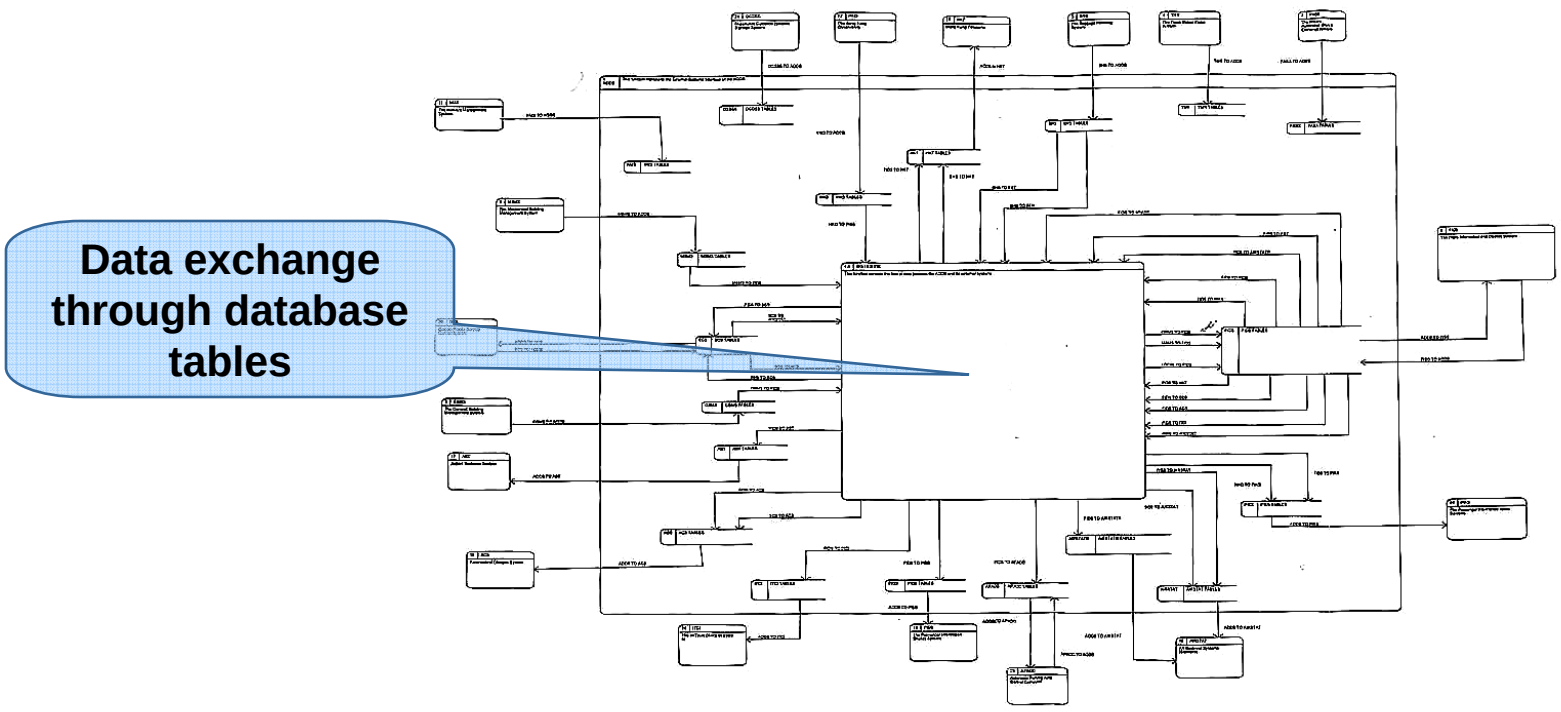
OASIS MEMBER

RosettaNet PARTNER

ebXML Asia Committee

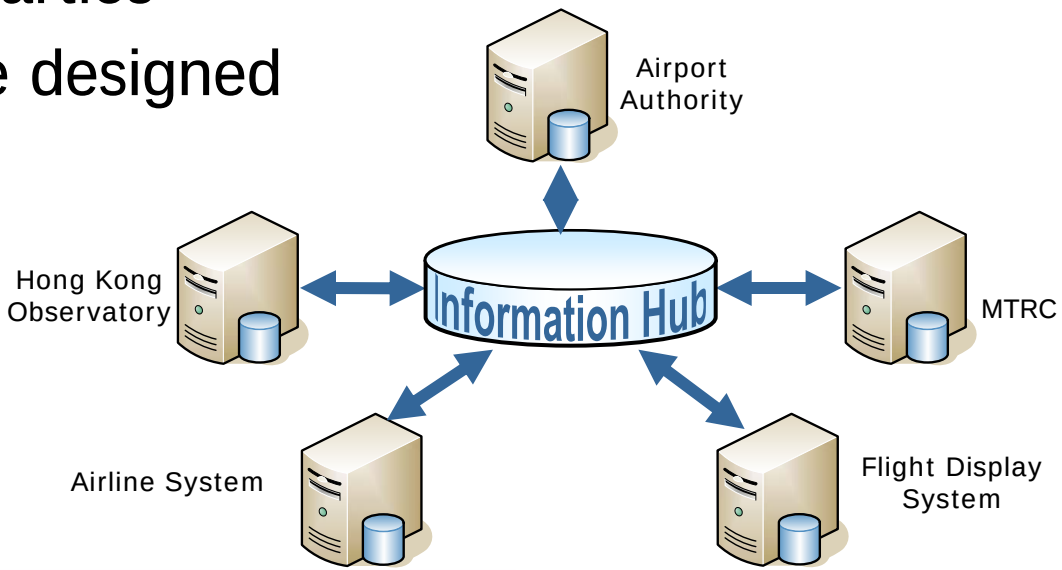
Case Background

- Airport Authority initialized an AODB (Airport Operation Database) Revamp Project



Objectives

- Build an information hub so that different parties can integrate the same set of enterprise information models using Web Services
- Real-time data update among Airport Authority and its external business parties
- XML Schemas to be designed



Scope

- Information exchange among 18 external parties
- ~120 database tables analyzed
- Meetings for review and clarification of requirements and data models
- Knowledge transfer
- Completed in 4 man-months
- 2.5 months in elapsed time

Business Benefits

- The centralized enterprise information model provides a common business understanding to all business parties and thus minimize the ambiguity during integration
