

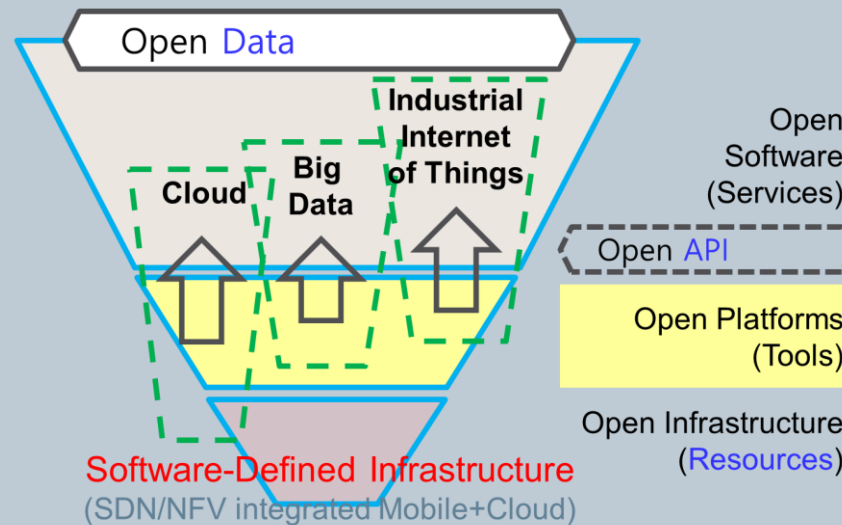
Enabling Open Networking with SmartX Shared Playground

Open Networking Korea 2016 Spring (DevCon)

Dr. JongWon Kim

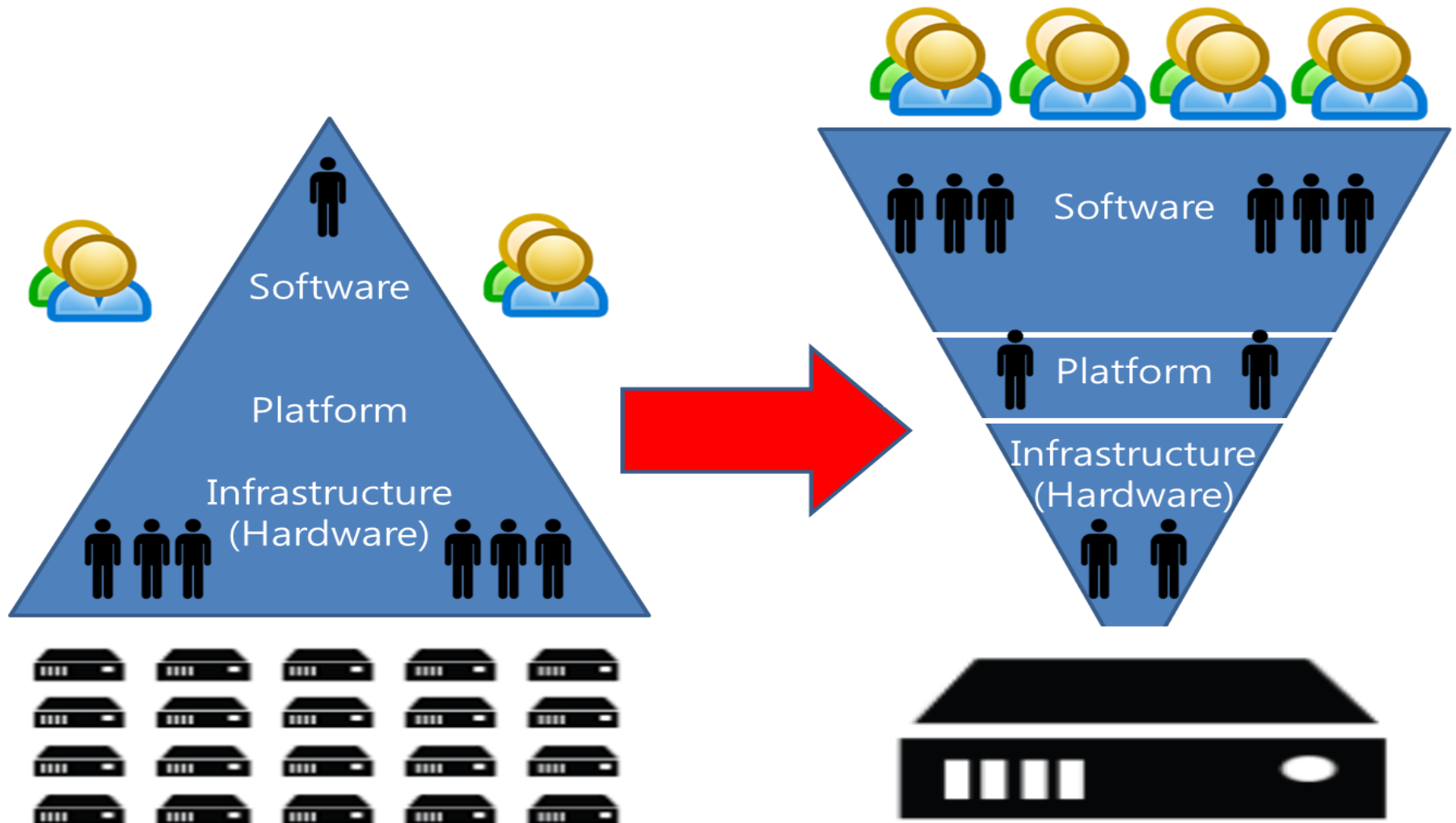
**Networked Computing Systems Laboratory
School of Information and Communications
Gwangju Institute of Science & Technology (GIST)**

Hyper-convergent Software-Defined Infrastructure

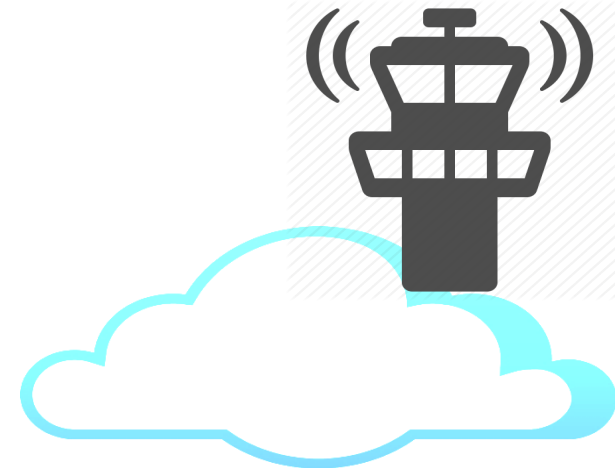
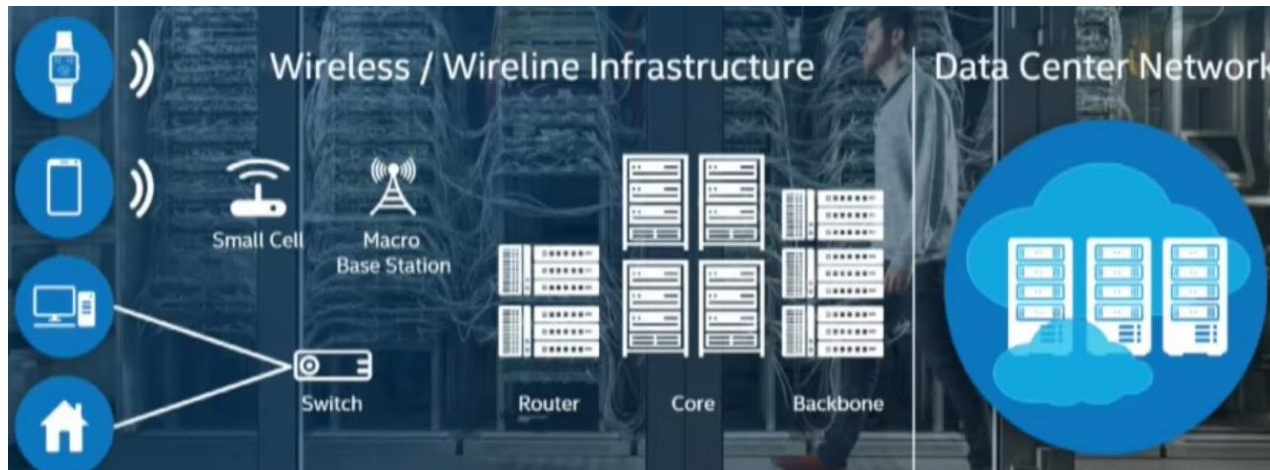
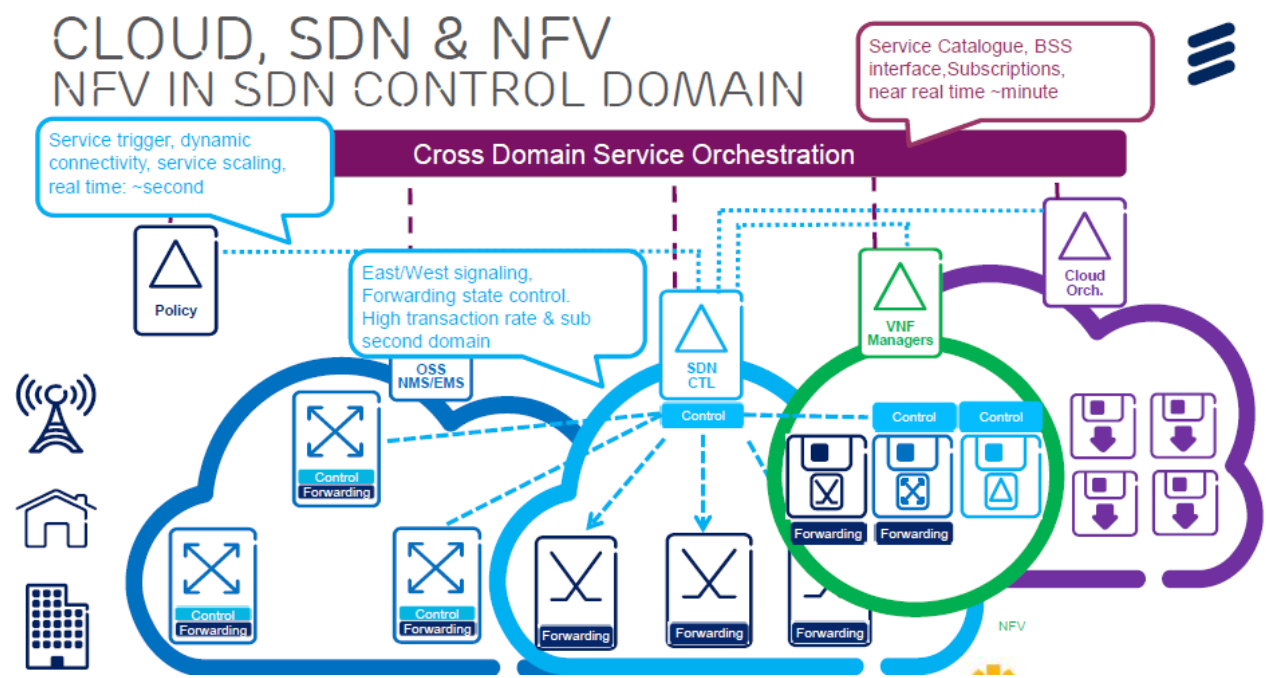


