ADB SEADS Southeast Asia Development Solutions

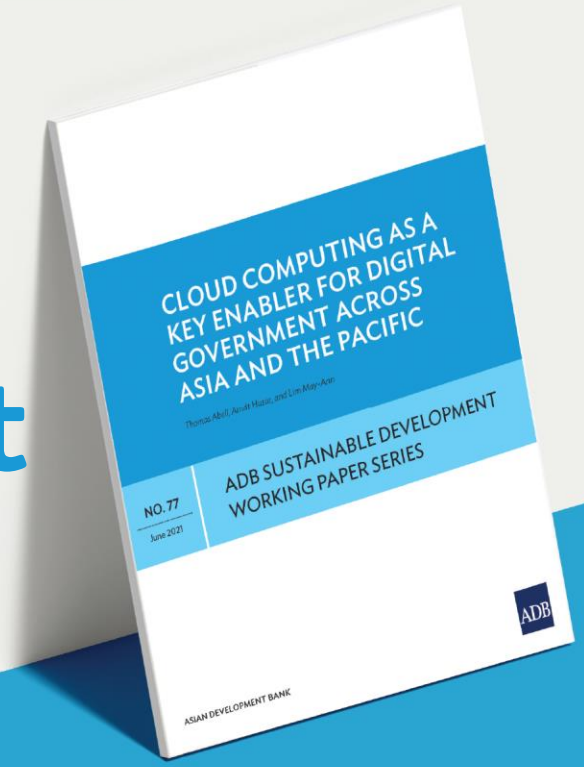
DIGITAL TECHNOLOGY FOR DEVELOPMENT

PUBLICATION LAUNCH

Cloud Computing as a Key Enabler for Digital Government across Asia and the Pacific

Monday, 5 July 2021

Cloud Computing as a Key Enabler for Digital Government Across Asia and the Pacific



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What is Cloud Computing?

Cloud computing is a model for enabling ubiquitous, 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.

Software as a Service (SaaS)

The capability provided to the consumer is to use the provider's applications running on a cloud infrastructure. The applications are accessible from various client devices through either a thin client interface, such as a web browser (e.g., web-based email), or a program interface. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, storage, or even individual application capabilities, with the possible exception of limited user-specific application configuration settings.

Examples – Slack, Trello, Office 365, Salesforce, Dropbox
Users - End-users

Platform as a Service (PaaS)

The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly configuration settings for the application-hosting environment.

Examples – Cloud Foundry, Heroku, Github, Kubernetes, Docker
Users - Software developers and engineers

Infrastructure as a Service (IaaS)

The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, and deployed applications; and possibly limited control of select networking components (e.g., host firewalls).

Examples – AWS, Google Cloud Platform, Azure, VMware, OpenStack
Users - Network architects and tech administrators

How do we deploy cloud for government?

Private cloud. The cloud infrastructure is provisioned for exclusive use by a single organization comprising multiple consumers (e.g., business units). It may be owned, managed, and operated by the organization, a third party, or some combination of them, and it may exist on or off premises.

Public cloud. The cloud infrastructure is provisioned for open use by the general public. It may be owned, managed, and operated by a business, academic, or government organization, or some combination of them. It exists on the premises of the cloud provider.

Hybrid cloud. The cloud infrastructure is a composite of two or more distinct cloud infrastructures (private, community, or public) that remain unique entities, but are bound together by standardized or proprietary technology that enables data and application portability (e.g., cloud bursting for load balancing between clouds).

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Cloud First and Whole-of-Government Approaches

- “Cloud First”, “Cloud by Default”
- Government sector prioritizing the use and procurement of cloud systems by default, where a secure, reliable, and cost-effective cloud computing option exists
- Usually accompanied by a new whole-of-government approach towards technological policy making, where government revisit the manner in which government services are administered

e.g. AU’s ASD, SG GovTech (report, p14)

Trending Cloud Computing Developments Within the Government Sector

- CleanTech
- AgriTech
- FinTech
- HealthTech
- xTech is the new e-Anything! :D

Health tech are deployed to better manage and allow citizens to self-monitor their health. For example, the Republic of Korea developed the Epidemic Investigation Support System in response to the need to conduct movement and contact tracing during the COVID-19 pandemic.

Korea: Epidemic Investigation Support System (EISS)

http://we-gov.org/wego-smart-health-responder/epidemiological-investigation-rapid-support-system-1/

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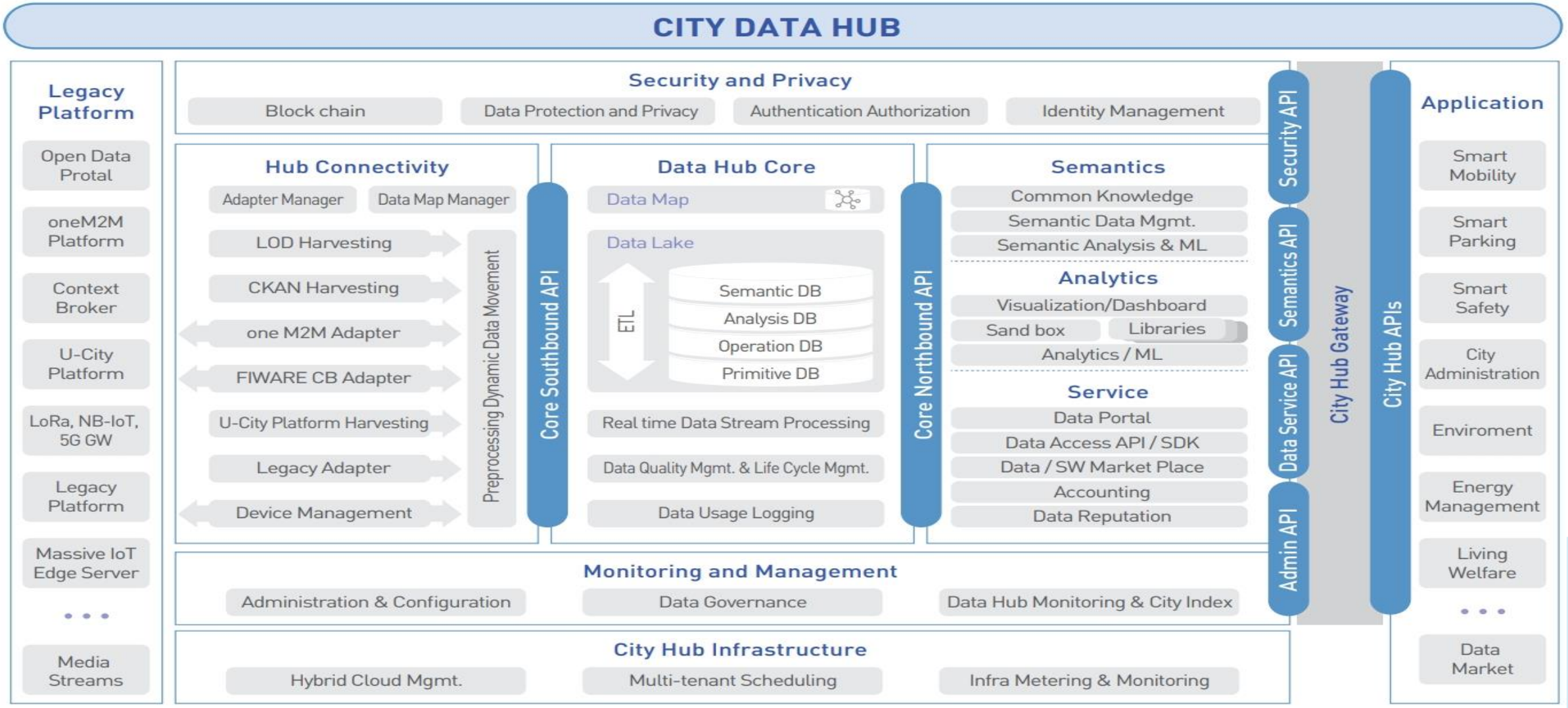
Korea: Epidemic Investigation Support System



