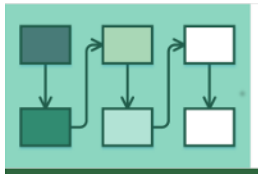

PLEASE2015

5th International Workshop on Product LinE Approaches In Software Engineering (PLEASE 2015), May 19, 2015, Florence, Italy
held in conjunctin with the 37th International Conference on Software Engineering (ICSE 2015)

Robots and their variability – A societal challenge and a potential solution

Thomas Buchmann, Johannes Baumgartl,
Dominik Henrich and Bernhard Westfechtel

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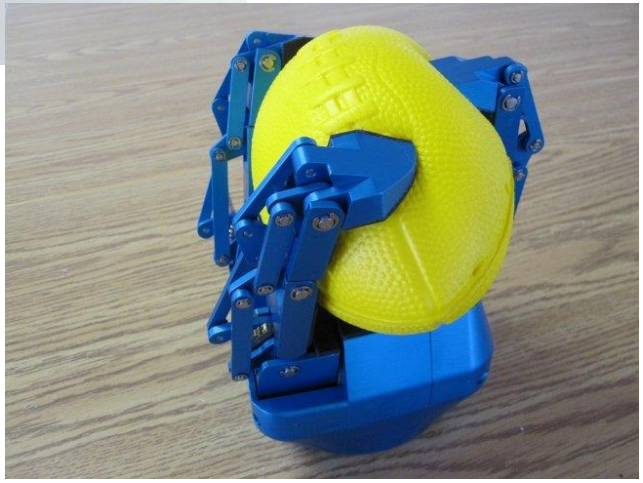
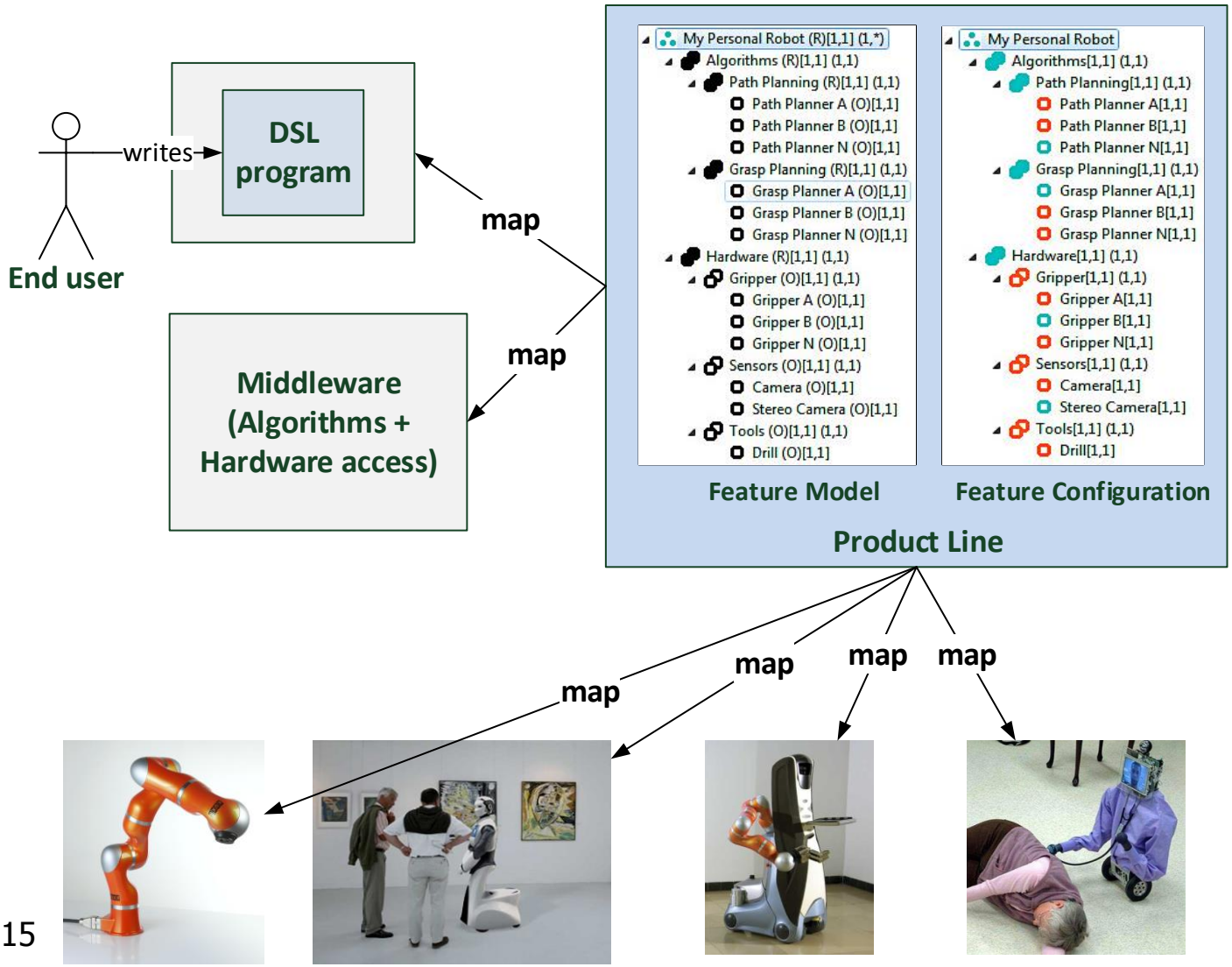
Motivation

