

The Tale of Two Source-code Analysis Tools

Learning and experiences

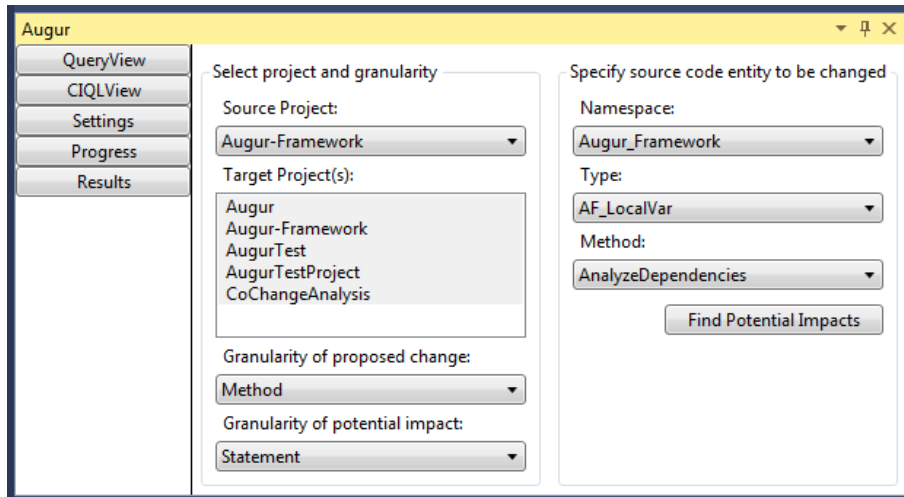


Tushar Sharma

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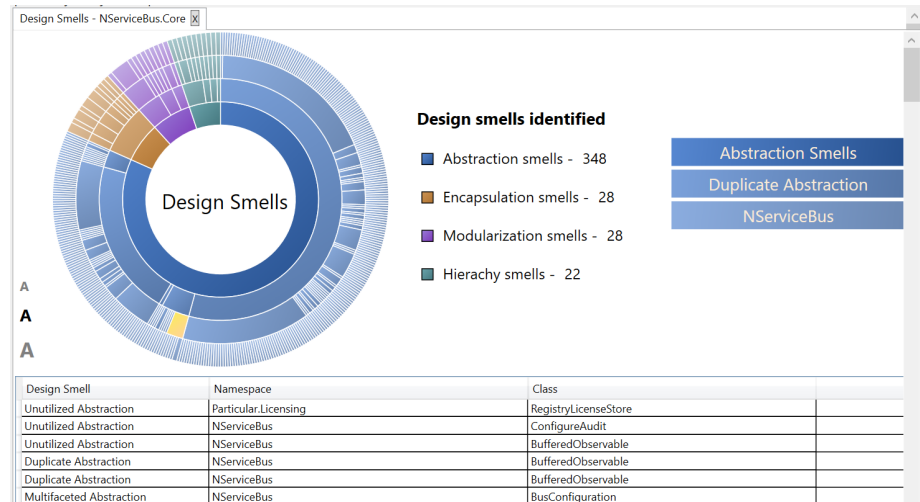
Funded by SENECA project under Marie-Skłodowska Curie Actions

Tools



Augur

A change impact analysis tool

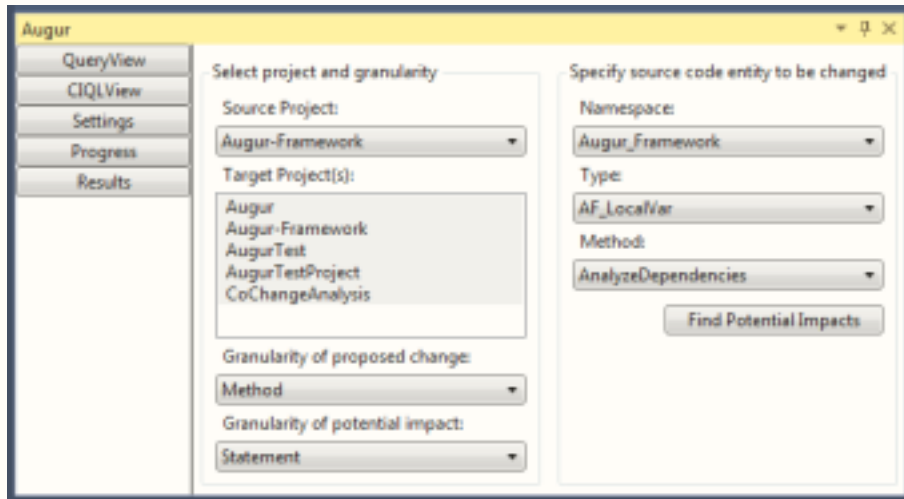


Designite

A software design quality assessment tool

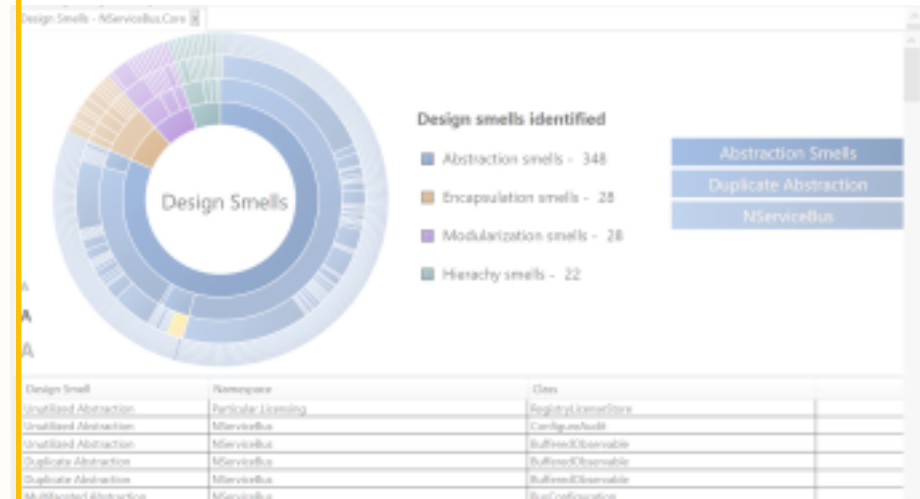
(<http://www.designite-tools.com>)

