

**Reference:** TF-Var

**Topic:** Evaluation of Methods from Variability Management and Software Quality Assurance

Course-Type: Seminar, Bac-Thesis, Master-Thesis

Start: As soon as possible

End: To be defined

Contact: Kristof Meixner (kristof.meixner@tuwien.ac.at)  
 Dietmar Winkler (dietmar.winkler@tuwien.ac.at)  
 Stefan Biffl (stefan.biffl@tuwien.ac.at)

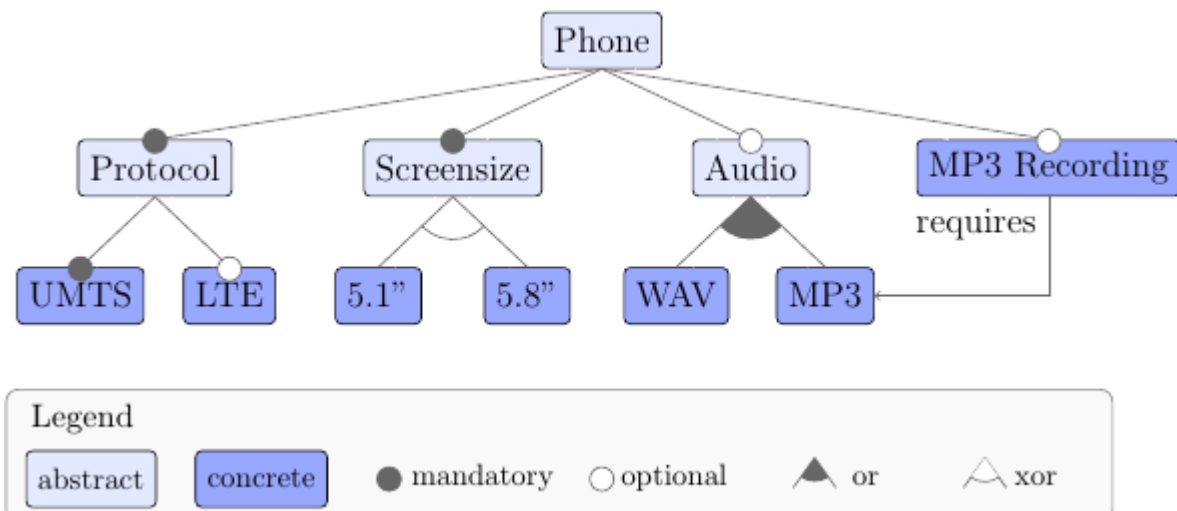
### Background:

Information Systems (IS) more and more shift from monolithic to service-oriented, or even micro-service oriented, architectures. In such systems, many times sub-systems, e.g., features represent the building blocks for user-centric functionality, which are a source for variability. For example, applications like Runtastic, depending on your subscription, can turn on or off optional features dynamically.

Handling the variability of such systems is a research field that is of growing interest in recent years [1]. Several approaches for Variability Modeling and Management exist today. E.g., the figure below shows a model of the functionality of a cell phone.

However, Cyber-physical (Production) Systems, which combine modern communication and computation technologies with smart physical devices building ubiquitous environments, introduce additional complexity to Variability Modeling due to their heterogeneous nature [2]. E.g., in CP(P)S the variability of products, the processes manufacturing these products and resources, like robots, used in these processes, needs to be modeled.

In the context of a conceptualization and development of a method for modeling the often heterogeneous variability in CP(P)S this topic aims at the development of a concept and implementation of a prototype for a product configurator.



### **Tasks (depending on type of seminar/thesis):**

- Identification and evaluation of literature and methods from variability management and modeling
- Identification and evaluation of literature and methods from Cyber Physical Production Systems
- Implementation of prototypes
- Evaluation of concepts and prototypes

### **Expertise:**

For this topic a set of skills is recommended.

- Good skills in English (mandatory)
- Good programming skills
- Interested in Variability Modeling
- Interested in Cyber Physical (Production) Systems

[1] Bosch, J. (2013). Software Product Line Engineering. In R. Capilla, J. Bosch, & K.-C. Kang (Eds.), *Systems and Software Variability Management SE - 1* (pp. 3–24). Springer Berlin Heidelberg.

[2] Krüger, J., Nielebock, S., Krieter, S., Diedrich, C., Leich, T., Saake, G., ... Ortmeier, F. (2017). Beyond Software Product Lines: Variability Modeling in Cyber-Physical Systems. In *Proceedings of the 21st International Systems and Software Product Line Conference*