

Towards Assessing the Technical Debt of Undesired Software Behaviors in Design Patterns

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Current TD Analysis Tools

- SonarQube (TD plugin)
 - SQALE model
- CAST
 - Prioritization of violations
- inFusion
 - Design disharmonies

?

Structural

Behavioral

Position

- More effort needs to be directed at understanding software behaviors as they impact TD
- Why?
 - Further the research area
 - Expand TD analysis tools' capabilities

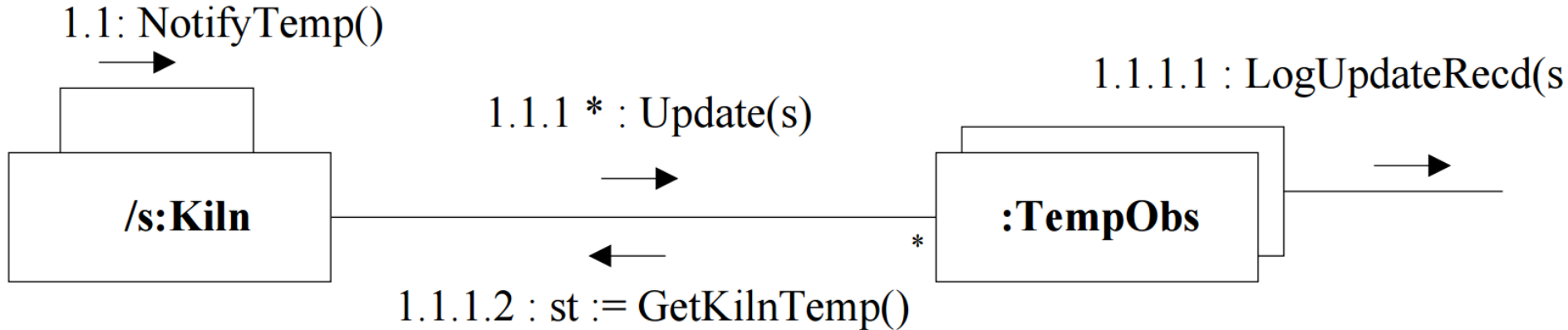
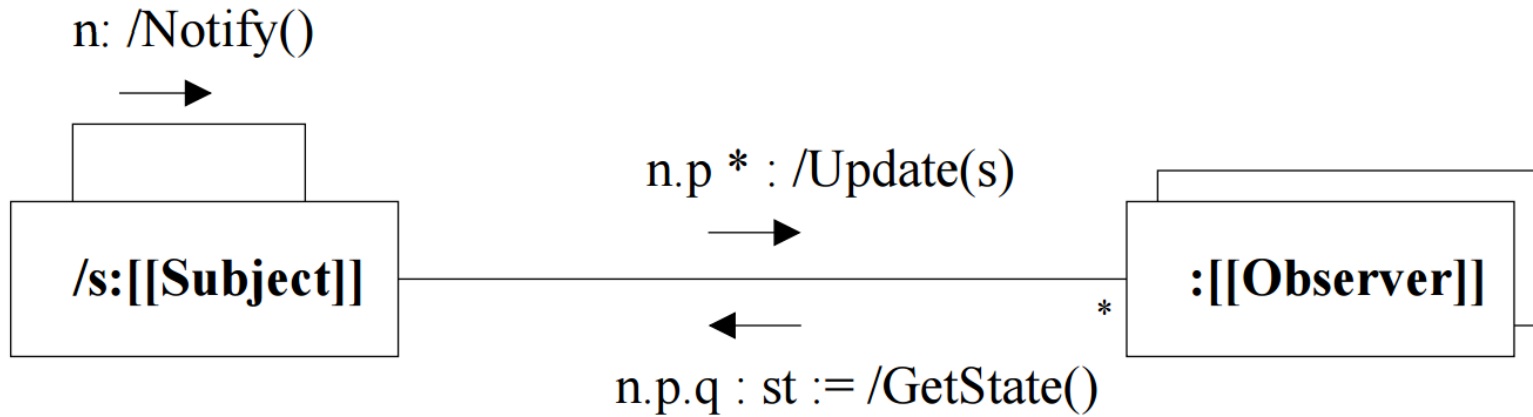
Software Behavior