Tools



Augur

A change impact analysis tool

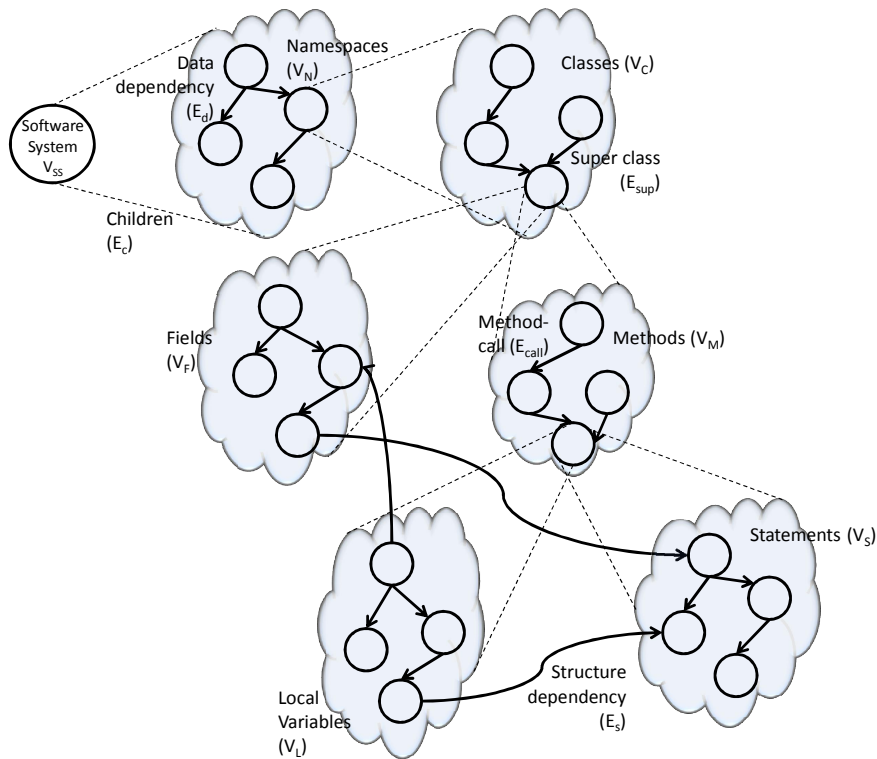


Designite

A software design quality assessment tool



Features



- **Change impact analysis with multiple granularity support**
 - Cutting across projects, namespaces, classes, methods, fields, and statements
- **Intra-granular queries**
 - Supporting a query where a change and the associated impact could be on different granularities



Features

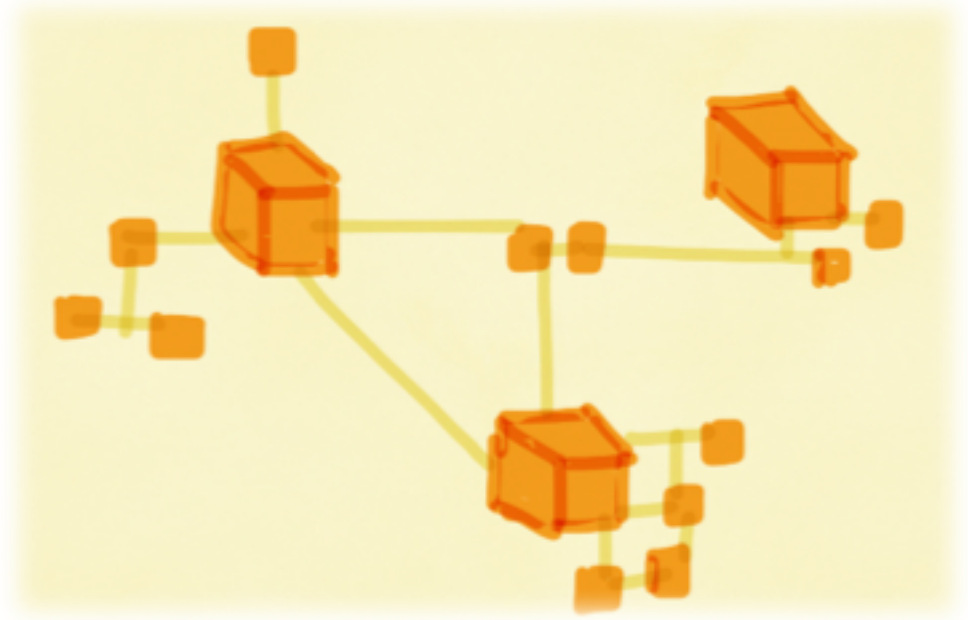
- **Change Impact Query Language (CIQL)**
 - For large scale batch querying – opening a new set of applications of CIA

*CIQL::get “<Granularity (Impact)>”
[within “<Scope>”]
[with “<Depth>”] where
“<Entity>” is
“<Granularity>”.*

