



Software Improvement Done Right

INNOQ

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✓ Architecture-Improver

✓ Coach, Trainer

✓ arc42, aim42

✓ iSAQB



Dr. Gernot Starke
INNOQ Fellow

There should be only

ONE

reason to change:



Change
to add value...

No:

- actionism
- cargo cult
- longing to try technology XY

**Add value by
removing problems**

P.A.O.B.L.E.M.S

Complicated systems

<https://flic.kr/p/7XAjXu>



<https://flic.kr/p/6xuSMU>

Problems in complicated system (0)

- taste
- price
- appearance
- location (of restaurant)



Problems in complicated system (1)

- taste
- temperature
- consistency
- popularity
- purchase price



<https://flic.kr/p/bDGDMY>

Problems in complicated system (2)

Nutritional value:
carbs, protein, fat, vitamins

drugs,
contamination,
poison,
radioactivity

Problems in complicated system (3)

Logistics &
storage of ingredients

<https://flic.kr/p/pnVsxu>



Kids...

- really nice!
- narrow focus
- limited field of vision
- driven by short-term desires



Pro

- **overview by methodical assessment**
- **objective priorities**
- **balance between strategy and tactic**

Beginner



Pro

- **overview by methodical assessment**
- **objective priorities**
- **balance between strategy and tactic**



