Forum on Emerging Technologies

Opportunities and challenges of Cloud Computing in higher education field

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Outline

- Cloud Computing concept
- Cloud Computing in higher education
- Opportunities in higher education
- Challenges in higher education

Cloud Computing Concept

- Cloud computing is a 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.

- [Source: ISO/IEC 17788 | Recommendation ITU-T Y.3500 “Information technology - Cloud computing - Overview and vocabulary”, approved on 13 August 2014]

Cloud Computing Concept

- Cloud Computing related definitions & taxonomies
  - 5 Cloud service categories (SaaS, CaaS, PaaS, IaaS, NaaS) with 2 new categories for Communication (real time) and network (transport & inter-cloud)
  - Cloud ecosystem actors (provider, partner & user) and roles
  - Different deployment models (e.g. public, private, hybrid)

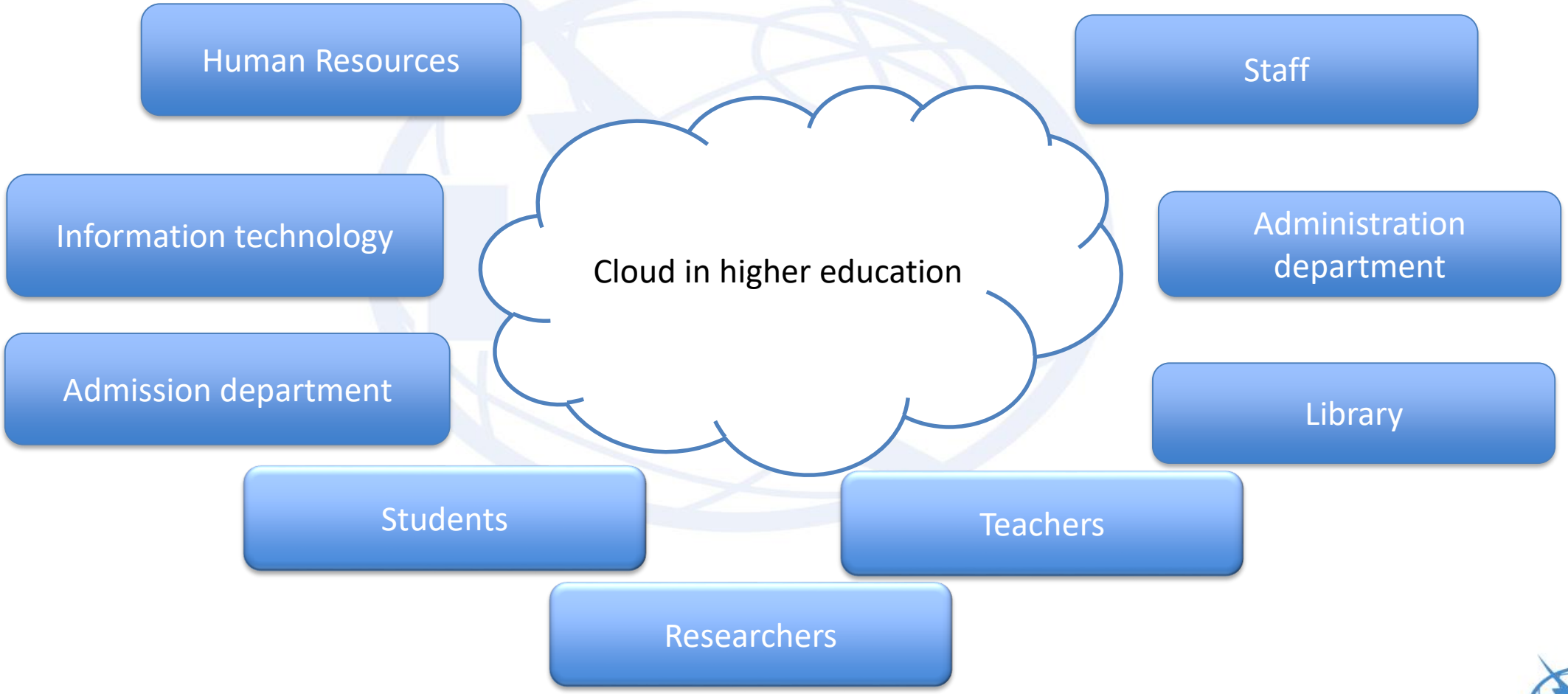
Cloud Computing Concept

- Main Characteristics
  - On-demand self-service
  - Broad network access
  - Multi-tenancy Resource pooling
  - Rapid elasticity and scalability
  - Measured Service