The structure of the "City Data Hub." The system modules of the City Data Hub, as loaded on the cloud system TOAST G, managed by the system NHN.

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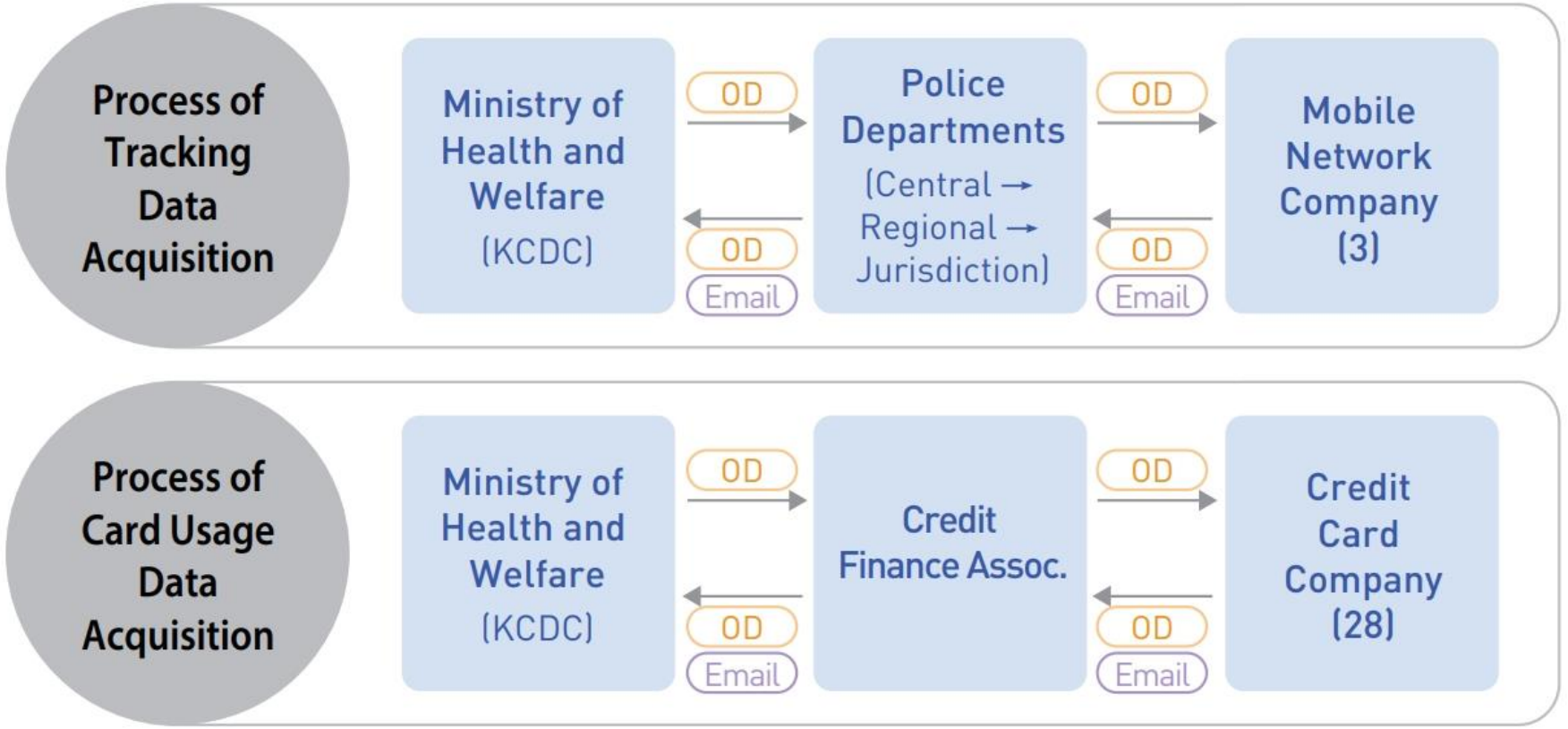
Korea: Epidemic Investigation Support System



Legal process: data collection procedure and data flow according to the "Infectious Disease Prevention and Control Act." OD = official document.

