Collaborative perspective on Service Science in HORIZON 2020 programs

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Summary

- HORIZON 2020 – The program
- Motivation
- A knowledge model for Service Science – requirements definition
- Ontological perspective on Service Science
- Implementation
- Final remarks

HORIZON 2020 – The program

ICT 2015 - Information and Communications Technologies (../calls/h2020-ict-2015.html)

H2020-ICT-2015
Opening Date 15-10-2014

Publication date 23-07-2014

Deadline Date 14-04-2015 17:00:00 (Brussels local time)

Total Call Budget €561,000,000

Main Pillar Industrial Leadership

Status Open

Topic: Technologies for better human learning and teaching ICT-20-2015

HORIZON 2020 – The program

Specific Challenge: The development and integration of robust and fit-for-purpose digital technologies for learning are crucial to boost the market for and innovation in educational technologies. This requires an industry-led approach in close cooperation with academia to defining the frameworks and interoperability requirements for the building blocks of a digital ecosystem for learning (including informal learning) that *develops and integrates tools and systems that apply e.g. adaptive learning, augmented cognition technologies, affective learning, micro-learning, game-based learning and/or virtual environments/virtual worlds to real-life learning situations*. This challenge also encourages public procurement of innovative solutions to address the needs of the digital learning ecosystem in making better use of educational cloud solutions, *mobile technology, learning analytics and big data*, and to facilitate the use, re-use and creation of learning material and new ways to educate and learn online.

Scope: Activities will focus on innovative technologies for learning, on the underpinning interoperability standards and on the *integration of different components into smart learning environments*. They should combine different technologies (e.g. mobile, augmented reality, natural interaction technologies) and support composing, re-using and distributing interactive educational content and services, with assessment and feedback functionalities. Based on technological advances enabled by research carried out so far, activities will support *networking, capacity building and experimentations in methodologies and tools for data-driven*, (including automated measurement of human-system interaction) non-linear *approaches to adaptive learning and remediation technologies and cognitive artifacts for effective and efficient human learning*. Gender differences in ICT-based learning attitudes should be considered.

HORIZON 2020 – The program

a. Research & Innovation actions

Research experimentations on smart learning environments providing students with *adaptive and personalized learning and assessmen*t, including through multi-modal / multi-sensory interaction technologies and advanced interfaces. Activities should facilitate networking and capacity building. *Research must be inherently multidisciplinary, building on advances on neuroscience, pedagogical and learning theories, educational psychology as well as artificial intelligence*. Application scenarios include formal and informal education, including workplace learning.

b. Research & Innovation actions

Establishing a technology platform to provide a framework and roadmap for stakeholders, led by industry in collaboration with academia, to develop innovative technologies for learning, address standards for interactive content and its adaptations into learning scenarios.

c. Innovation actions

Support to large scale pilots (in real settings) that develop and integrate innovative digital educational tools, solutions and services for learning and teaching, and supporting engagement of teachers, learners and parents. They should foster greater connection between formal, non-formal and informal learning and remove obstacles for ubiquitous learning. The pilots should link all relevant stakeholders in educational technology. As part of piloting scenarios, a specific target group to address are children and adults with mental or physical disabilities who undergo general education, lifelong learning or vocational training. Activities for the latter could include work on skills recognition/validation through smart and business intelligence applications (human-robot collaboration).

d. Public procurement of innovative devices and software

Coordinate the development of joint specifications and procuring innovative devices and software for the application of technology mediated scenarios for learning and teaching in educational settings.

HORIZON 2020 – The program

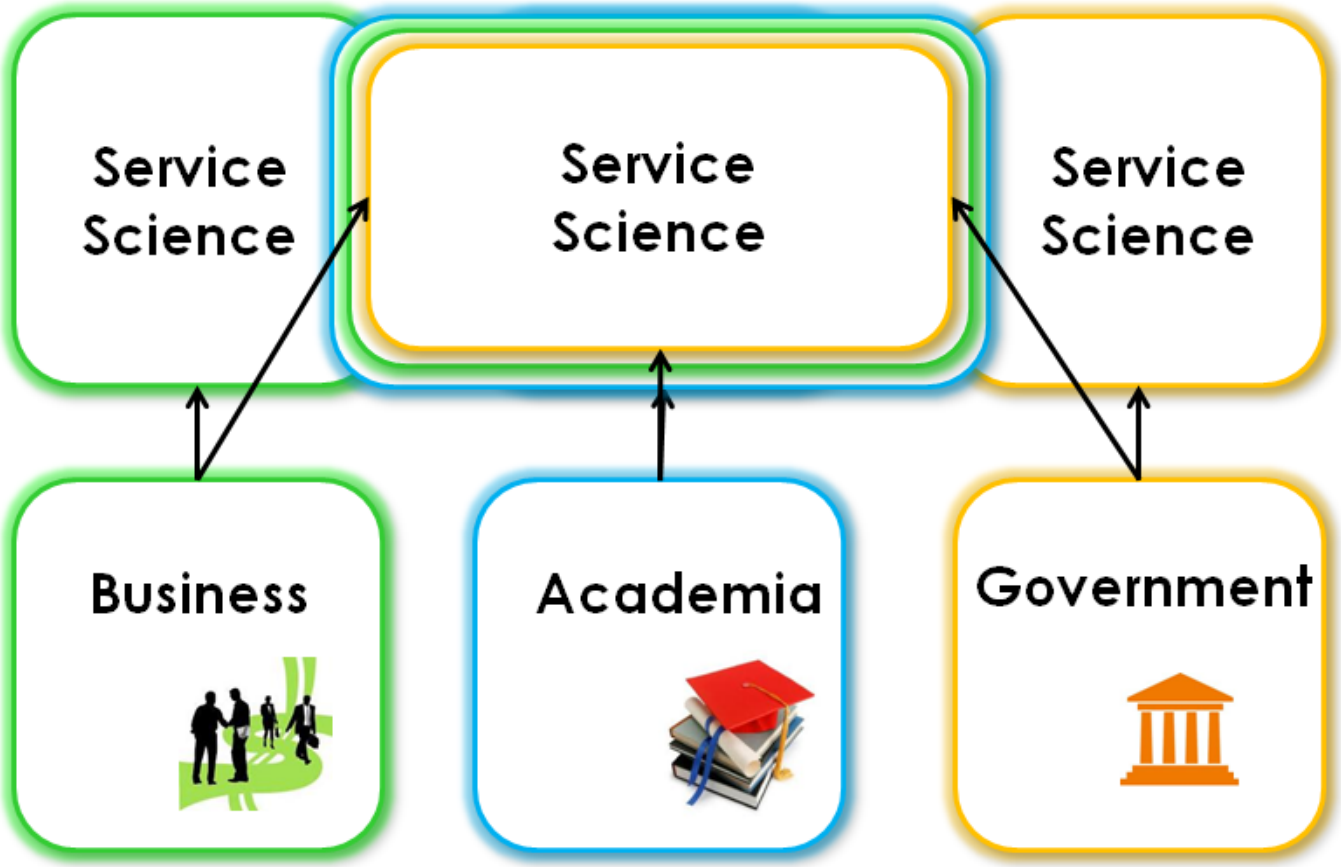
Expected impact:

· Reinforce European leadership in adaptive learning technologies for the personalisation of learning experiences. This must be measured by the number of excellence centres collaborating through specific joint research experimentations and technology transfers programs.
· Enable faster ways of testing fundamental business hypothesis (including continuous development and testing with users) and increased skills capacity. Facilitate the emergence of new innovative businesses.
· Facilitate the emergence of innovative businesses and create a digital learning ecosystem in Europe.
· Speed up the rate of adoption on technologies for the modernization of education and training.
· Contribute to the objectives of the "Opening up Education" initiative.
· Enhance the development of digital learning and teaching resources, including for children and adults with mental or physical disabilities.
· Increase the number of public-private partnerships addressing technological challenges for modernizing and improving education and training.

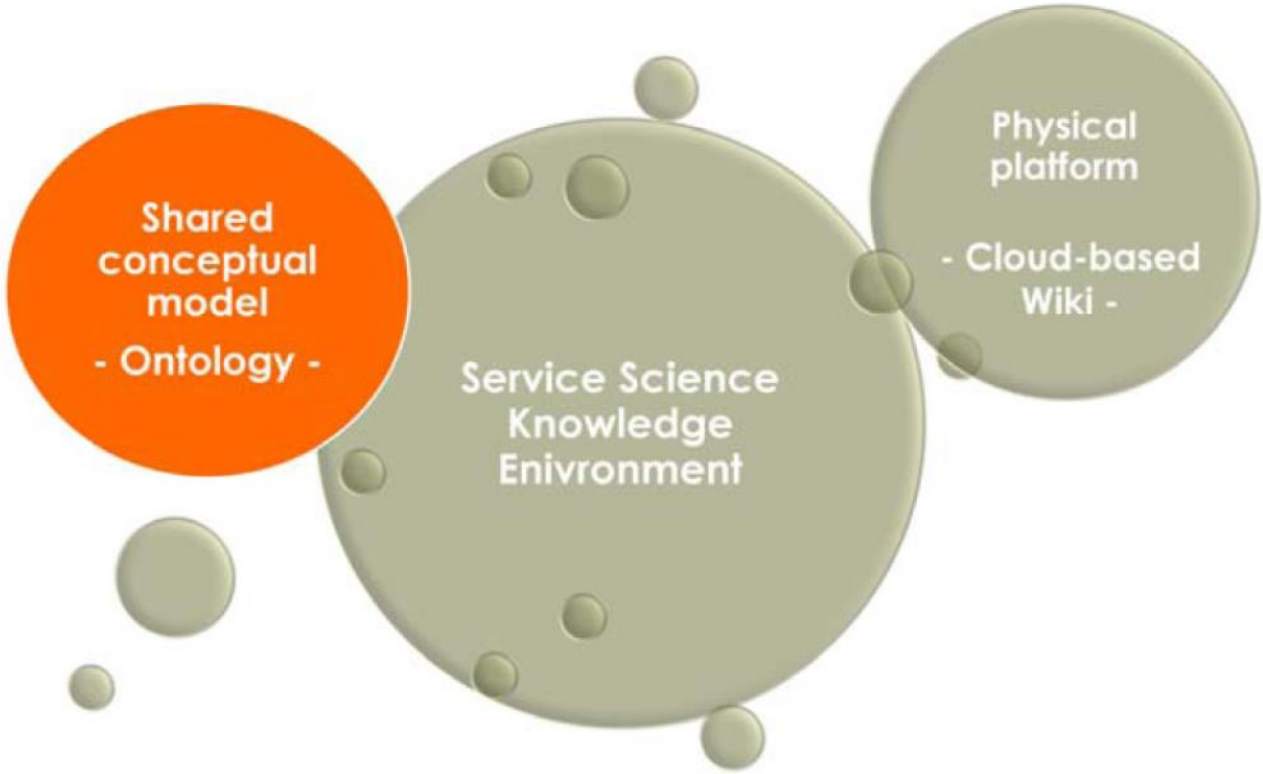
Service Science and Service Innovation

- identified need - economic development requires service innovation:
  - new skills and knowledge
  - need to train adaptive innovators, to
    - understand and marshal diverse, and increasingly global, resources to create value
    - identify and realize a continuous stream of innovation in service systems
- Information and communication technologies (ICT) enabled the creation of new services and service businesses