**architecture
improvement
method**

<https://aim42.org>

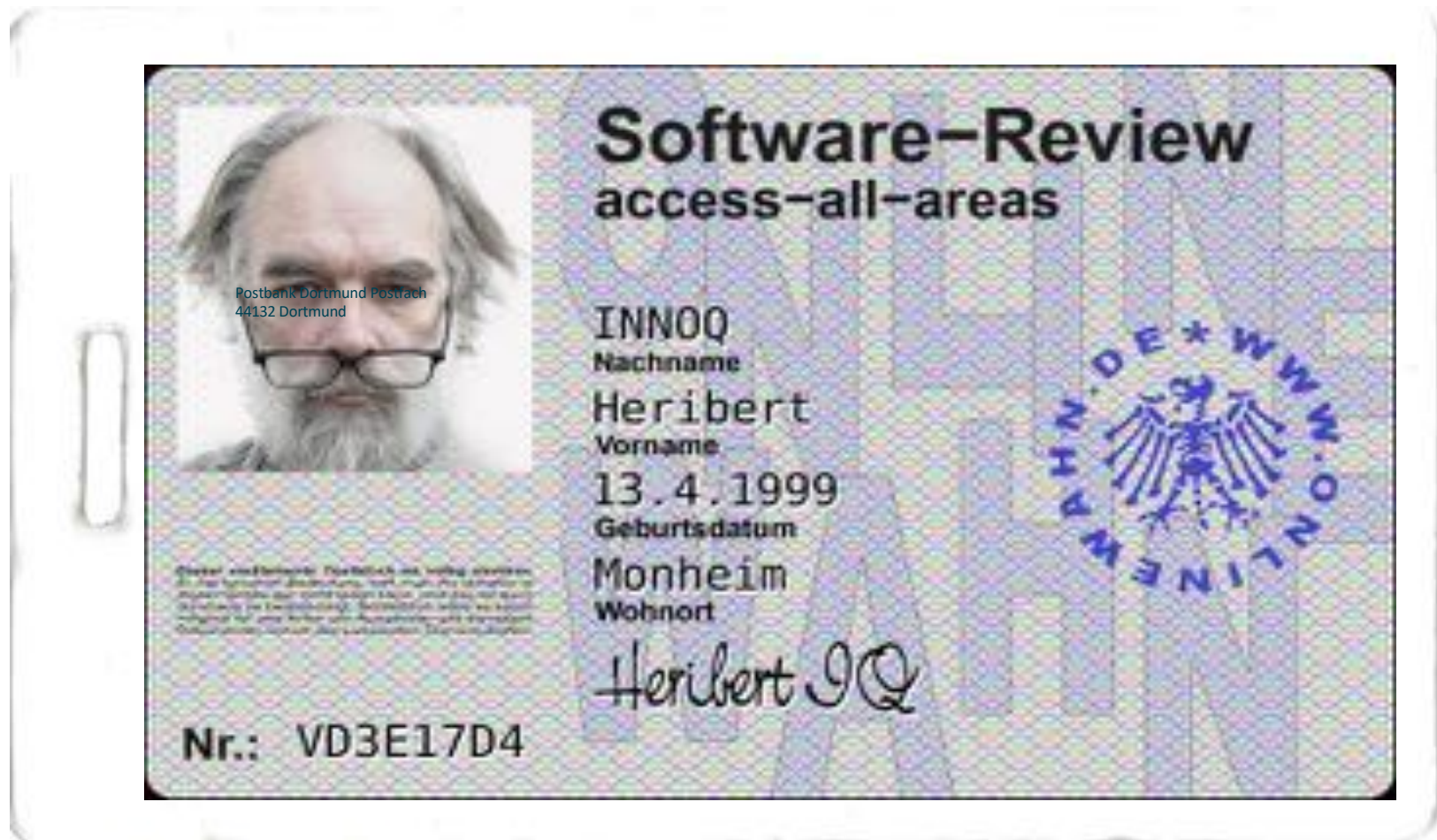


Stakeholder	Context	Quality	Architecture	Code	Runtime	Data	Tests	Processes	Infrastructure	Security
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Breadth-first search

Access All Areas



Breadth-first search

1. Stakeholder
2. (Overall) structure
3. Code details
4. Cohesion
5. Context
6. Qualities
7. Development process
8. Persistence
9. Technology
10. Infrastructure

examples...

Stakeholder know many problems

(+ solutions).

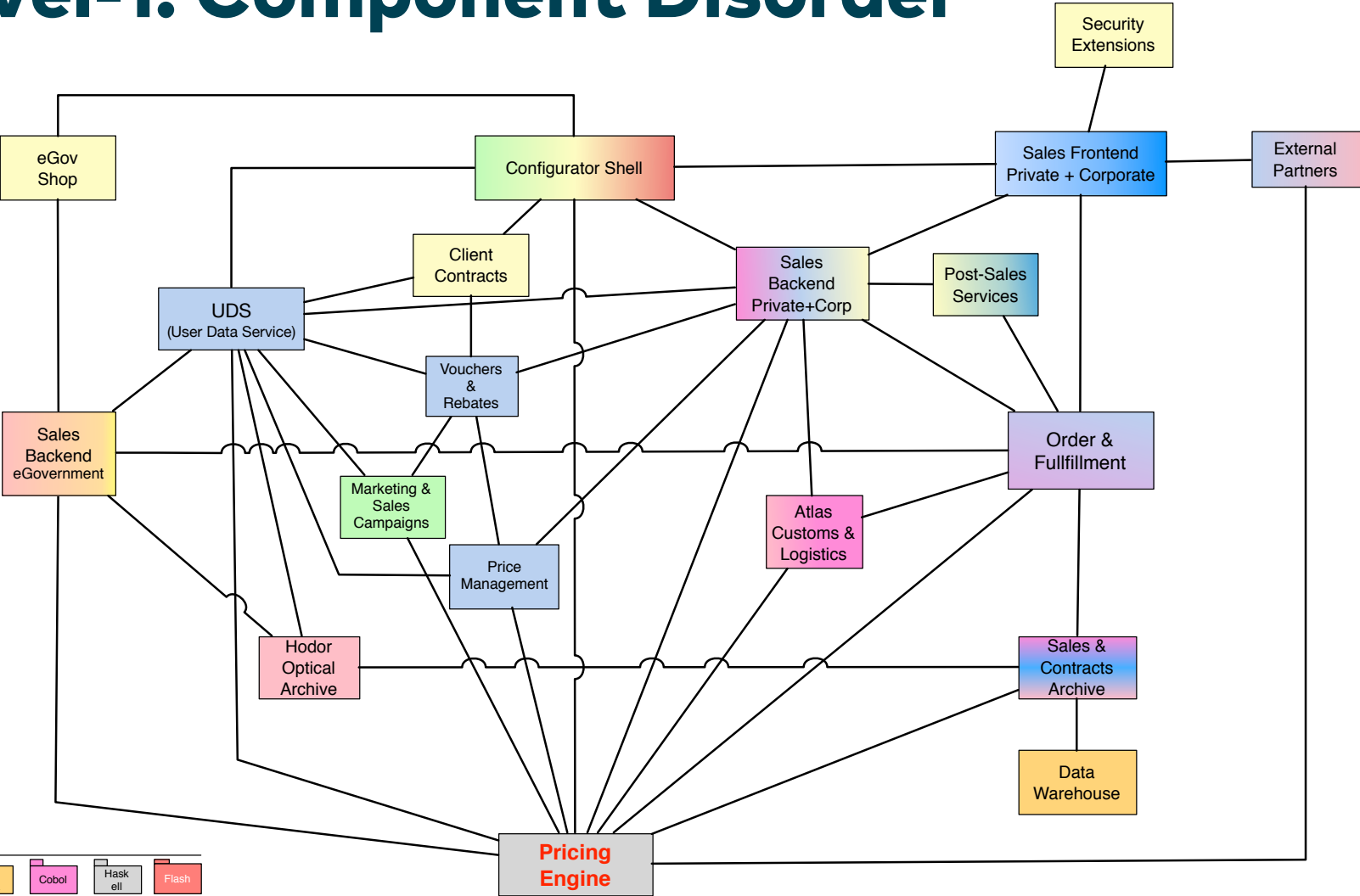


Overall structure

**Does component structure
fit to problem?**

Too many dependencies?