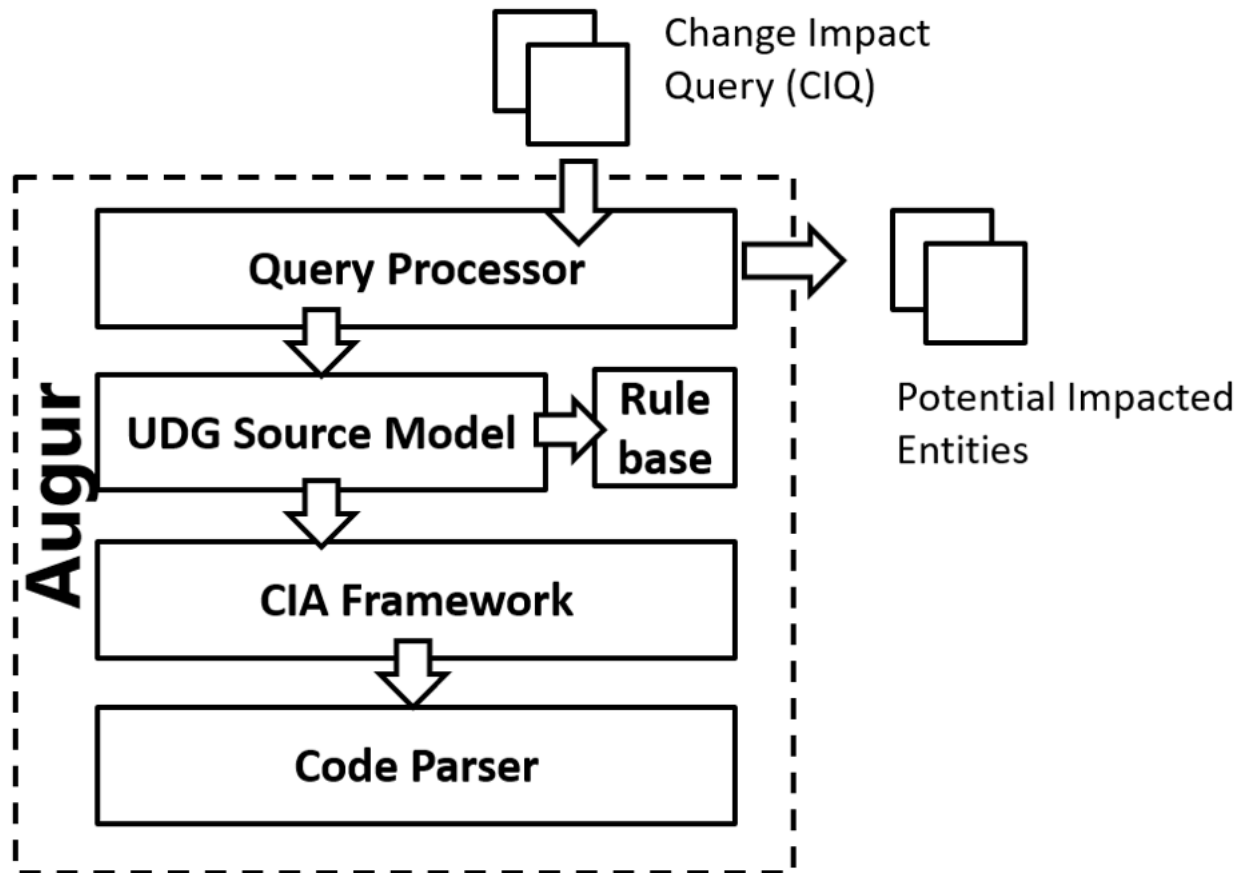


Features

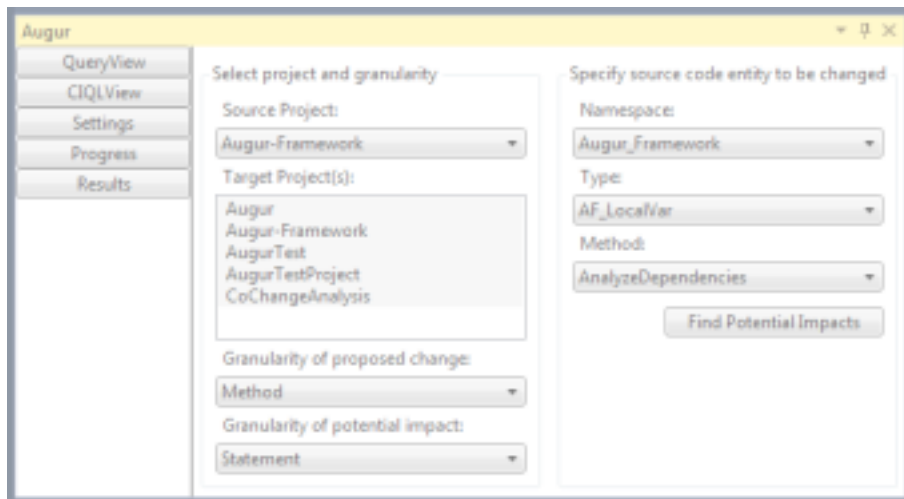
- **Support for extended dependencies**
 - Data
 - Control
 - Semantic
 - Environment



