

**ITU Regional Forum on New Technologies for Development,
Cairo-Egypt, 23-24 November 2016**

Overview of International Standards for Cloud Computing

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SG 13 Vice Chairman & SG 13 WP2 Co-Chairman**



Establishment of cloud activity

- 2010:
 - Establishment of the FG Cloud by TSAG: delivered 7 Cloud Computing Technical Reports on 12/2011
- 2012: SG 13
 - Set up a dedicated WP in SG13 for Cloud Computing with 3 Questions:
 - Requirements, Architecture and Management
 - Set up 2 Collaborative Teams with ISO/IEC (terminated in July 2014) :
 - Overview and vocabulary and reference architecture
- 2014: Extending the scope to cover Big Data and Trusted cloud
- Since 2012:
 - Delivery of 20 Recommendations on Cloud Computing and Big Data

Cloud Computing activities in ITU-T

- SG 13 WP2 cloud computing :
 - Q.17: Requirements, ecosystem and general capabilities for cloud computing and Big data
 - Q.18: Cloud functional architecture, infrastructure and networking
 - Q.19: End-to-end Cloud computing management and Security
- Joint Rapporteur Group between SG 13 and SG 2 on cloud management
- SG 17: Q.8 Cloud computing security
- SG 11: Q.14 Cloud interoperability testing
- FG on Aviation Applications of cloud computing for Flight Data Monitoring (terminated in 02 2016)

Cloud Recommendations (Requirements and Architectures)

1. Y.3500 (ISO/IEC 17788): Cloud computing - Overview and Vocabulary
2. Y.3501 (2nd edition): Cloud computing framework and high-level requirements
3. Y.3502 (ISO/IEC 17789): Cloud Computing - Reference architecture
4. Y.3503: Requirements for Desktop as a Service
5. **Y.3504: Functional architecture for Desktop as a Service**
6. Y.3510 : Cloud Computing Infrastructure Requirements
7. Y.3511: Framework of inter-cloud computing
8. Y.3512: Cloud Computing - Functional requirements of NaaS
9. Y.3513: Cloud Computing - Functional requirements of IaaS
10. Y.3520 (2nd edition): framework for end to end Cloud resource management
11. Y.3521 /M.3070 : Overview of end-to-end cloud computing management
12. **Y.3522: End-to-end Cloud Service Lifecycle Management Requirements**
13. Y.3600: Big data – cloud computing based requirements and capabilities
14. **Series Y Supplement 40: Big data standardization roadmap**

Cloud Recommendations (Security and Testing)

1. X.1601 (2nd edition): Security framework for cloud computing
2. X.1602: Security requirements for SaaS
3. X.1631 (ISO/IEC 27017): Code of practice for information security controls based on ISO/IEC 27002 for cloud services
4. X.1641 Cloud computing security – Cloud computing security best practices and guidelines
5. X.1642: Operational security for cloud
6. Q.4040: Framework and overview of cloud computing interoperability testing

Y.3500 (ISO/IEC 17788) : Cloud Computing Definition

“Paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand”

NOTE – Examples of resources include servers, operating systems, networks, software, applications, and storage equipment.

On-demand self-service: Feature where a **cloud service customer** can provision computing capabilities, as needed, automatically or with minimal interaction with the **cloud service provider**

Y.3500: Cloud Computing Overview

- 6 Characteristics
 1. Broad network access
 2. Measured Service
 3. Multi-tenancy
 4. On-demand self-service
 5. Rapid elasticity and scalability
 6. Resource pooling
- 3 Main Cloud Computing Roles: Customer, Provider and Partner
- 4 Deployment models: public, private, hybrid, community
- 7 Cloud services categories: **SaaS, PaaS, IaaS, CompaaS, DSaaS, NaaS, CaaS**
- 3 Data categories: customer, provider and derived.

Y.3500: 3 main Cloud Roles

➤ Roles are sets of activities implemented by functional components

Role that is in a business relationship for the purpose of using cloud services

Cloud service partner (CSN)

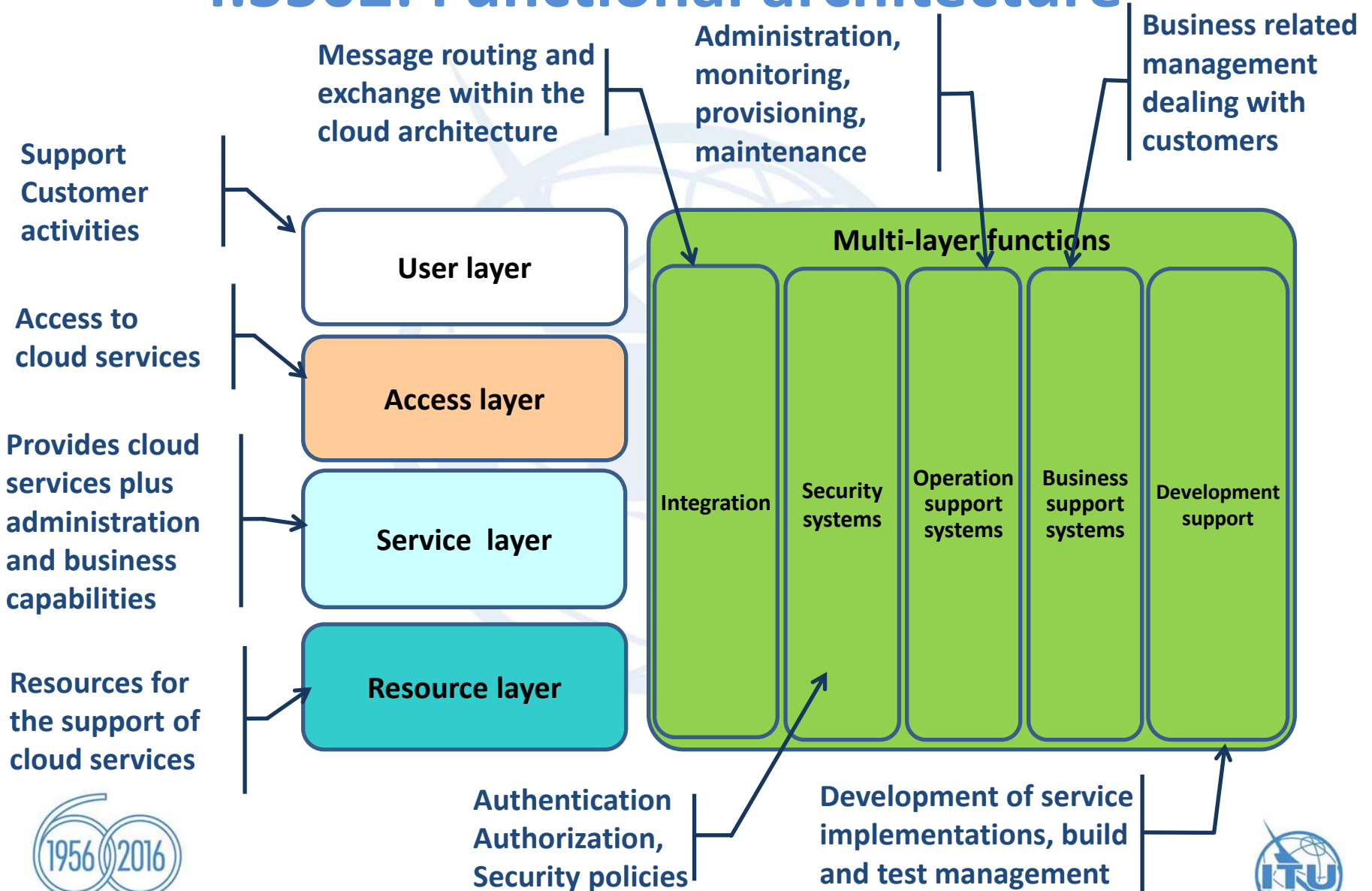
Cloud service customer (CSC)