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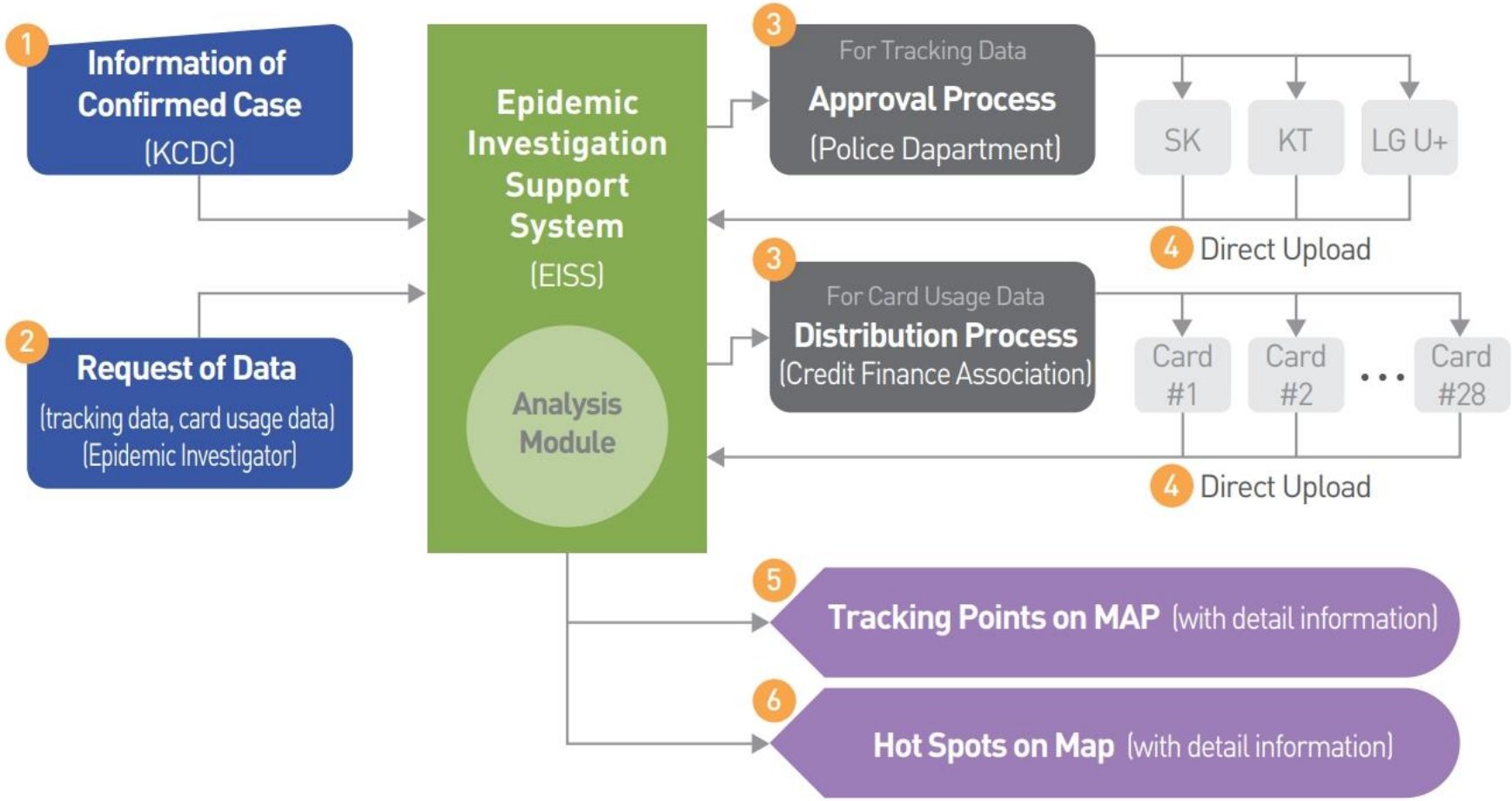
Korea: Epidemic Investigation Support System



Data flow via the EISS. 1) Entry of information concerning confirmed COVID-19 cases; 2) Data requests made by local governments and central epidemic investigators; 3) Approval given by the Police Department, and search and distribution details provided to credit card companies by the Credit Finance Association; 4) Upload of the access information to mobile base stations (time period, as well as latitude and longitude location information) and card usage details (credit card member store information such as name, address) for requested confirmed cases; 5) Presentation of tracking information for confirmed COVID-19 cases, as analyzed via the use of uploaded data; 6) Presentation of analysis results (hot spots) concerning the tracking data for confirmed COVID-19 cases.

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Korea: Epidemic Investigation Support System

Contact Tracing: Infographic of the network spread from confirmed cases. An index COVID-19 case confirmed by the epidemic investigation. 2nd-Nth infected cases are displayed. The relationships and locations of transmission can be identified.

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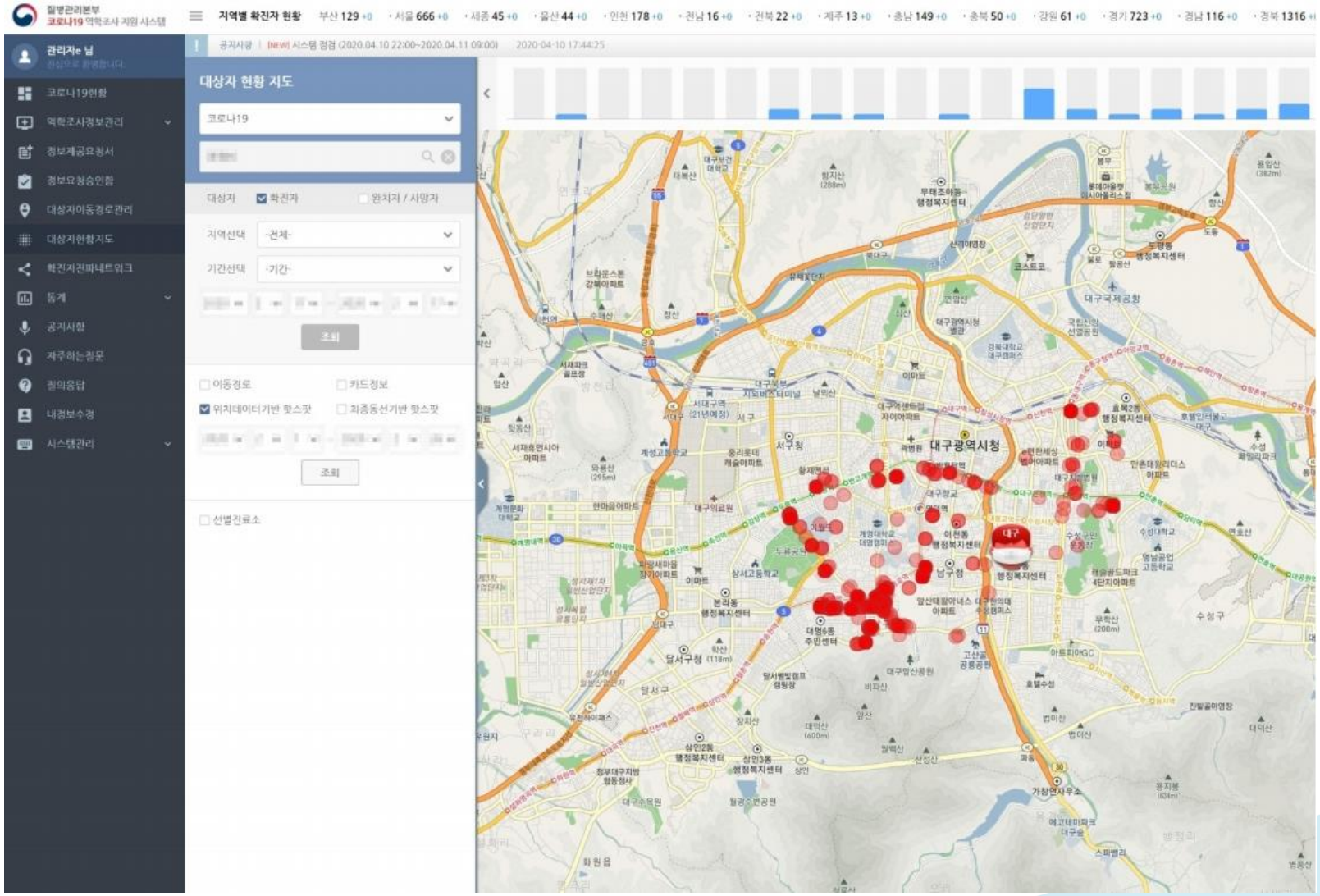

