EPFL

CS-491   **Enterprise and service-oriented architecture**

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Cursus	Sem.	Type
Computer science	MA2	Opt.
SC master EPFL	MA2, MA4	Opt.

Language of teaching	English
Credits	6
Session	Summer
Semester	Spring
Exam	Oral
Workload	180h
Weeks	14
Hours	**6 weekly**
Courses	6 weekly
Number of positions	

Summary

In this course, we teach how to define the requirements for an IT system that would best serve the needs of an organisation. The course is taught using a non-conventional style in which the students learn mostly through the stress of a series of concrete experiences that mimic real-life situations.

Content

The goal of this course is closely related to IT, but a substantial part the material is related to business, as well as philosophy and psychology. Some formal models and programming are also taught, but the course can be taken by non IT students.
The exam might be written exam (to be agreed with the students at the beginning of the semester).
Detailed contents:
1) Business Part (4 weeks): practical experimentation and theoretical understanding of the key business processes of a manufacturing company : request for quotation process, development, planning, quality management and accounting.
2) Business / IT Part (6 weeks): specification of an IT system that provides after-sales service. We teach the following techniques : interviews, root cause analysis, analysis/design of the business services and of the IT services. The underlying theory is system thinking (Weinberg, Vickers) and the ISO/IEC standard RM-ODP.
3) IT Part (2 weeks): implementation - using BPMN visual programming - of an IT system prototype. Overview of the technological aspects of service-oriented architecture (wsdl, bpel, and soap protocols; rest architecture style).
4) Enterprise Architecture & Conclusions (2 weeks): Overview of the enterprise architecture frameworks (Zachman, TOGAF, Urba-EA). Synthesis and key learning points of the course.

Keywords

Request for quotation (RFQ), quotation, purchase order, leadtime, bill of material, development process, V process, spirale process, manufacturing planning, quality system, traceability, ISO 9000, financial statements, year-end book closing, ERP,
interview, contextual inquiry, root-cause analysis, ITIL, business service, IT service, requirements engineeing, SEAM system modeling, SEAM goal-belief modeling, SEAM behavior modeling, Vickers appreciative system, behavioral refinment, information modeling,
service-oriented architecture (SOA), BPMN, BPEL, WSDL, SOAP, REST.
enterprise architecture (EA), Zachman, TOGAF, Urba-EA.
Systemic paradigm, epistemology, ontology, axiology (ethics and esthetics).

Learning Outcomes

By the end of the course, the student must be able to:

- Describe business processes (sales, engineering, manufacturing, accounting)
- Assess / Evaluate business processes using ISO9000
- Coordinate business operations (role play)
- Analyze business needs for an IT system design

- Assess / Evaluate the IT processes using ITIL
- Conduct interviews with business stakeholders
- Formalize business requirements for an IT system design
- Design BPMN / BPEL workflow

Transversal skills

- Continue to work through difficulties or initial failure to find optimal solutions.
- Use both general and domain specific IT resources and tools
- Write a scientific or technical report.
- Collect data.
- Make an oral presentation.
- Summarize an article or a technical report.

Teaching methods

Problem-based teaching

Resources

Bibliography

Beyer, H. and K. Holtzblatt (1999). "Contextual design." interactions **6**(1): 32-42.
http://dl.acm.org/citation.cfm?id=291229

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Carr, N. G. (2003). "IT Doesn't matter", Harvard Business Review
https://hbr.org/2003/05/it-doesnt-matter

OMG (2004), Introduction to BPMN
http://www.omg.org/bpmn/Documents/Introduction_to_BPMN.pdf

Regev, G., H. Olivier, et al. (2011). Service Systems and Value Modeling from an Appreciative System Perspective. Second International Conference on Exploring Services Sciences. Geneva Switzerland, Springer-Verlag New York, Ms Ingrid Cunningham, 175 Fifth Ave, New York, Ny 10010 Usa. **82:** 146-157.
http://infoscience.epfl.ch/record/163961

Regev, G. and A. Wegmann (2004). Defining Early IT System Requirements with Regulation Principles: The Lightswitch Approach. Proceedings of the 12th IEEE International Requirements Engineering Conference (REí04). Kyoto, Japan**:** 144-153.
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Regev, G. and A. Wegmann (2005). Where do Goals Come from: the Underlying Principles of Goal-Oriented Requirements Engineering. Proceedings of the 13th IEEE International Conference on Requirements Engineering, IEEE Computer Society**:** 253-362.
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ITSMF (2007). An Introductory Overeiw of ITIL v3
http://www.best-management-practice.com/gempdf/itSMF_An_Introductory_Overview_of_ITIL_V3.pdf

Wegmann, A. (2003). On the Systemic Enterprise Architecture Methodology (SEAM)**:** 483-490.
http://infoscience.epfl.ch/record/89690

Wegmann, A., A. Kotsalainen, et al. (2008). Augmenting the Zachman Enterprise Architecture Framework with a Systemic Conceptualization. Proceedings of the 2008 12th International IEEE Enterprise Distributed Object Computing Conference, IEEE Computer Society: 3-13.
http://infoscience.epfl.ch/record/126293

Zachman, J. A. (1987). "A framework for information systems architecture." IBM Syst. J. **26**(3): 276-292.
http://ieeexplore.ieee.org/xpl/articleDetails.jsp?arnumber=5387107

Tools:
Alloy **http://alloy.mit.edu/alloy/**

Intalio **http://ww.intalio.com/**

SeamCAD **htt://lams.epfl.ch/seamcad/**

Ressources en bibliothèque

- SeamCAD
- Intalio
- Declarative Specification and Alignment Verification of Services in ITIL / Rychkova
- Service Systems and Value Modeling from an Appreciative System Perspective / Regev
- Where do Goals Come from: the Underlying Principles of Goal-Oriented Requirements Engineering / Regev
- Contextual design / Beyer
- Quality Management Systems / ISO
- Introduction to BPMN / White
- An Introductory Overeiw of ITIL v3 / ITSMF
- On the Systemic Enterprise Architecture Methodology / Wegmann
- Defining Early IT System Requirements with Regulation Principles / Regev
- A Langage and Tool for relational models
- Augmenting the Zachman Enterprise Architecture Framework with a Systemic Conceptualization / Wegmann
- A framework for information systems architecture / Zachman
- Alloy