Software-centric Vision for ICT Infrastructure

**Reset, Rebuild,
Run!**



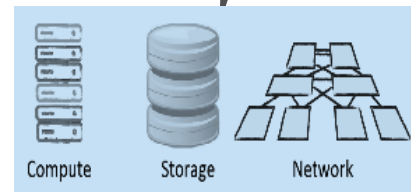
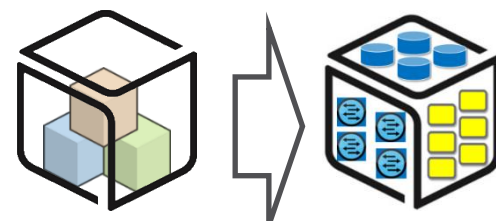
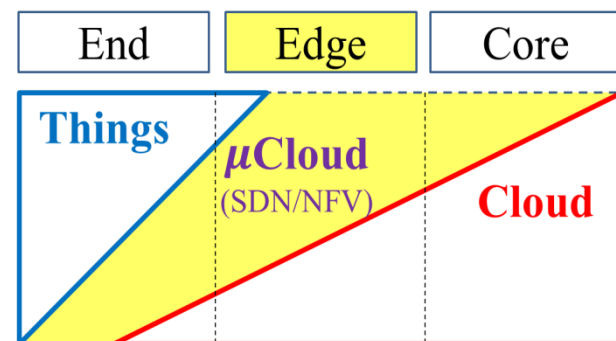
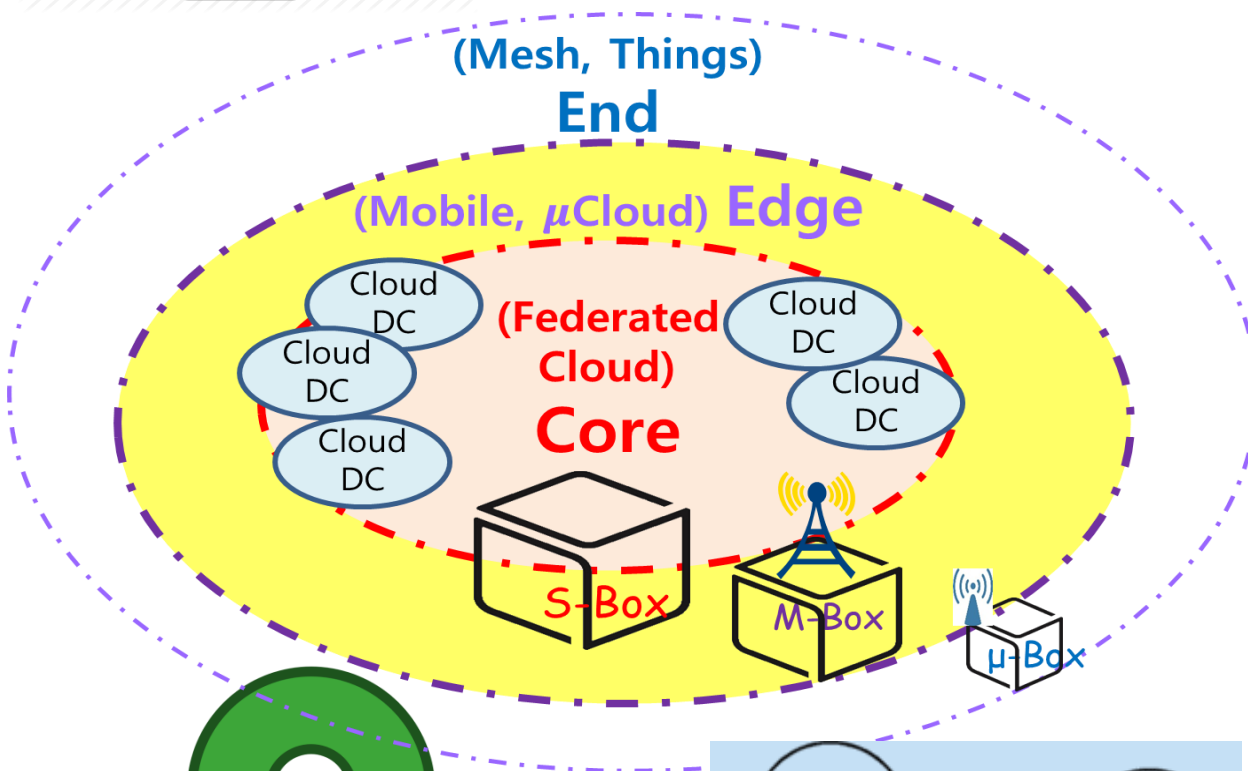
Converged Software- Defined Infrastructure (SDN/NFV/Cloud Integration)



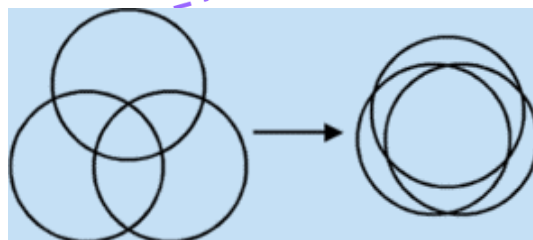
- Amazon AWS / Microsoft Azure / Google Cloud Engine
- OpenStack (IBM, RackSpace, HP, Cisco, AT&T, Verizon, NTT, ...)
- VMware Hybrid



Hyper-converged Software-Defined Infrastructure (SDN/NFV/Cloud Integrated)

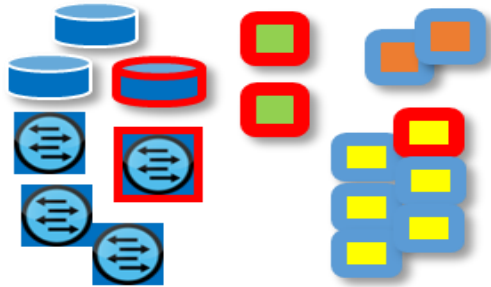


open source
initiative

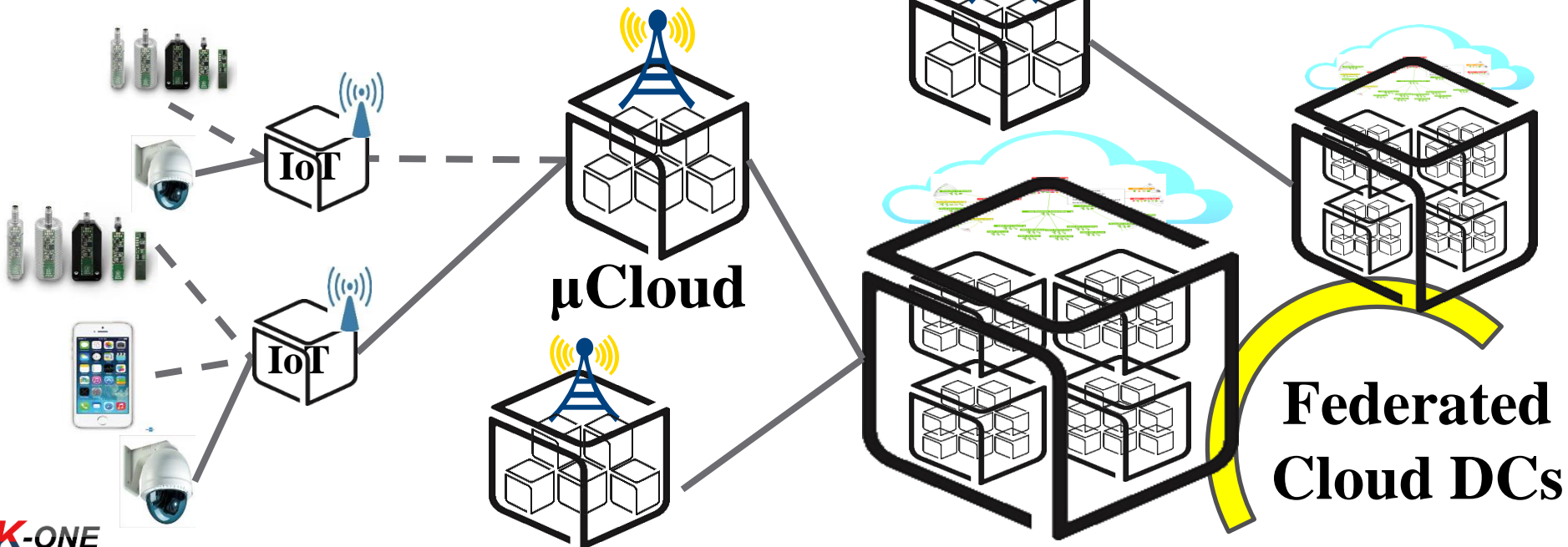
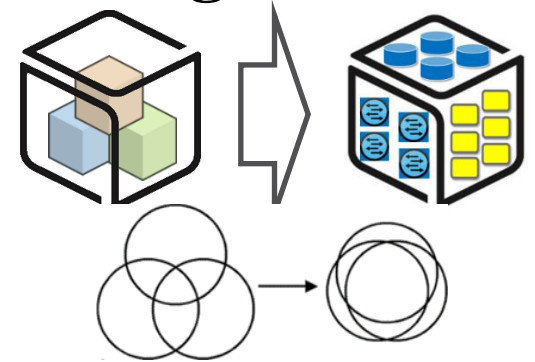