Architecture

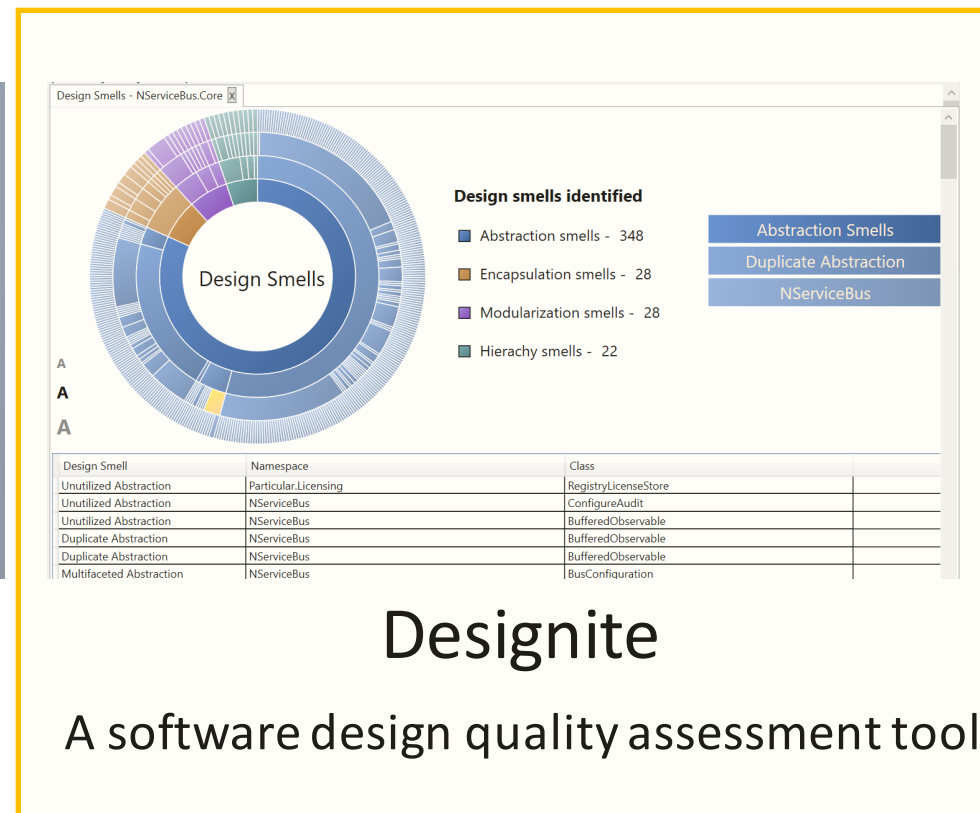


Tools



Augur

A change impact analysis tool



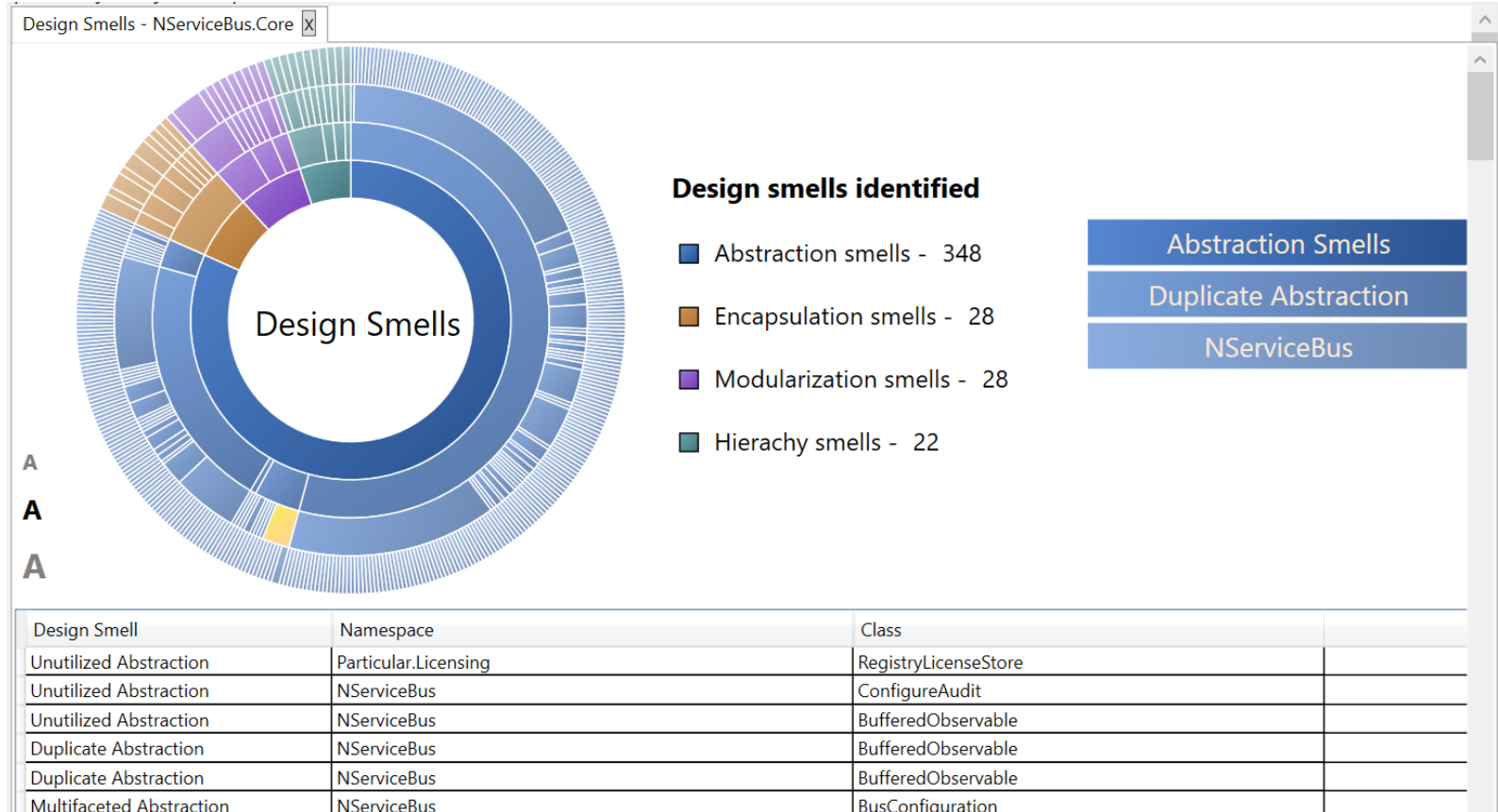
Designite

A software design quality assessment tool



Features

- Supports detection of 19 design smells and 11 implementation smells



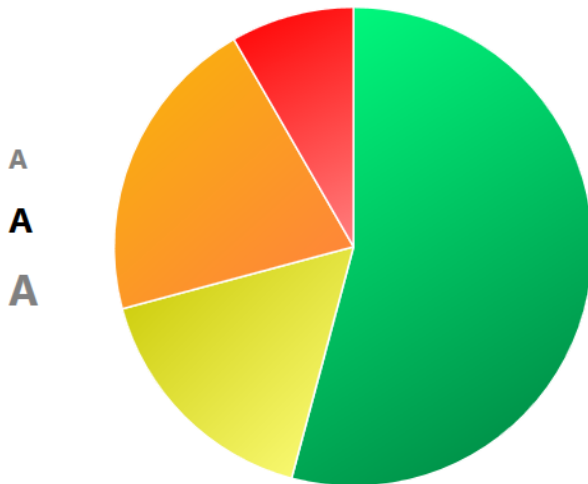


Features

- Supports computation of various metrics with custom thresholds

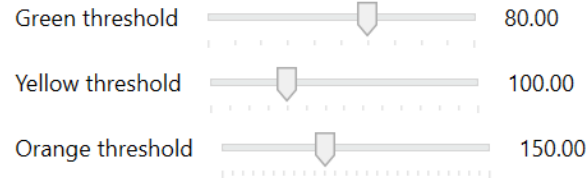
WMC - Weighted Method per Class

Distribution of types based on metric thresholds



- Types honoring the metric threshold - 13
- Types slightly above the metric threshold - 4
- Types quite above the metric threshold - 5
- Types dangerously above the metric threshold - 2