- Reduce the data mapping work from one system to all the others and thus speed up the information update
- Difficulties:
  - Uncertainty in model design
    - lack of supporting documents for the database
    - lack of documents of how data is access by external business parties
  - Uncertainty in data requirements from users

Case Sharing 2

Enterprise Application Integration

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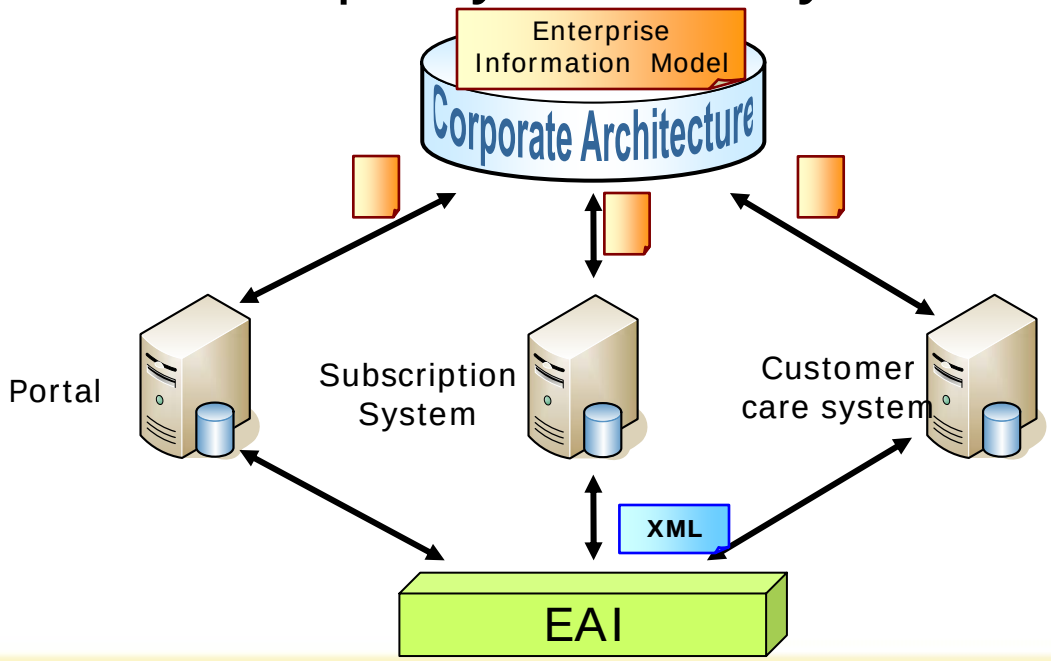
Case Background

- A mobile phone operator with numerous system improvement projects for daily operations, e.g. CRM, Accounting, Data Warehouse
- Enterprise Application Integration (EAI) initiative, e.g. how to integrate 2G and 3G billing information into a single bill

Objectives

- To build a well-designed enterprise data architecture that enables scalable EAI initiatives
- Building an enterprise data model is one of the keys in the architecture to achieve data quality, reusability and maintainability