Hot Spots presented by the EISS. In this screen, hot spots can be identified. These hot spots as graded in levels, depending on the extent of its overlap with other confirmed cases amongst the tracking data of all confirmed cases that have been entered into to the EISS. It has become anonymized to prevent the identification of specific confirmed COVID-19 cases. The map function can be zoom in and out. It can also determines which confirmed COVID-19 cases overlapped in the tracking path when an individual point is selected (data not shown).

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Benefits of Cloud Computing to Government: Stories from the Field

1. Cloud Computing Reduces Cost

SG SLA saved 60% going to cloud vs on-prem DC build // PH's Bureau of Customs spent 10% of its original cost estimates for a new DC

2. Cloud Computing Streamlines Operations and Improves Efficiency

PH's DICT reduced 2-3 days process to 30mins-1/2day // S. AU Dept for Communities and Social inclusion - reduced 4-6wks payment processing time to <3days // TH Ministry of Public Health - AI modelling with 80-90% accuracy for health disease hotspots

3. Cloud Improves Agility and Allows Public Services to Scale

AZ built Tier III DC, regional transit centre possibility // CN cloud-based edu platform to continue learning during COVID-19 lockdowns // JP Osaka transitioned smoothly 2000 staff to telework during COVID-19 lockdown

4. Cloud Improves Resilience with Better Business Continuity and Disaster Recovery

W. AU land information authority power outage - 4-5min system impact only // AZ Baku airport - failover systems in place

5. Cloud Facilitates Human Resource Development

Ageing legacy computer systems on COBOL vs cloud = always updating

Barriers and Solutions to Cloud Adoption by Governments

Lack of Processes for Data Protection and Security

- What's safe? What's not?
- ***Solution: Cloud Security Certifications***

Poor Understanding of Cloud Cost Structures and the Utility Procurement Model

- How to write-down legacy infrastructure? How to buy on utility? How to estimate costs in order to get budget approval?
- ***Solution: Move public sector from capital expenditure single-expenditure to operational expenditure utility-based procurement model***

Human Resource Legacy Issues in Skills Development and Acquisition

- Who can I hire? How to retain strong workers?
- ***Solution: Workforce retraining, reform of human resource management***

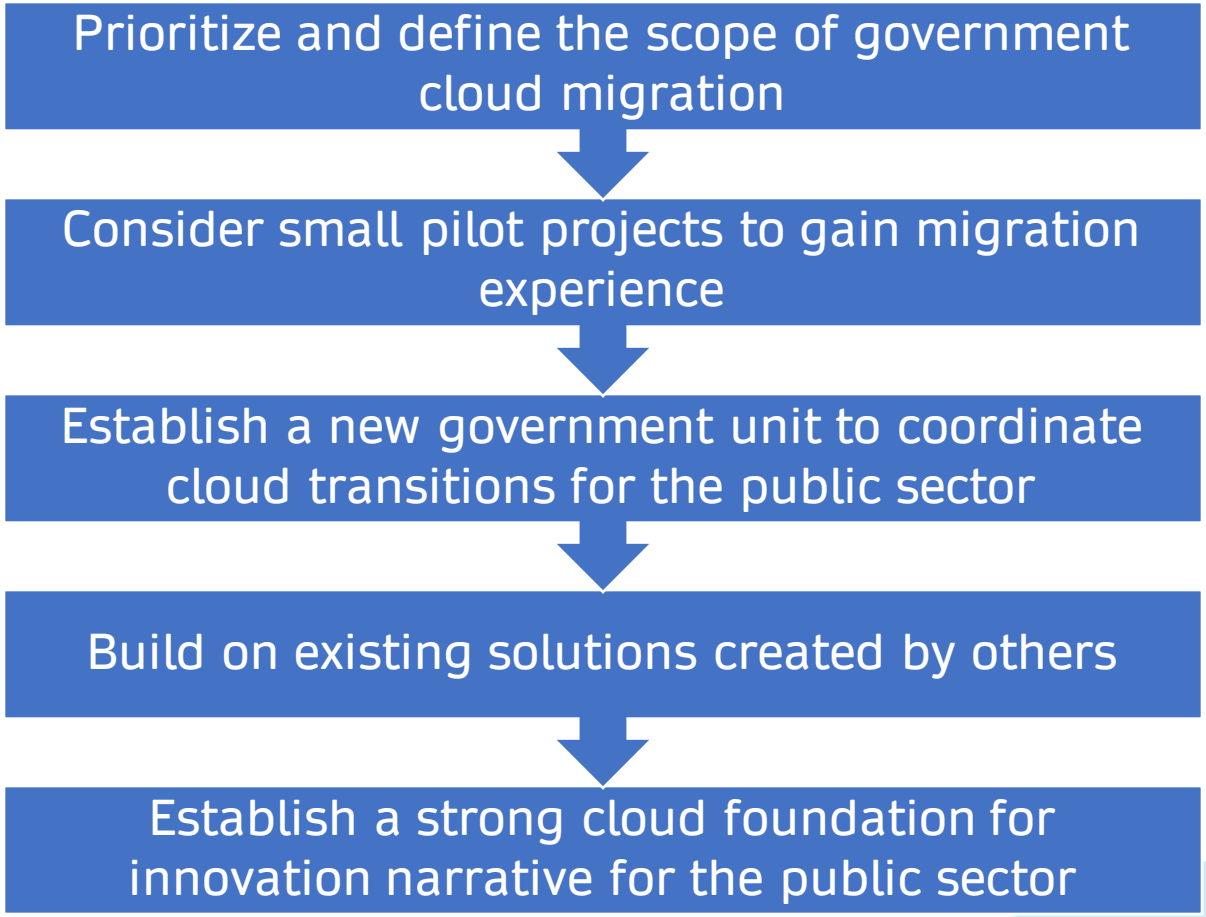
How governments can effectively adopt cloud computing