Level-1: Component Disorder



- Legend:
- PL/SQL
 - Cobol
 - Haskell
 - Flash
 - C/C++
 - Python
 - PHP
 - Java
 - HTML/JS

Code details

Hotspots and other smells...



Metrics

good



- coupling / dependencies
- code complexity
- performance
- ...



Metrics

good



- coupling / dependencies
- code complexity
- performance
- ...

better



- errors per component
- Know-How per component
- change frequency
- ...



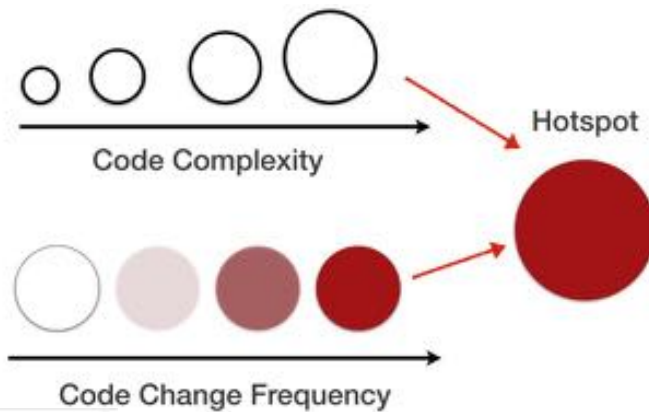
Telco:

- Management measures (Java-) system with red/yellow/green (CAST Application Intelligence Platform)
- >70% implemented in XSLT,
- not measured by CAST



Find Hotspots

complex code that's modified often.