Hyper-convergent SDI for Diversified Services

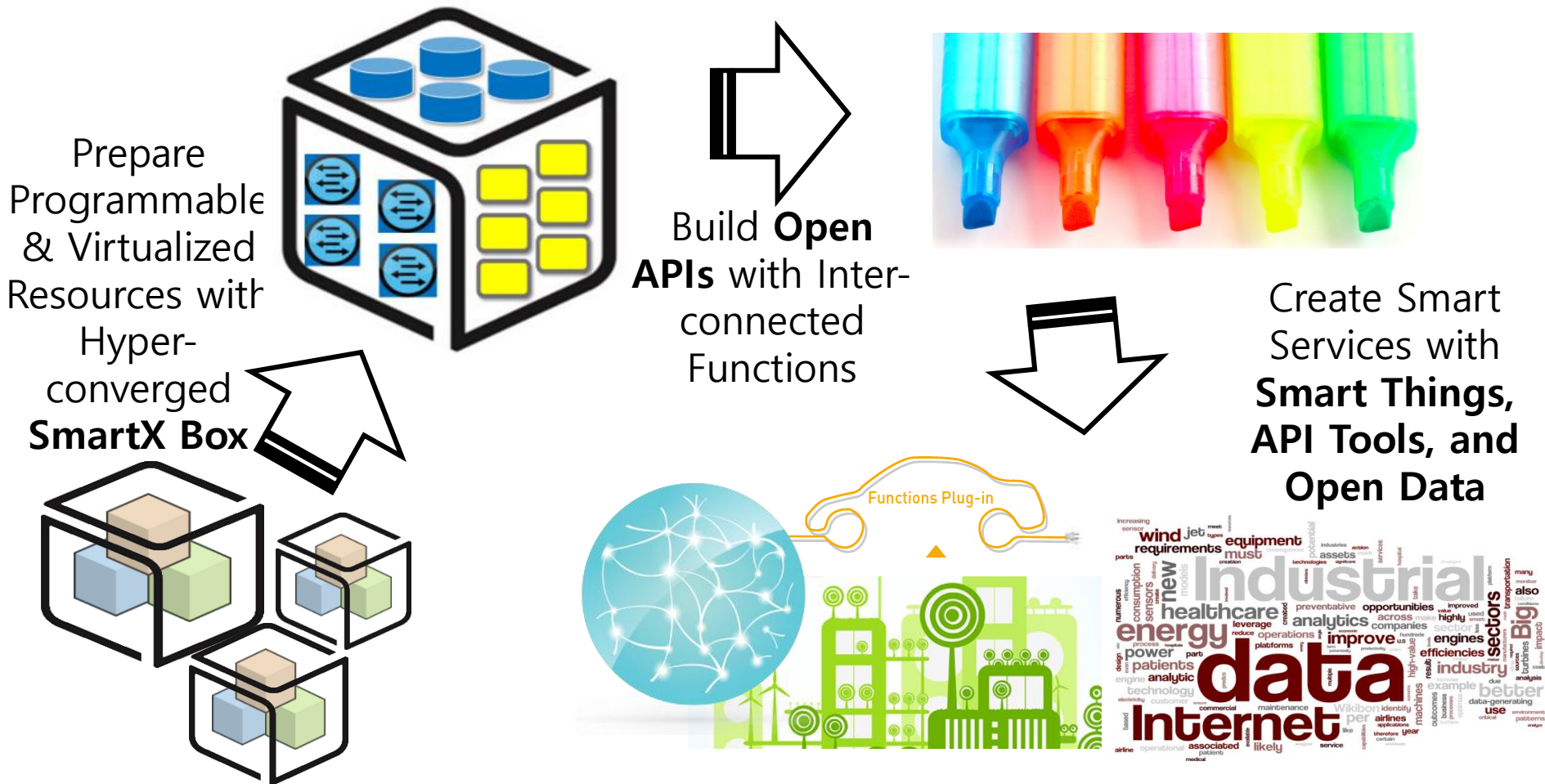
Diversified **SaaS** Applications



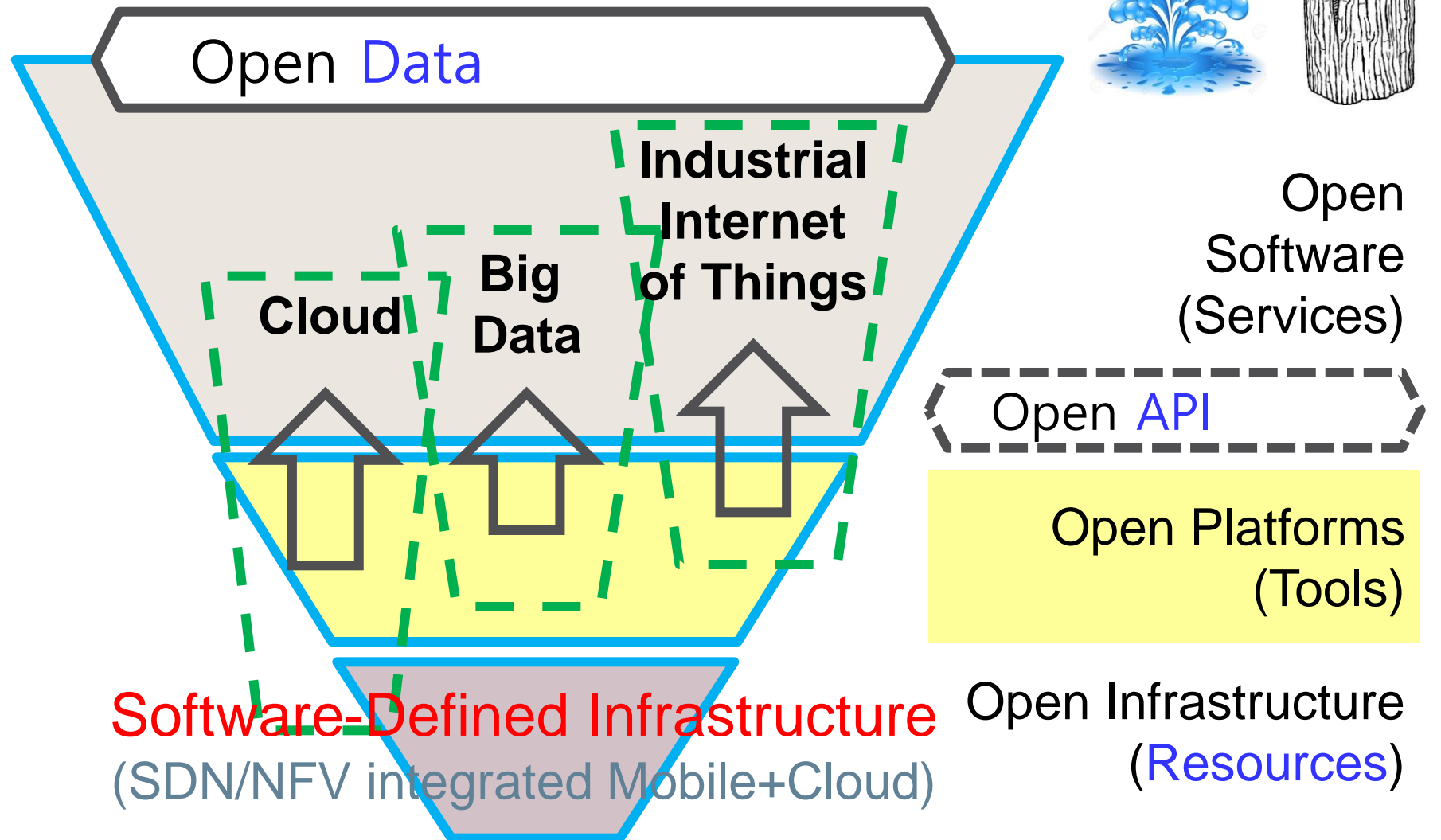
Resources in Hyper-convergent Boxes



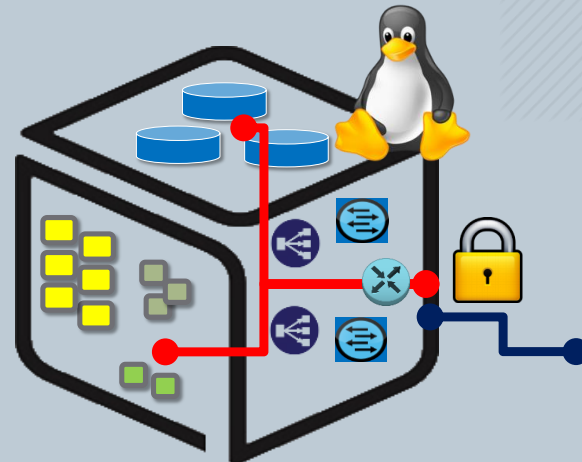
Realize SmartX Services with Open APIs enabled by SmartX Boxes



Human-Defined Services over Software-Defined Infrastructure



Open-Source Software/Hardware & SmartX Boxes



Inter-Connected Functions (Microservices) inside SmartX Boxes/Sites

 **Provisioning**

 **Orchestrate**

 **Visibility**


SaaS
OverCloud
UnderCloud

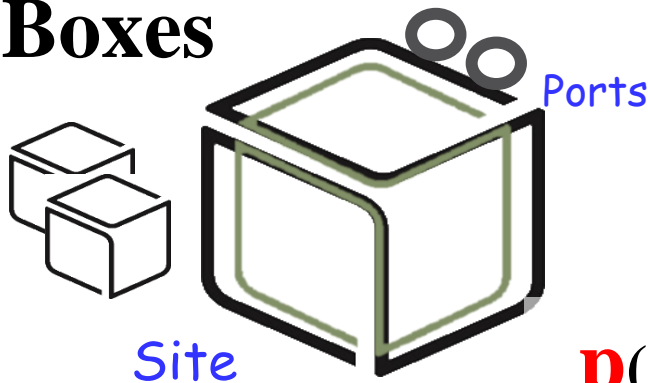
Inter-Connect

Functions

Normal

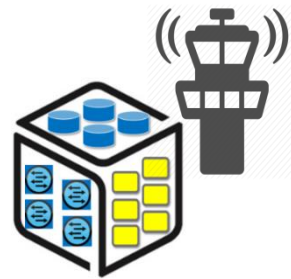
Tag/Steer/Mapped

Boxes

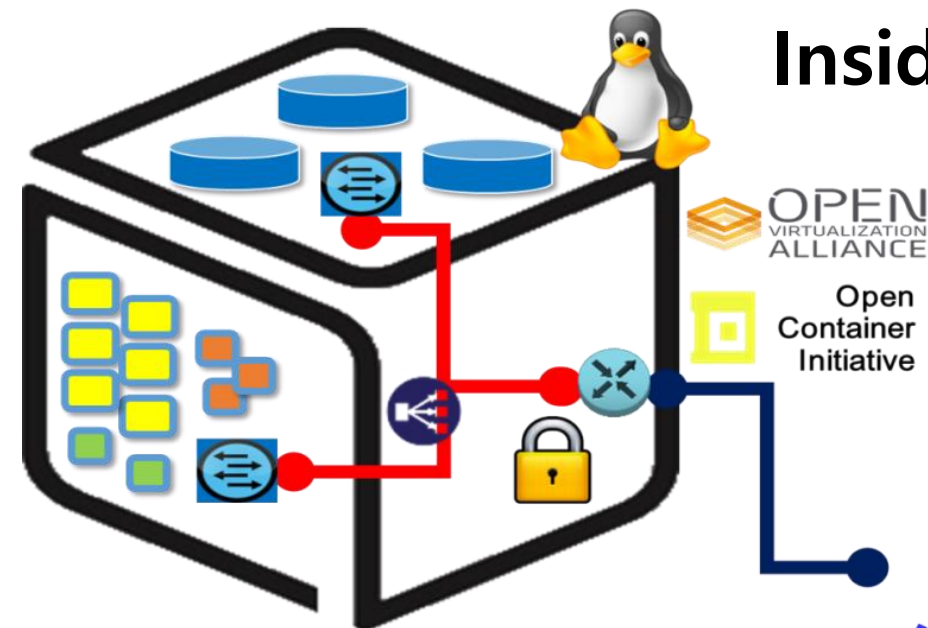


$\mathbf{p}(\text{Baremetal}) + \mathbf{v}(\text{VM}) + \mathbf{c}(\text{Container})$

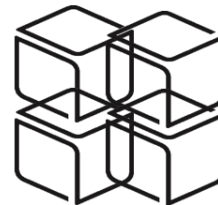
SmartX Box: Inter-Connected Functions inside/among Boxes/Sites