- How do we talk about behavior?
- Internal
 - Interior mechanisms and API calls
- External
 - Observable results

Design Pattern Characteristics

- Known best practice
- Formalizations
 - SPS and IPS
- Grime (structural)
 - Unintended artifacts that muddy a pattern instance

Observer Pattern IPS

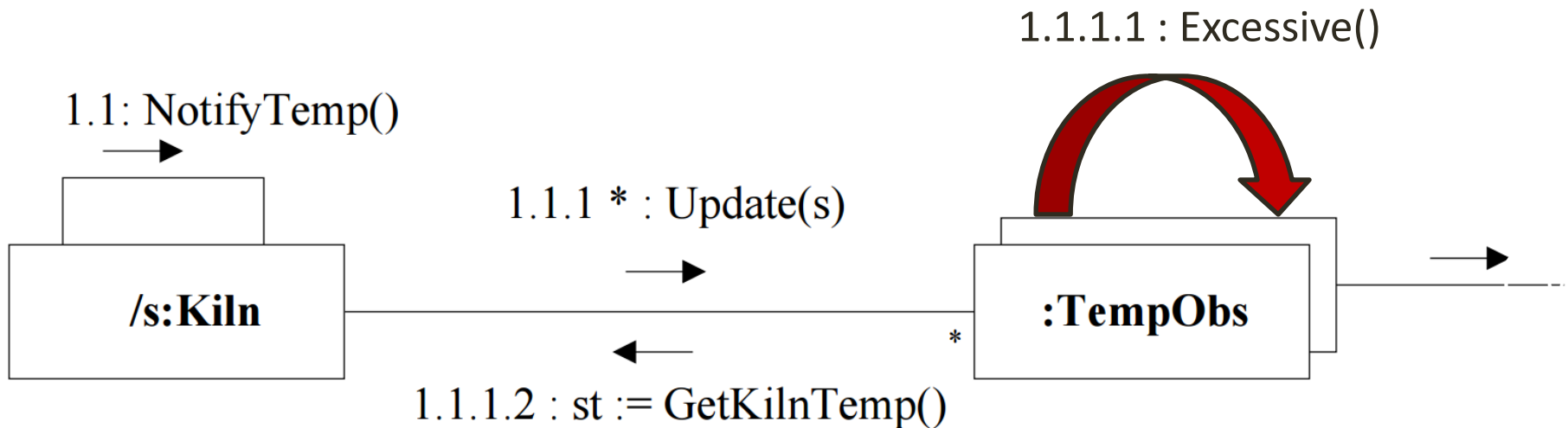


Excessive Action(s)

- Excessive action(s)
 - Action(s) that are un-essential to the functional runtime behavior of the pattern
 - Same external behavior, different internal behavior
- Created by:
 - Forgetting to remove debugging code
 - Changing implementation details

Excessive Action(s)

```
1
2 public class RemoteTempObserver1 extends AbstractRemoteTempObserver {
3
4     @Override
5     protected void update(AbstractKiln kilnToUpdate) {
6
7         // excessive behavior
8         for (int j = 0; j < 100; j++) {
9             j++;
10        }
11
12        this.displayedTemp = kilnToUpdate.getTemperature();
13    }
14 }
```