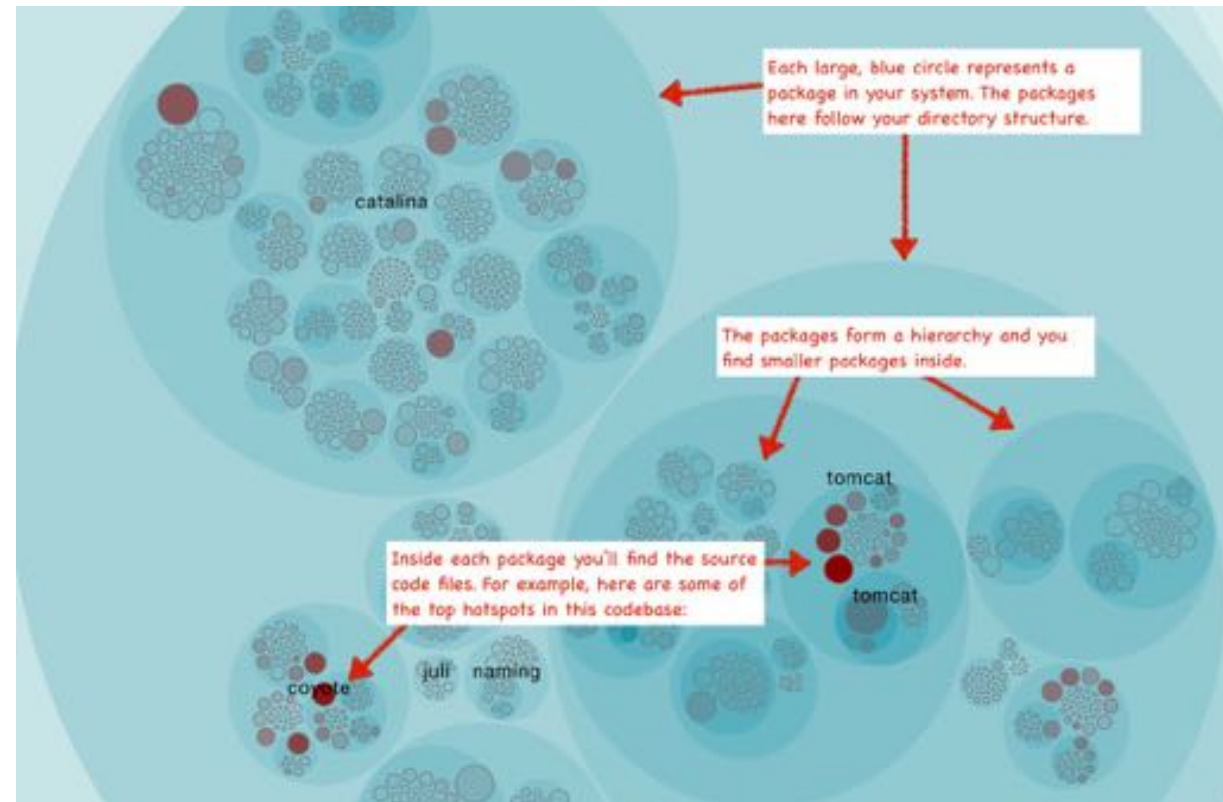
The Pragmatic Programmers

Investigate
Date: _____
Case #: _____
Location: _____

Your Code as a Crime Scene

Use Forensics
to Arrest Defects, Bottlenecks,
Bad Design in Your Code

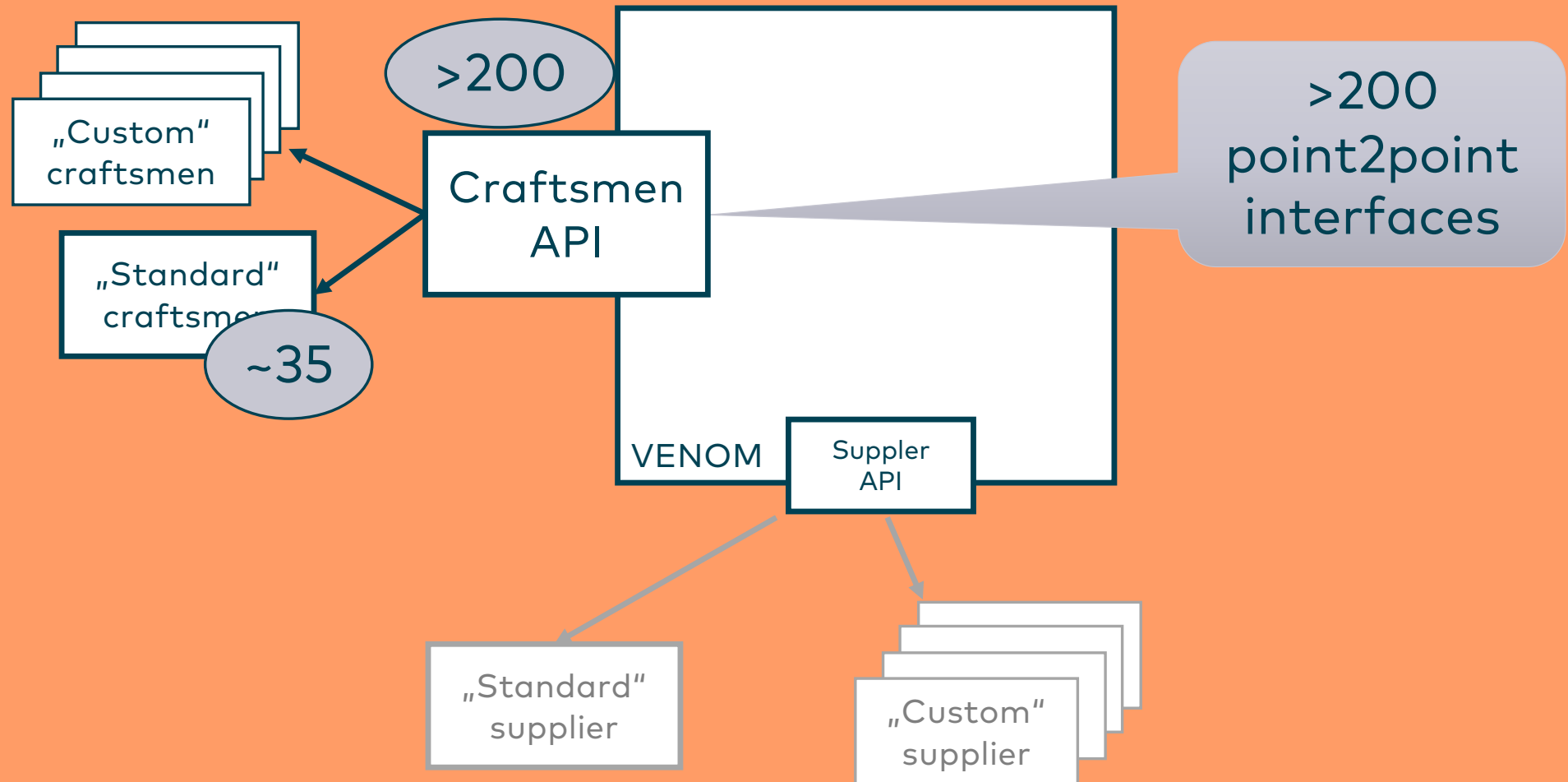
```
int j = 0; j < loc; j++) res[j] = buf  
n res;
```