Scope

- 93 database tables from multiple systems
- 8 interfaces for information exchange
- Definitions and relationships of databases in 3 other systems referenced
- Standards in the telecommunications industry, Shared Information/Data Model, referenced
- Knowledge transfer
- Completed in 10 man-months
- 3 months in elapsed time

Business Benefits

- Align the business understanding of information among the stakeholders of different systems
- Speed up the integration and thus lower the cost by reusing information models developed
- Information models consistently evolved and maintained across different business units to reduce redundancy
- Difficulties
  - The understandings of business information among different stakeholders are often different
  - Harmonization of information requirements from different teams take ample time

Case Sharing 3

Content Standardization

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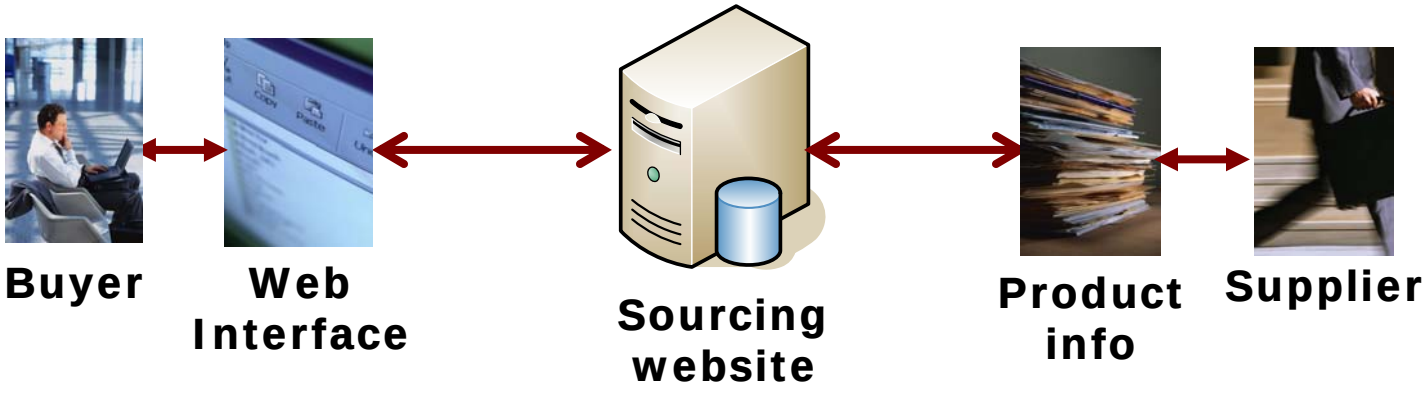
Case Background

- A leading marketing arm in HK providing global services to facilitate trade opportunities
- Business Challenges
  - Data Quality
    - Arbitrary textual description of product/company
    - Difficult to categorize the product, e.g. is a MP3 playing watch a watch or a MP3 player
  - Data Interoperability
    - Thousands of data systems across different regions ➔ lack of a holistic view of business information
    - Incompatible data formats and meaning

Objectives

- Establish information standard for product specification and company profile for different trading categories
- Better indexing and searching of products and companies information



Scope

- Analyze 24 business documents
  - Advertisement submission form
  - Sample web pages of product specification and company profile
- Refer to about 20 other sourcing and online shopping websites
- Training session
- Completed in 3 man-months
- 1.5 months in elapsed time

Business Benefits

- Improvement in data quality
  - Re-align inaccurate data fields in paper form or uploaded files with the designed data models
    - format restriction enforced
    - consistent business understanding
  - More appropriate company and product attributes to be indexed and thus improved search precision
- Reuse of data models to design other business data with more strategic values
  - Save cost from repetitive effort while data quality is still ensured
- Market Discovery is much improved by providing a more effective search buyer-supplier matching

Concept of SOA

Case Study

Let's say we are doing a study on the infrastructure of a Mobile Company

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We maintain the **phone switch** and the **call log**. Every time our customer makes a call, our network base station will connect to the phone switch and request for a switch connection. That part is quite hardware related, and our work is to write a **custom C program** and deploy to the phone switch operating system. Every time the phone switch open or close a connection, it will call our C program, so that we can **check the access right**, **log down the call information** (e.g. the caller's number, the callee's number, the duration of the call, etc.) to our specially designed database.