Stakeholders' perspective on Service Science



SSKE – Development Steps



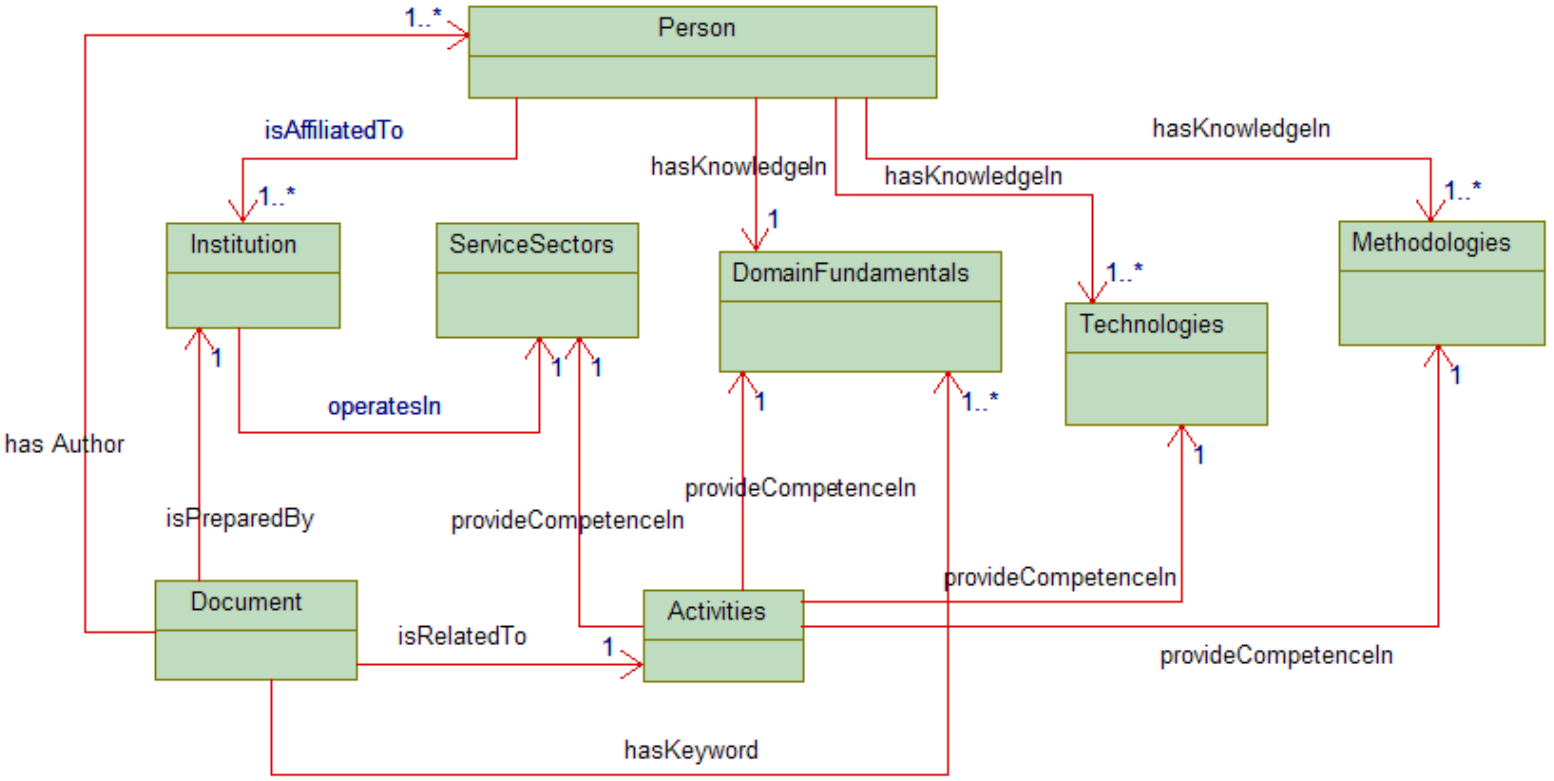
Ontological perspectives on Service Science

- focus:
  - to establish an unifying framework of service representation in different perspectives, based on the Service-Dominant Logic view
    - Fragidis, G., Tarabanis, K.: Towards an Ontological Foundation of Service Dominant Logic. In: IESS 1.1, Geneva, 2011
    - Lemey, Elisah, Poels, G.: Towards a service system ontology for service science. In: Service oriented computing, ICSOC 2011, LNCS, vol.7084, 250-264, Springer, 2011
    - Mora, M., Raisinghani, M., Gelman, O., Sicilia, M.A.: Onto-ServSys: A Service System Ontology. In: Demirkan, H., et al. (eds.) The Science of Service Systems, Service Science, pp. 151–173, Springer Science+Business Media (2011)
    - Poels, G., Van Der Vurst, G., Lemey, E.: Towards an Ontology and Modeling Approach for Service Science. In: IESS 2013. LNBIP, vol. 143, pp. 285–291. Springer, (2013)
    - …
- … but all of them refer only to specific parts of knowledge that can be related to Service Science and its supporting technologies

