TOWARDS GRAPHICAL CONFIGURATION INSIDE THE INTO-CPS APPLICATION

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AGENDA

• Background
• Contribution and Demo
• Future Work
• Questions
BACKGROUND – MOTIVATION

System Engineering Course

Powerful tooling

Frustrating User interface
BACKGROUND – CONNECTIONS INSIDE APPLICATION

- Gets the job done
- Limited overview
- Find un-connected port?
BACKGROUND – SYSML PROFILE

Better overview

Familiar experience

Ease of use?

External
BACKGROUND – OTHER TOOLS

20Sim, OMEDIT, Simulink ...

Integrated block-based design

Key difference to SysML profile?
CONTRIBUTION – GRAPHICAL EDITOR

- Integrated Block-based editor
- Faster development loop
- User assistance
- Future proof
CONTRIBUTION – GRAPHICAL EDITOR

Project explorer

Canvas

Library
GRAPHICAL EDITOR – PROJECT EXPLORER

Abstract representation of system

Overview of hierarchy

Also shows artefacts not “drawable” on canvas
GRAPHICAL EDITOR – CANVAS

Drag connections

Double click to configure

Context menu
GRAPHICAL EDITOR – PARAMETERS

Configuration of system

Instance specific vs shared

Cooping with large number of parameters
GRAPHICAL EDITOR – LIBRARY

Drag and Drop

Categories?

Potential sources?
EXCHANGE FORMAT – LOOKING FORWARD

Why is this relevant?

Current format

Future format
EXCHANGE FORMAT – CURRENT FORMAT

Simple JSON format

No geometry, shared parameters, hierarchy ...

Requires drilling into the FMU archives

```
{"fmus": {
    "{WaterTank}": "singlewatertank-20sim.fmu",
    "{Controller}": "watertankController-Standalone.fmu"
},
"connections": {
    "{WaterTank}.wt.level": [
        "{Controller}.cont.level"
    ],
    "{Controller}.cont.valve": [
        "{WaterTank}.wt.valvecontrol"
    ]
},
"parameters": {
    "{Controller}.cont.maxlevel": 2,
    "{Controller}.cont.minlevel": 1
  }
}"
```
EXCHANGE FORMAT – FUTURE

System Structure And Parameterization (SSP)

FMI and SSP

What is an component?

Extension Mechanisms

```plaintext
---singleTank.ssp
  SystemStructure.ssd : default multi model
  VarA.ssd : alternative multi model
  ParameterSet.ssv : set of parameters
  ParameterMappings.ssm : binding params to instances
  SignalDictionary.ssb : mechanism to group signals

---documentation
  index.html

---extra : extra files extension mechanism

---resources : implementations of components
  WaterTank.fmu
  Controller.fmu
  subsystem.ssp : potential subsystem
```
FUTURE WORK

Integration into application(s)

Exchange Format

Adaptations

Hierarchy
FUTURE WORK – SEMANTIC ADAPTATION

- Fix mismatches
- Wrapper
- DSL vs graphical?
FUTURE WORK – HIERARCHY

Complexity Reduction

Relation to adaptations
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System Structure and Parameterization