Cloud service provider (CSP)

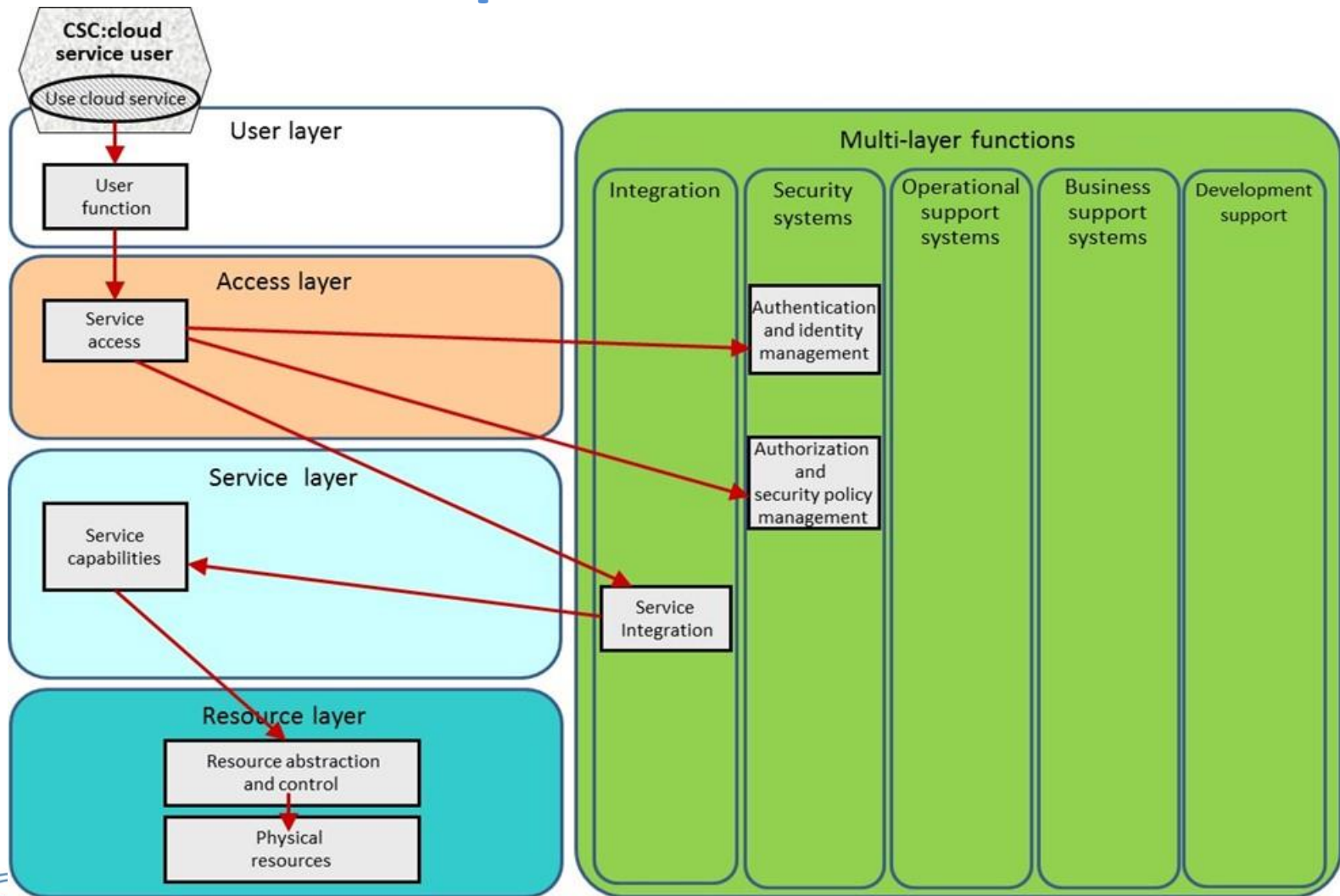
Role in support of, or auxiliary to, activities of either the CSP or the CSC, or both

