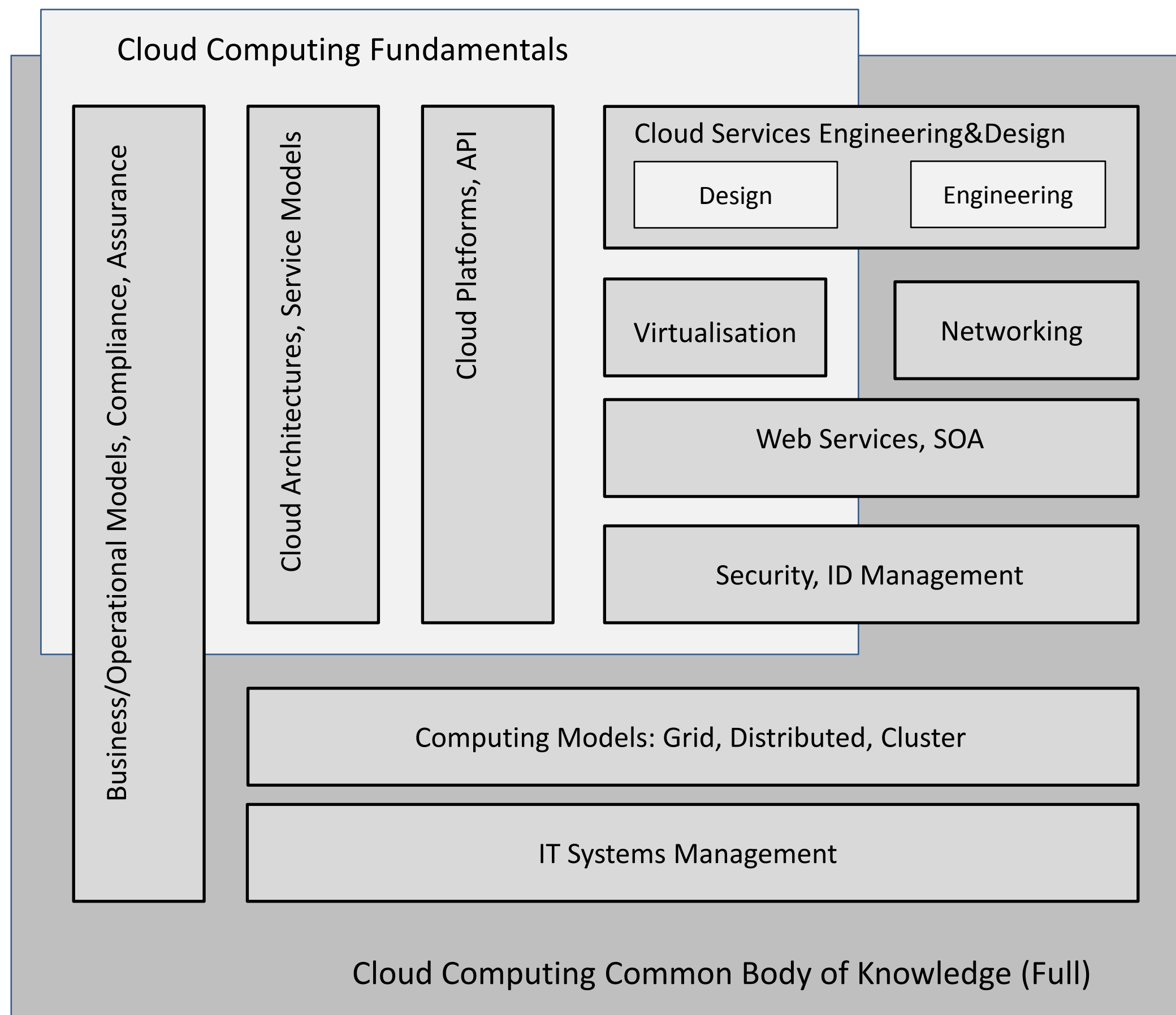


Missing Component: Education on Cloud Computing Technologies and Engineering

Yuri Demchenko, Adam Belloum, Ana Oprescu, Cees de Laat (University of Amsterdam)