Reset thresholds



Reset

Select metric

- ☐ DIT ☐ Fan-in ☐ Fan-out ☐ LCOM ☐ LOC ☐ NC ☐ NOF ☐ NOM ☐ NOPF ☐ NOPM ☐ NOP ☒ WMC



- ## Dependency Structure Matrix
- Scope

☒ All projects

☐ A project

Granularity

☐ Types

☒ Namespaces

☐ Projects
- Show

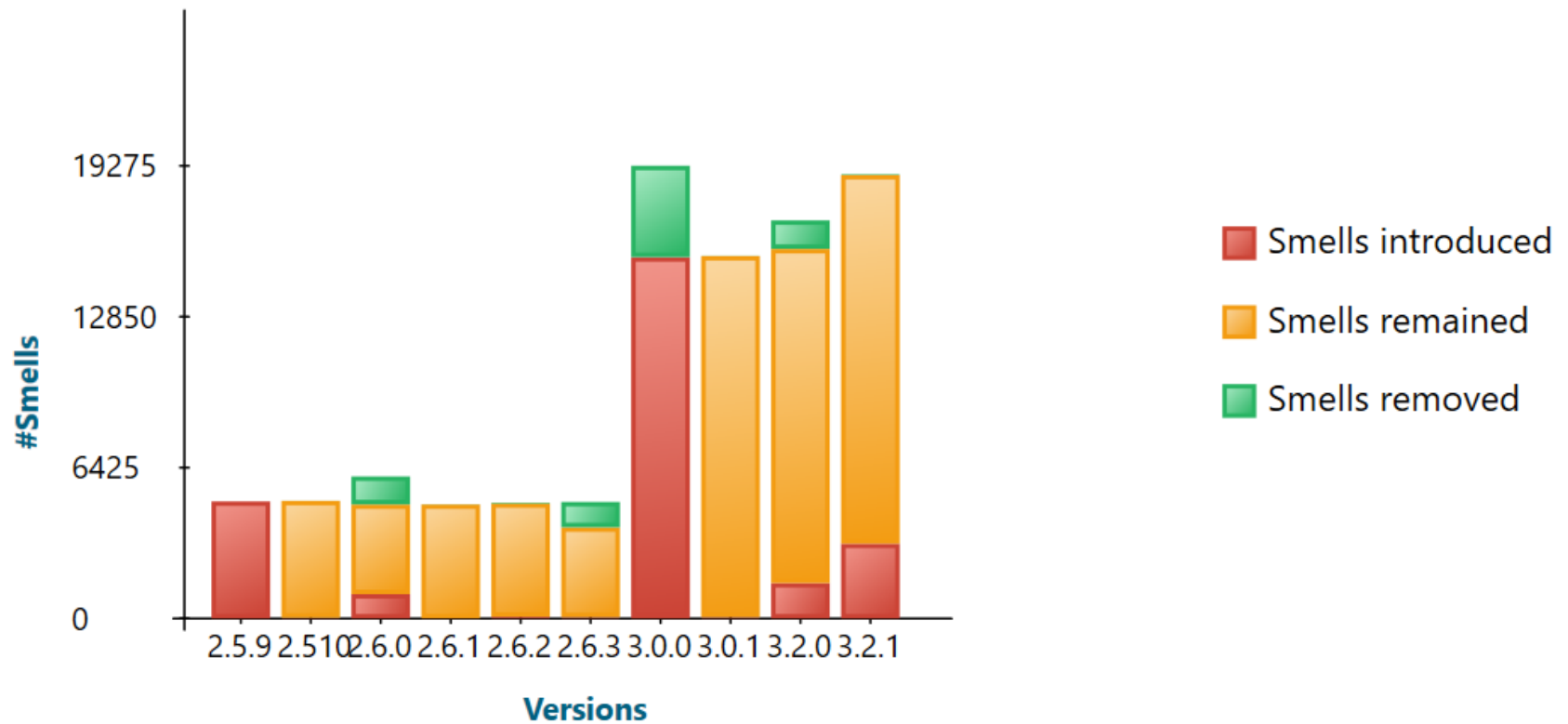
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
0 NServiceBus.ContainerTests																		
1 NServiceBus.Utils.Reflection																		
2 NServiceBus.Serializers.XML.XsdGenerato																		
3 Particular.Licensing																		
4 NServiceBus	6					6	2		51		1		2	1	2	12		1
5 NServiceBus.Transports					14				5						1	1		
6 NServiceBus.Config					3				9				1					
7 NServiceBus.Container					1													
8 NServiceBus.Features					11	1												1
9 NServiceBus.DataBus									2									
10 NServiceBus.Encryption.Rijndael																		
11 NServiceBus.Extensibility					3										1			
12 NServiceBus.Faults					2	1			1									
13 NServiceBus.MessageMutator					2													
14 NServiceBus.Binlogging.Contents					2											1		