Inside a Box



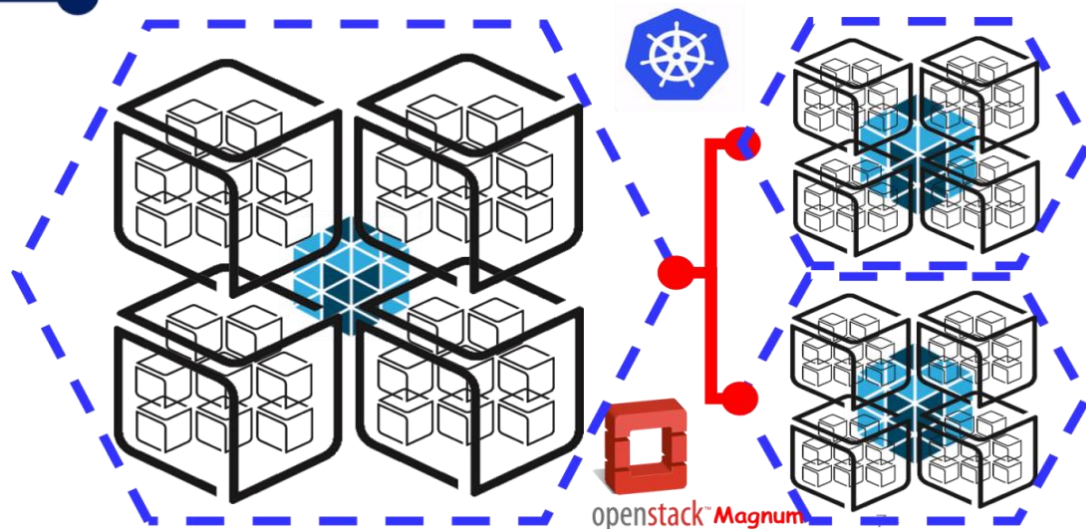
Scale Out



Scale Up



Across Clusters



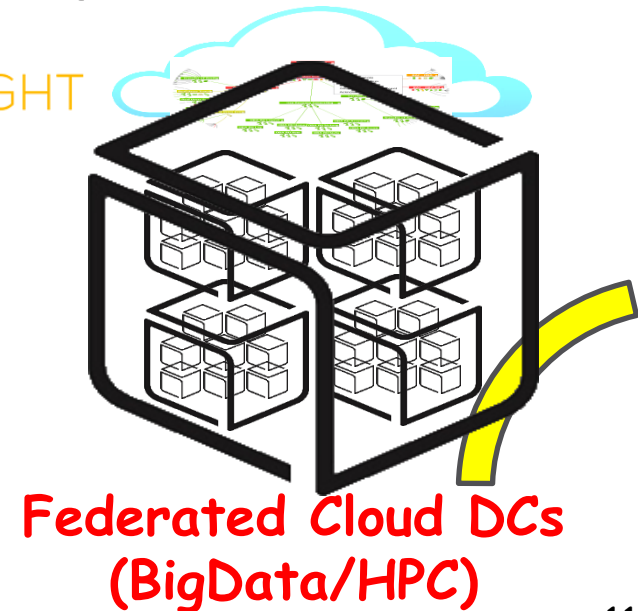
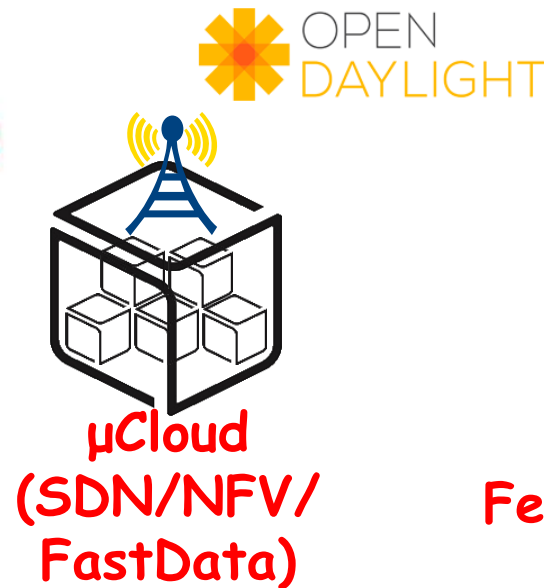
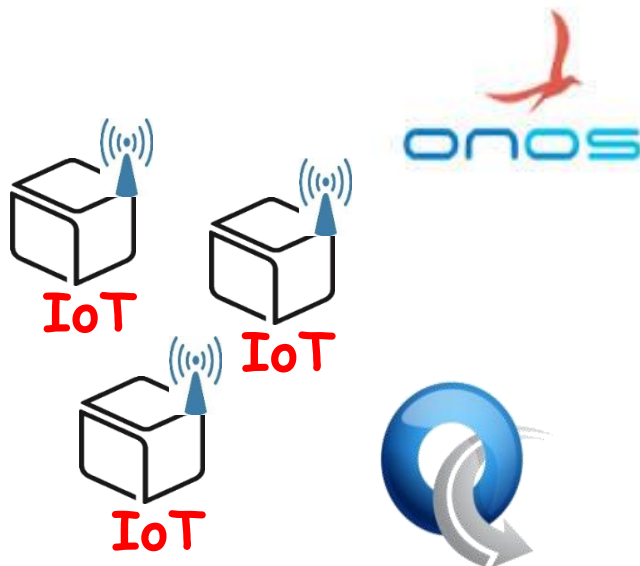
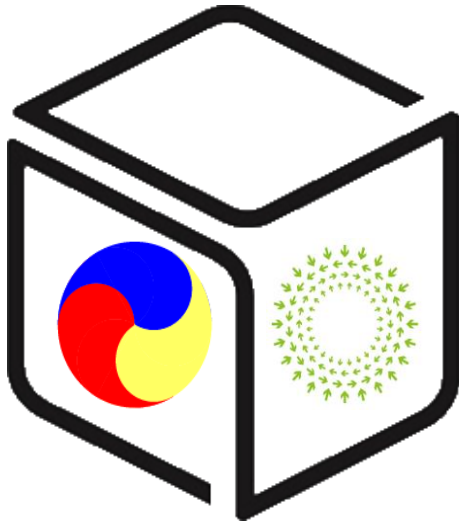
p+v+c Challenge:

p(Baremetal)

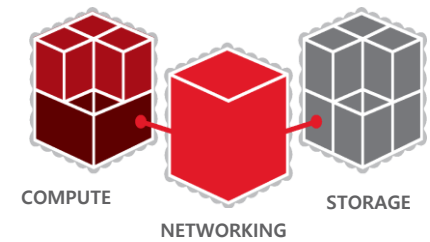
+ **v**(VM)

+ **c**(Container)

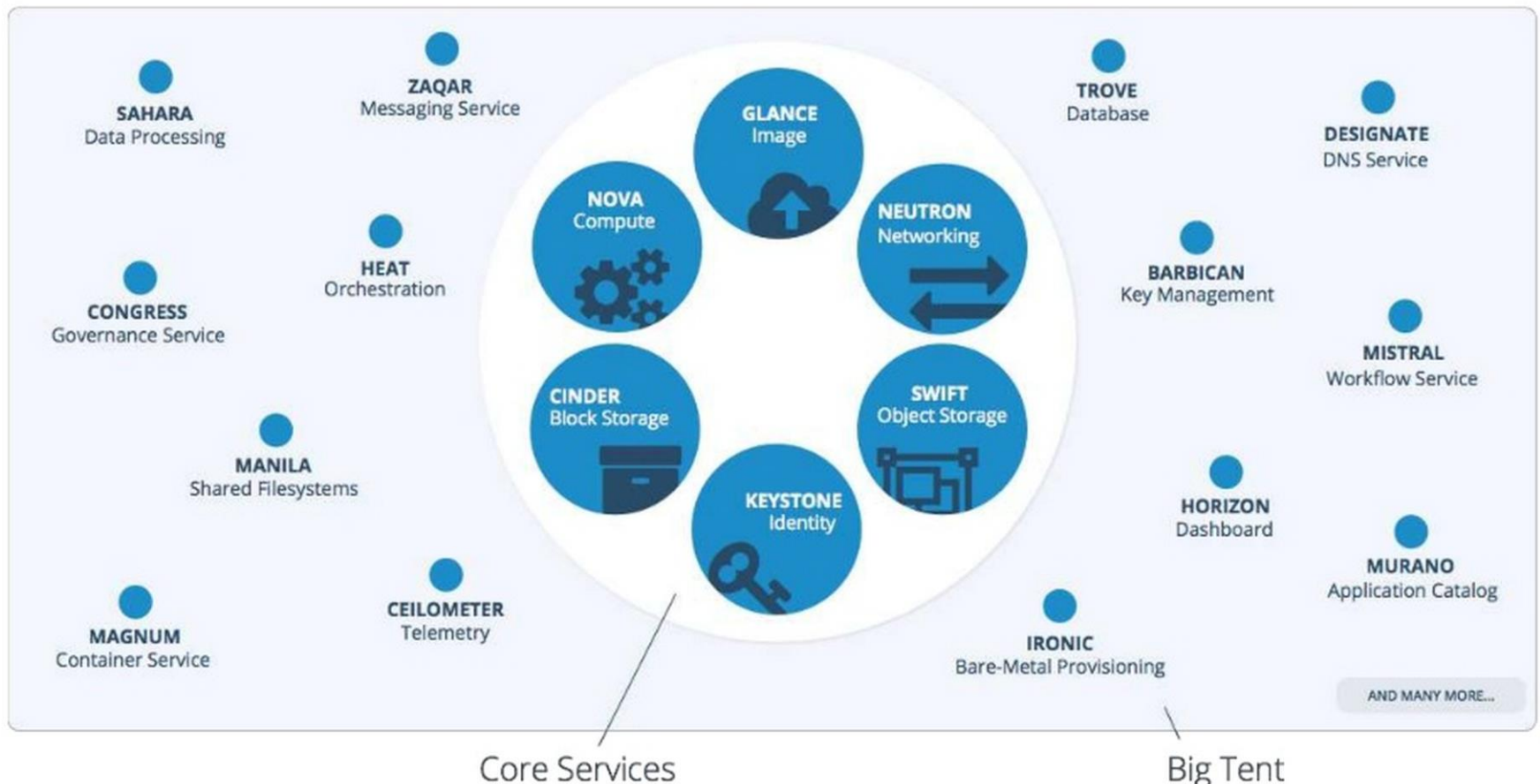
Convergent SDI & Open-Source Software



Open-Source Cloud OS: OpenStack



The “big tent” and “core services”



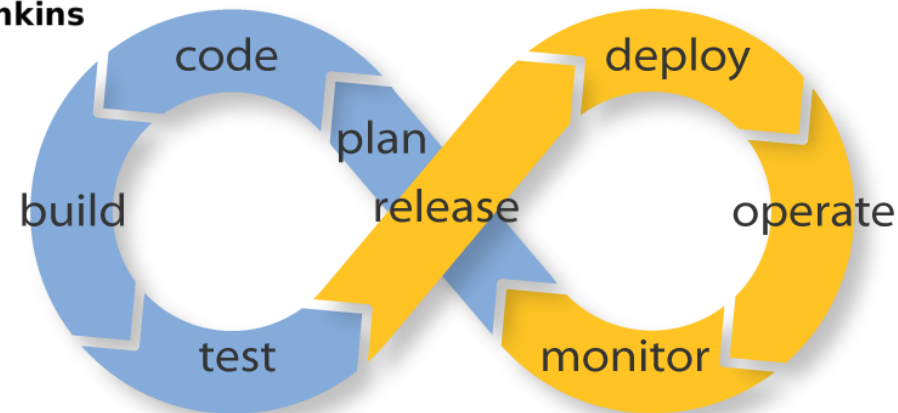
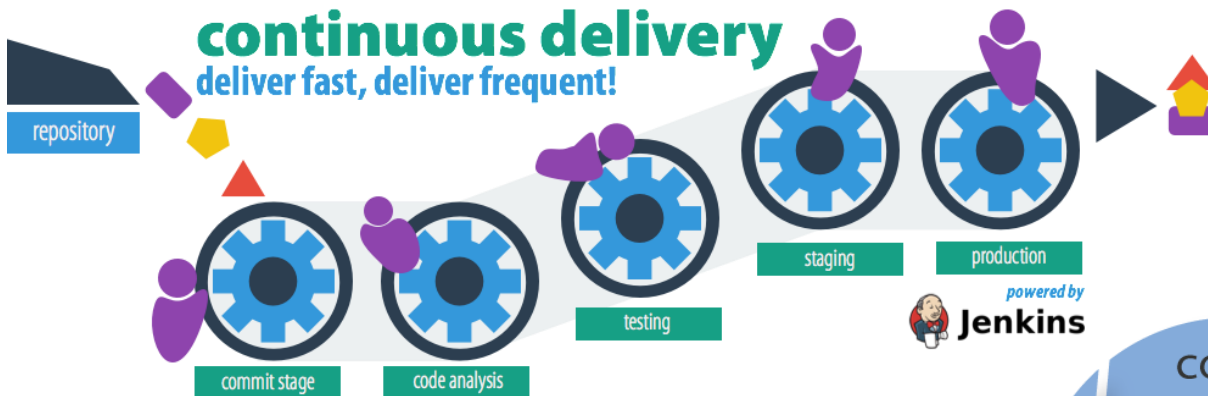
DevOps Automation & Continuous Integration/Delivery



