Deconstructing the Refactoring Process from a Problem-Solving and Decision-Making Perspective

Thorsten Haendler (WU Vienna) and Josef Frysak (JKU Linz)

Motivation
Context and Problem:
- deficiencies in software design and architecture can severely impede software development or maintenance progress
- but, software refactoring is still a neglected part of software engineering in practice, attributed to several barriers that prevent software engineers from refactoring, see, e.g., (Tempero et al., 2017)

Objective:
- develop a decision-making process model for software refactoring to help better understand the difficulties (barriers) in the refactoring process

Process Models and Phases

Fig. 1: Mapping decision-making process models (top) (Simon, 1977; Beach and Mitchell, 1978; Te’eni and Ginzberg, 1991; Simon, 1997) to refactoring process models (bottom) (Kitchenham et al., 1999; Leppänen et al., 2015).

Fig. 2: Proposed refactoring process model as result of the applied analysis. The model integrates the decision-making sub-processes for primary decision problems in refactoring: whether (and when) to refactor? (top), what to refactor? (center), and how to refactor? (bottom). Each sub-process is ordered by key phases (horizontal) and by the organizational level of decision makers and context (vertical).

Result: Process Model for Decision-Making in Software Refactoring

Allocating Refactoring Barriers and Enablers

Tab. 2: Exemplary allocation of barriers identified by (Tempero et al., 2017) and of several refactoring decision-support techniques (enablers) to steps in the process model in Fig. 2.

Discussion
The applied theoretical perspective allows for structuring the refactoring process into phases of decision-making for selected primary decision problems on different hierarchical levels

Limitations:
- focus on 3 selected primary decision problems with sub-processes
- reflected refactoring barriers by (Tempero et al., 2017) only
- included tools/techniques from software engineering domain only

Conclusion
The resulting process model for decision-making in refactoring allows for allocating refactoring barriers and enablers to process steps, which may contribute to support in better understanding the refactoring difficulties

Future Work:
- survey with software developers and managers in order to evaluate and refine the proposed process model
- investigation of how decision-support techniques, also from other domains, can be combined