Software Quality –
you know it when you see it

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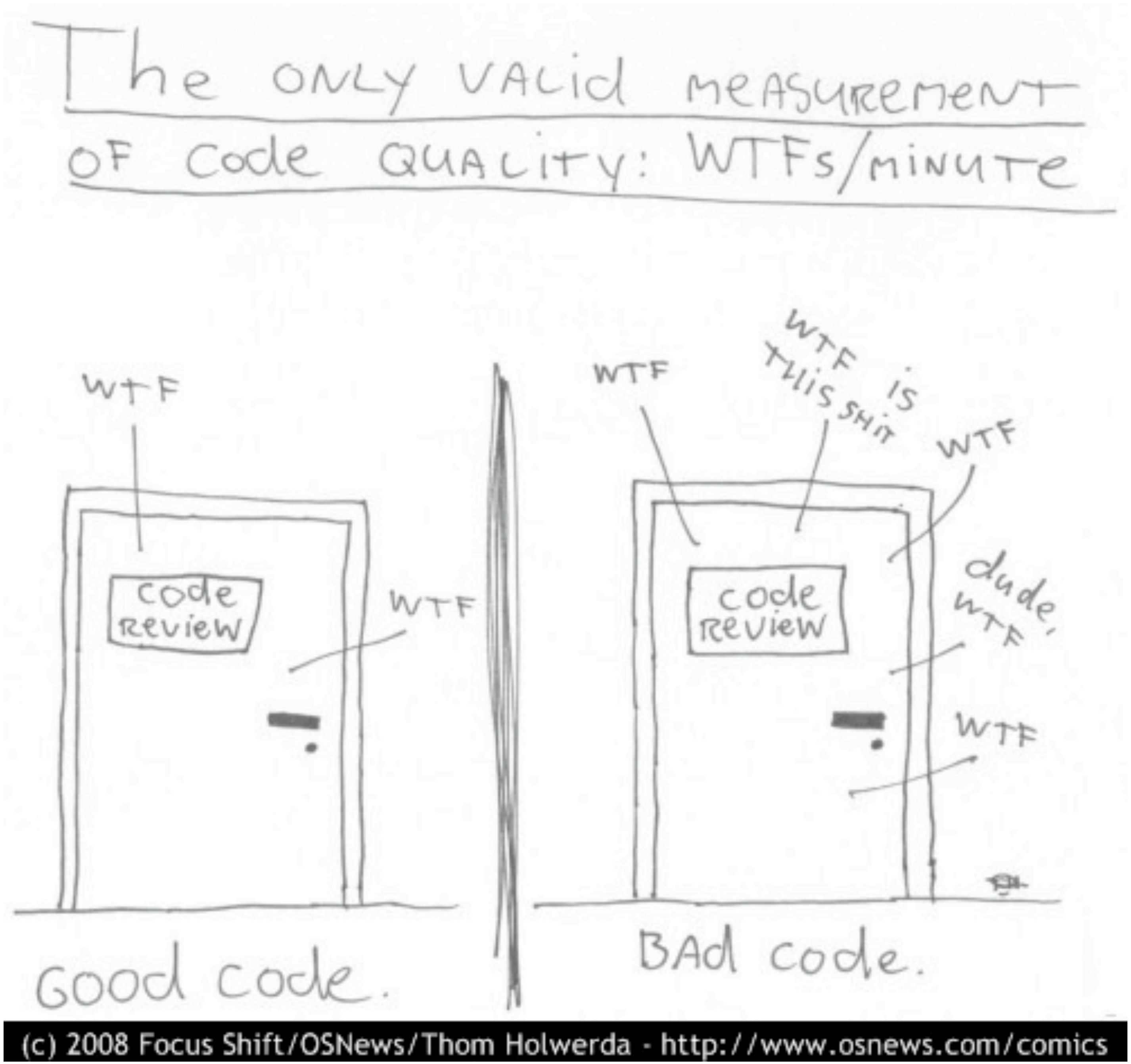