Role that makes cloud services available

Y.3502: Functional architecture



Y.3502: example of use a cloud service



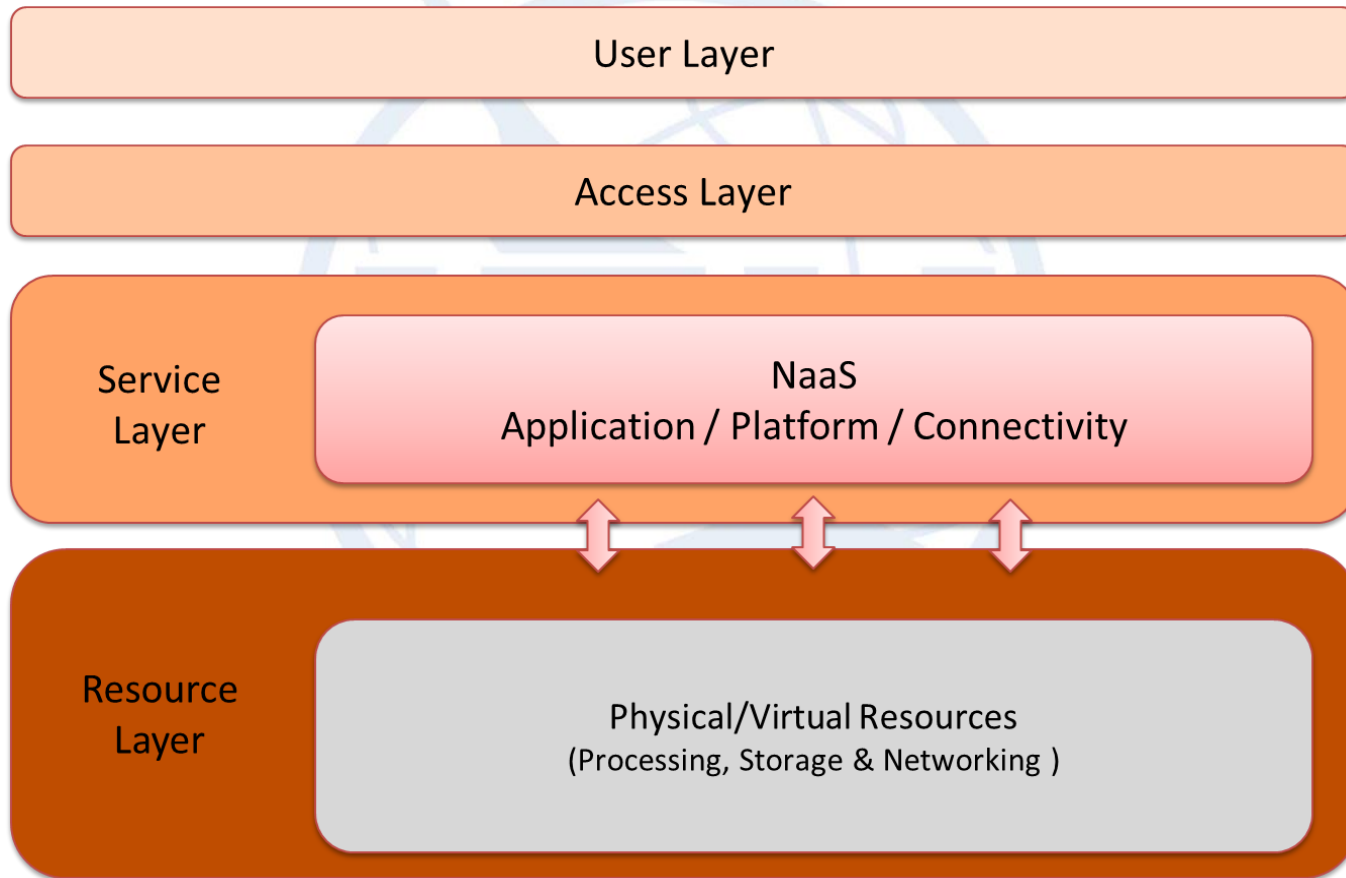
Y.3502: Cloud Cross Cutting aspects

Cross Cutting: behaviors which need to be coordinated across roles and implemented consistently in a cloud computing system:

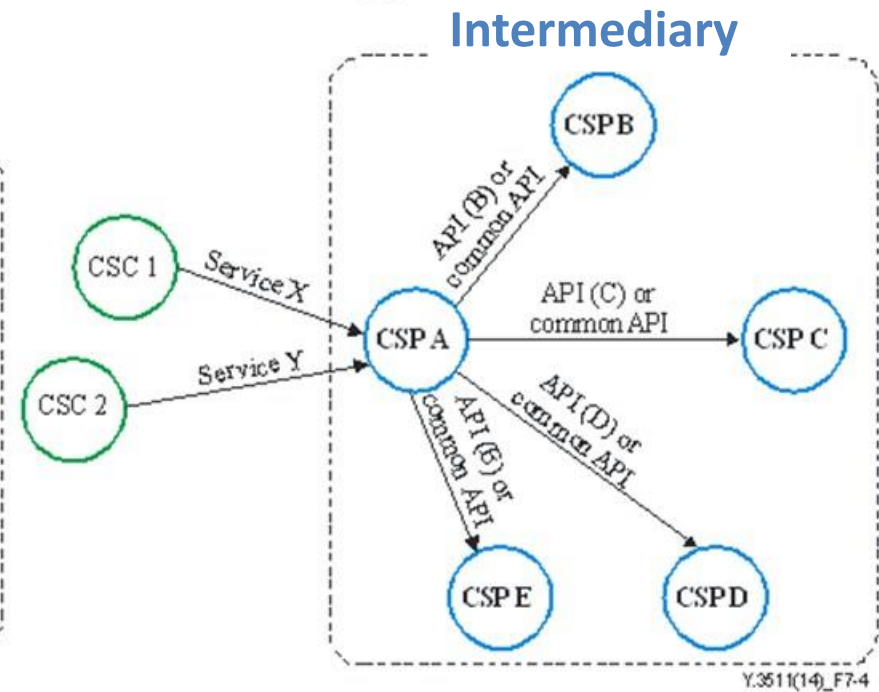
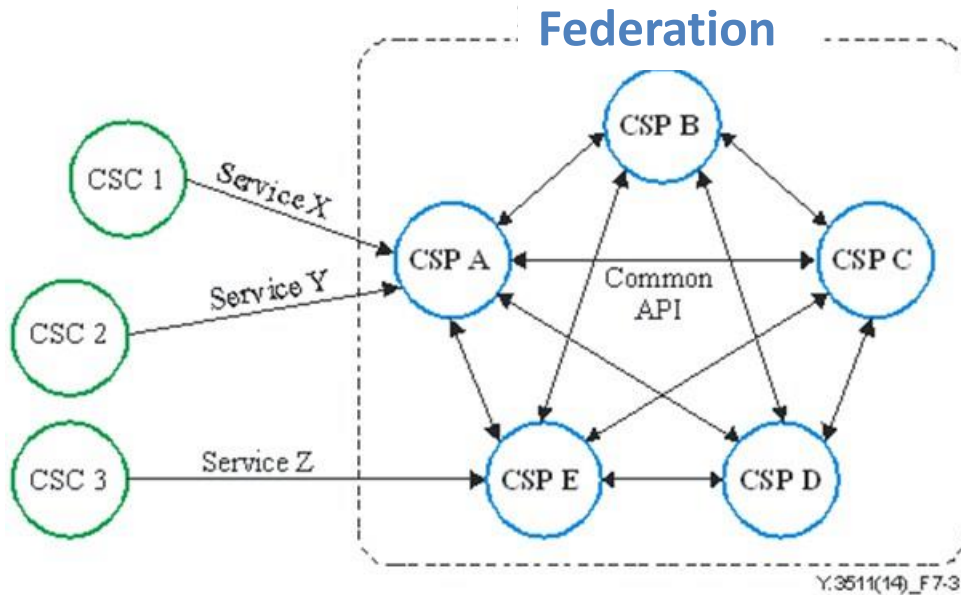
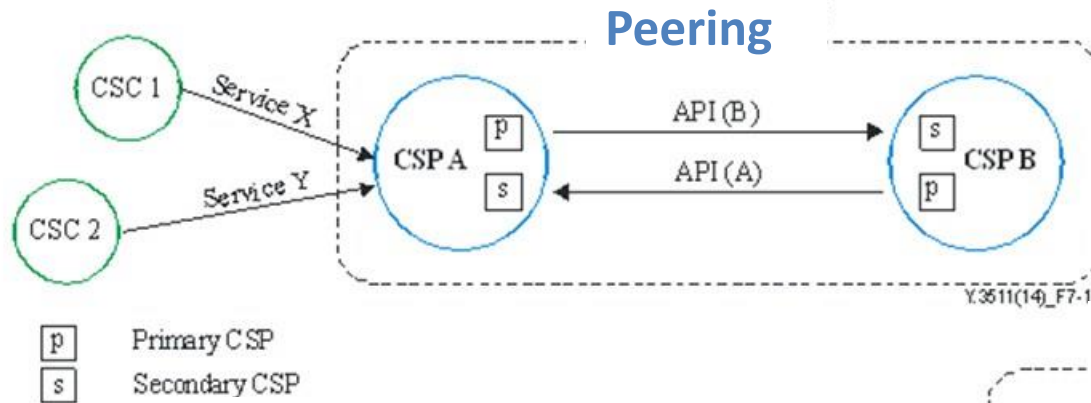
- **Auditability**
- **Availability**
- **Governance**
- **Interoperability**
- **Maintenance and versioning**
- **Performance**
- **Portability**
- **Privacy**
- **Regulatory**
- **Resiliency**
- **Reversibility**
- **Security**
- **Service levels and service level agreement**

Y.3512: Network as a Service

- NaaS concept is based on 3 capabilities types of service:
NaaS Application (VNF), NaaS Platform & NaaS Connectivity (SDN)



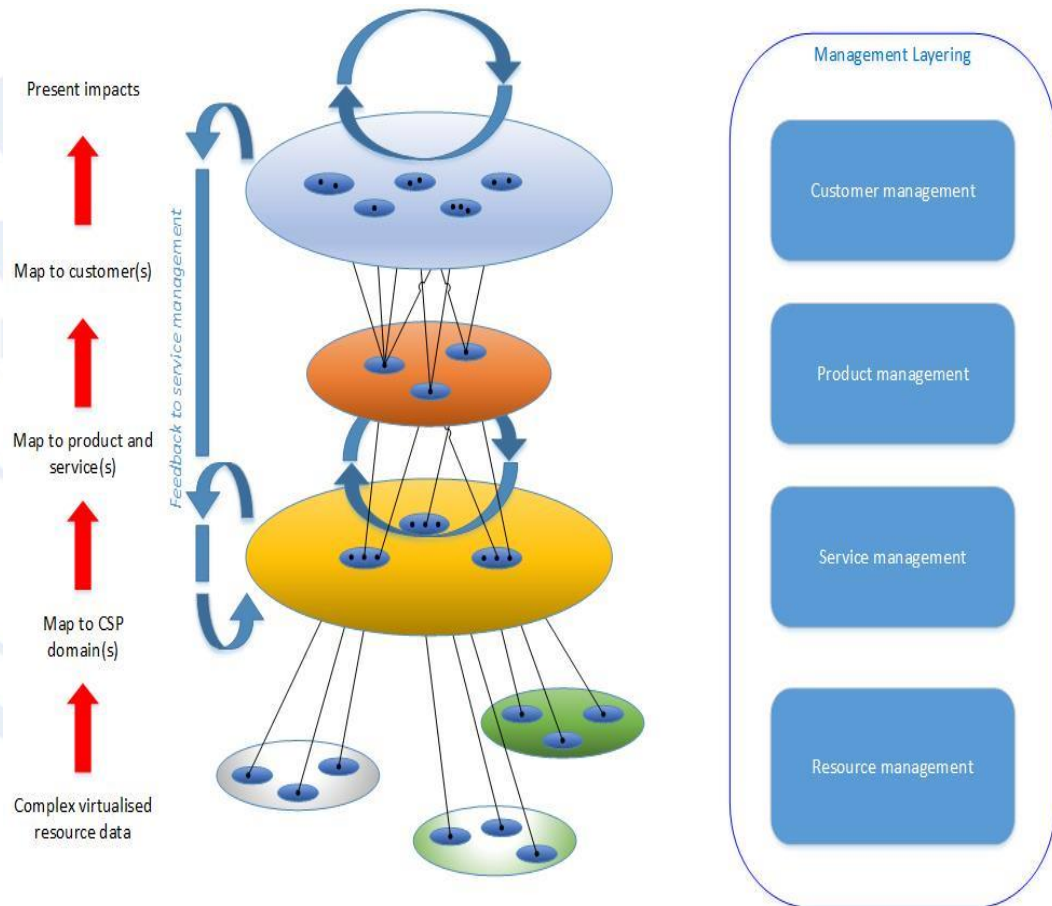
Y.3511: Inter cloud computing (3 scenarios)