Phone Switch Team

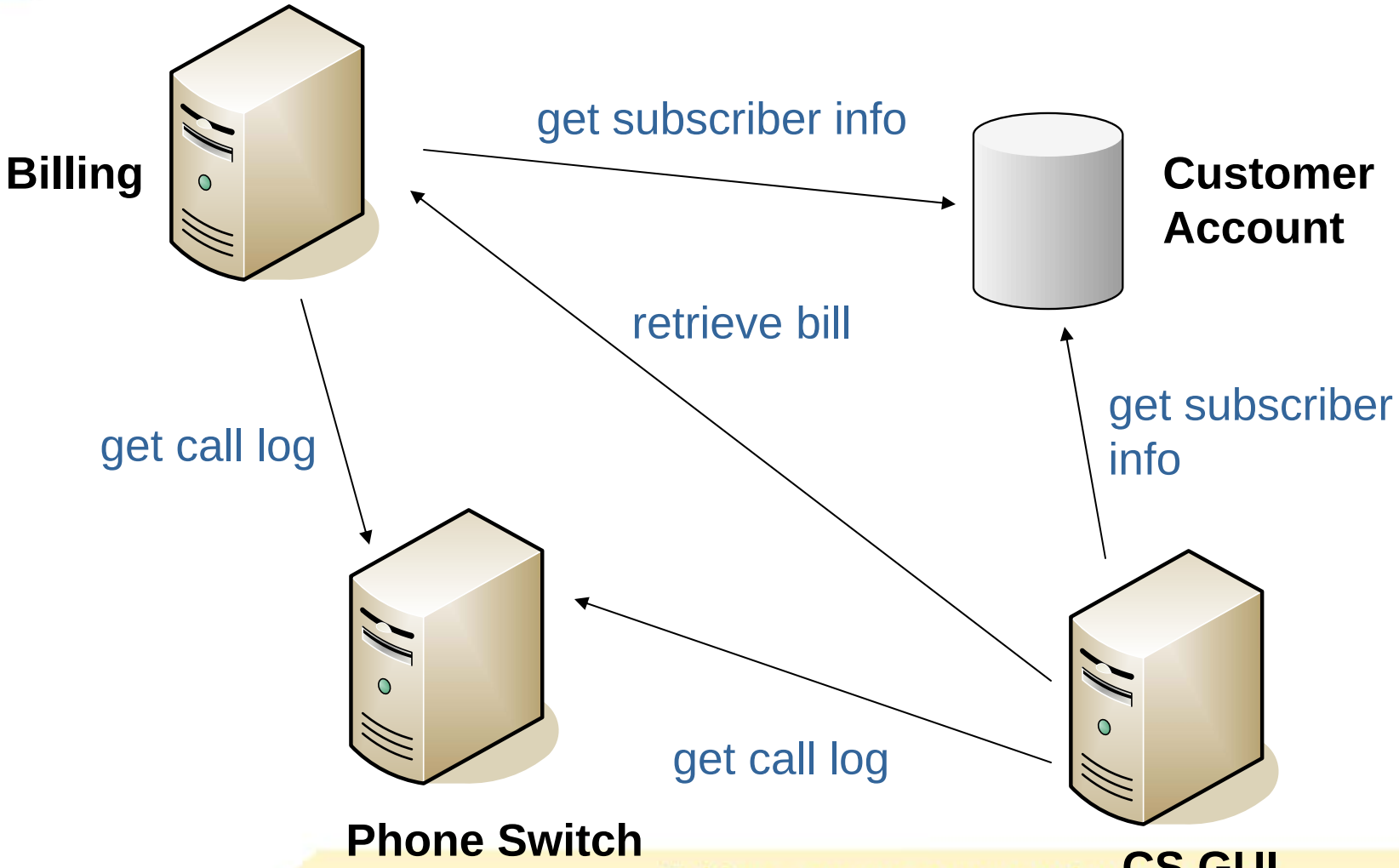
We maintain the **billing** system. Every month, we issue statements to all our subscribers. It lists the service charge and usage report in the last month. There is a program written in **PL/SQL**, which runs once a month automatically. The program will do a processing job for **each** of the subscribers in the database. The process will **look up the log database** of the phone switch, compute the charge, and compile a usage summary for each subscriber. The processed result will be **stored** to the billing database. The process will also trigger the statement printer which will produce **hard copies** of the statement for sending out to the customers.

Billing Team

We maintain the **customer service system**. It is basically a **client server** system used only by the customer service representatives in the call center. The system is written using **PowerBuilder**. The customer service representatives will use the graphical user interface (**GUI**) of the client to **query subscriber records**, and **input requests from customers** (e.g. update address, request addition copy of statement, etc.). The GUI client will **connect to the database** of the billing system for reading the records, and **make updates** to the customer account database when needed.