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Software Quality

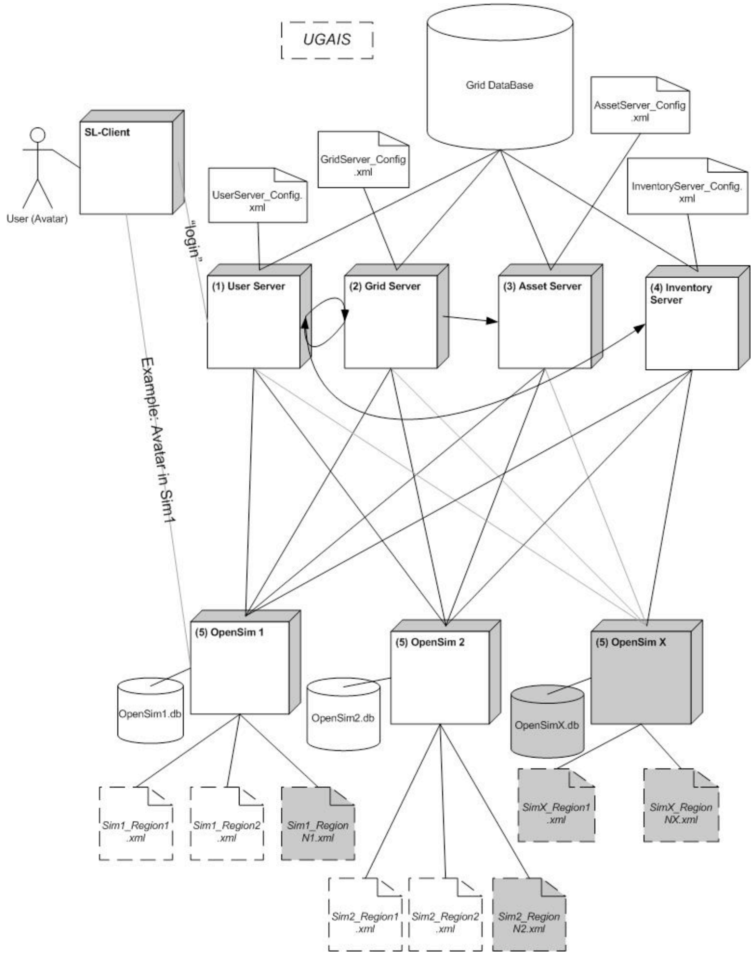
External perspective

- Is the software of value to its users?