Context

External interfaces

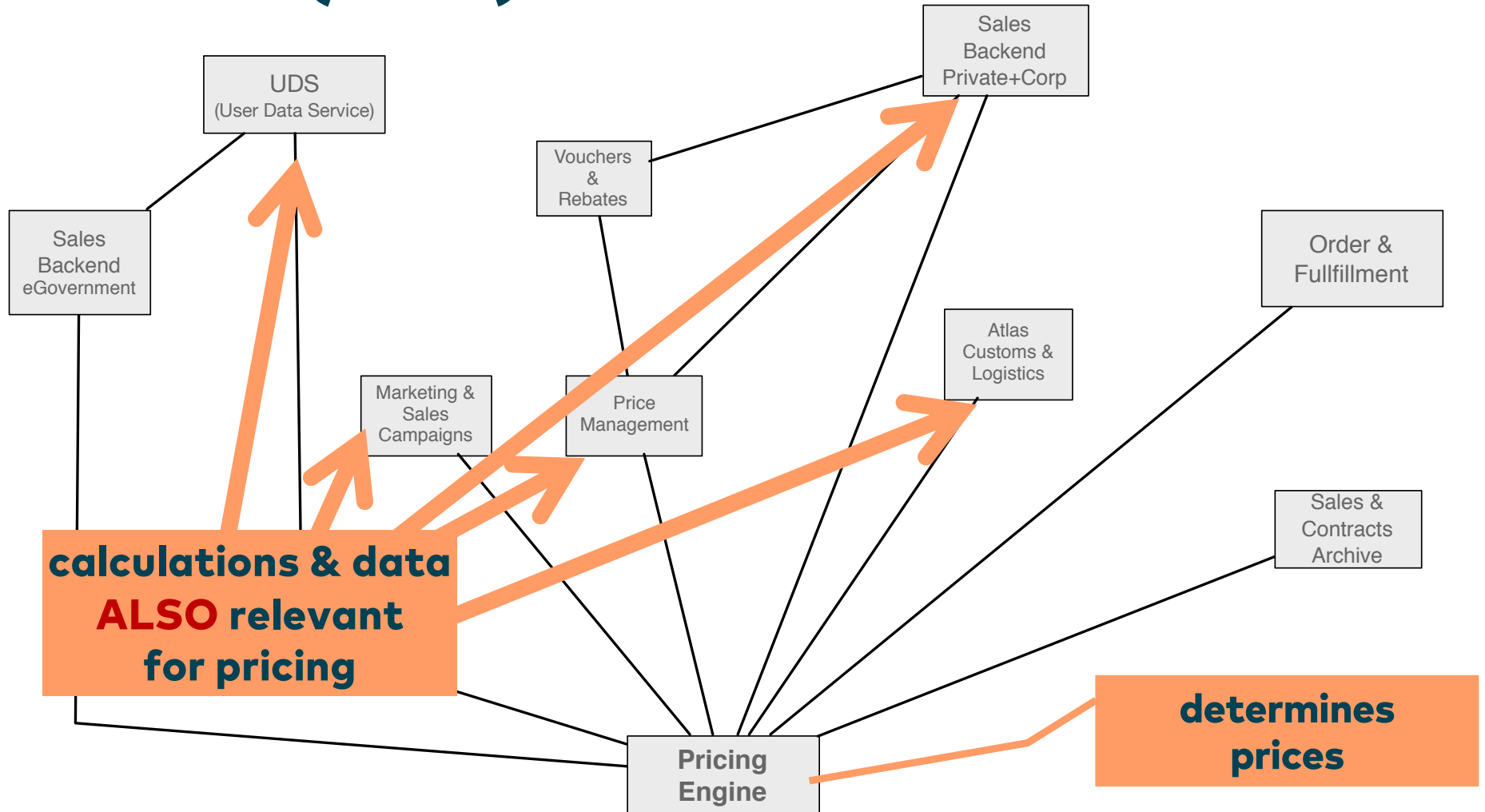
External Interface Hell



Cohesion

(does it belong together?)