Customer Service Team

Architecture



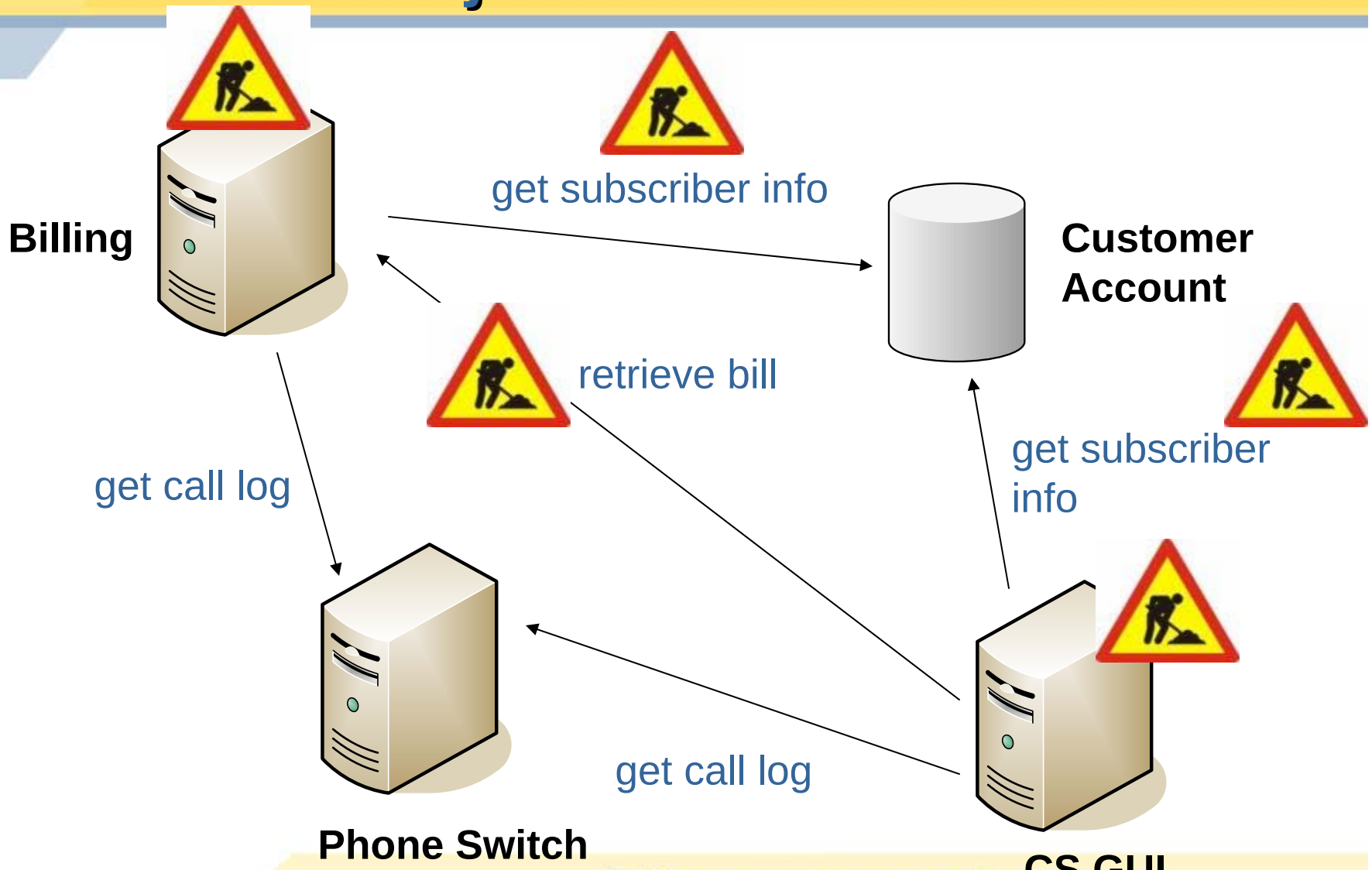
Tightly Coupled

- Internal implementation of one system affects all other systems
  - E.g. When the database schema of customer account changes, the CS GUI will be affected
- Business rule coupled with system design
  - E.g. The design of billing system highly depends on how the company manages the subscribers