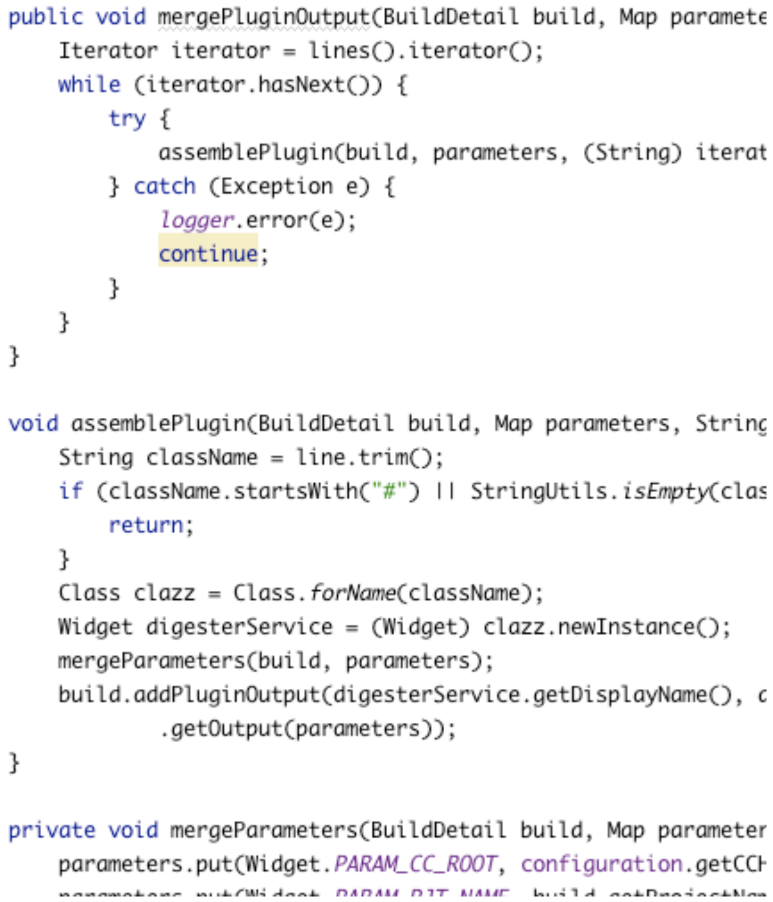
Internal perspective

- How appropriate is the design?
- How easy is it to understand and extend?
- How maintainable is the software?

30.000ft and ground level



http://opensimulator.org/wiki/Grid_Architecture_Diagram

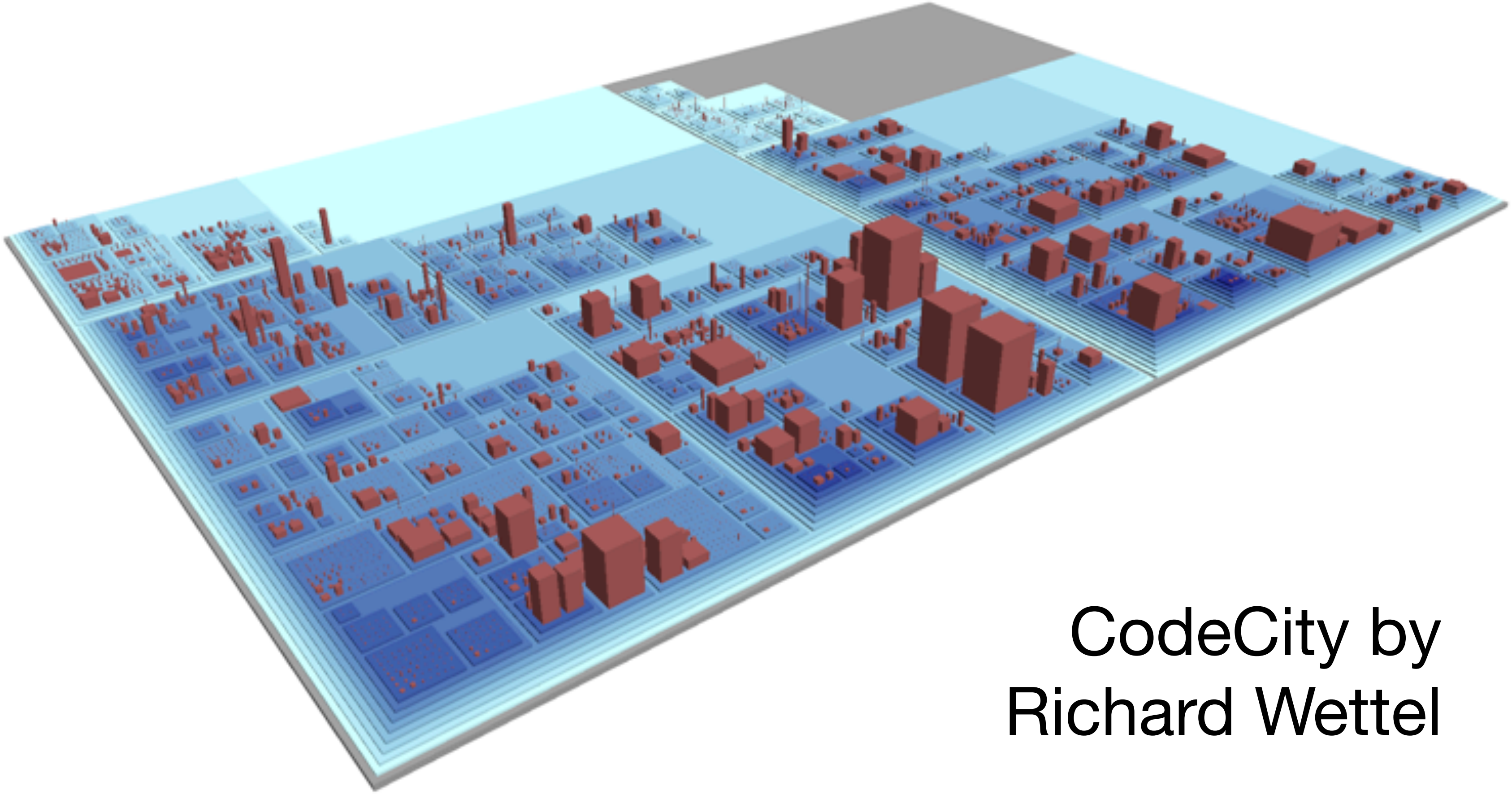


```
public void mergePluginOutput(BuildDetail build, Map paramete
    Iterator iterator = lines().iterator();
    while (iterator.hasNext()) {
        try {
            assemblePlugin(build, parameters, (String) iterat
        } catch (Exception e) {
            logger.error(e);
            continue;
        }
    }
}

void assemblePlugin(BuildDetail build, Map parameters, Strinc
    String className = line.trim();
    if (className.startsWith("#") || StringUtils.isEmpty(clas
        return;
    }
    Class clazz = Class.forName(className);
    Widget digesterService = (Widget) clazz.newInstance();
    mergeParameters(build, parameters);
    build.addPluginOutput(digesterService.getDisplayName(), c
            .getOutput(parameters));
}

private void mergeParameters(BuildDetail build, Map parameter
    parameters.put(Widget.PARAM_CC_ROOT, configuration.getCCH
    parameters.put(Widget.PARAM_PJT_NAME, build.getProjectNam
```

