Applying TDD for Creating DSM solutions: demo

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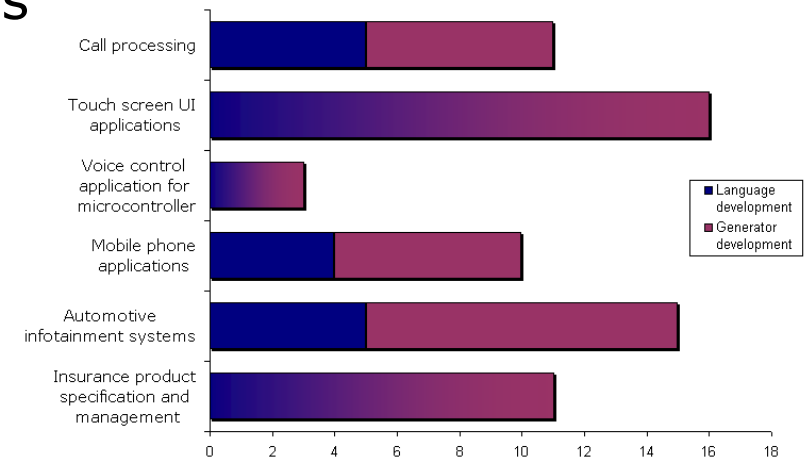
Motivation

- Better ensure that DSM solution (= language and generator) works as expected
  - When created
  - When modified while the domain evolves
- Our special focus is on generators as their development takes more time than languages
- Various approaches have been presented to test languages and generators
  - We present one considered cost-effective



Idea

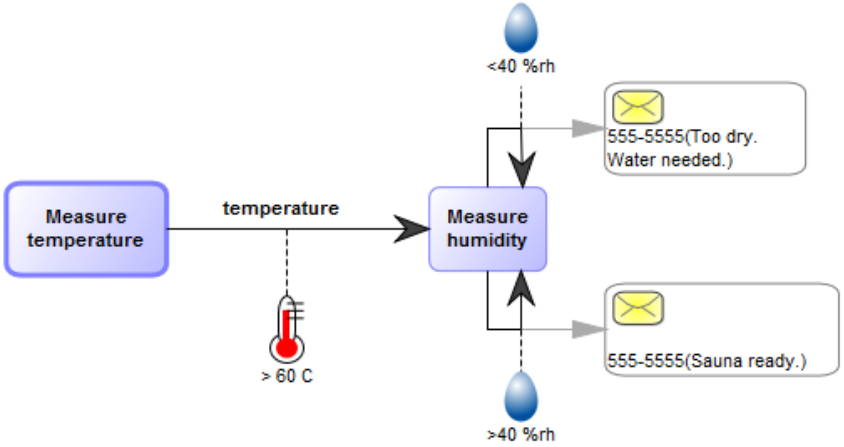
- Apply TDD for DSM creation and maintenance as follows:
  1. Create a library of small test models along with related output (in a format preferred)
  2. Build the DSM solution in small steps starting from the simplest test model of the library and then extend to others

     Step = language element(s) + its test model + its generator + expected output
  3. Test DSM solution after each step of adding/removing/changing metamodel or generator
  4. Run all previous tests for regression testing
  5. Automate the process