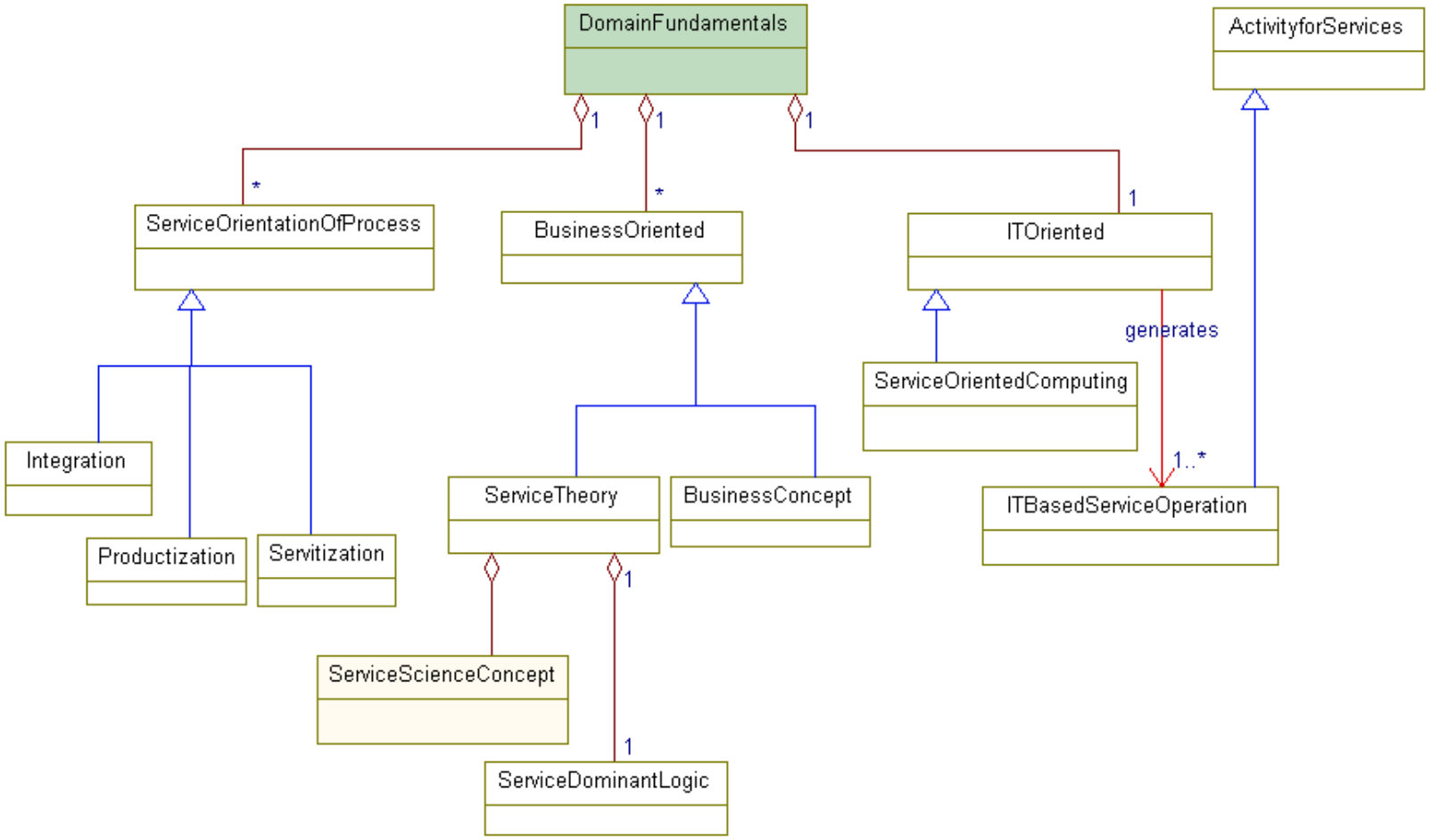
SSKE - Ontological perspective on Service Science

- a holistic view on knowledge dedicated to the Service Science multidisciplinary domain
  - Information related to the multidisciplinary sub-domains gathered under the umbrella of the broader term ”Service Science” to be classified as specific knowledge resources and
  - accessed through a dedicated knowledge base owning a specific ontology-based query formulation methodology
- *…. to be further used for managing service related knowledge*

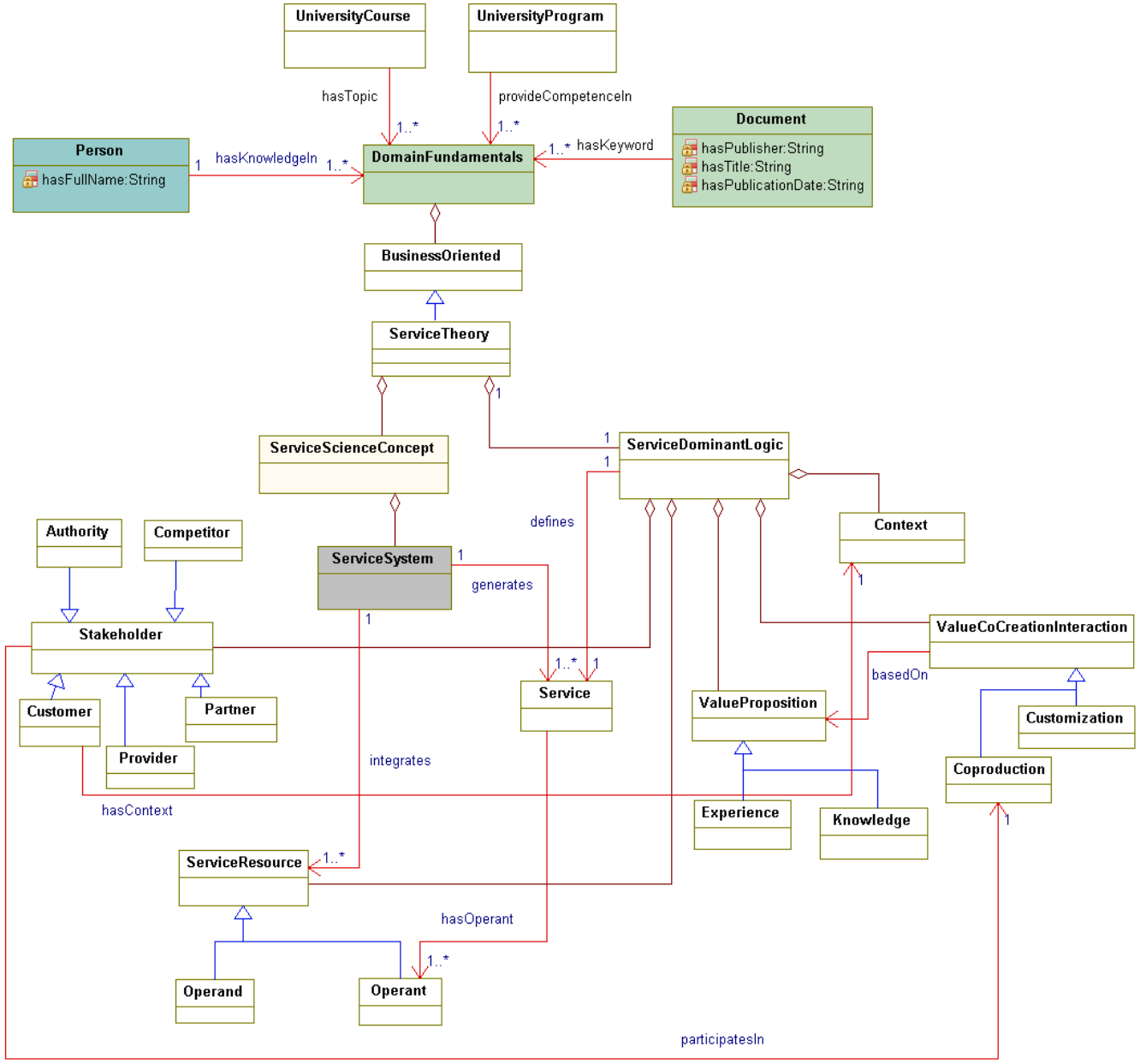
SSKE – knowledge resources (main ontology concepts / extended ontology)