DevOps (Development & Operation, 개발운영병행체제)

Building Software-based Automation over Overall Lifecycle:

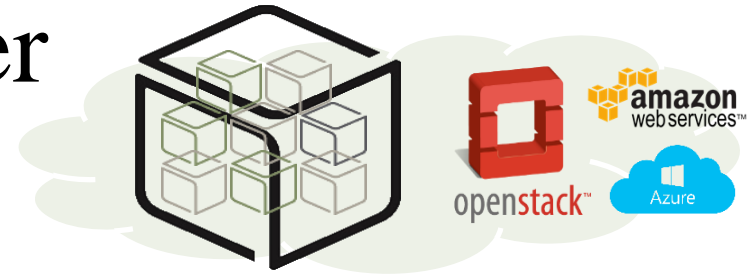
Development (Plan, Code, Build) → Test (QA & Staging) → Production (Deployment, Operation, Evaluation)



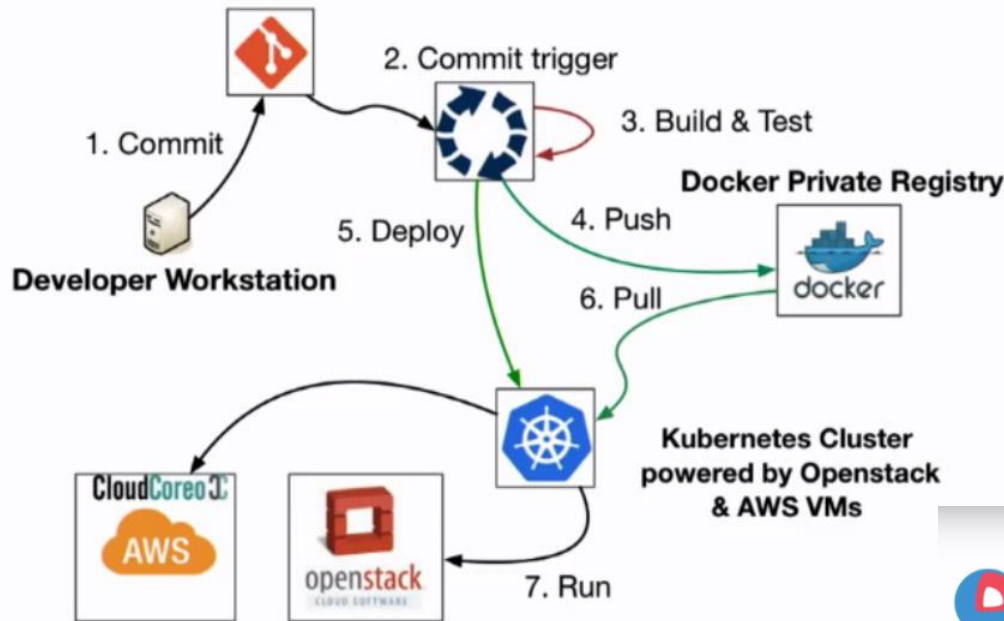
Endless Possibilities: DevOps can create an infinite loop of release and feedback for all your code and deployment targets.

Container-based Automated Service Deployment over Hybrid Cloud

Composable/Software-Defined Infrastructure

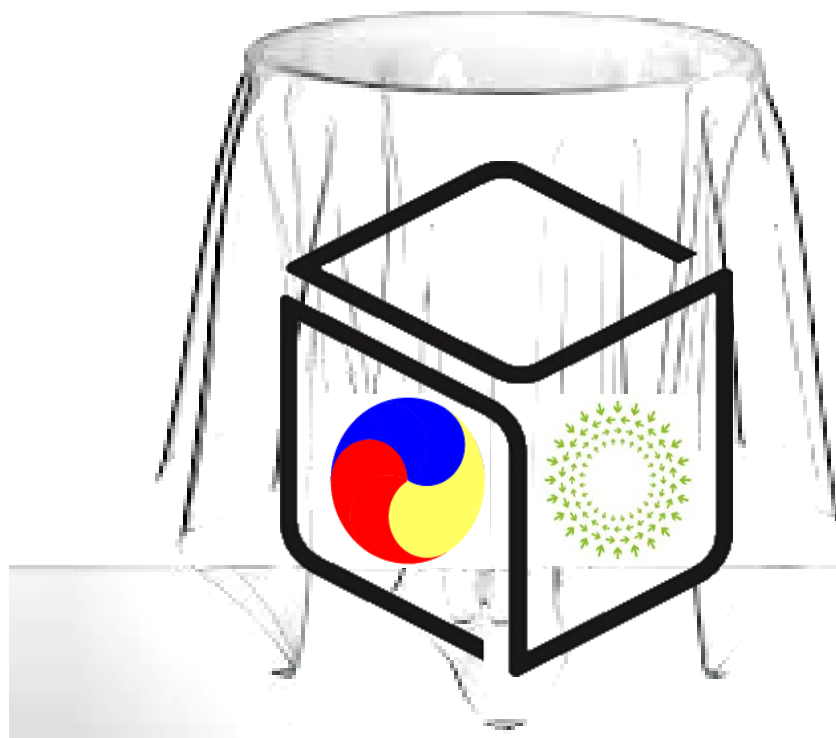
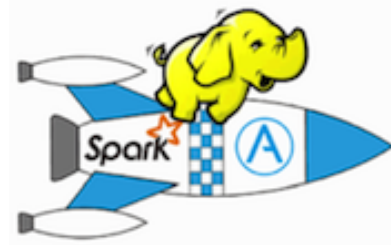
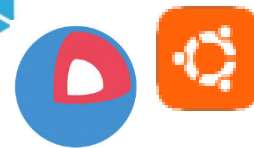
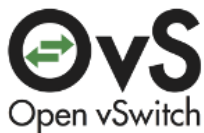
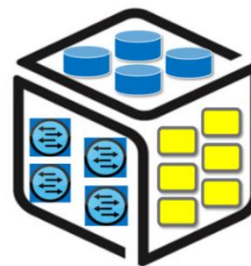


Microservice Pipeline



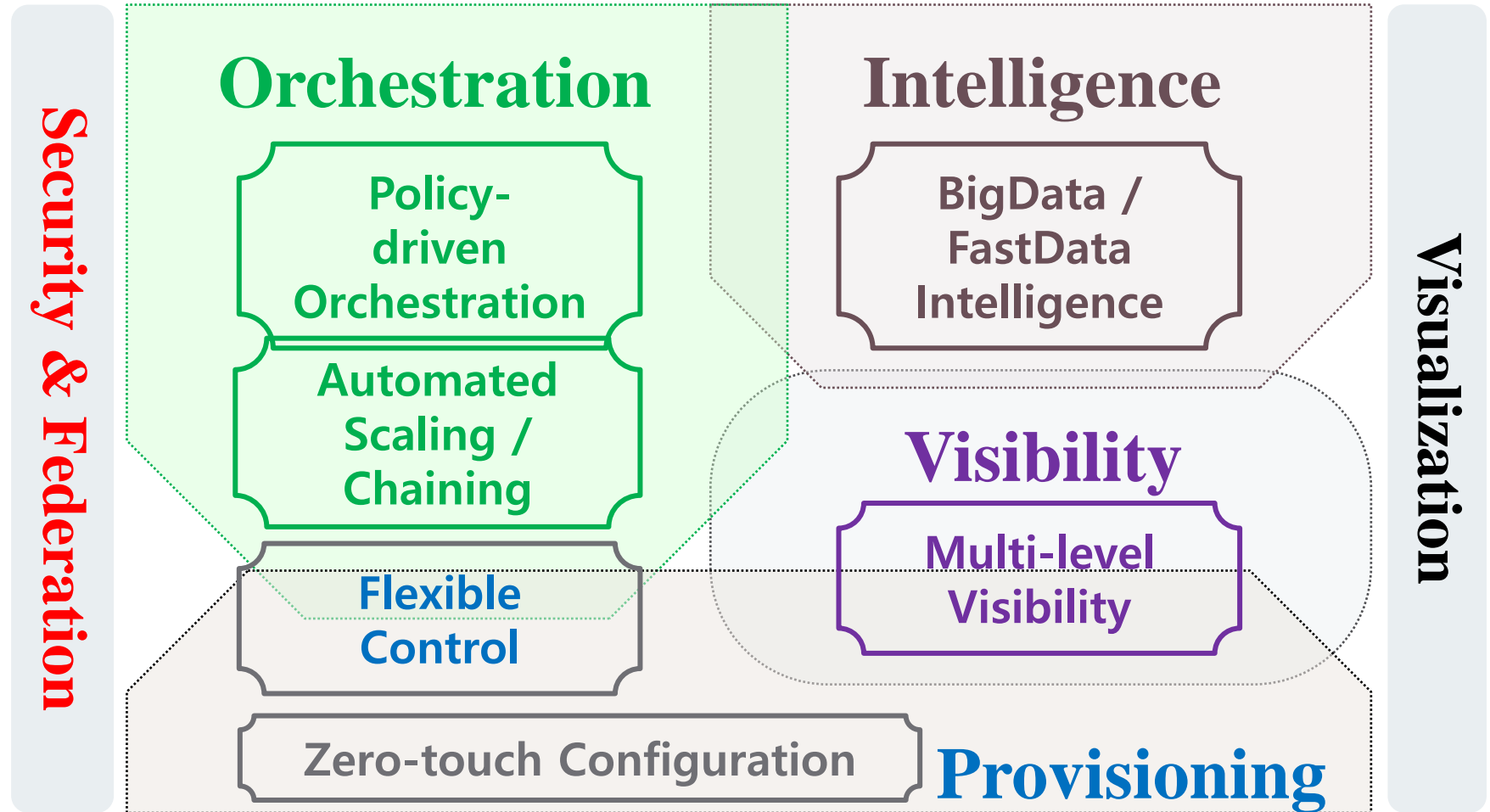
Container-based Orchestration &
Dynamic Resource Pooling