Features

- **Performs Trend Analysis**

Trend Analysis

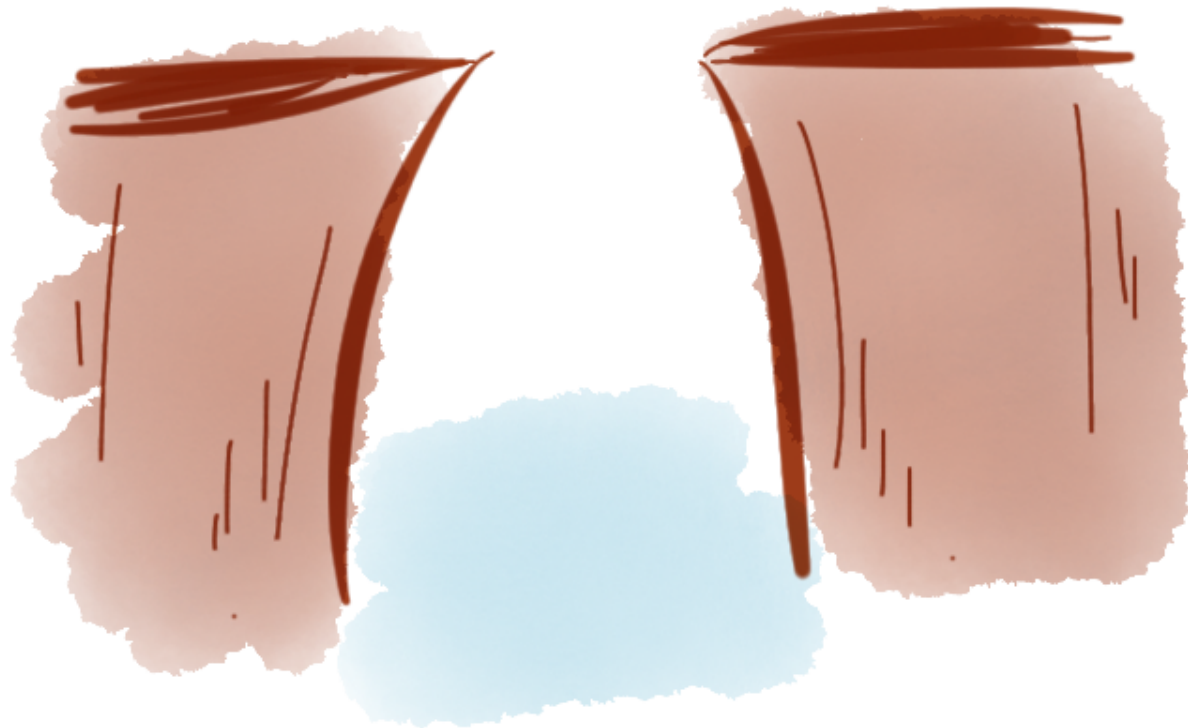




The Big Gap

between Academics and Industry

Proposing a new research program in a corporate research organization is not easy!



The Big Gap

between Academics and Industry

Learning (as a researcher)

- Make sure the availability of artifacts and their broader applicability

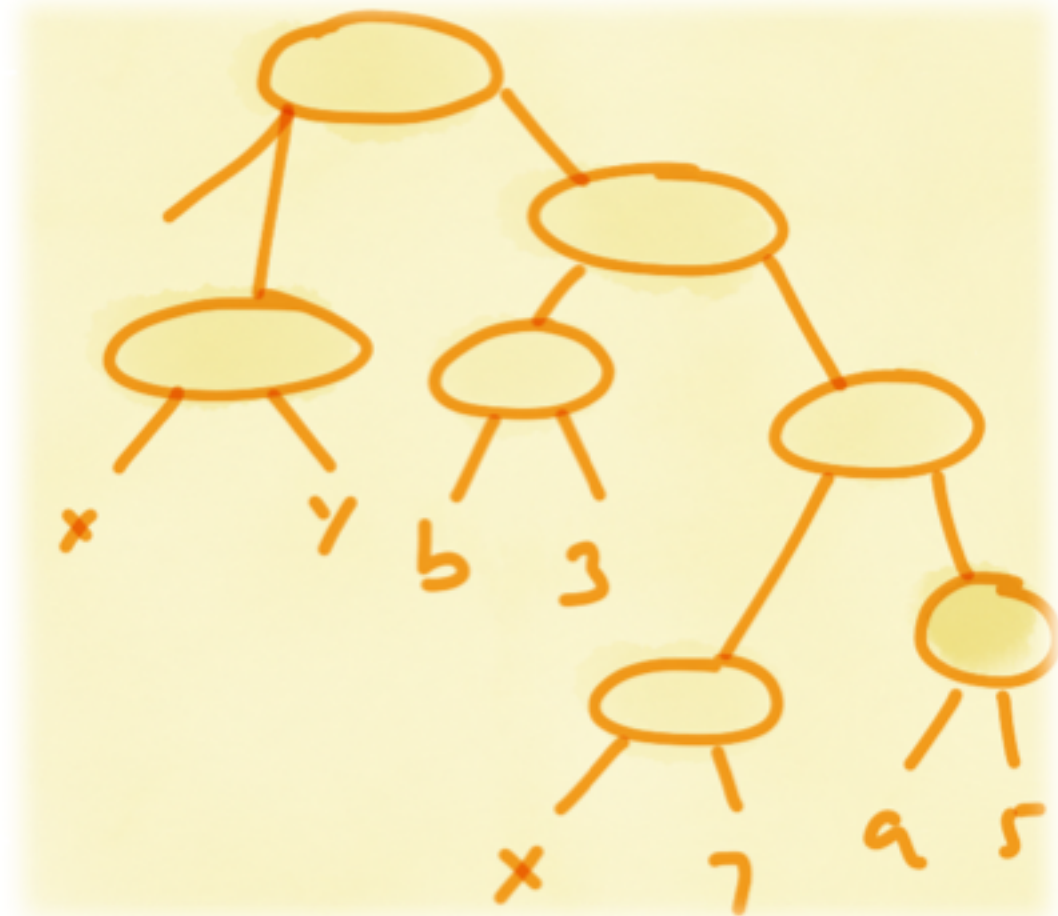


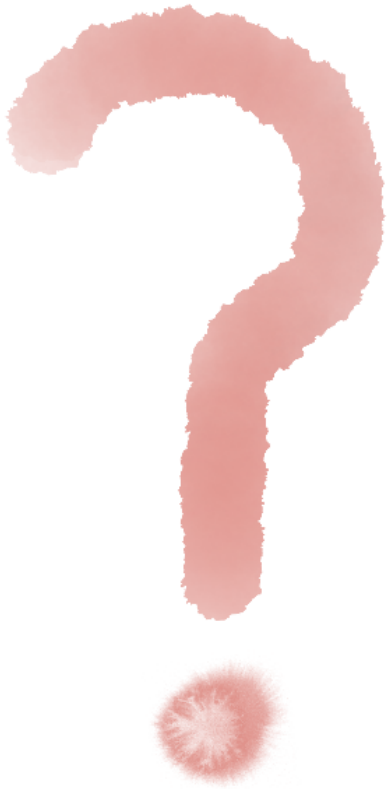


Parsing mechanism

Various options for collecting source code information

- String manipulation
- Reflection
- AST
- Byte code analysis





Which AST library?