Extended SSKE Ontology - Domain Fundamentals related concepts



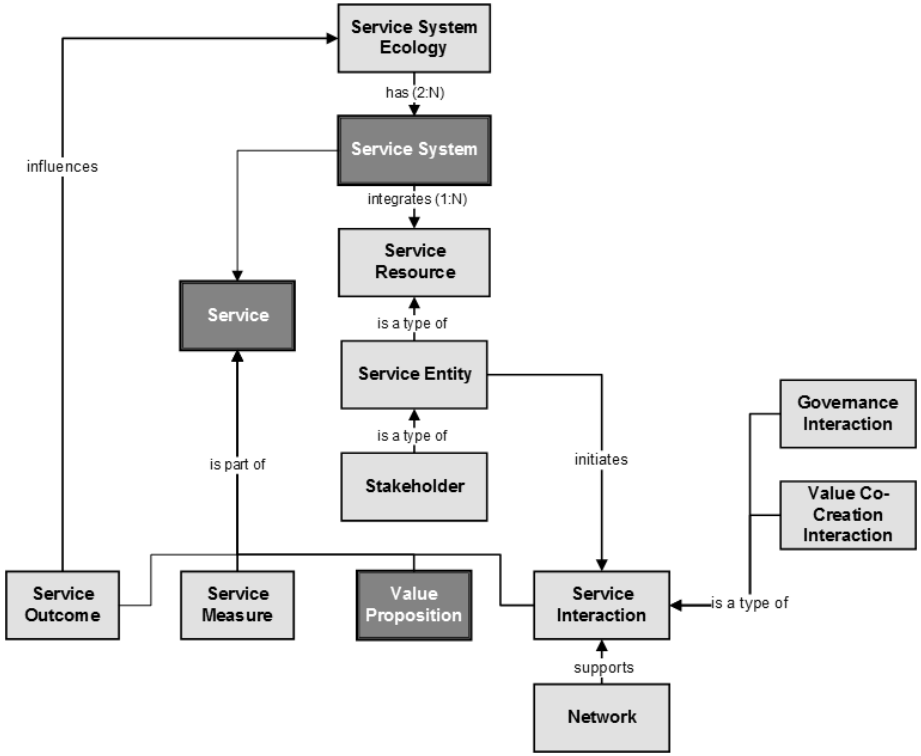
Extended SSKE Ontology - Service Science related concepts