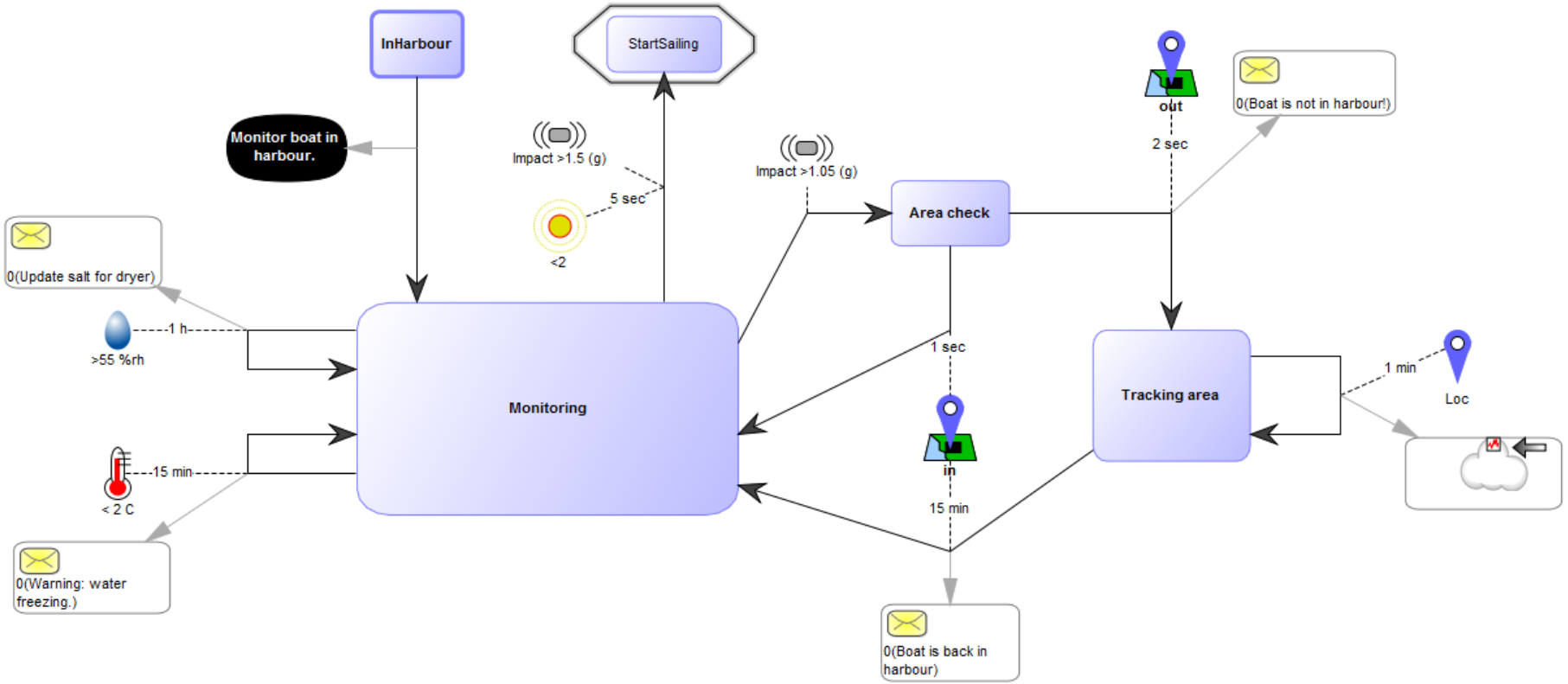
Domain for demo: Apps for IoT device

- Sensors
  - altitude, movement (in 3 directions), humidity, location, luminance, pressure, speed, temperature, time, geofence, battery status…)
- Actions
  - sending SMS, send to cloud, push notification, saving logs