CSParser

Metaspec

MS Roslyn

#Recognize!

NRefactory



Parsing mechanism

Selection criteria

- License
- Features
- Cost
- Community support
- Future proof-ness



Architecture



Plug-in
or
Independent application



Console application

Options

- Use conditional compilation (using ConditionalAttribute)
- Duplicate the code-base
- Perform architecture refactoring





Console application



Experience:

- Architecture refactoring is expensive but effective!
- Support for architecture refactoring within IDEs is not sufficient



Extensibility

Smell detection logic must be extensible

i.e. new rules can be added without any change in source code analysis logic and user interface

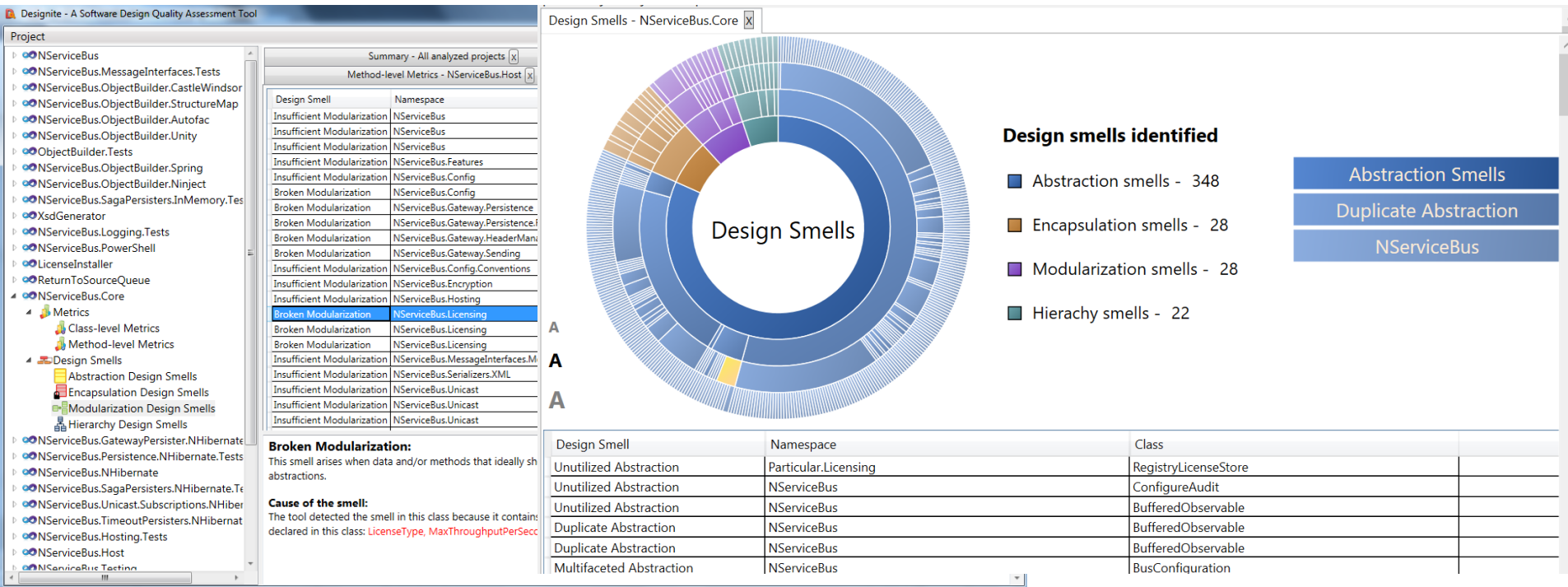
Learning:

- The role of appropriate design is important



Information dissemination

Producing useful information is desirable;
presenting it well to the user is the extra mile.





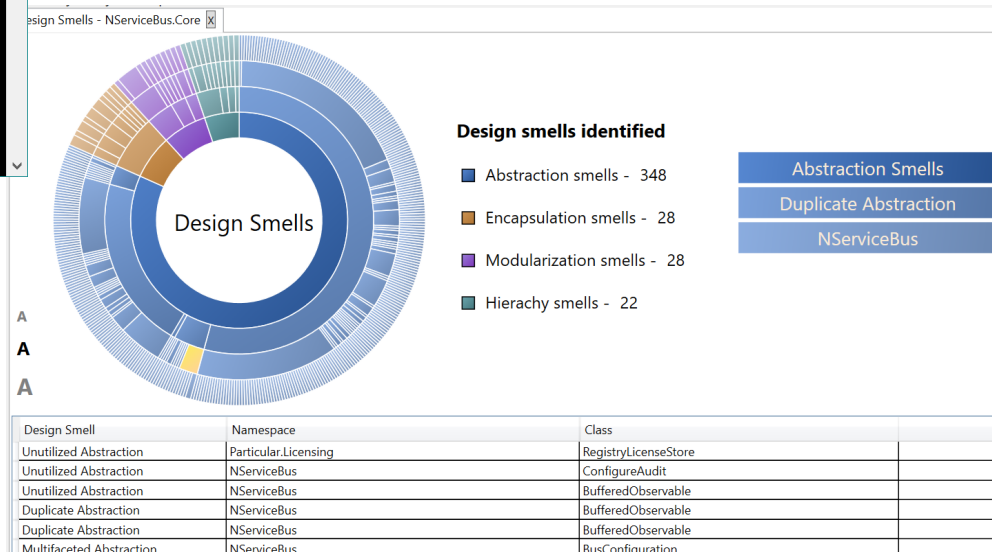
Information dissemination

Different types of users, different requirements.

```
C:\Windows\System32\cmd.exe

C:\Program Files (x86)\Designnite\Designnite>DesignniteConsole.exe
Usage: DesignniteConsole <InputArg> <Option> <ExportPath>
  where <InputArg> is either -
    Solution file name with path in double quotes, or
    Batch file name with path in double quotes.
  and <Option> is either -
    -E      to export analysis results in an Excel sheet, or
    -X      to export analysis results in an XML file
    -C      to export analysis results in CSV files
  and <ExportPath> refers to the export file name with path in double quotes
  for Excel or XML format. For CSV format, specify the folder path.

C:\Program Files (x86)\Designnite\Designnite>
```