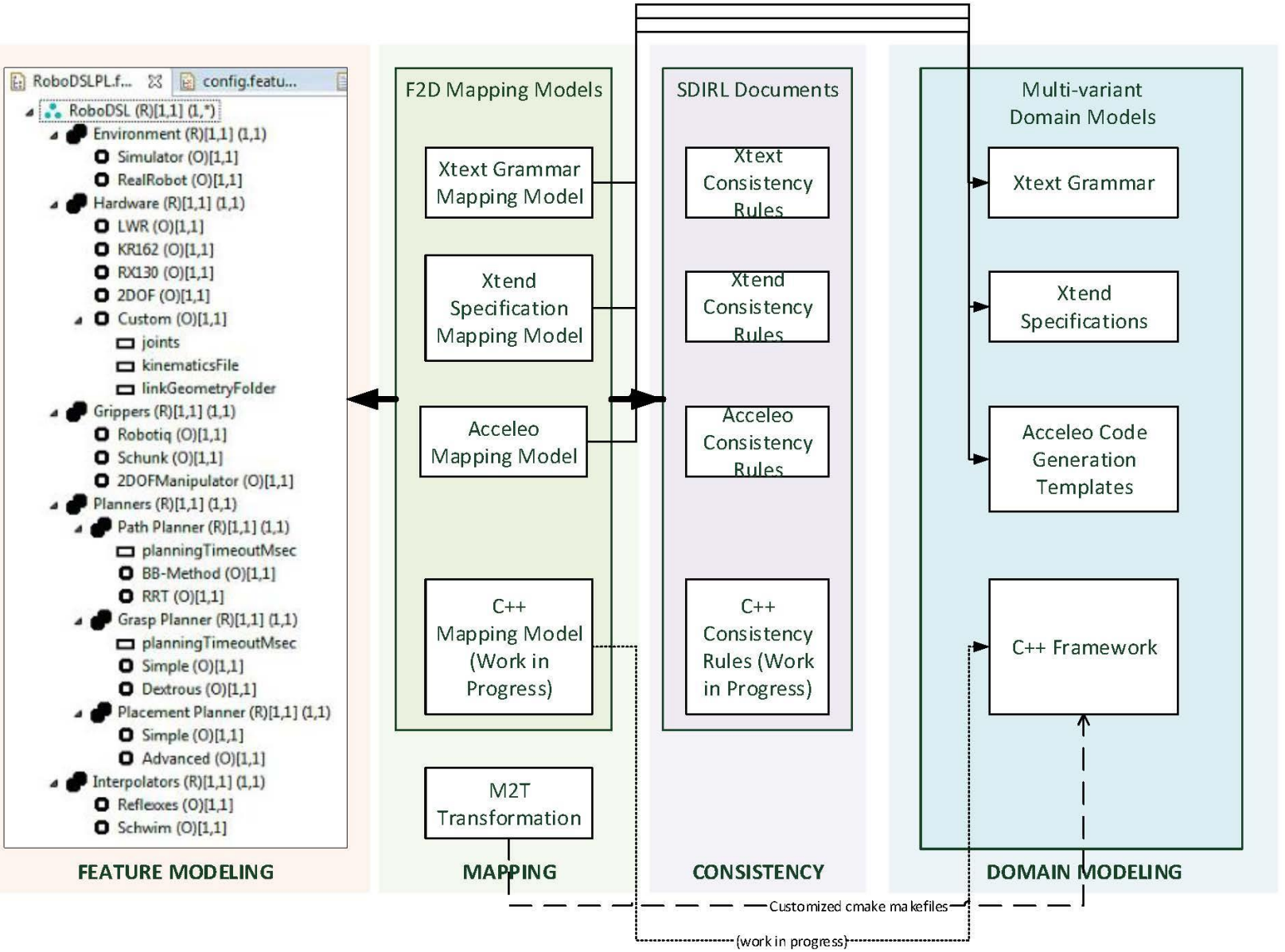
Motivation



Our approach



Conceptual Overview



Example

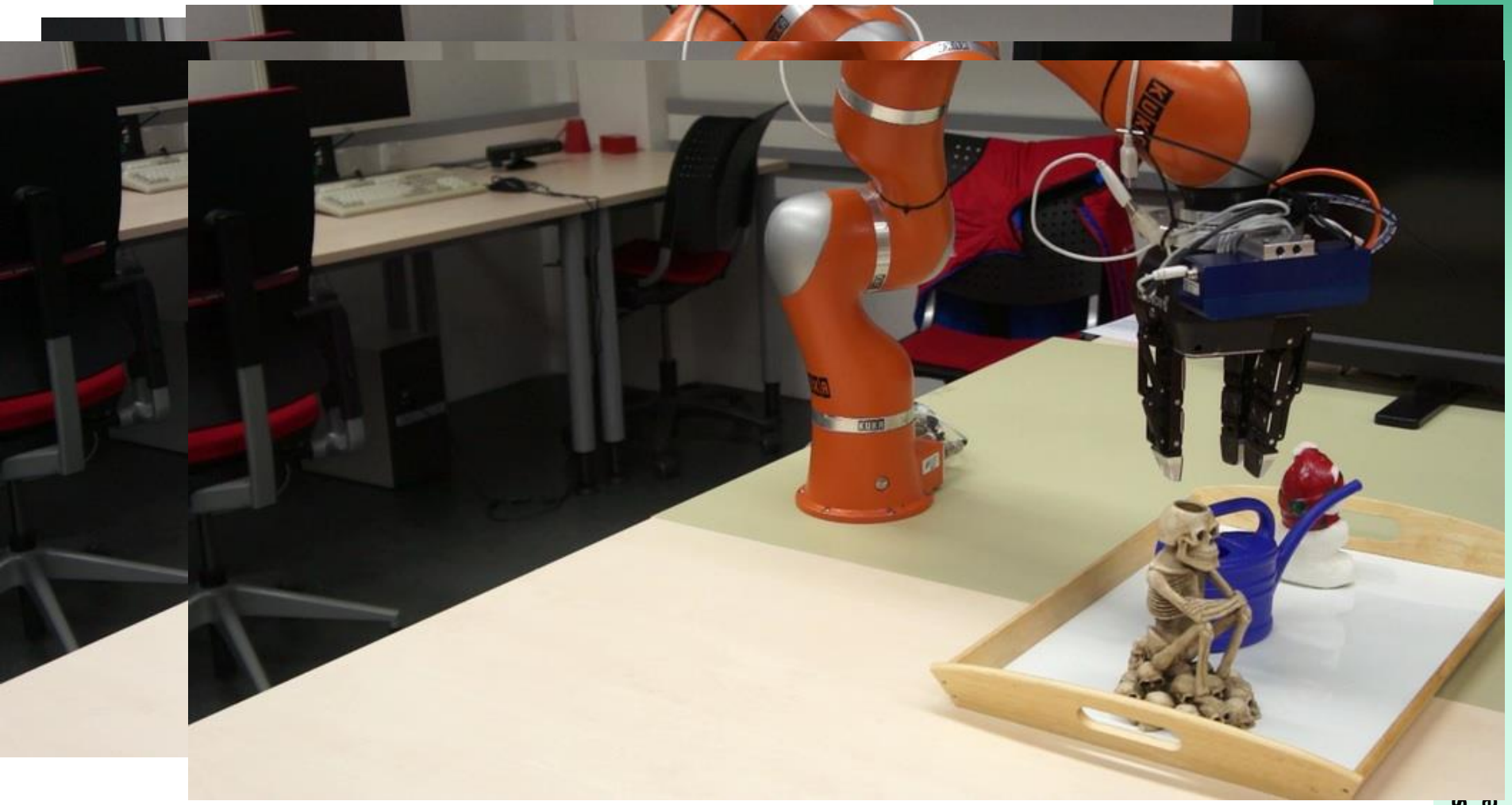
- Hardware Configuration
  - Small industrial robot
  - Multi degree of freedom gripper
  - Depth camera

- Environment
  - Two sensing volumes
    - Robot's workspace
    - Robot itself

Example

- Task:
  - Pick all objects detected inside the first sensing volume and place them on the tray located in the second one
- Challenging Problems:
  - Objects must be reconstructed using the physical depth sensor
  - Plan a feasible task-constrained grasp for every reconstructed object and the corresponding placement pose
  - Plan a collision-free path in-between the grasp and the placement pose

Example



Example

```
1  program LWRSim
2
3  declare RED = color (255,0,0)
4
5  declare environment = object  {
13
14 declare tablet = object {
23
24 declare R1Home = joints  {
27
28 declare Robot1 = robot {
33
34 declare EnsensOffsetObj = sensor {
44
45
46 declare EnsensOffsetPlace = sensor {
56
57
58 EnsensOffsetObj.perceive()
59
60 var objs = EnsensOffsetObj.reconstruct()
61
62 foreach (o in objs) {
63         EnsensOffsetPlace.perceive()
64         Robot1.pnp(o, tablet)
65         EnsensOffsetPlace.clear()
66 }
67
68 EnsensOffsetObj.clear()
```

Questions?

- Thank you for your attention!