The 1000ft view, literally



CodeCity by
Richard Wettel

The 1000ft view

Provides information at the *right* level

Aggregates lots of data and multiple metrics

Uses visualisation tools and techniques

Depends on the question you need answered

Metrics

Some established metrics:

- Lines of Code
- Method length
- Class size
- Boolean expression complexity
- Cyclomatic Complexity

pmd

DON'T SHOOT THE MESSENGER

ckjm

checkstyle

...

Metrics

Some newer metrics:

- Duplication
- Coverage
- Testability

Composed metrics

- coverage against test/code ratio

simian

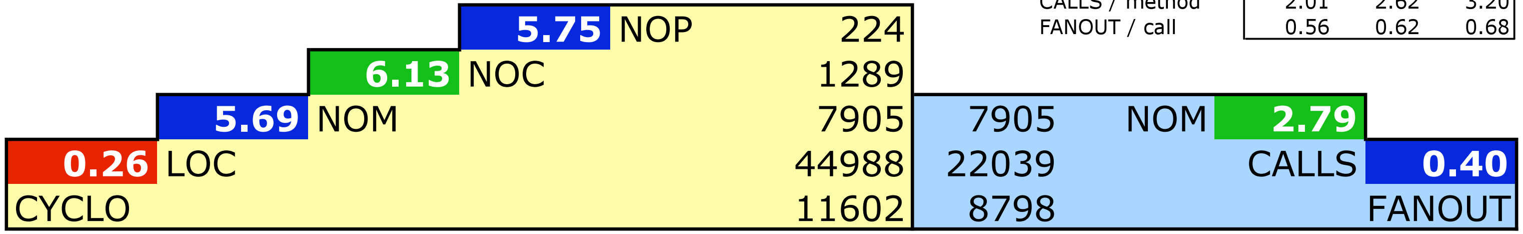
cobertura

Testability Explorer

...