A. Create Pro-Cloud Regulatory Conditions

1. Understand that data localization does not equate to data security
2. Enable cross-border data transfers via data accountability mechanisms e.g. APEC CBPR, ISO/IEC27000
3. Implement a data classification framework e.g. UK, AU, PH, SG etc
4. Address central and local government policy conflicts e.g. JP PIPA, PH Electronic Business Permits and Licensing System has forced cloud use

B. Create a robust cloud strategy and adoption plan

How governments can effectively adopt cloud computing



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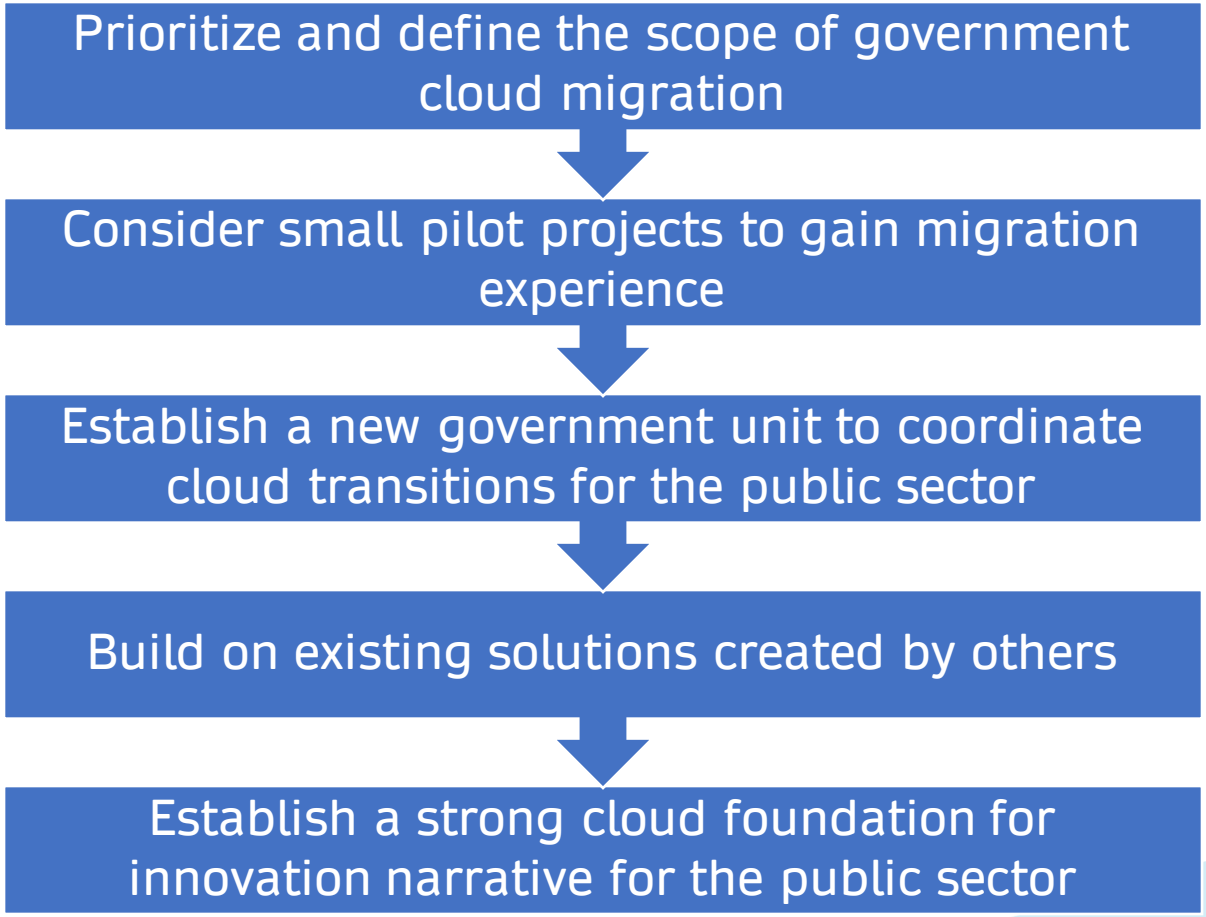