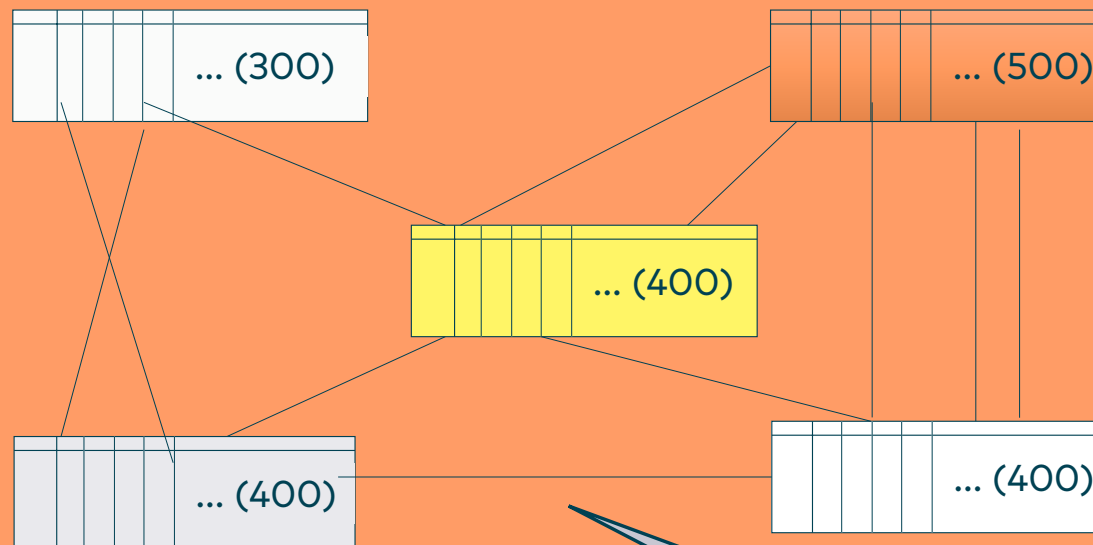
(bad) Cohesion



Analyse application data / data structures

**Databases, data-structures,
distribution, replication, etc**

Clean Code + Bad Persistence



relational DB,
„done wrong“

Technology

Appropriate?
Outdated?
Mis-used?

#3



<https://www.youtube.com/watch?v=xL4>



<https://www.youtube.com/watch?v=xL40UN5p6IY>

Example: Use of Rule-Engine

- Review identifies **deviation** from standard (concerning loading strategy of Working-Memory)
-
- (Standard) assumption:
few but **huge** data sets
- Reality: **many** but very **small** data sets





Quality



Structure



Metrics



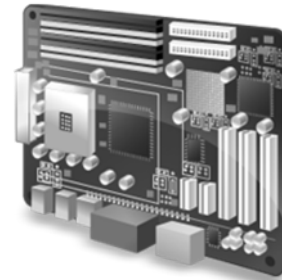
Security

```
except socket.error, (errno, strerror):
    print "socket error: (%s) %s" % (errno, strerror)
for h3 in page.findall("h3"):
    value = (h3.contents[0])
    if value != "Adfeling":
        print >> txt, value
        import codecs
        f = codecs.open("alle.txt", "r", encoding="utf-8")
        text = f.read()
        f.close()
        # open the file again for writing
        f = codecs.open("alle.txt", "w", encoding="utf-8")
        f.write(value+"\n")
        # write the original contents
        f.write(text)
        f.close()
```

Code



etc.



Technology



Application Data

Pro

- **overview by methodical assessment**
- **objective priorities**
- **balance between strategy and tactic**

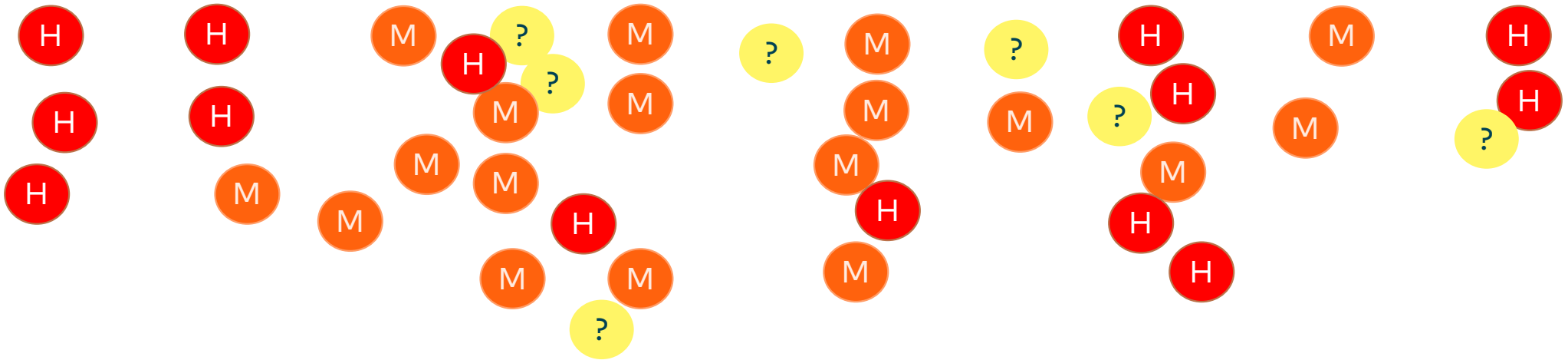


Our status:

LARGE number of problems

Breadth-first search

Stakeholder	Kontext	Qualität	Architektur	Code	Laufzeit	Daten	Tests	Prozesse	Infrastruktur	Security	...
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Priorities needed!