Size & complexity pyramid

	Low	Medium	High
CYCLO / Line	0.16	0.20	0.24
LOC / method	7	10	13
NOM / class	4	7	10
NOC / package	6	17	26
CALLS / method	2.01	2.62	3.20
FANOUT / call	0.56	0.62	0.68



5.75 NOP 224

6.13 NOC 1289

5.69 NOM 7905 7905 NOM 2.79

0.26 LOC 44988 22039 CALLS 0.40

CYCLO 11602 8798 FANOUT

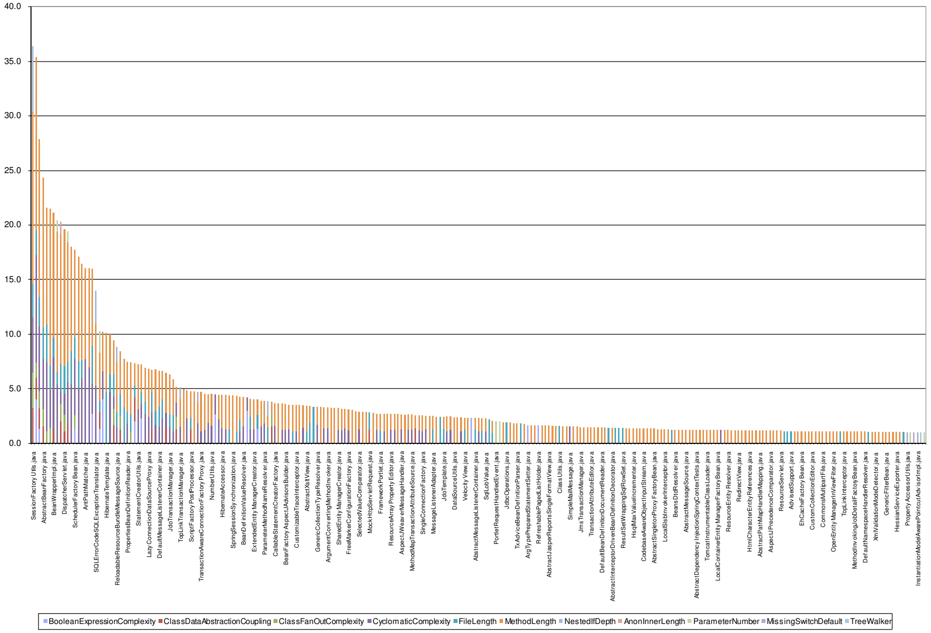
Developed at Universities of Berne and Lugano

Shows key metrics and their relationships

Allows comparison to “industry standards”