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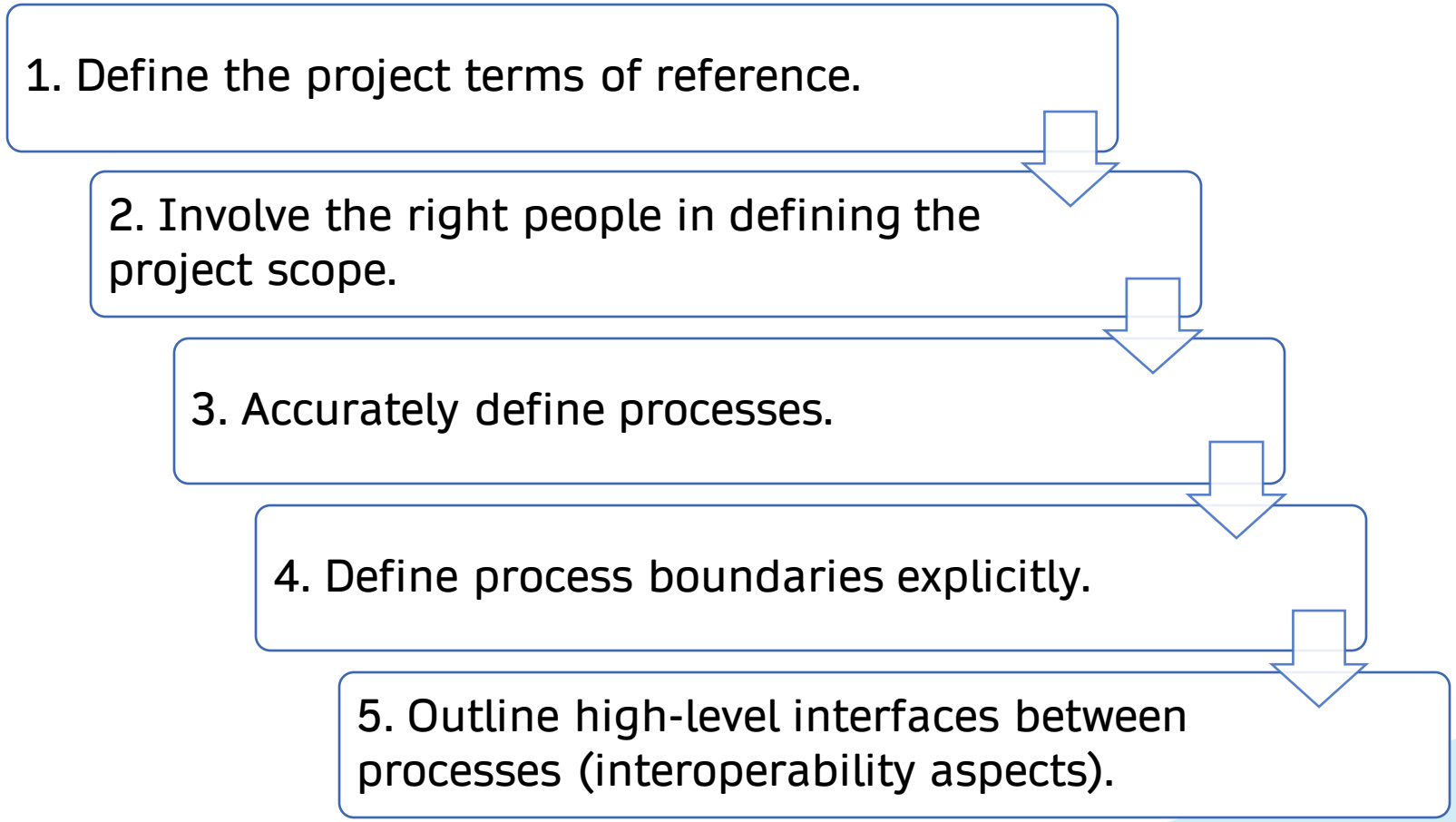
Prioritize and define the scope of government cloud migration