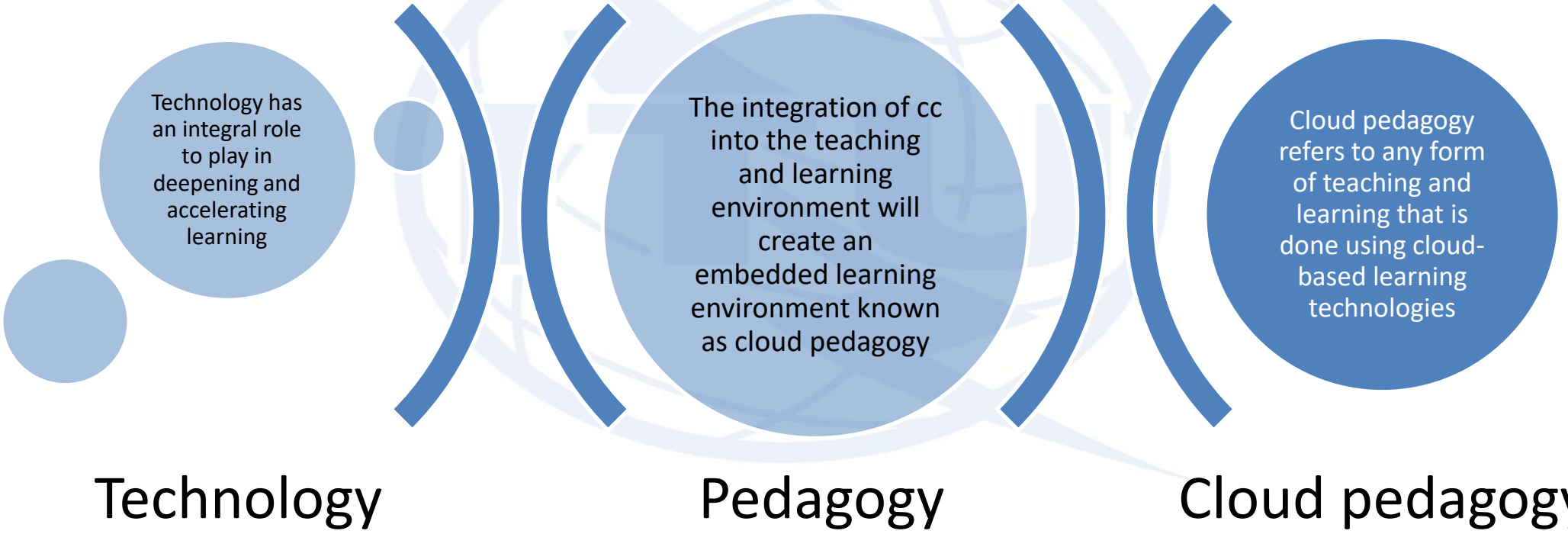
Cloud Computing in higher education

Demands in complex environment for university	Management of students, classes and faculties
	Efficient collaboration and communication
	Reducing CAPEX and OPEX
	Competing among other universities
	Offering stable system

Cloud Computing in higher education



Cloud Computing in higher education



Cloud Computing in higher education
Service models

- Massive open online courses (MOOCs)
  - students with disabilities
  - lifelong learning
- Mobile Learning
  - Bring-Your-Own Device (BYOD) policies.
- Unified communication tools
- Collaboration tools
- Storage solutions

Cloud Computing in higher education
Service models

Infrastructure layer	•Resources such as computing, data storage, and network communications •Various types of virtual machines
Development environment	•Development environment •Public API •Web services
Application interface layer	•Office systems •Assignment systems •Courseware production •Presentation software
User interface layer	•Web-based interface •Use the browser of any device

Cloud Computing in higher education characteristics

Broad and network access	The capabilities and resources are available over the network Location Independence
Open access	Online courses always share for each person for free Require few on the client device
Cost Saving	Optimal use of software and hardware
	Reduced expenditure on Technology Infrastructure
	Payment is on demand basis
Elasticity	The cloud can be dynamically scalable to meet the needs of application and user-scale

Opportunities in higher education

- Students as passive targets
- Credit driven
- Information asymmetry
- Fixed time and location
- Rigid software solutions
- Traditional communication and collaboration
- Traditional exams and tests

- Improve student productivity
- Focus more on their learning goals
- Rich learning environment
- Access resources and knowledge in different locations
- New Services
- Better collaboration
- Customized assessment environment

Opportunities in higher education

- Enhance learning outcomes
- Increase speed of innovation
- Improve educational strategies
- Allow focusing on teaching and learning
- Improve the effectiveness of assessment and projects
- Provide a global collaboration among academics

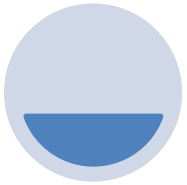
Opportunities in higher education

Before	After
Distributed Infrastructure	Centralized Infrastructure
Manual and slow provisioning	Rapid, dynamic and smart provisioning
Not optimal utilization	Cost savings and efficiencies
Human interaction	Self Service On Demand
Management load and effort	Refocus on Core Competencies
Weak policies	Strong policies
Abstract skills	Real and mature environment

Challenges in higher education

Security concerns	•Network security •Data security •Malicious Insiders •Abuse Of Cloud Services •Compliance •Governance
Control concerns	•Loss of physical control •Loss of control over data •Trusting vendor services
IT skills	•Training of IT and development staff •Complexity of building a private cloud
Cost/benefits ratio	•Infrastructure cost •Services cost

Challenges in higher education



Interoperability

Universal set of standards

Reliability

Many existing cloud infrastructure leverage commodity hardware that is known to fail

Performance

All access to the cloud is done via the internet

Conclusion

- Cloud computing is an emerging technology paradigm that promises to provide solution to the current challenges faced by HE institutes.
- It provides a major opportunity to increase organizational efficiency, improve agility, and stimulate innovation
- A modern educational systems should be based on Cloud systems

Thank you