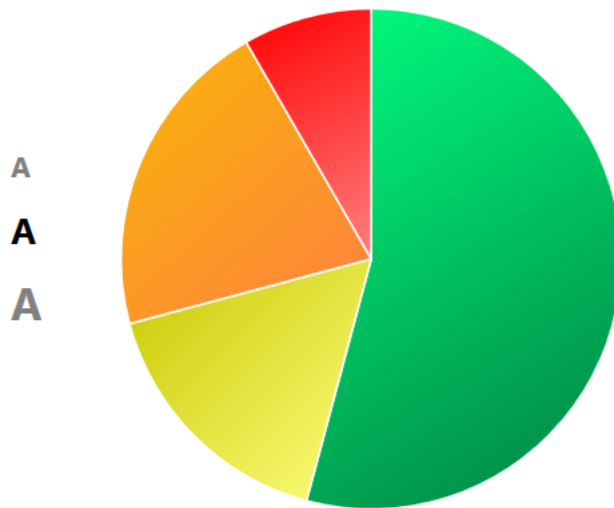




Paying attention to user requirements

WMC - Weighted Method per Class

Distribution of types based on metric thresholds



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Reset thresholds

Green threshold  80.00

Yellow threshold  100.00

Orange threshold  150.00

Reset

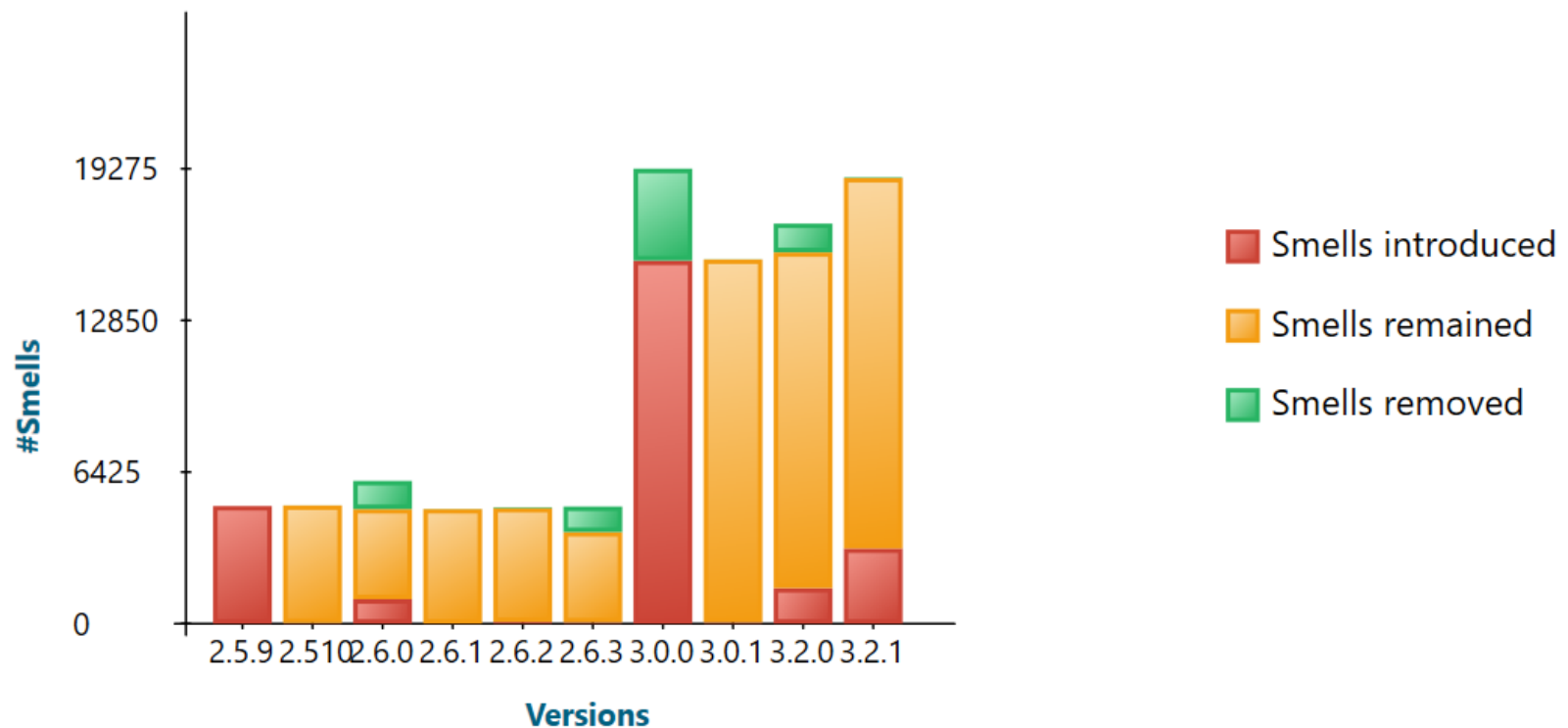
Select metric

☐ DIT ☐ Fan-in ☐ Fan-out ☐ LCOM ☐ LOC ☐ NC ☐ NOF ☐ NOM ☐ NOPF ☐ NOPM ☐ NOP ☒ WMC



Paying attention to user requirements

Trend Analysis



References

[1] Tushar Sharma, Pratibha Mishra, and Rohit Tiwari. 2016. Designite: a software design quality assessment tool. In *Proceedings of the 1st International Workshop on Bringing Architectural Design Thinking into Developers' Daily Activities* (BRIDGE '16). ACM, New York, NY, USA, 1-4. DOI: <http://dx.doi.org/10.1145/2896935.2896938>

2] Tushar Sharma, Girish Suryanarayana. Augur: Incorporating Hidden Dependencies and Variable Granularity in Change Impact Analysis. Submitted at SCAM 2016, waiting for the decision.

Thank you!!



Courtesy: spikedmath.com

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