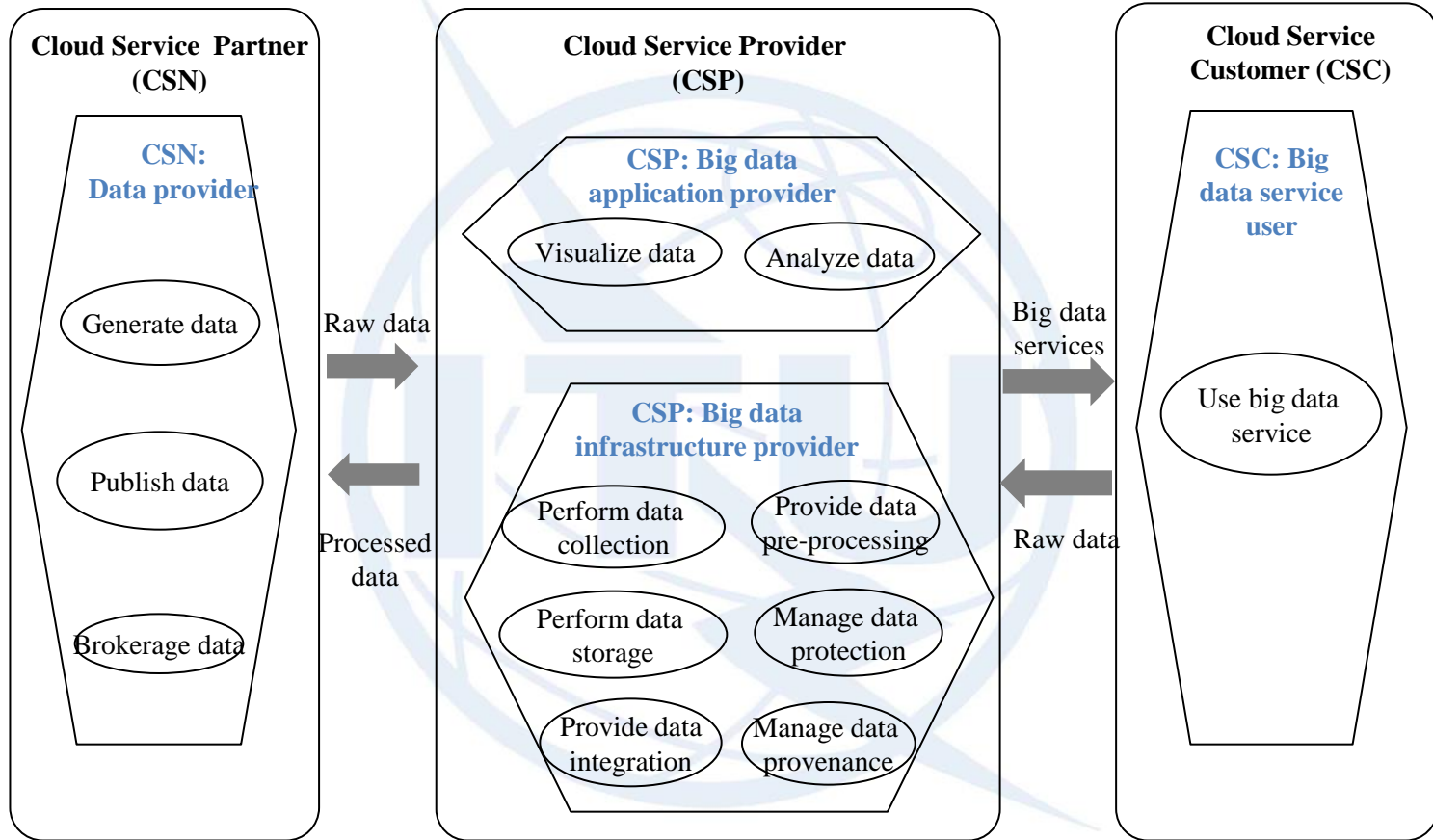
Y.3521/M.3070: Overview of end-to-end cloud computing management

End to End common Model management functionalities

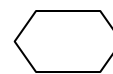
- Functionalities for cloud **customer** management
- Functionalities for cloud **product** management
- Functionalities for cloud **service** management
- Functionalities for cloud computing **resource** management