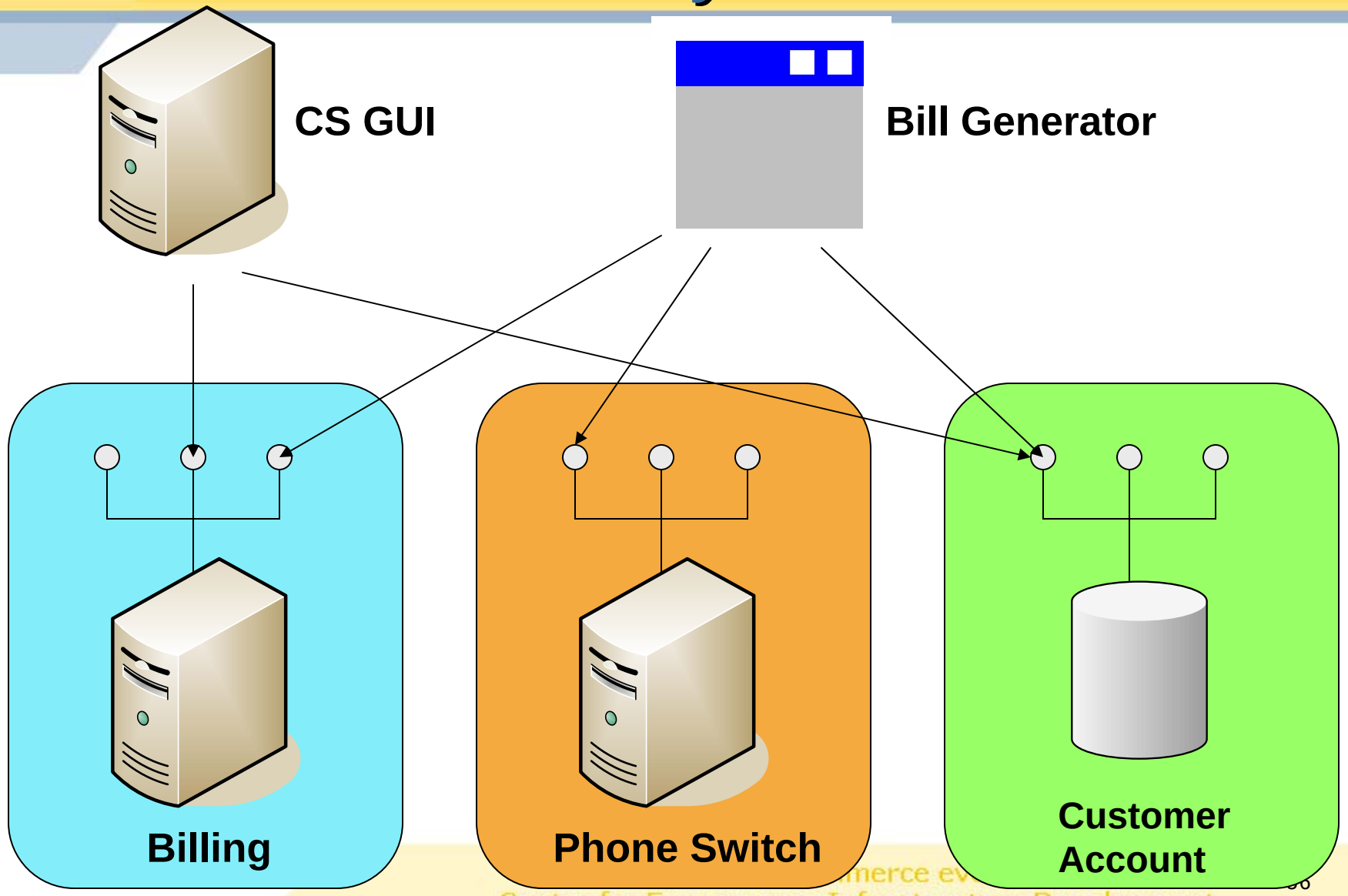
Discussion

- How can we change the system if we want to send only one statement to each customer, instead of one per subscriber?
- How can we change the system if we want to display all related accounts in the CS system?

The Project

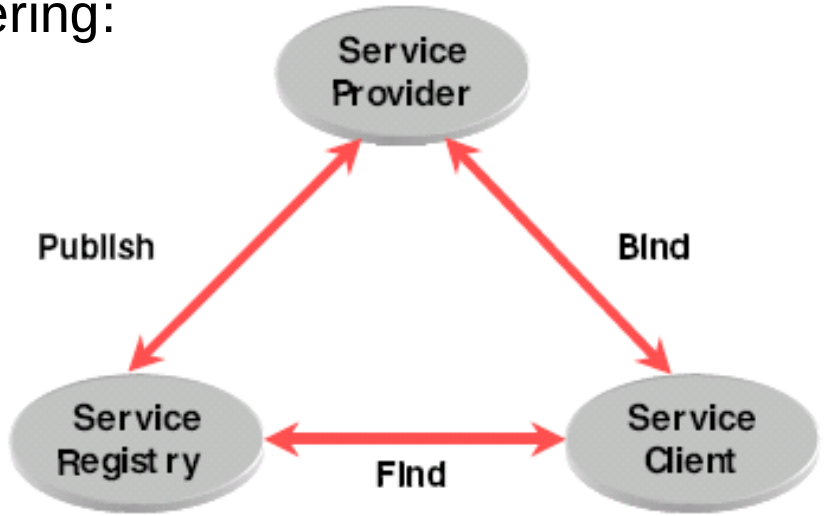

Billing
get subscriber info
Customer Account
retrieve bill
get subscriber info
get call log
Phone Switch
get call log
CS GUI