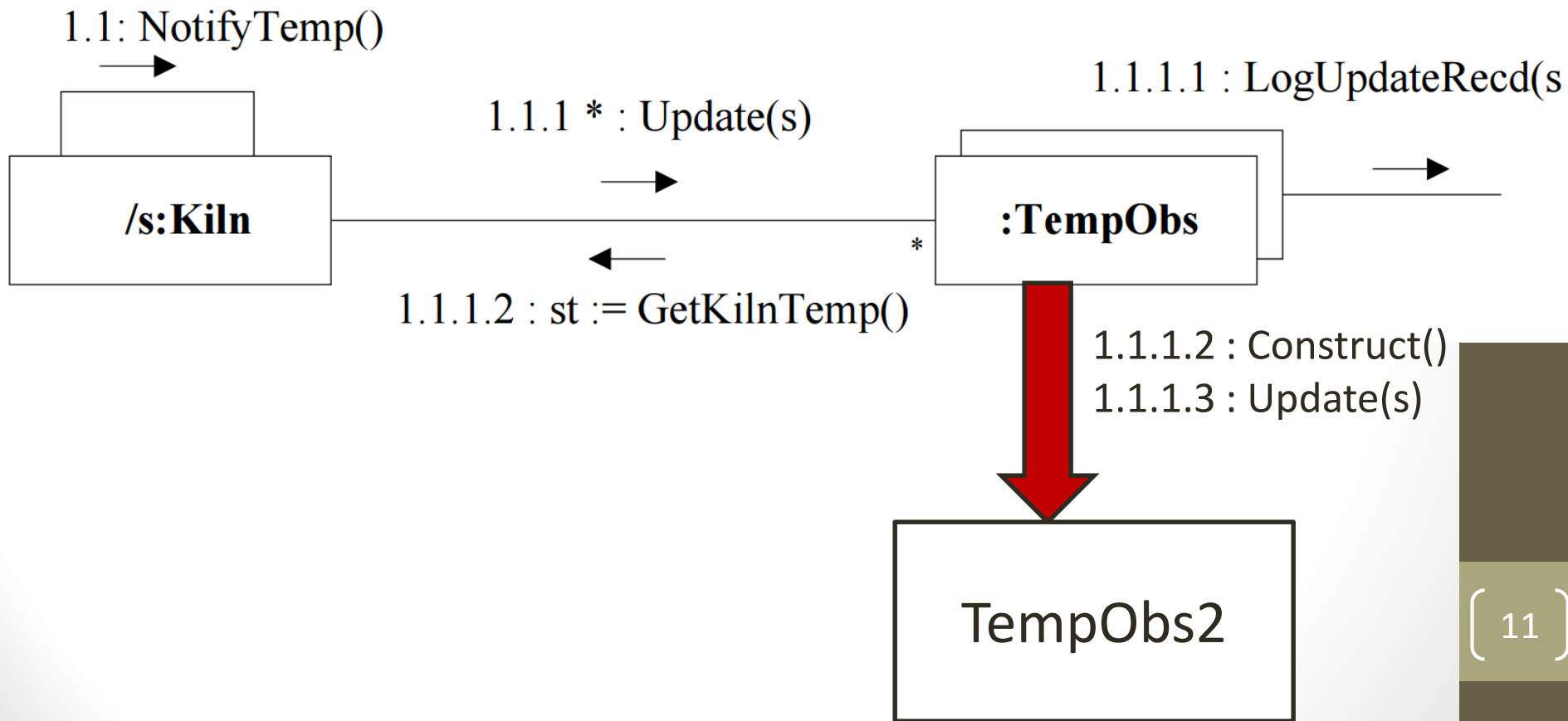
Improper Order of Sequences

- Improper Order of Sequences
 - Incorrect order of method/class calls during runtime execution
 - Same external behavior, different internal behavior
- Created by:
 - Unfamiliarity with design pattern

Improper Order of Sequences

```
1
2 public class RemoteTempObserver1 extends AbstractRemoteTempObserver {
3
4     @Override
5     protected void update(AbstractKiln kilnToUpdate) {
6
7         // improper order of sequences
8         RemoteServer2Grime grime = new RemoteServer2Grime ();
9         grime.update(kilnToUpdate);
10
11         this.displayedTemp = kilnToUpdate.getTemperature ();
12     }
13 }
```

Improper Order of Sequences



Conclusion and Future

- More effort needs to be directed at understanding software behaviors as they impact TD
- Find more errant behaviors
- Identify/propose behavioral metrics
- Benchmarking
- Implementation in tools

Questions