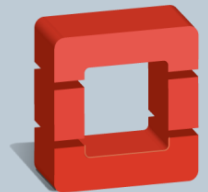


SmartX Software Framework

SmartX Automation



Open Networking Collaboration with SmartX Shared Playground



openstack™

Open Networking KOREA



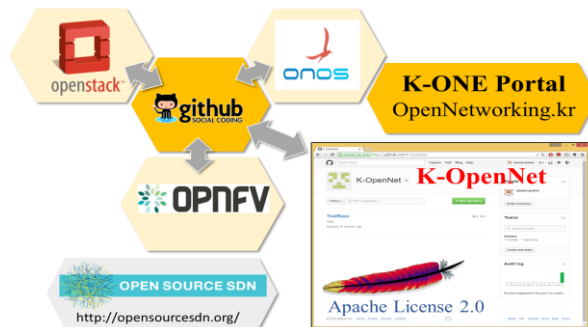
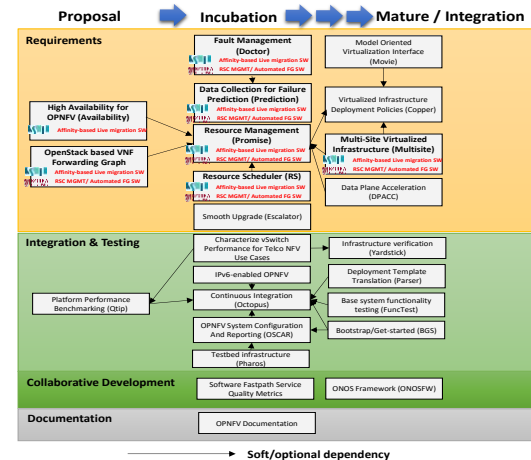
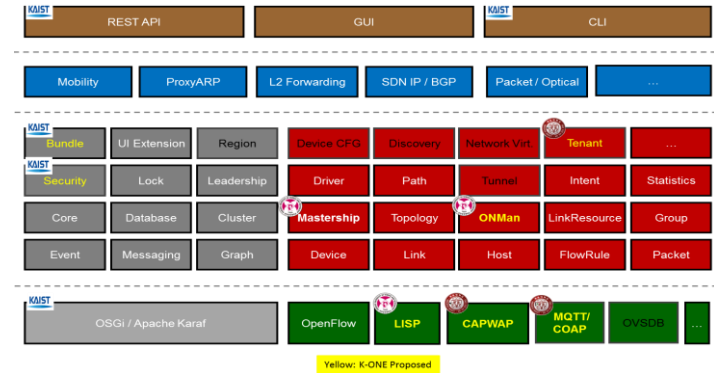
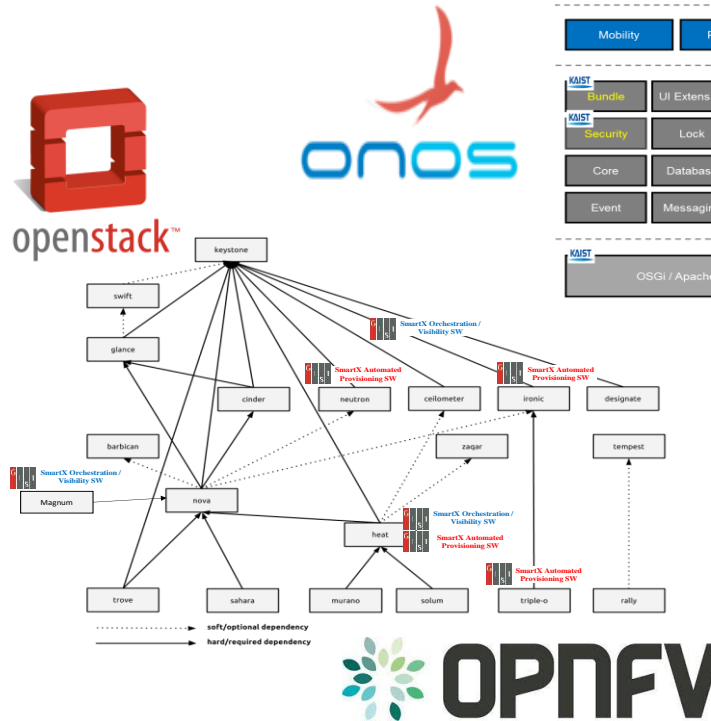
openwincon

Single controller for all wired & wireless networks

<http://opennetworking.kr>

K-ONE (Korea – Open Networking Everywhere)

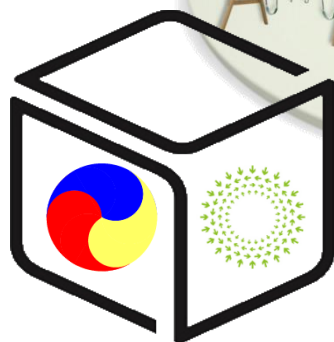
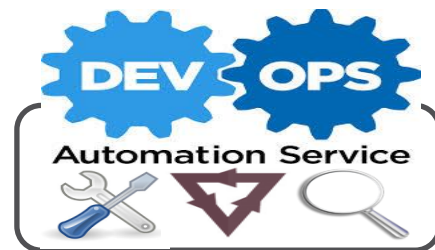
SDN/ NFW/
Cloud 통합
차세대
네트워킹
공개
소프트웨어
개발



K-ONE

K-ONE
공용개발환경

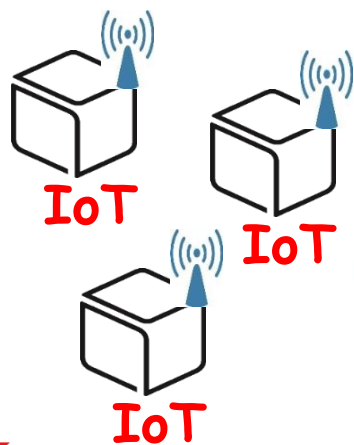
How to Build and Operate Convergent SDI



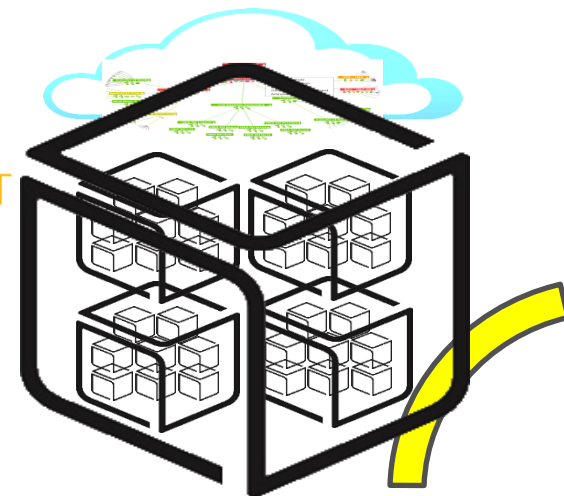
openwincon

Single controller for all wired & wireless networks

K-ONE

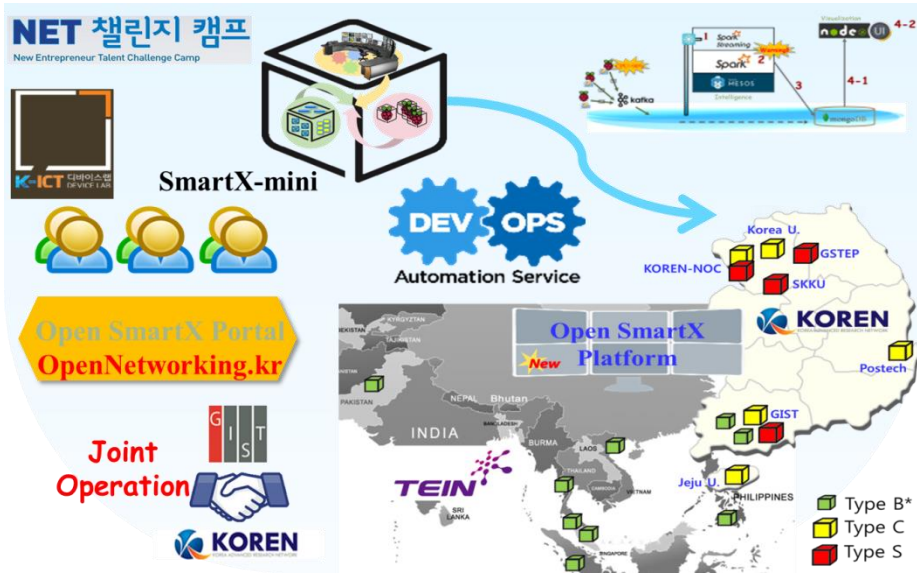


**μCloud
(SDN/NFV/
FastData)**

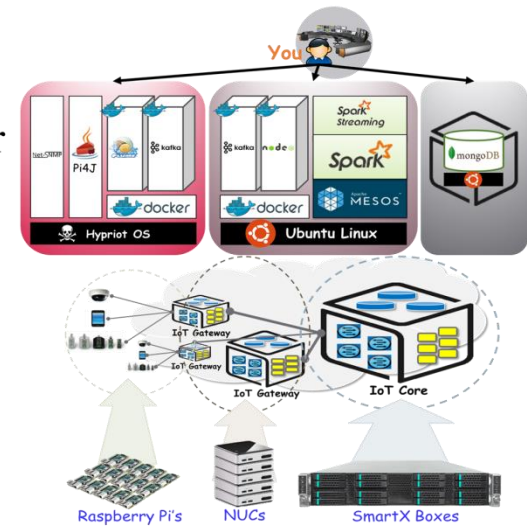
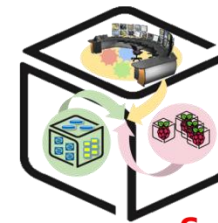


**Federated Cloud DCs
(BigData/HPC)**

SmartX Playgrounds & Open SmartX Platform



SmartX
Playground
Expansion for
IoT—Cloud
(2015~)

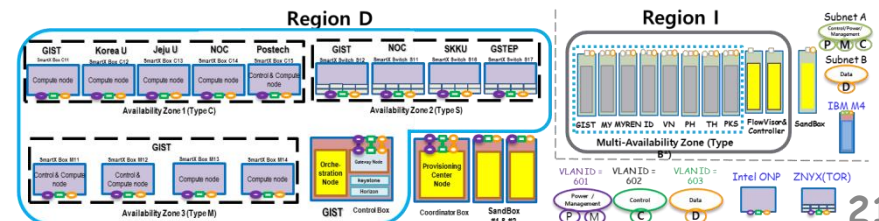
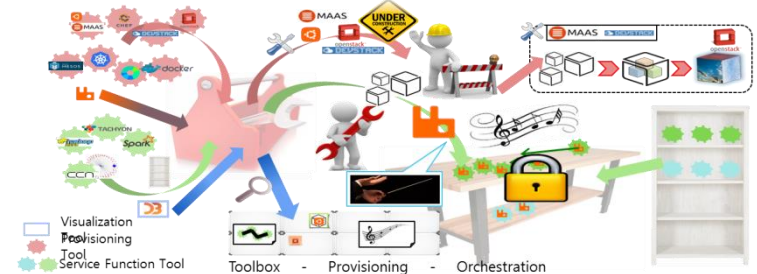
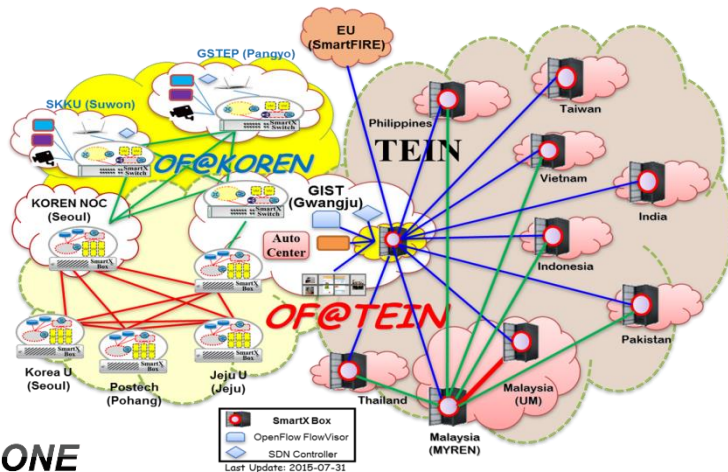