Common Body of Knowledge (CBK) in Cloud Computing

CBK refers to several domains or operational categories into which Cloud Computing theory and practices breaks down

1. Cloud Computing Architectures, service and deployment models
2. Cloud Computing platforms, software/middleware and API's
3. Cloud Services Engineering, Cloud aware Services Design
4. Virtualisation technologies (Compute, Storage, Network)
5. Computer Networks, Software Defined Networks (SDN)
6. Service Computing, Web Services and Service Oriented Architecture (SOA)
7. Computing models: Grid, Distributed, Cluster Computing
8. Security Architecture and Models, Operational Security
9. IT Service Management, Business Continuity Planning (BCP)
10. Business and Operational Models, Compliance, Assurance, Certification

Professional Education in Cloud Computing - Principles

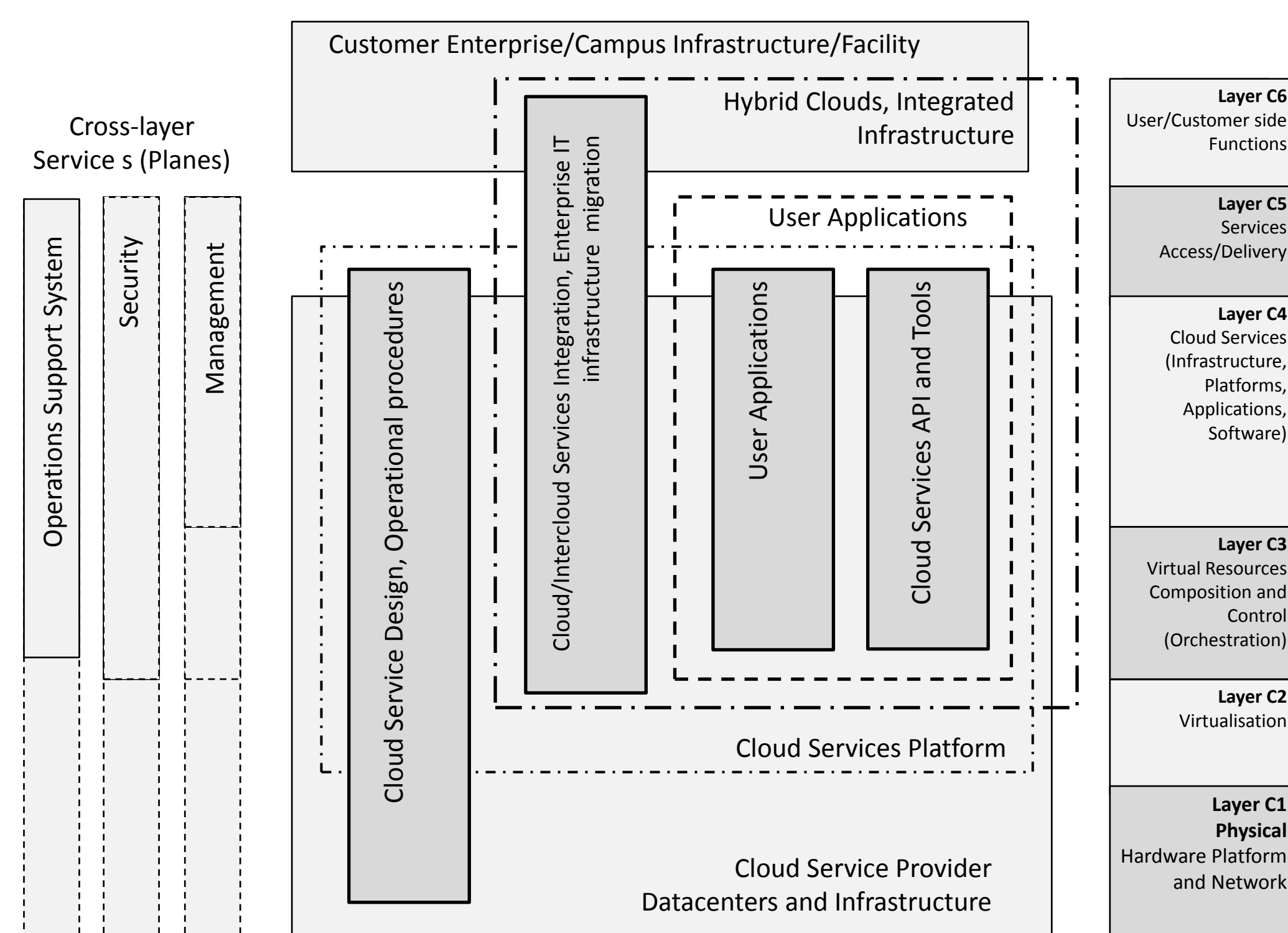
- Provide knowledge both in **Cloud Computing** as a new technology and **background technologies**
- Empower the future professionals with ability to **develop new knowledge** and build stronger expertise, prepare basis for new **emerging technologies** such as **Big Data**
- **Bloom's Taxonomy** as a basis for defining learning targets and modules outcome
 - Provides a basis for knowledge testing and certification
- **Andragogy vs Pedagogy** as instructional methodology for professional education and training
 - Course format: On-campus education and training, online courses, self-study