How governments can effectively adopt cloud computing



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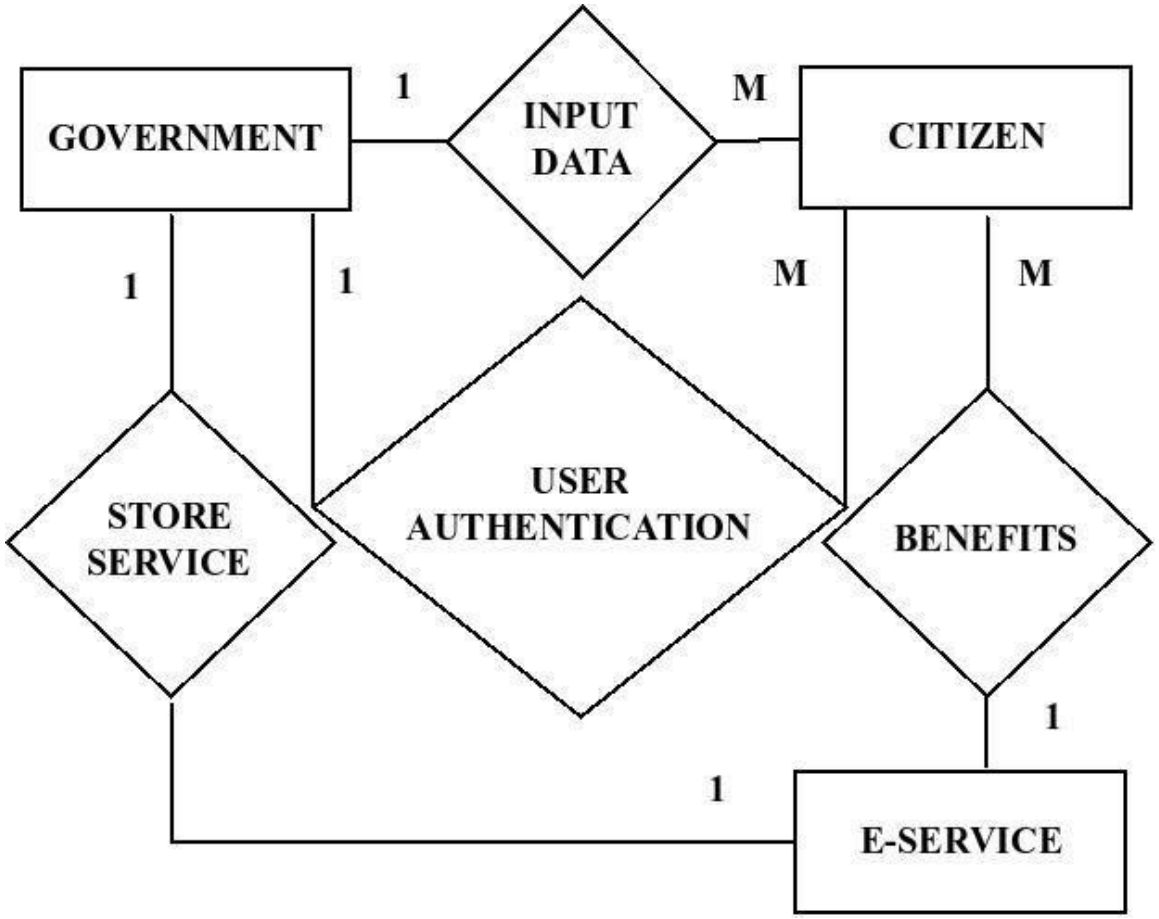
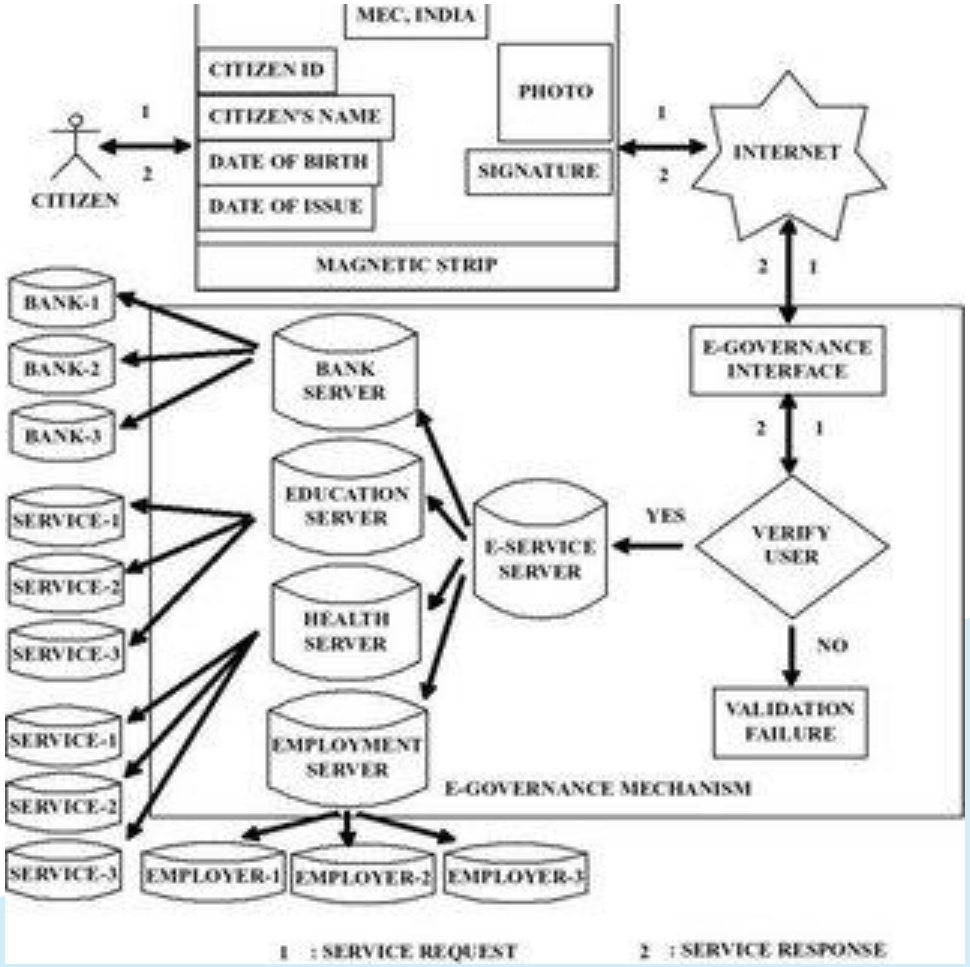
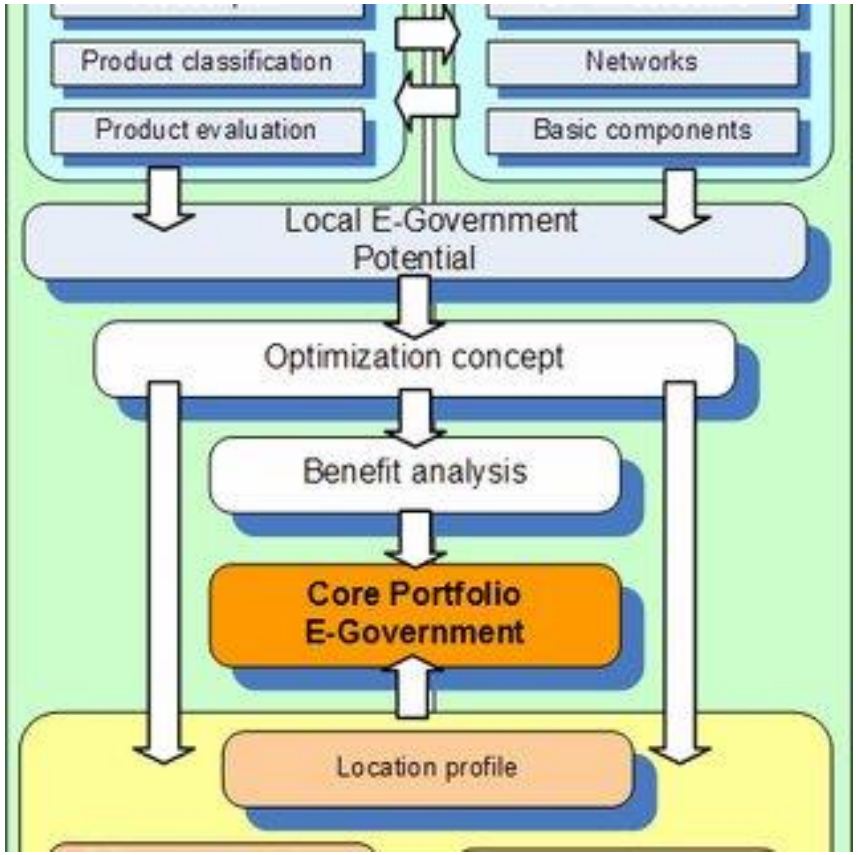
Supporting Slides