Pro

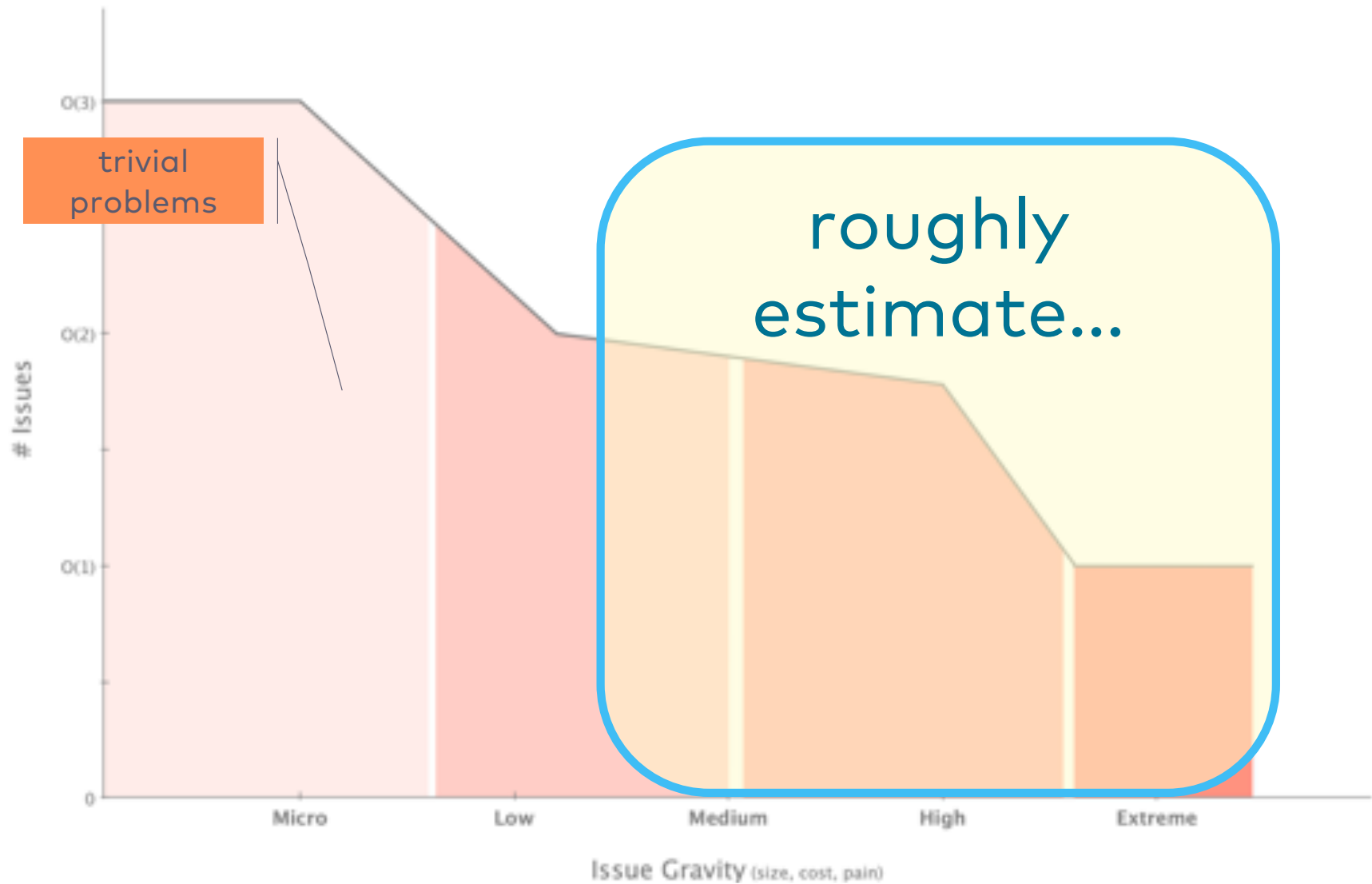
- overview by methodical assessment
- objective priorities
- balance between strategy and tactic



Proposal:

Map problems to money

prioritize / estimate problems



Only change something if
problem is **more expensive**
than its solution

**Issue
Cost**

>

**Improvement
Cost**

Estimation: Fundamentals...