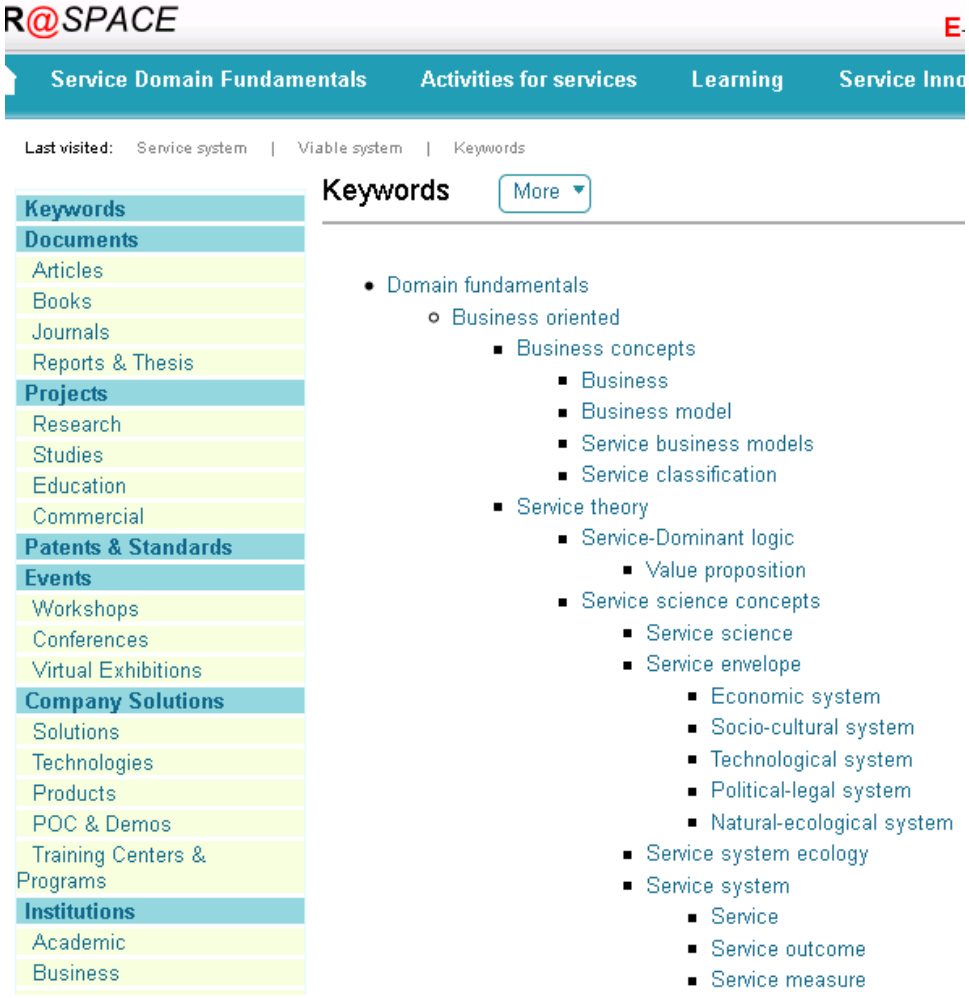
Building an extended ontology – proposed methodology

- proposing non-ambiguous relations between more specific concepts, like *Service System*, and more general ones, like *Organizational System of Systems* or *System of Systems*
- consider *Service System* from the *System of Systems* perspective that allows an adequate description of the role and place of *System Viability*

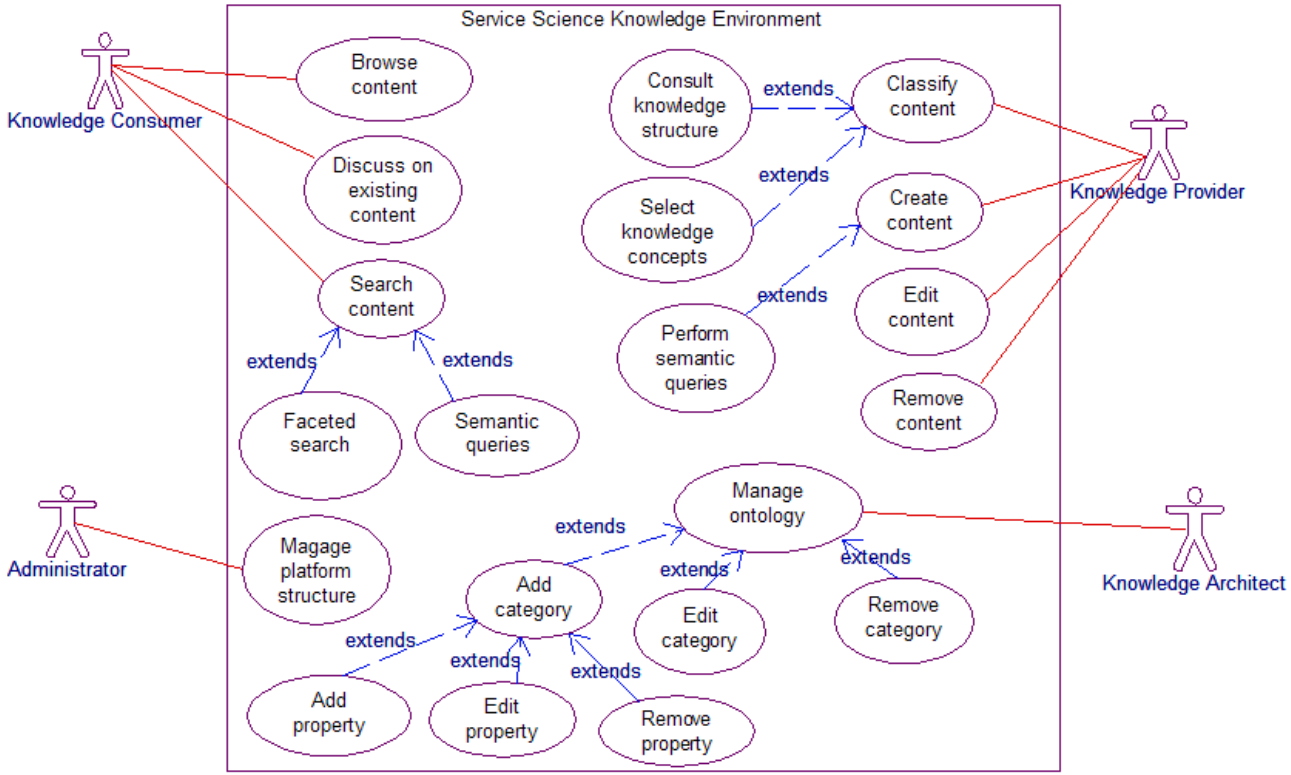
- two major steps proposed:
  - a gradually refinement of the granularity of the service system description, starting from the ten foundational concepts, on one side, and
  - the interconnection of the *Service System* description with the *Organizational System* description and *System of Systems* description, respectively