Sample: Sauna App

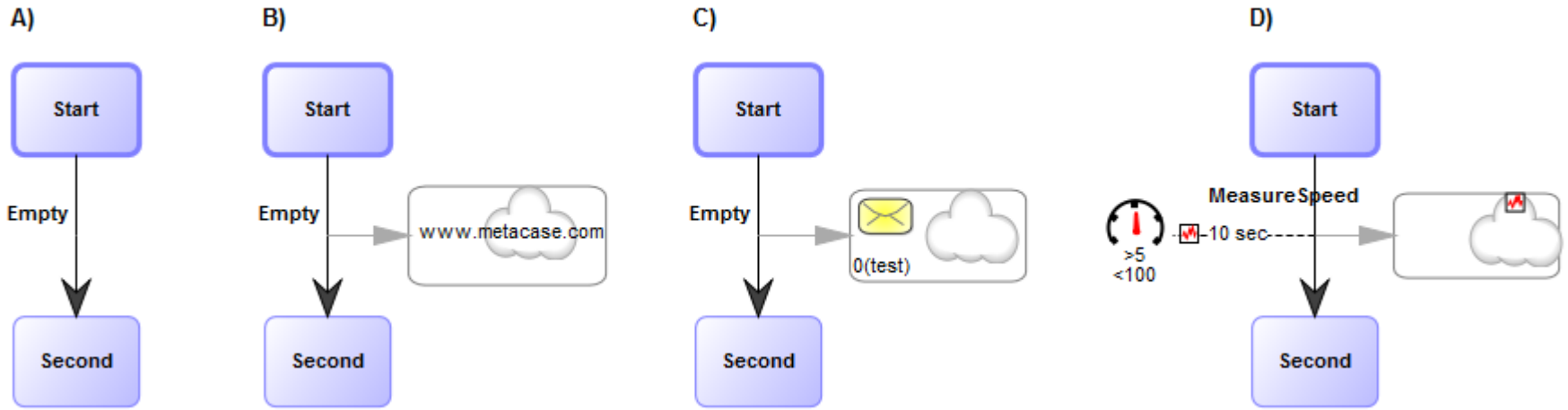


Sample 2: Boat monitor



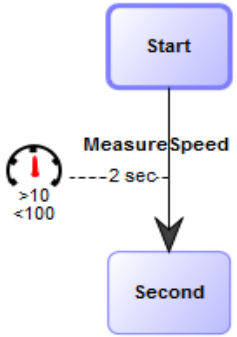
Some test models to start with

- 4 out of 37 in total



Test model and expected code

- Model with 3 elements and 1 connection => 50+ LOC
- Automated test checking that generated = expected
- Test individual tests or all tests from the library




```
{
  "pId": "1",
  "apiVersion": "00.18",
  "initPuId": 1,
  "purposes": [
    {
      "puId": 1,
      "name": "02 OneTrigger",
      "initStId": 0,
      "states": [
        {
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          "name": "Start",
          "events": [
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              "name": "MeasureSpeed",
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                },
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                  "sendEvent": false,
                  "sendPush": false
                }
              },
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                    "count": 1
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                    "interval": 2000
                  },
                  "thresholds": {
                    "isGt": 2.77778,
                    "isLt": 27.7778
                  }
                }
              ]
            }
          ]
        },
        {
          "stId": 1,
          "name": "Second",
          "events": []
        }
      ]
    }
  ]
}
```
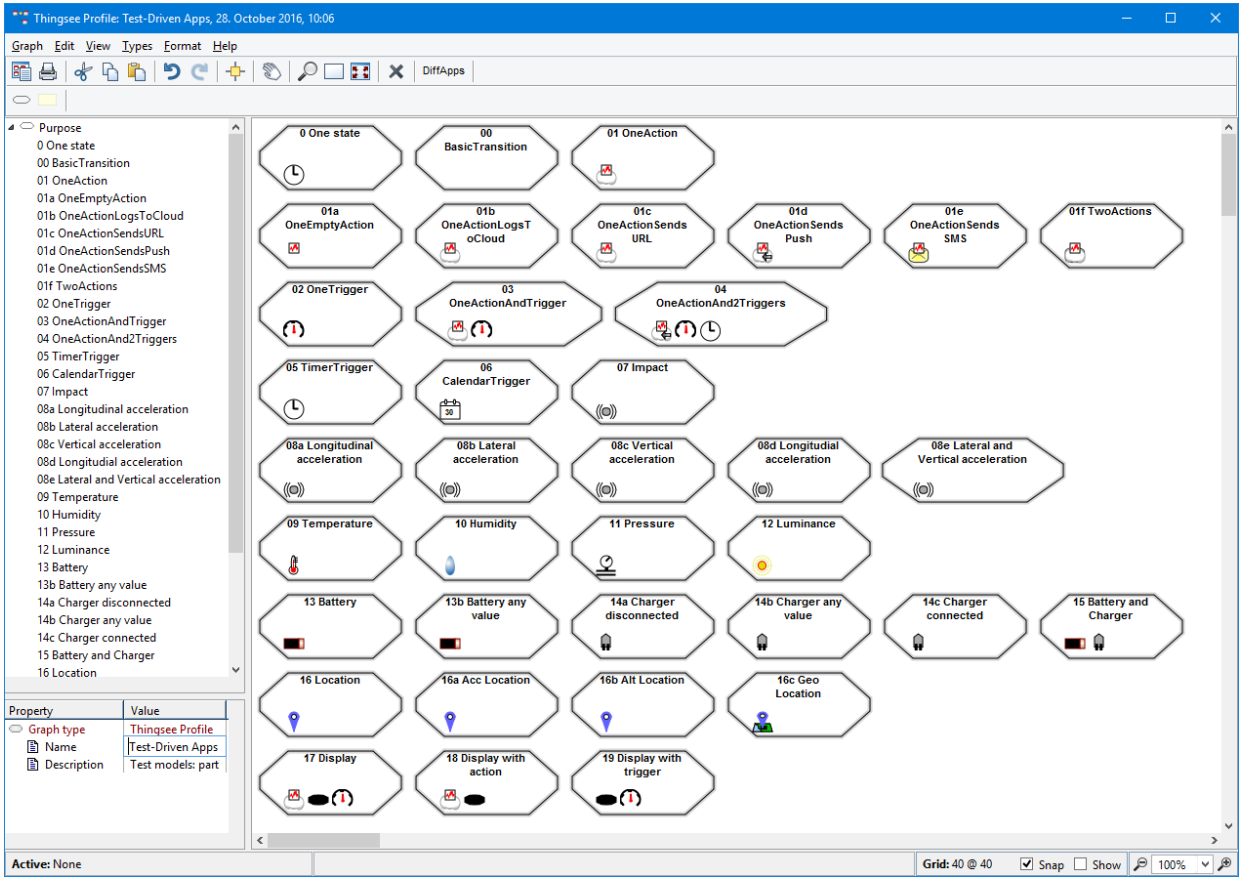

Test library at the end



Demo

Experiences on applying TDD for DSM

- Makes DSL development "systematic"/phased
  - Supports planning and estimating on the DSM development effort
- Provides regression testing giving conformance that nothing breaks when language & generator changed
  - Is not the only testing approach as also existing models (and generated code) can be applied as test data
- Can be extended to cover results generated with the platform/components/etc.
  - i.e. integrate resulting code with the rest and test together
- Considered applicable in practice (by MetaEdit+ users)

Remarks

- This approach is been applied in industrial projects when the customer has known:
  1. what needs to be generated early on
  2. enough language concepts to create test models
- Extensions applied include running the tests from other tools, including the framework code (that is not generated from models) with the tests
- Is not applied to cover all parts of the DSM solution (e.g. translators from model entry to output entry, naming rules with regexp)

Thank you!

Questions?

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