Cloud Computing Course Structure

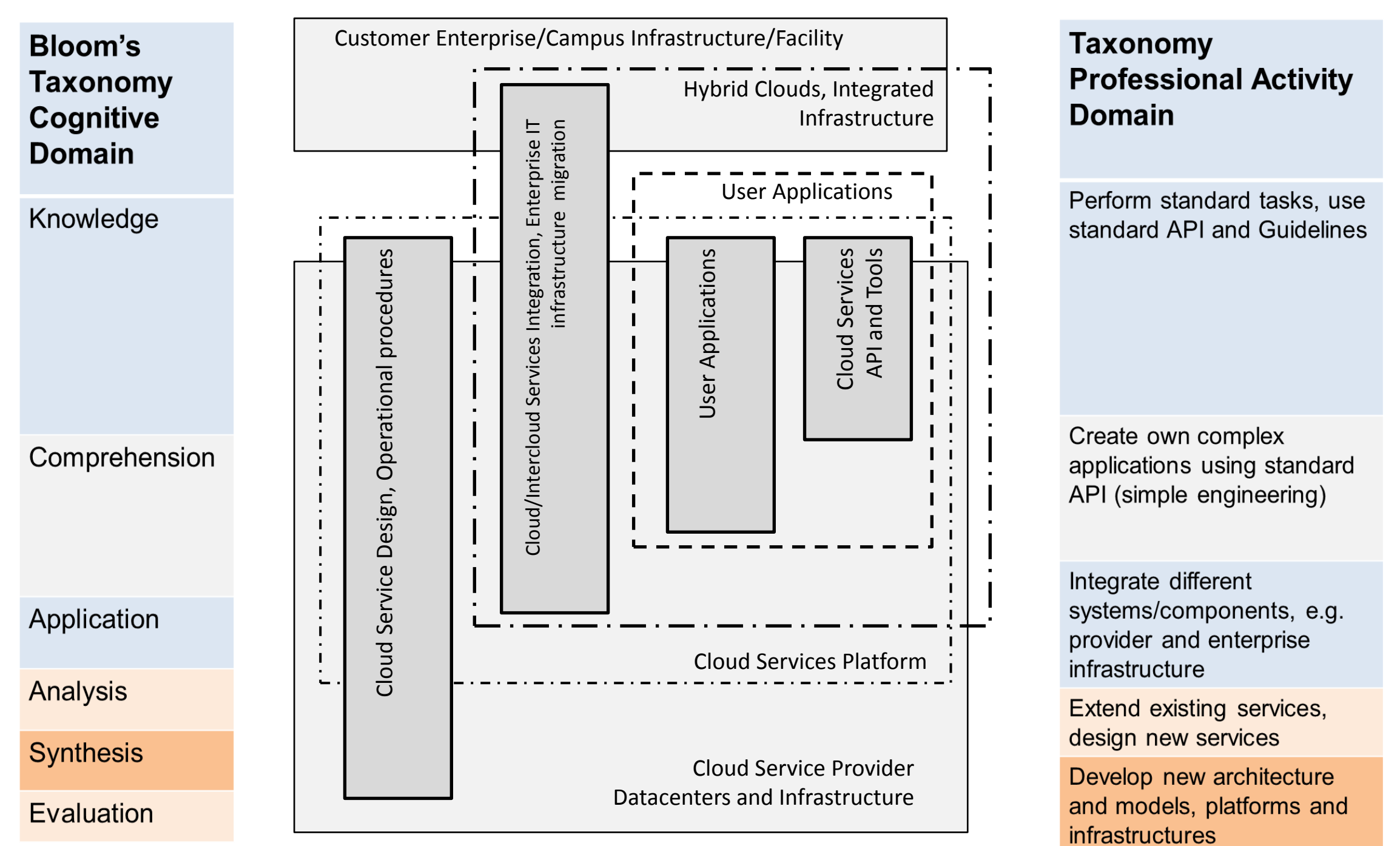
- Part 1.1. Cloud Computing definition and general usecases
 Part 1.2. Cloud Computing and enabling technologies
 Part 2.1. Cloud Architecture models and industry standardisation: Architectures
 Part 2.2. Cloud Architecture models and industry standardisation: Standard interfaces
 Part 3.1. Major cloud provider platforms
 Part 3.2. Major cloud provider platforms: Research and Community Clouds
 Part 4. Cloud middleware platforms (architecture, API, usage examples)
 Part 5.1. Cloud Infrastructure as a Service (IaaS): Architecture, platform and providers
 Part 5.2. Cloud Infrastructure as a Service (IaaS): IaaS services design and management
 Part 6.1. Cloud Platform as a Service (PaaS): Architecture, platform and providers
 Part 6.2. Cloud Platform as a Service (PaaS): PaaS services design and management
 Part 7.1. Security issues and practices in clouds
 Part 7.2. Security services design in clouds; security models and Identity management
 Part 8 (Advanced). InterCloud Architecture Framework (ICAF) for Interoperability and Integration: Architecture definition and design patterns