Building an extended ontology – proposed methodology (cont.) – sske.cloud.upb.ro

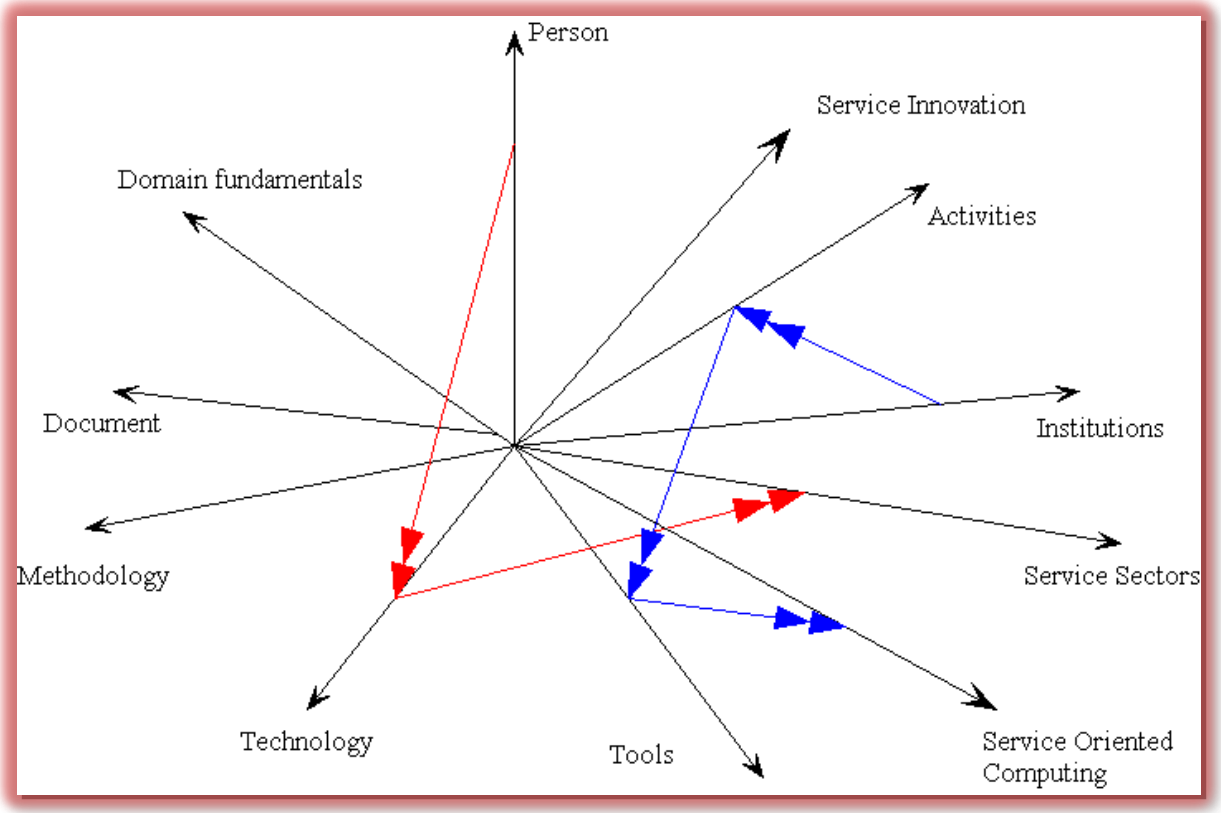


SSKE - Knowledge Oriented Collaboration for Service Science

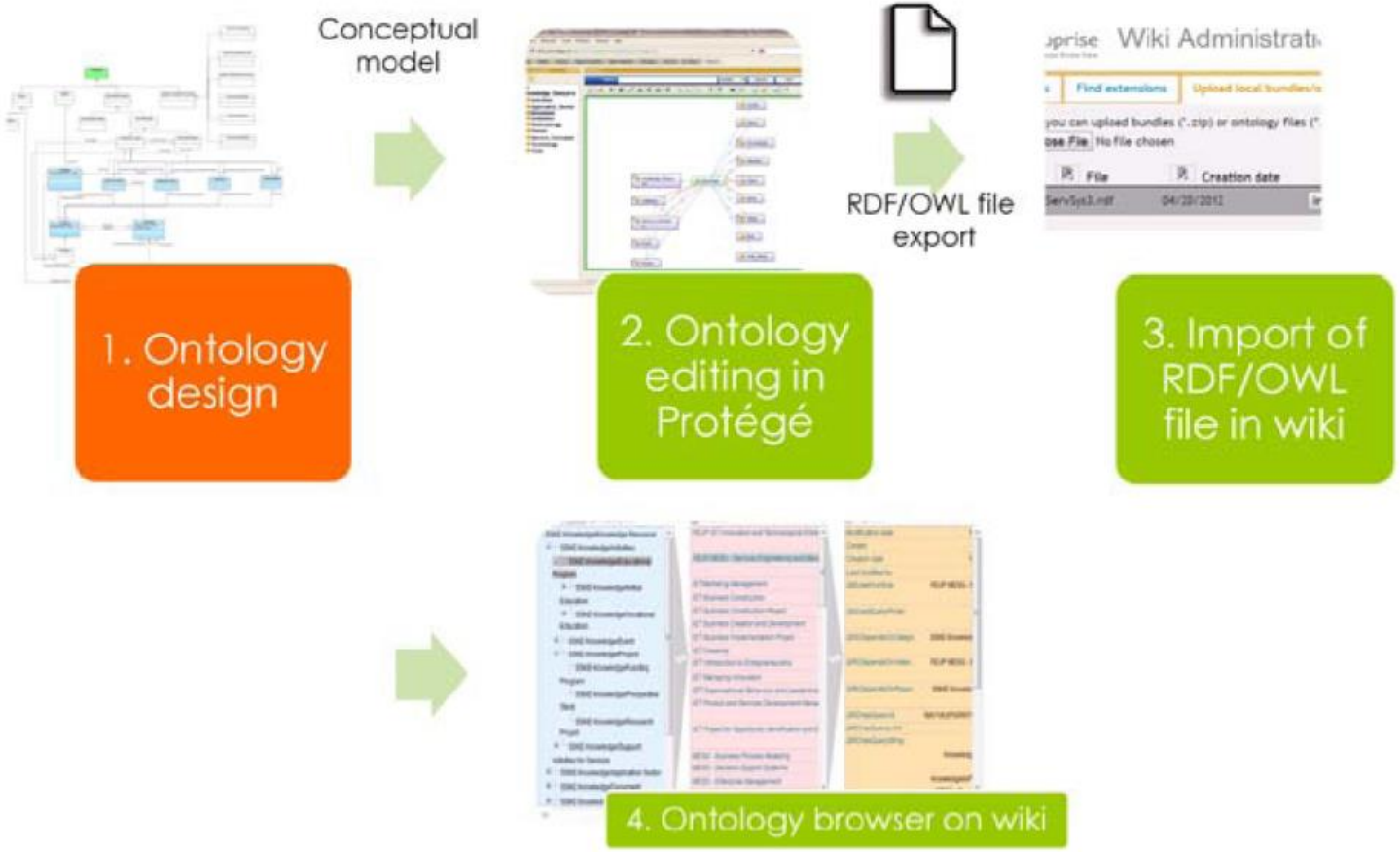


SSKE – using the knowledge model

- a tree of interrelated concepts - an ontology - based classification
- aims at the creation of a digital library to include specific knowledge on Service Science.
  - to *classify* and to manage knowledge resources

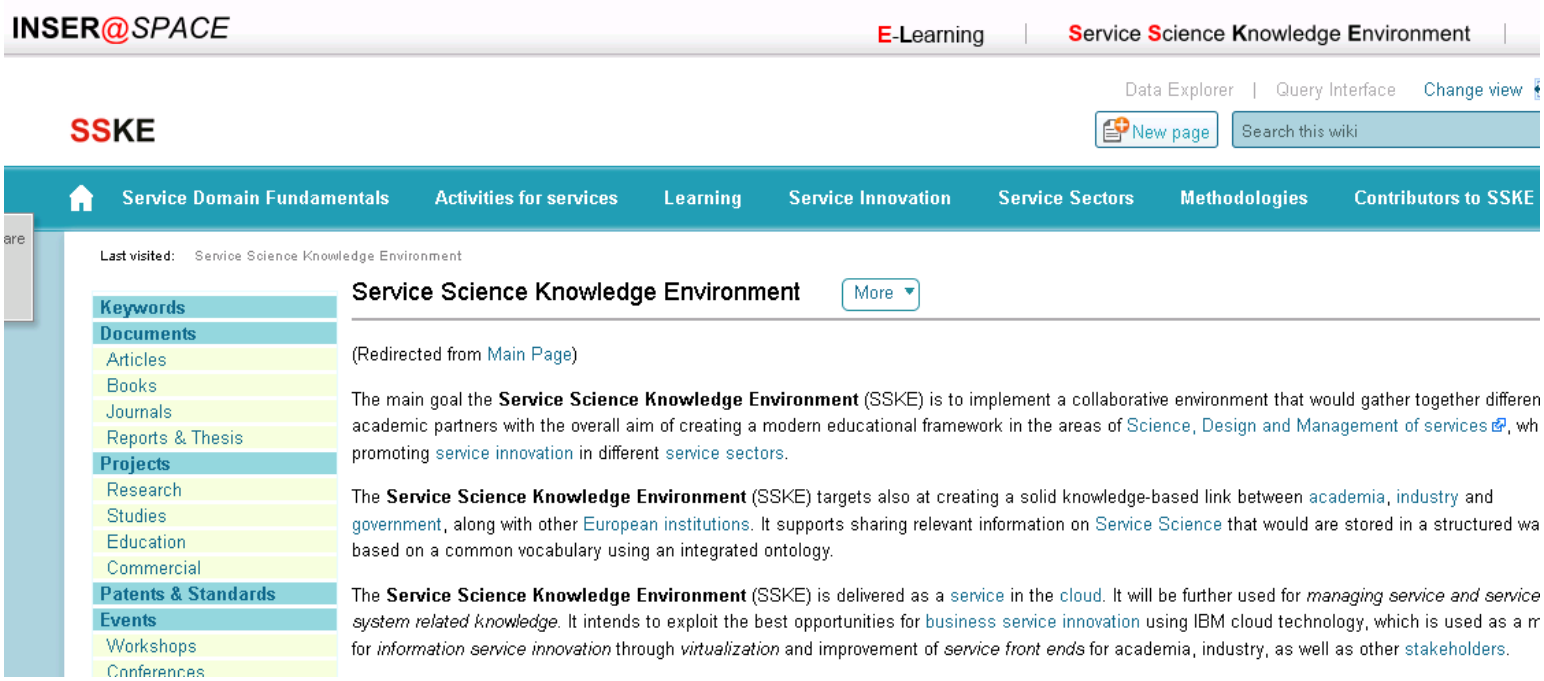


SSKE – Design (step 1)



SSKE – Deployment (step 2)

- The SS–KE is the knowledge resource sharing component of the INSER@SPACE, using cloud computing technology



Final remarks

- could the community use further the SSKE for ***managing service related knowledge***?
- is the Service Science community interested to foster ***knowledge-oriented collaboration*** on this common research and education topic?
  - is it possible to support the development of a common *reference ontology* for a group of organisations sharing the same business domain, i.e. Service Science?
    - interoperability of existing ontologies on Service Science: *merging* / *inclusion* / *mapping* ?
  - templates for contributors to the SSKE - http://sske.cloud.upb.ro/sskemw/index.php/Contributors_to_the_SSKE
- your feedback would be highly appreciated:

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Thank you!