The SOA Way


CS GUI
Bill Generator
Billing
Phone Switch
Customer
Account

Technology Development

- SOA is a **logical** way of designing a software system to provide services to either end-user applications or other services distributed in a network through **published and discoverable interfaces**.
- **Observatory Service Bus**
  - Realization of basic SOA by delivering:
    - Technology neutrality
    - Loosely coupled service binding
    - Location transparency



Technology Development

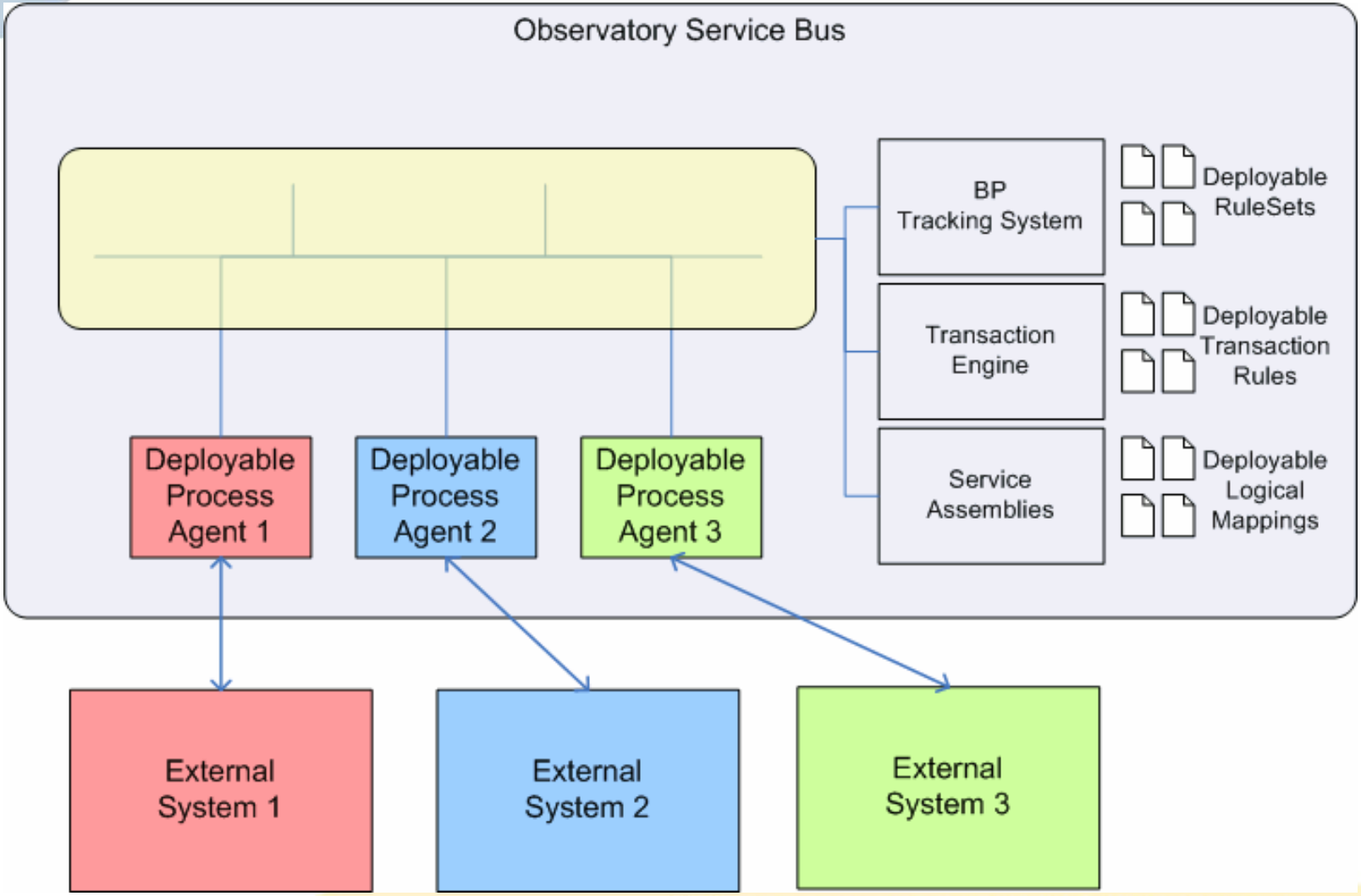
- Observatory Service Bus
  - Extended SOA [1] support
    - Support aggregated service
    - Coordination
    - Monitoring
    - Conformance
    - **Transaction support**
    - **B2B extension**