Y.3600: Cloud computing based big data



Role

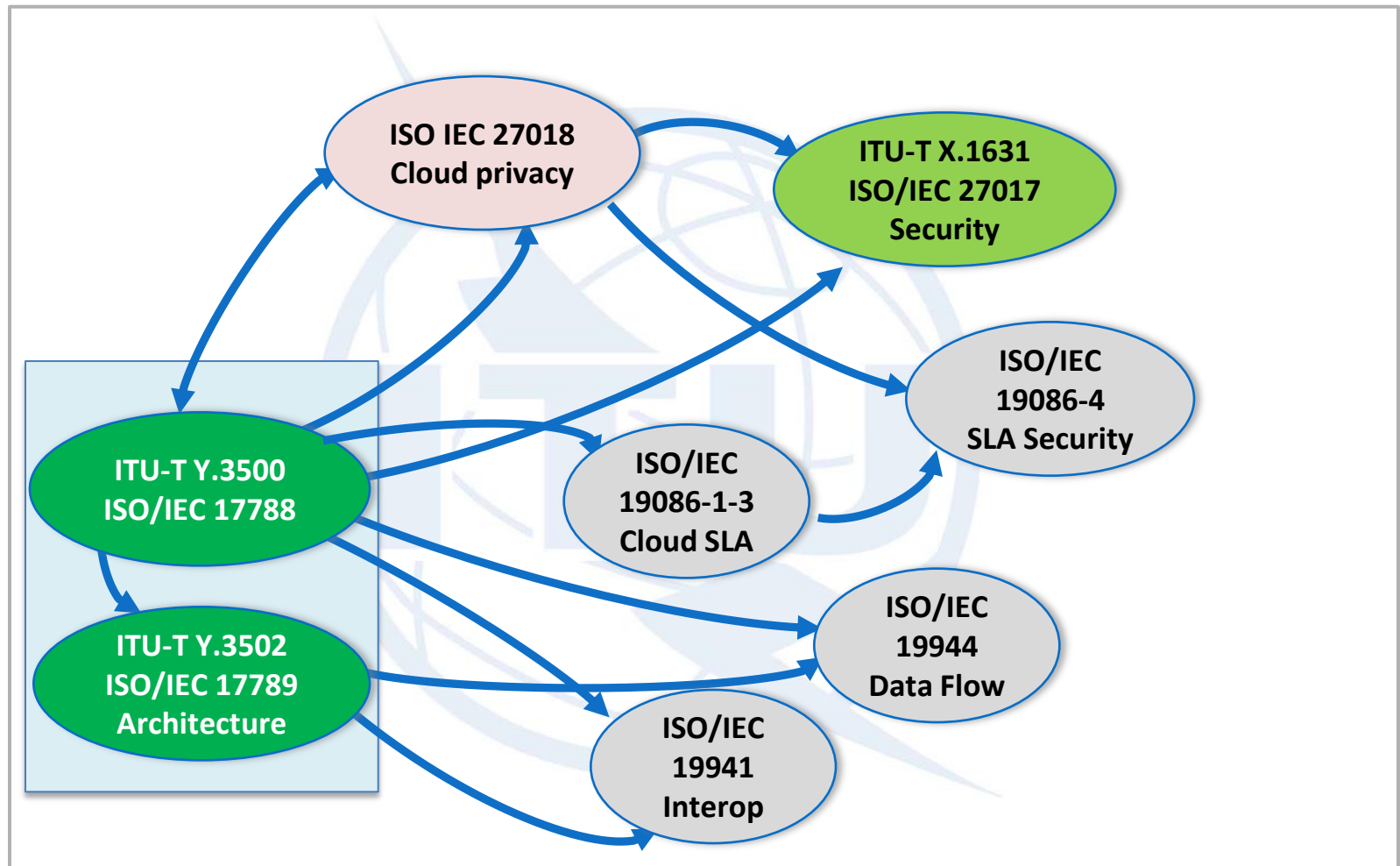


Sub Role



Activity

ISO/IEC and ITU-T Cloud Standards



Standards & Specifications by other SDOs

- **CSA:** Trusted Cloud security architecture, Cloud Control Matrix, Cloud Audit and Open Certification Framework
- **DMTF:**
 - Open Virtual Format (OVF), published as ISO/IEC 17203
 - Cloud Infrastructure Management Interface (CIMI), published as ISO/IEC 19831
 - Cloud Audit Data Federation (CADF)
- **ETSI:** ISG NFV Network Function Virtualization related to NaaS, published several Group Specifications on requirement and functional architecture
- **OASIS:**
 - Topology and Orchestration Specification for Cloud Applications (TOSCA),
 - Cloud Application Management for Platforms (CAMP)
- **SNIA:** Cloud Data Management Interface (CDMI) extension to cloud Storage in 2015, published as ISO/IEC 17826

Recommendations under Development in ITU-T SG 13

1. NaaS architecture
2. Functional Architecture of inter-cloud computing
3. Requirements for containers and micro-services
4. Trusted inter-cloud computing framework and requirements
5. *Supplement on cloud computing standardisation Roadmap*
6. Big Data as a Service architecture
7. Big Data exchange framework and requirements

➤ Next meeting February 2017 Geneva (under new study period 2017-2020)

Contacts

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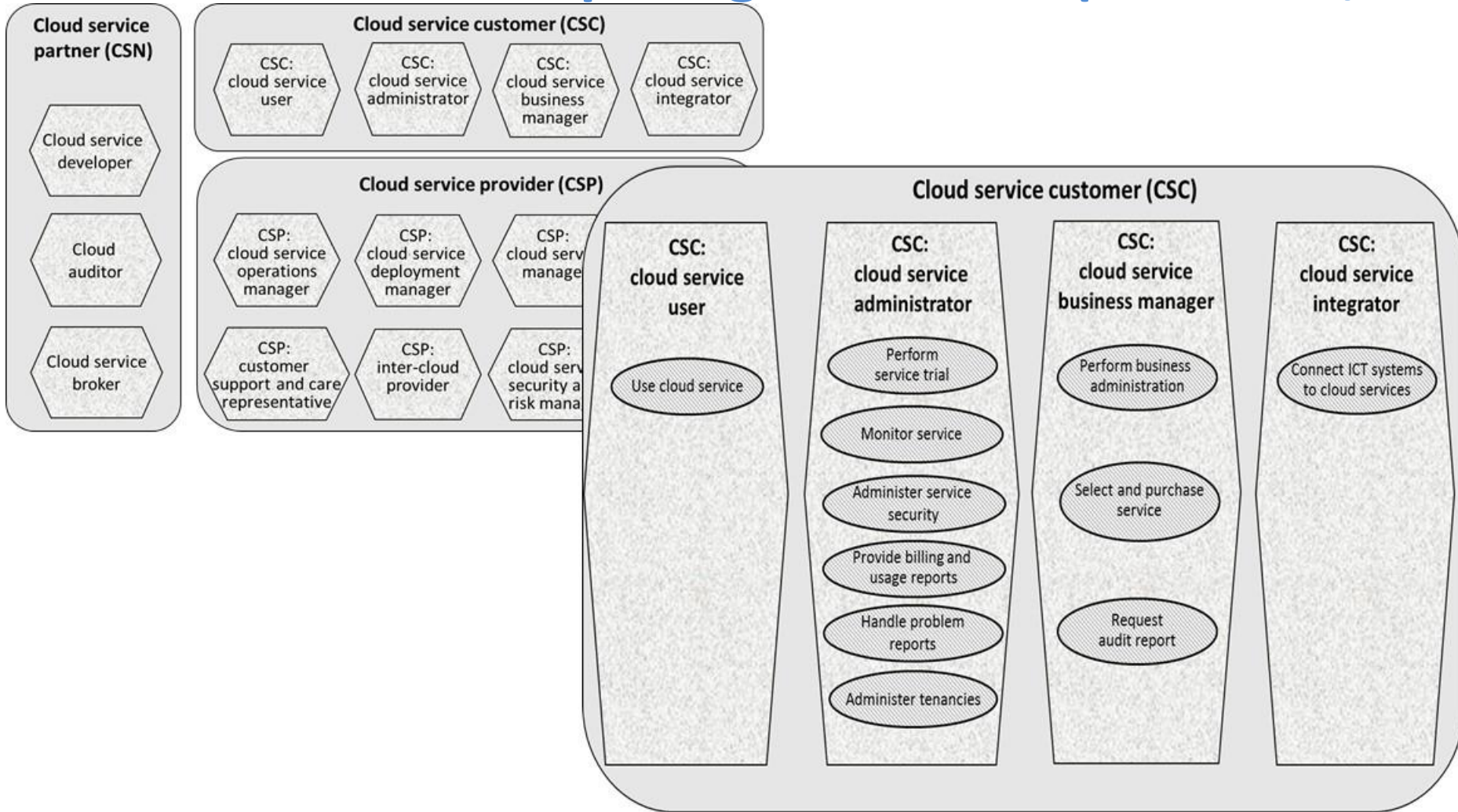
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Dr. Leo Lehmann, SG13 chairman