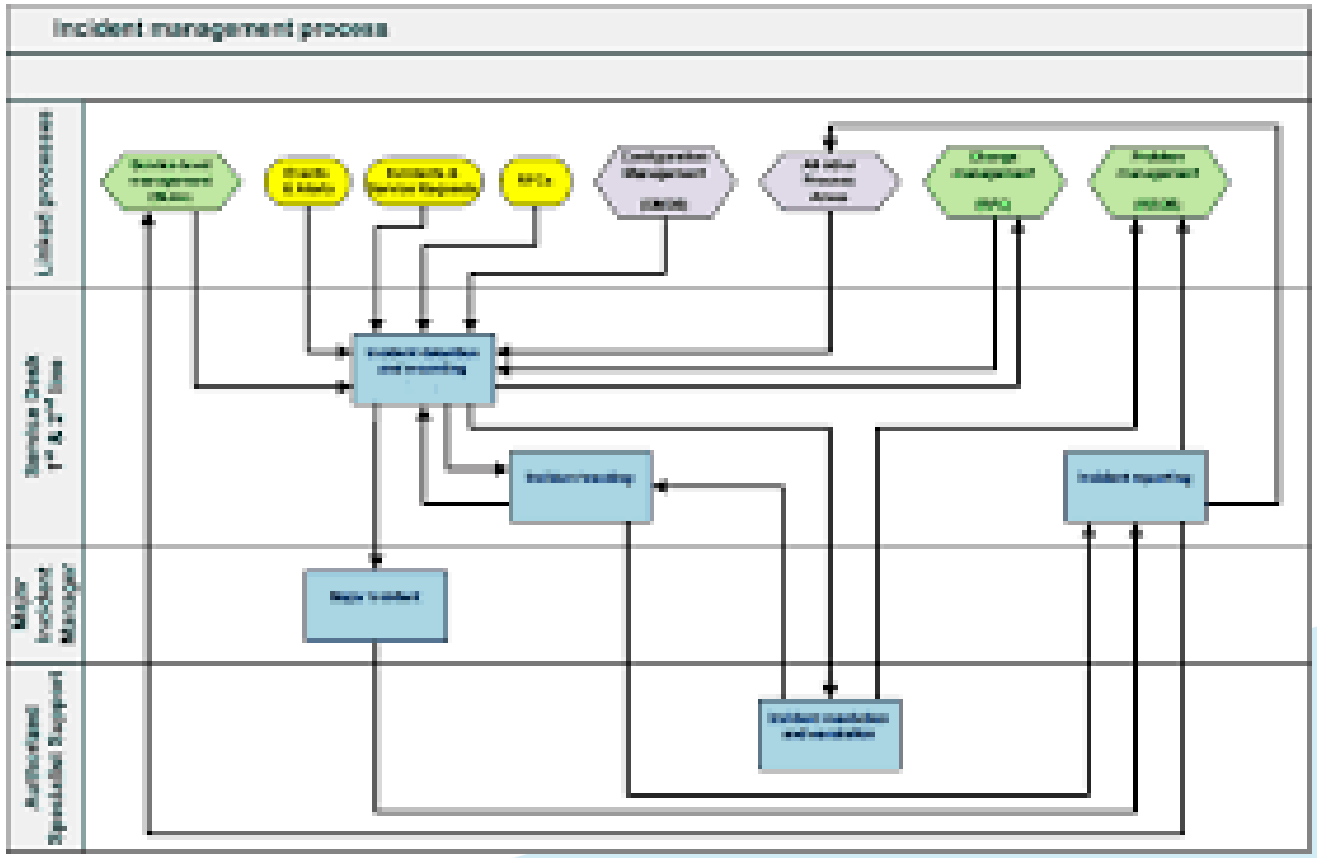
ER Diagram example



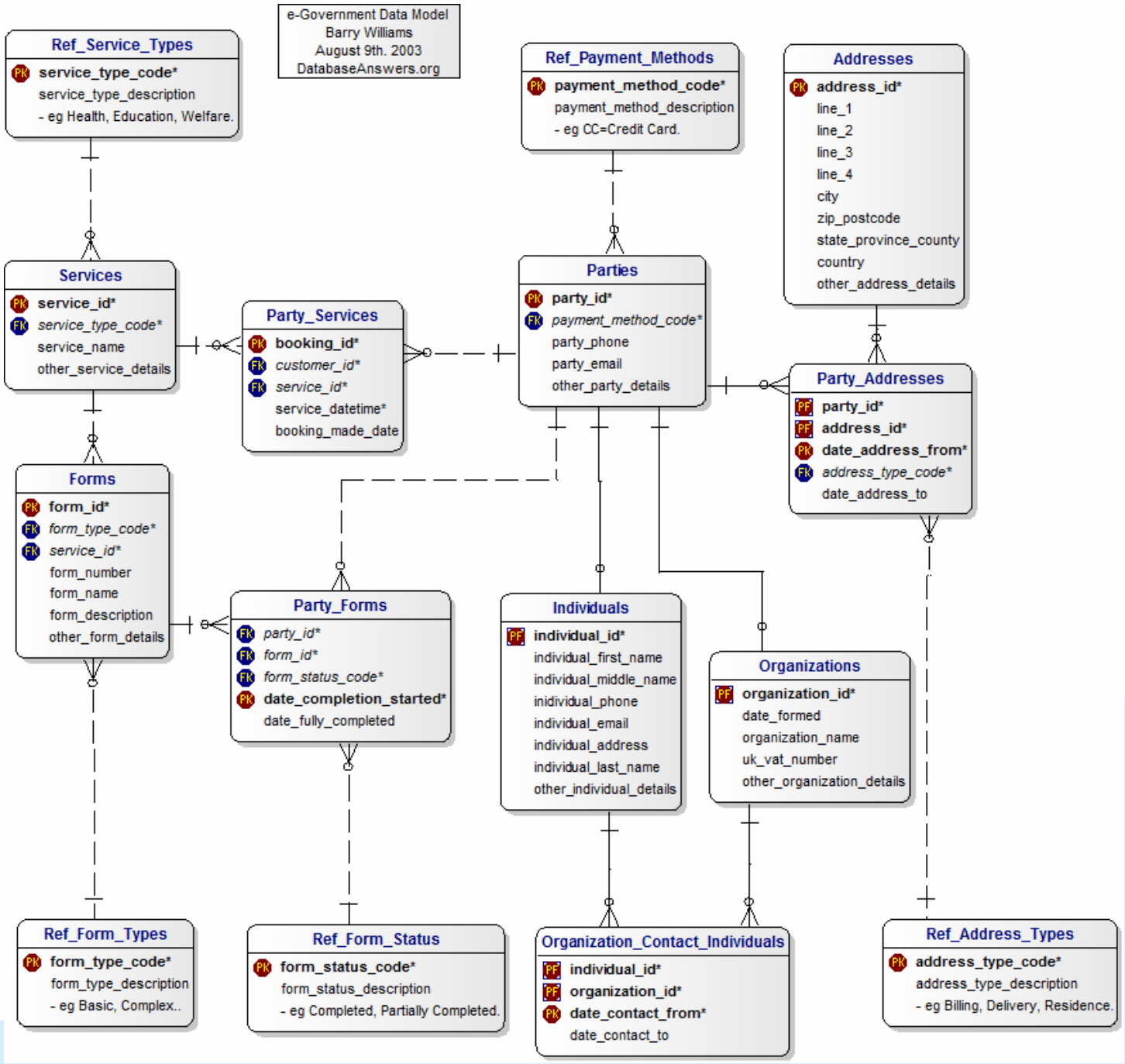


Swim Lane Examples





Data Model: Entity Database Design



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