Basic profile and [Advanced profile](#)

Course Components in Relation to Cloud Services Model [1]



Course Components in Relation to Bloom's Taxonomy [3]



Professional level of knowledge includes:

- Knowing basic concepts and major application areas
- Knowing similar concepts (and concepts inter-relation) and alternatives, as well as application specific areas
- Knowing basic technologies and their relation to basic concepts
- Knowing authoritative sources of information and how to evaluate quality of information
- Ability to work with standards, beneficially contribution to standardisation
- Ability to critically evaluate and filter inconsistent information, e.g. news, blogs etc.
- Critically evaluate vendors' information that sometimes doesn't provide enough background information
- Practical development and experience with few projects, writing reports, technical documents

Related links

- [1] Demchenko Yu., et al. Intercloud Architecture for Interoperability and Integration. The 2nd NetCloud2012 Workshop on Network Infrastructure Services as part of Cloud Computing, in Proc. The 4th IEEE Conf. on Cloud Computing Technologies and Science (CloudCom2012), 3 - 6 December 2012, Taipei, Taiwan.
- [2] Intercloud Architecture Framework for Interoperability and Integration, Draft version 0.6, 15 Feb 2013. SNE Tech Report. <http://staff.science.uva.nl/~demch/worksinprogress/sne2012-techreport-12-05-intercloud-architecture-draft06.pdf>
- [3] Bloom's Digital Taxonomy. <http://edorigami.wikispaces.com/Bloom's+Digital+Taxonomy>
- [4] Pew S., Andragogy and Pedagogy as Foundational Theory for Student Motivation in Higher Education. <http://www.eric.ed.gov/PDFS/EJ864274.pdf>

Contributing Projects

GEYSERS – Generalised Architecture for Infrastructure services - <http://www.geysers.eu/>
 GEANT3 JRA3 Task 3 – Composable services (GEMBus) - <http://www.geant.net/>

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