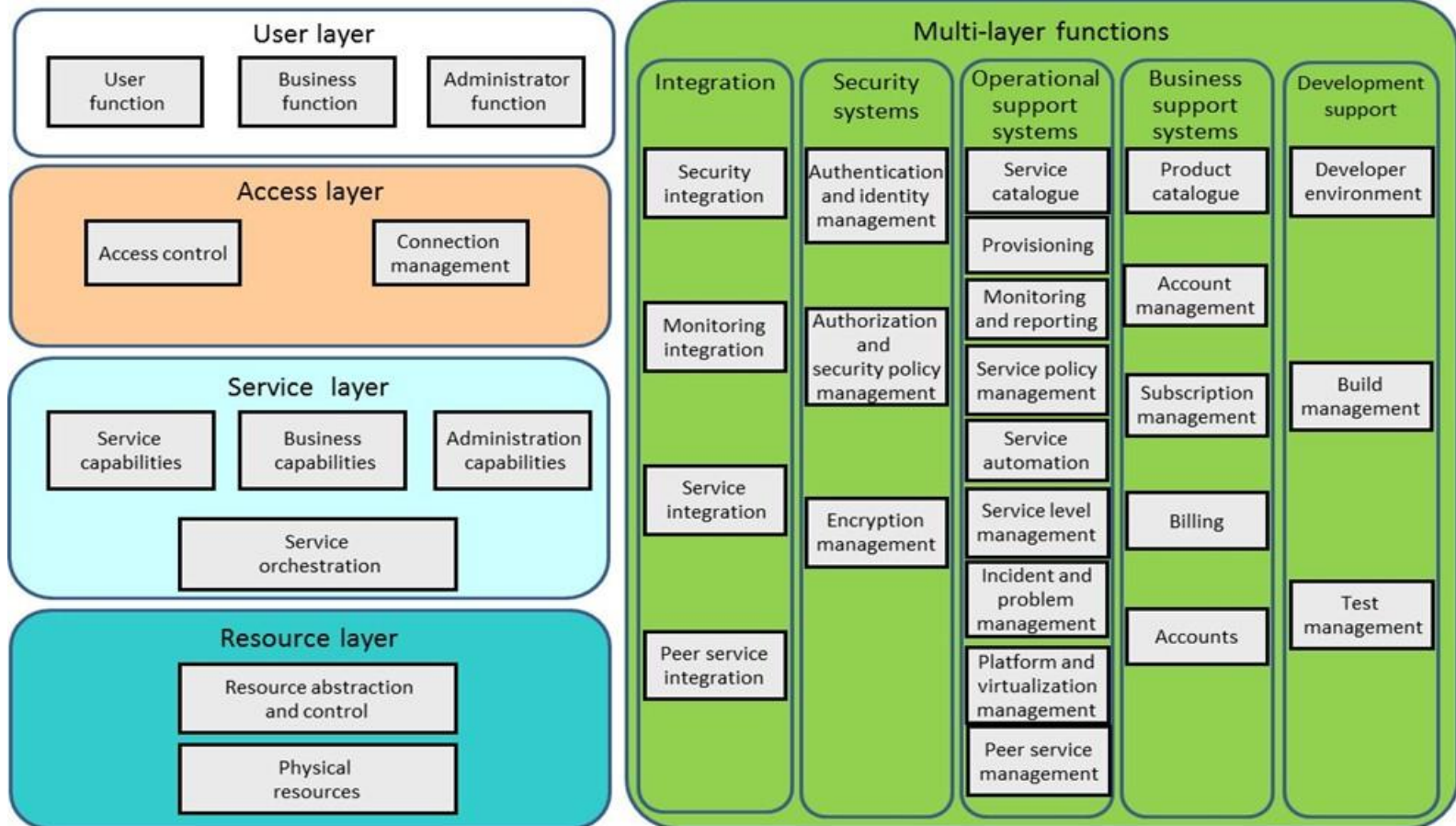
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Y.3502: Cloud Computing user view (activities)