Created by iPlasma tool from source code

Toxicity chart

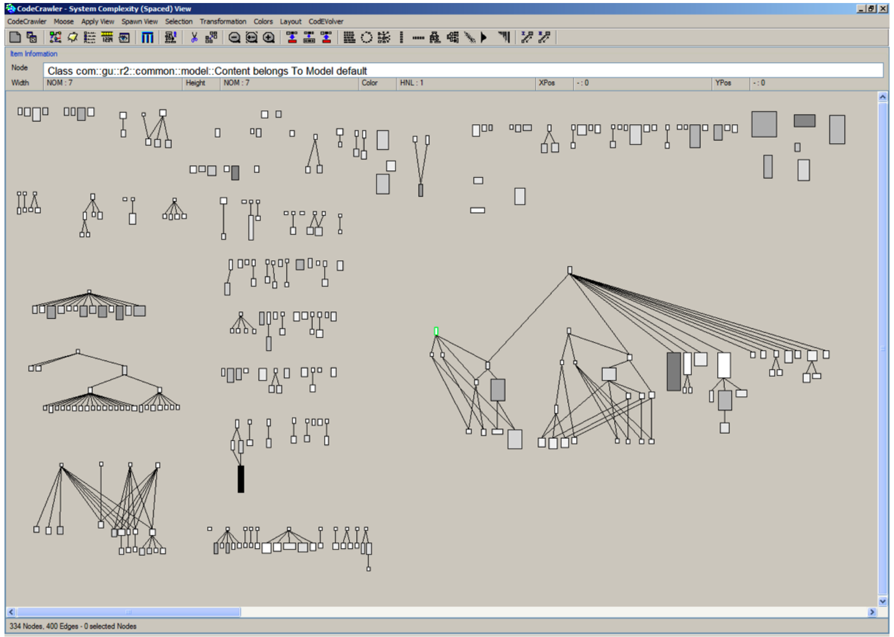


Developed by ThoughtWorks

Provides easy to compare overview of quality

Created with checkstyle & Excel from source

Codecrawler



Node: Class com::gu::r2::common::model::Content belongs To Model default

Width: NOM : 7 Height: NOM : 7 Color: HNL : 1 XPos: - : 0 YPos: - : 0

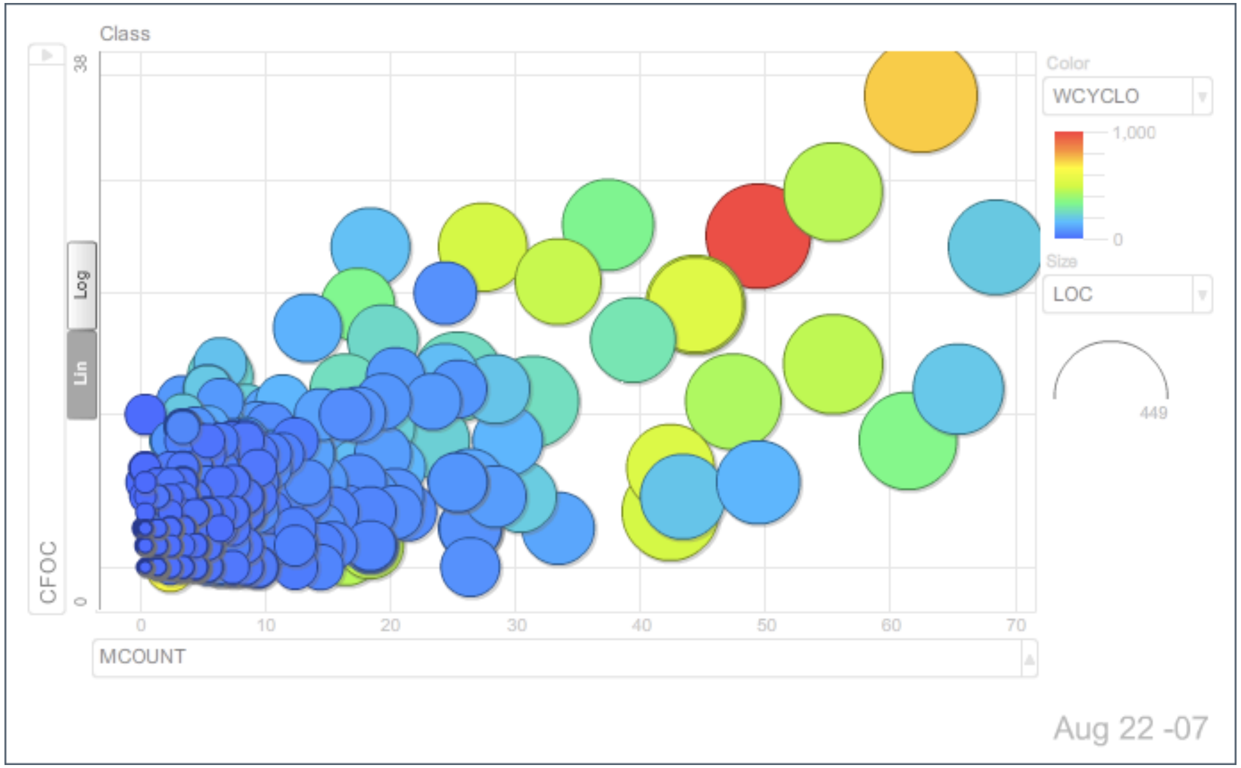
334 Nodes, 400 Edges - 0 selected Nodes

Part of a larger academic initiative

Allows exploration of quality metrics

Reads XMI data

Class metrics chart

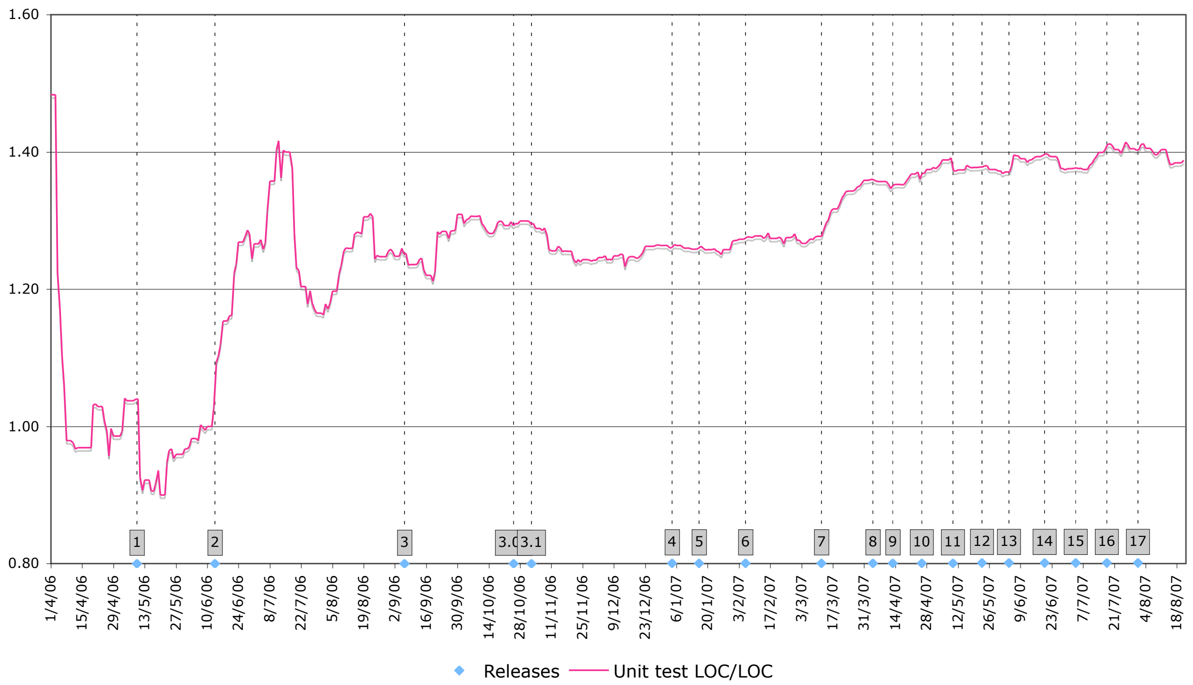


Takes class as the basic entity and explore highly dimensional properties/metrics

Uses Google Docs and Motion Chart gadget

Test to code ratio

Lines of unit test code per line of production code



Shows the test to code ratio over time

Created with Unix tools & Excel

DIY

1. Choose tools that calculates the metrics
    - Source code analysis easier than bytecode
2. Aggregate data
    - Ruby scripts, unix tools, etc
    - VBA and pivot tables are an option, too
3. Choose tool to render graphics from data
    - Excel is a powerful graphing tool
    - Gnuplot and InfoViz are also useful

How do you see quality?

Quality can be subjective and relative

Comparisons

- industry standards
- different revisions of same software (trends)
- different parts of same system (outliers)

Aesthetics

- Symmetry
- Balance/harmony

And then what?

Measure tech debt

Measure effectiveness of training / coaching

Guide refactoring / cleanup

Direct effort

Celebrate success

Thank you

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www.thoughtworks.com