SmartX & SmartX-mini IoT-Cloud

Building/Operating SmartX (OF@KOREN /
OF@TEIN) Playground (2012~2015)



SmartX Playground & Operation Tower (2012~2015)

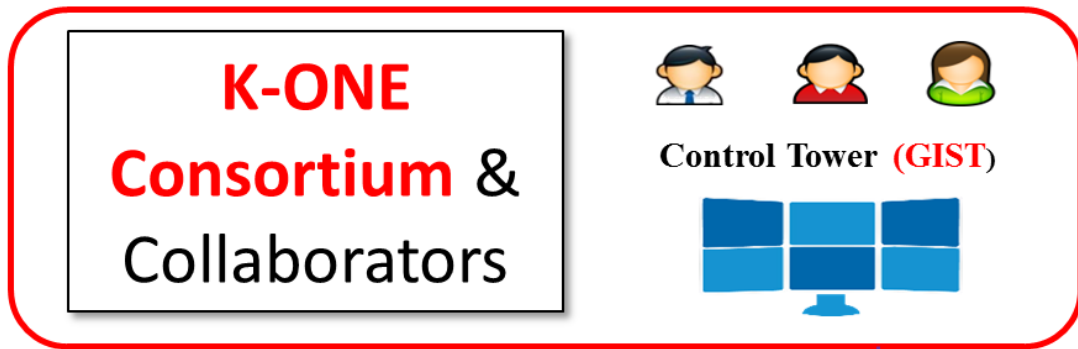


Open Federated Playground for SDI R&D (2015 Initial Plan)

K-ONE



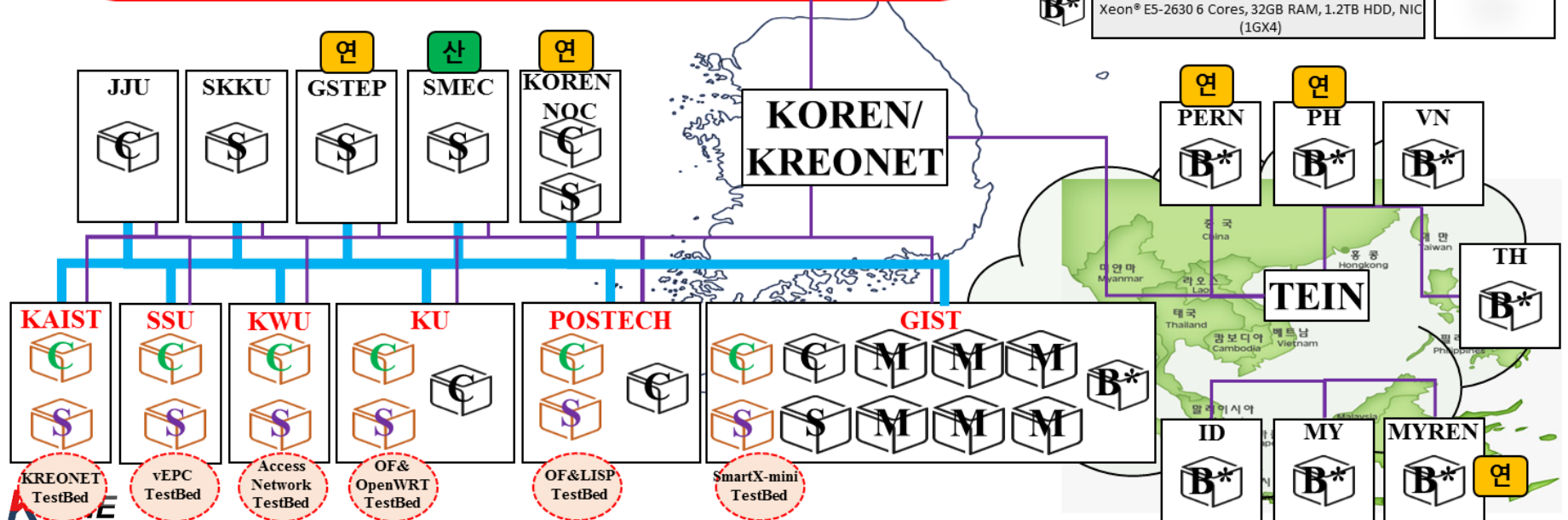
- 분산 Cloud 환경을 지원하는 ONP Box (SmartX Box Type C)
- Cloud 스토리지 실증을 위한 ONP Box (SmartX Box Type M)
- SDN/NFV에 대응되는 Znyx Server-Switch (SmartX Box Type S)
- SDN-Cloud 실증을 지원하는 IBM Box (SmartX Box Type B*)



SmartX Box HW

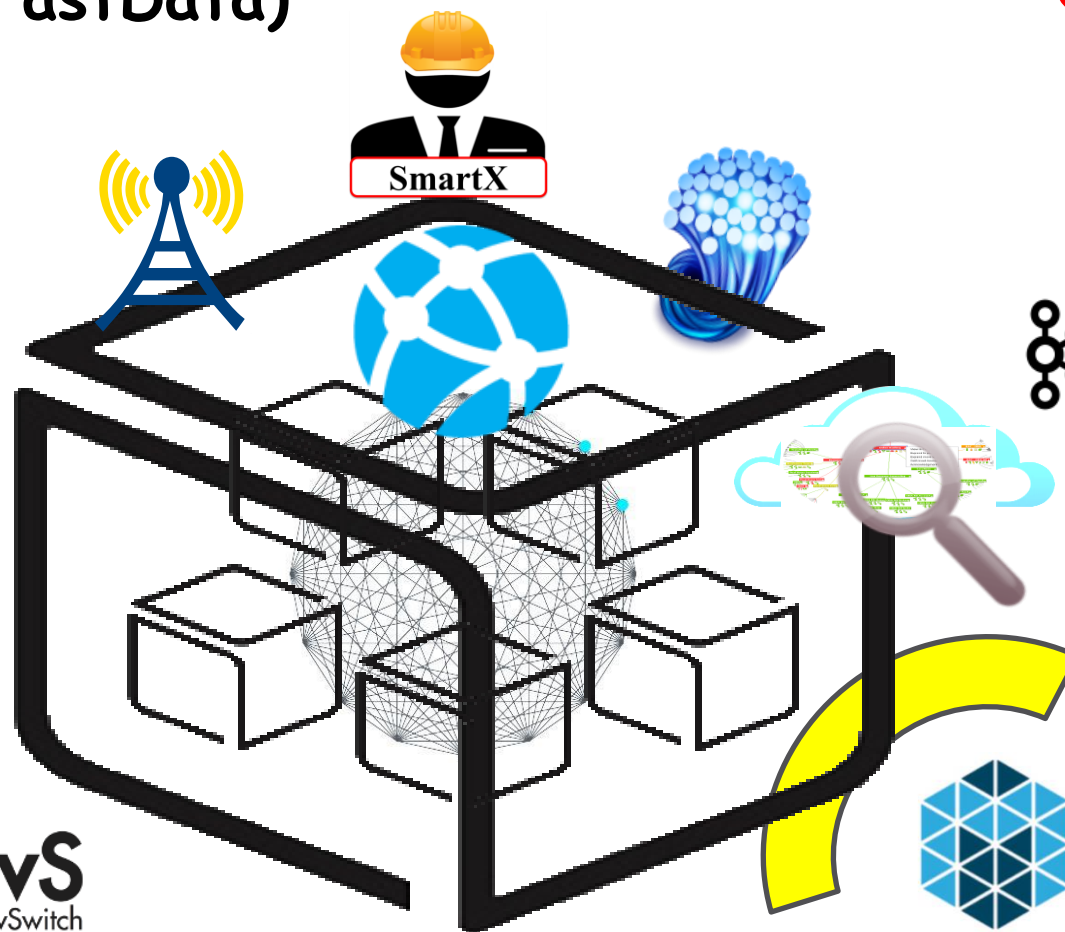
	ONP Box (High-Power Cloud) Xeon® E5-2690 v2 20 cores, 96GB RAM, 1.3TB SSD, 3TB HDD, NIC(10GX2, 1G X4)
	ONP Box (Cloud Storage) Xeon® E5-2650 v3 20 cores, 128GB RAM, 120GB SSD, 8 TB HDD, NIC(10GX2, 1GX4)
	Server-Switch Box (SDN/NFV) ATOM C2558 4 Cores(Sw)/Xeon® E5-2600 v2 16 Cores(Server), 40GB RAM, Ports(10G X 24, 40G X 4)
	IBM Box (SDN-Cloud) Xeon® E5-2630 6 Cores, 32GB RAM, 1.2TB HDD, NIC (1GX4)