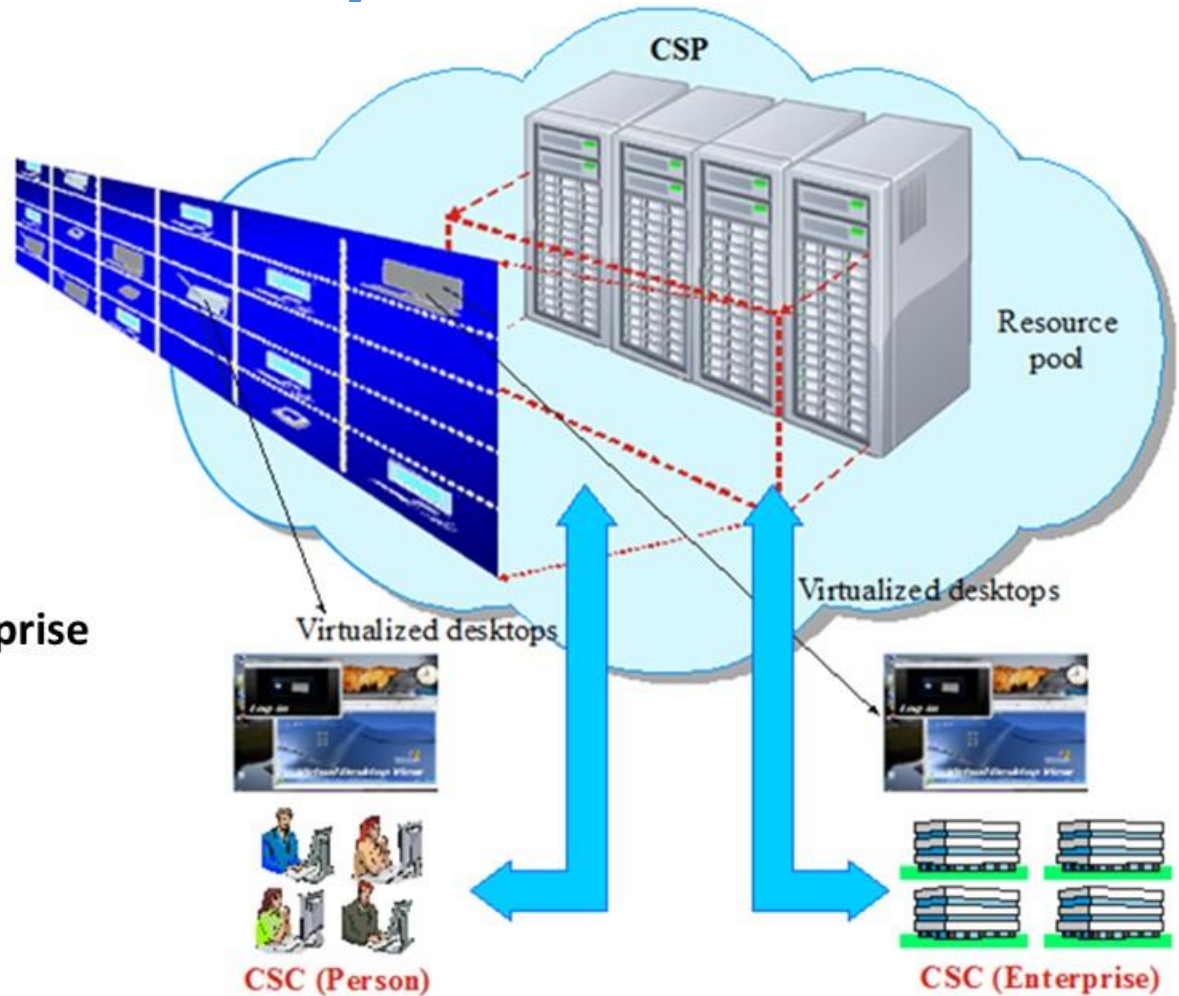
Y.3502: Cloud functional architecture



Y.3503: Desktop as a service

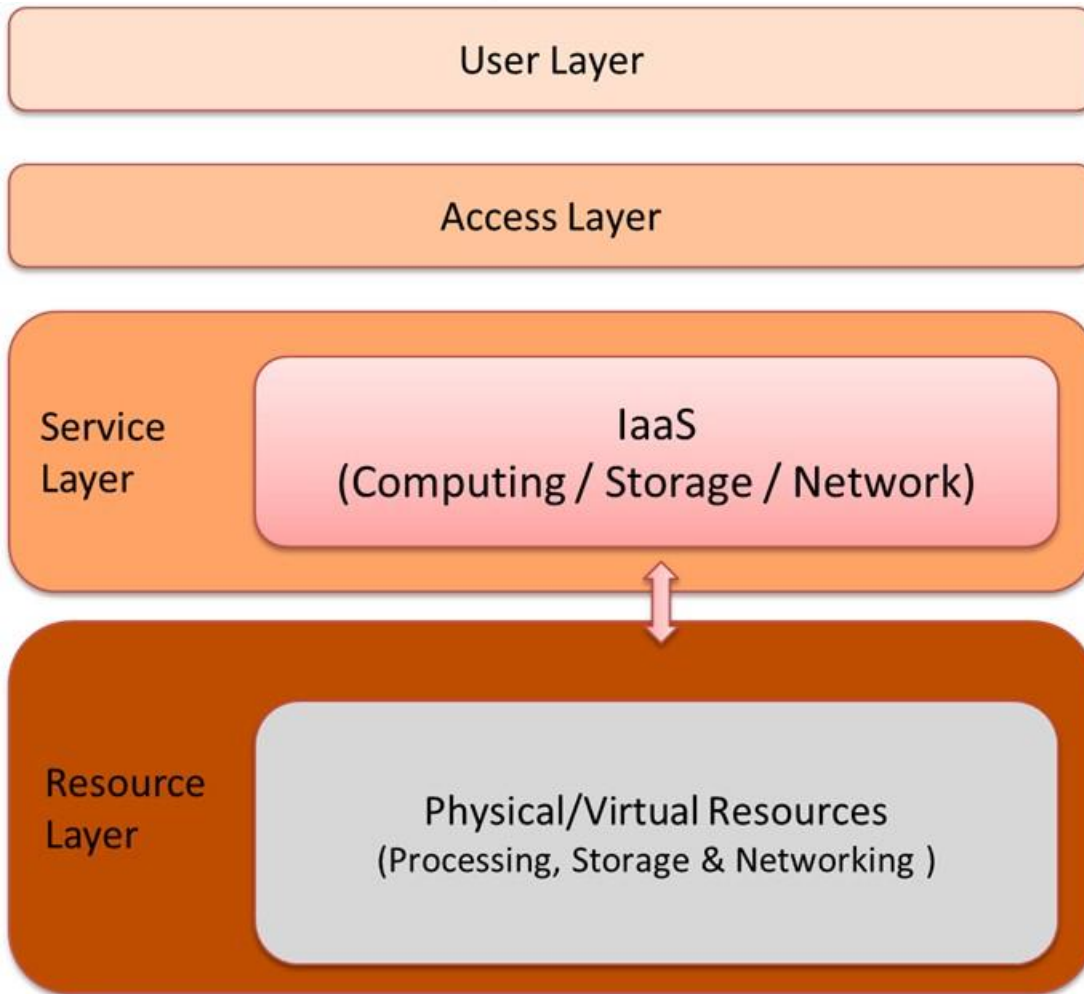
DaaS: ability to build, configure, manage, store, execute and deliver users' desktop functions remotely

person/ enterprise



Y.3501(13)_F04

Y.3513: Infrastructure as a Service



computing service functions allow CSC to provision and use **processing resources**.

storage service functions allow CSC to use **storage resources**.

network service functions allow CSC to use **networking resources**.





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