[1] Mike P. Papazoglou, “Service-Oriented Computing: Concepts, Characteristics and Directions”, Proceedings of the Fourth International Conference on Web Information Systems Engineering (WISE’03)

Observatory Service Bus

SOA Requirement	OSB Features
Technology neutrality	Support Process Agents (PAs) as agents to interact with divergent systems, either via in-process mode or out-of-process mode. Developed Service Assemblies to map PAs with logical names
Location transparency	
Loosely coupled service binding	Support JBI API for service binding and consumptions
Support aggregated service	Devised RuleSet to represent bundled services
Coordination	Developed BP Tracking System to monitor and coordinate RuleSet execution; also the BP Tracking System will screen out non-conformant messages
Monitoring	
Conformance	
Transaction support	Support transaction in Process Agents
B2B extension	Integrated with Hermes to support B2B messaging

Observatory Service Bus



Mashing up B2B E-Commerce and Web 2.0

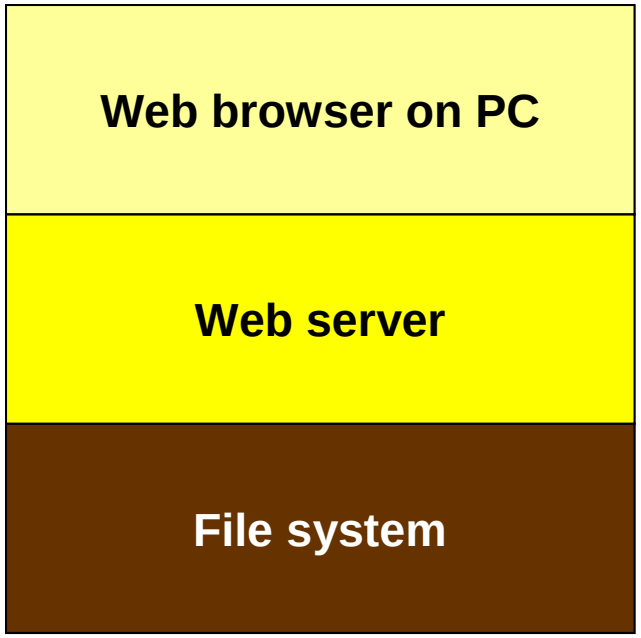
Findings from the research for Web 2.0 Report

- Emphasis of Web 2.0

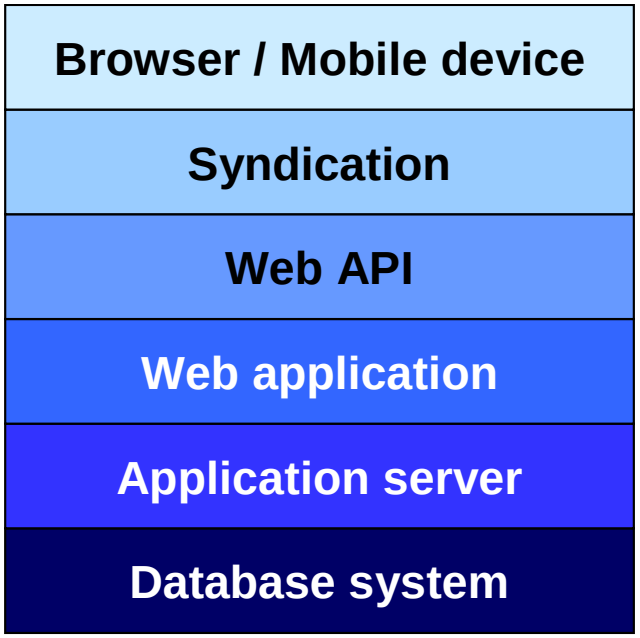
Web 1.0	Web 2.0
Graphic design	Usability
Navigation structure	Distribution media and channels
Information publishing	Service delivery
Content preparation	Content aggregation
Number of visits	Community base

Findings from the research for Web 2.0 Report

- Web 2.0 architecture



Web 1.0 architecture



Web 2.0 architecture

Findings from the research for Web 2.0 Report

- Features of Web 2.0

User behavior aspect	Architecture of participation
	Personalization of web resources
	Power of the *Long Tail*
Software design aspect	Deployment of rich applications
	Perpetual beta release
	Syndication of information and services

B2B E-Commerce

- Security Problem
  - Authentication
  - Non-repudiation
  - Authorization
- Reliability (Once-and-only-once)
- Data Quality Problem

Technology Development

1. Findings from the research for Web 2.0 Report deliverable
2. RSS/ATOM and AJAX Extension Modules
   - Business Document Feed Publisher – Add security measures to RSS/ATOM
   - Business Document Composer – Add rich interface to web form filling