Legend
 Network
 10G
 1G
 Box
 Existing
 New

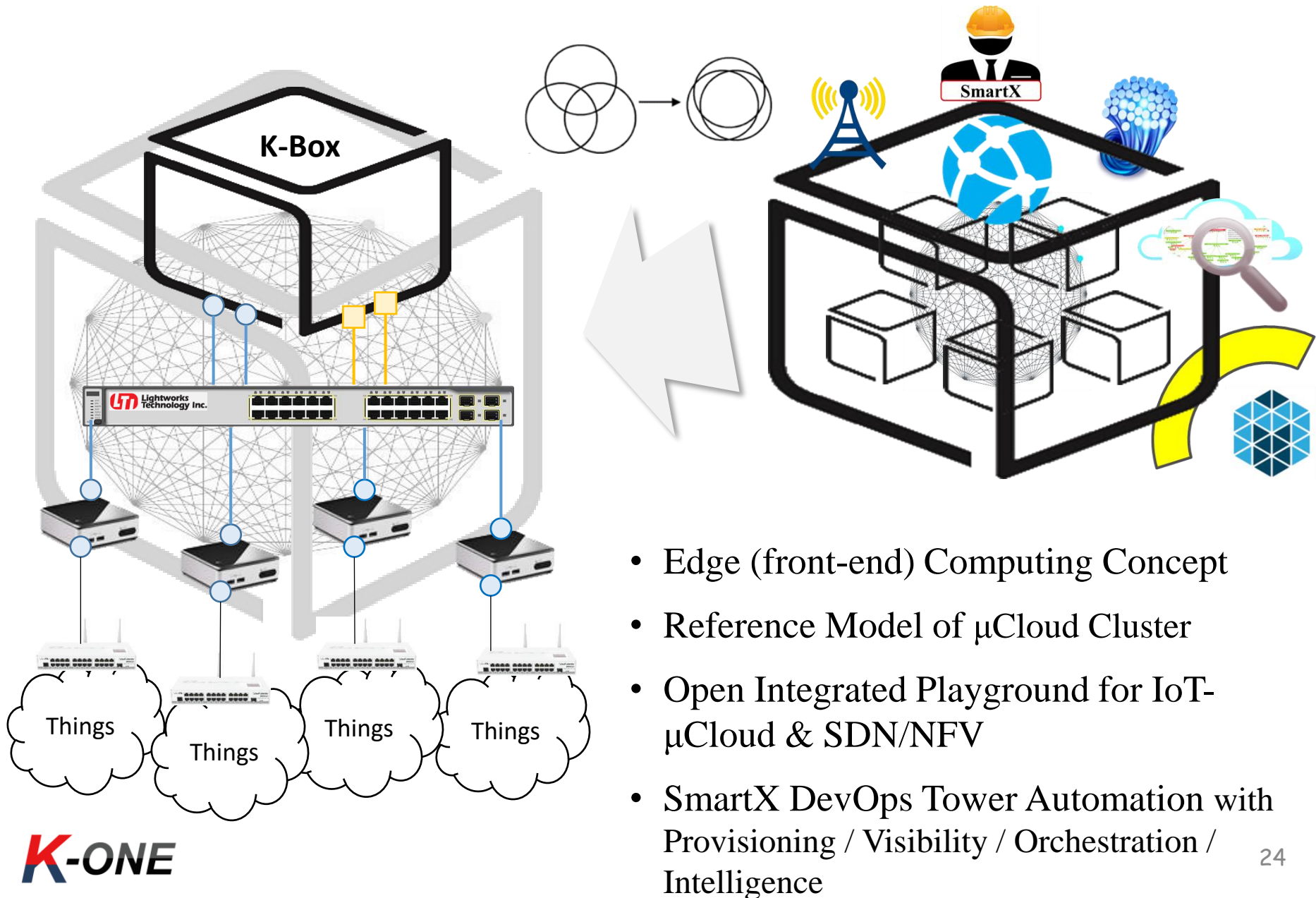


K-Cluster Concept Design (2016. 01 - v0.1)

Federated μ Clouds
(SDN/NFV/FastData)

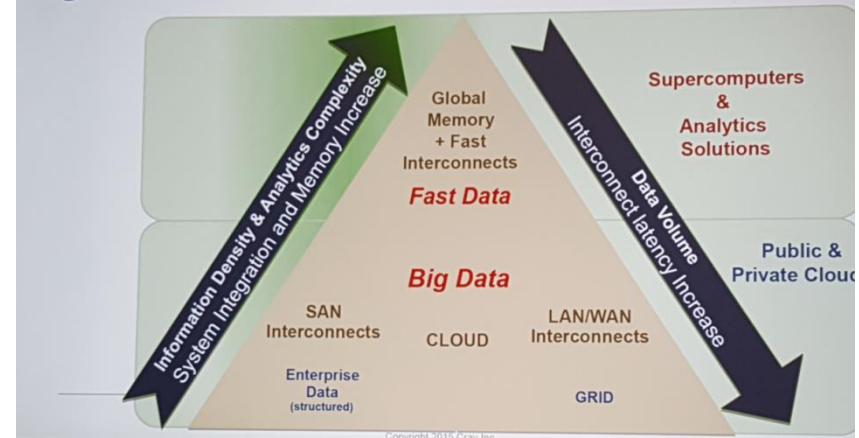


K-Cluster Early Prototype (2016 Spring)



SmartX IoT—Cloud Services with FastData/BigData Analytics

Big Data vs. Fast Data

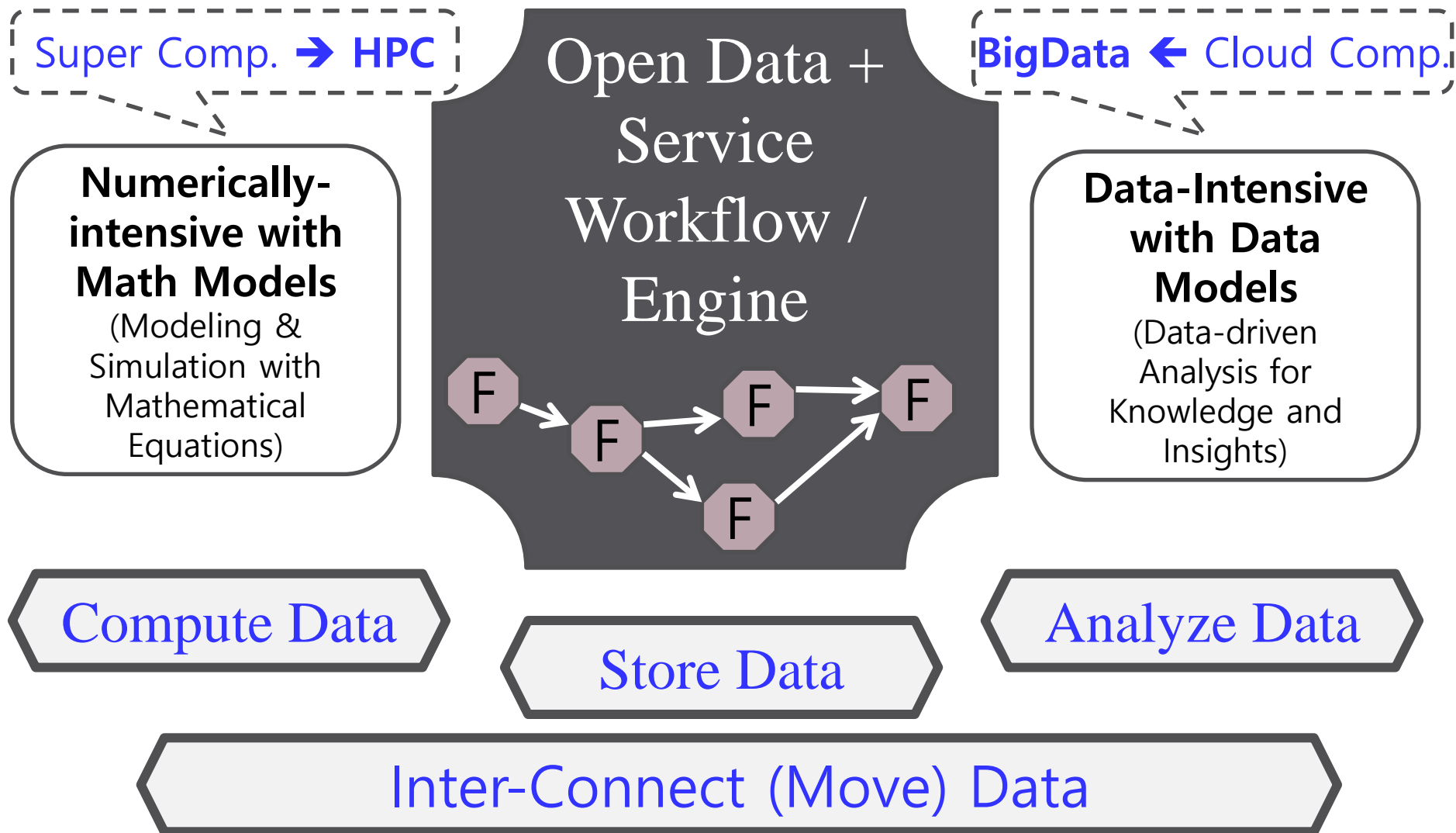


BigData Predictive Analytics

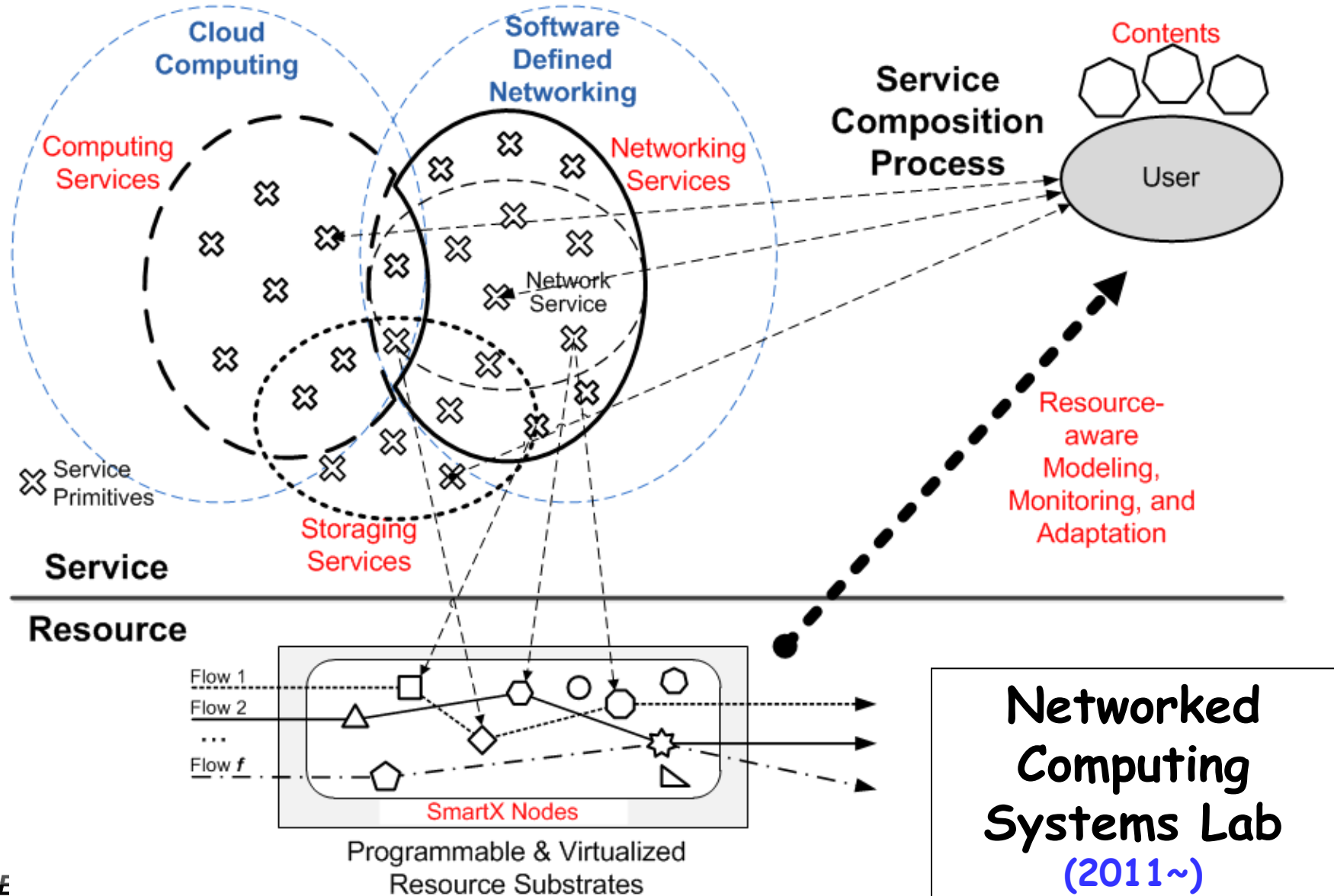


SmartX Services with Open Data & Lifecycle Orchestration

F Functions = MicroServices



Balanced Service Composition based on Programmable (*and Virtualized*) Resources





Gwangju Institute of
Science & Technology



Thank you!

jongwon@gist.ac.kr