Subject	What do we estimate
Unit	Time, money, effort, pain
(cost) factor	What influences the subject?
Assumptions	What do we estimate/guess about these factors
Observation	Metrics, counts etc. of single factors
Probability	How sure are we of these numbers?

Pro

- overview by methodical assessment
- objective priorities
- **balance between strategy and tactic**



Scheduling Improvements

day-to-day development

Practices

Practices

Practices

Practices

Practices

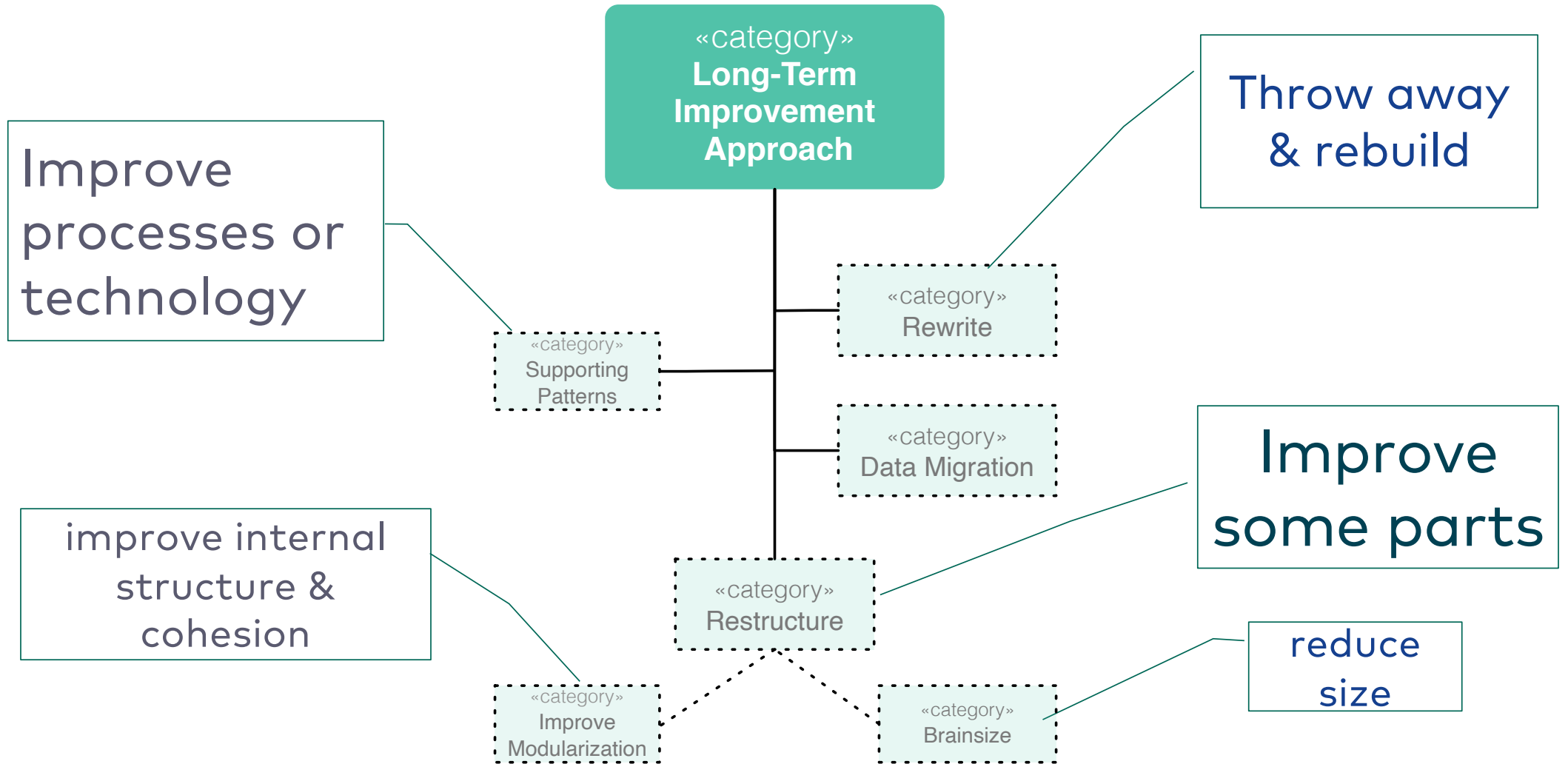
Practices

Approaches

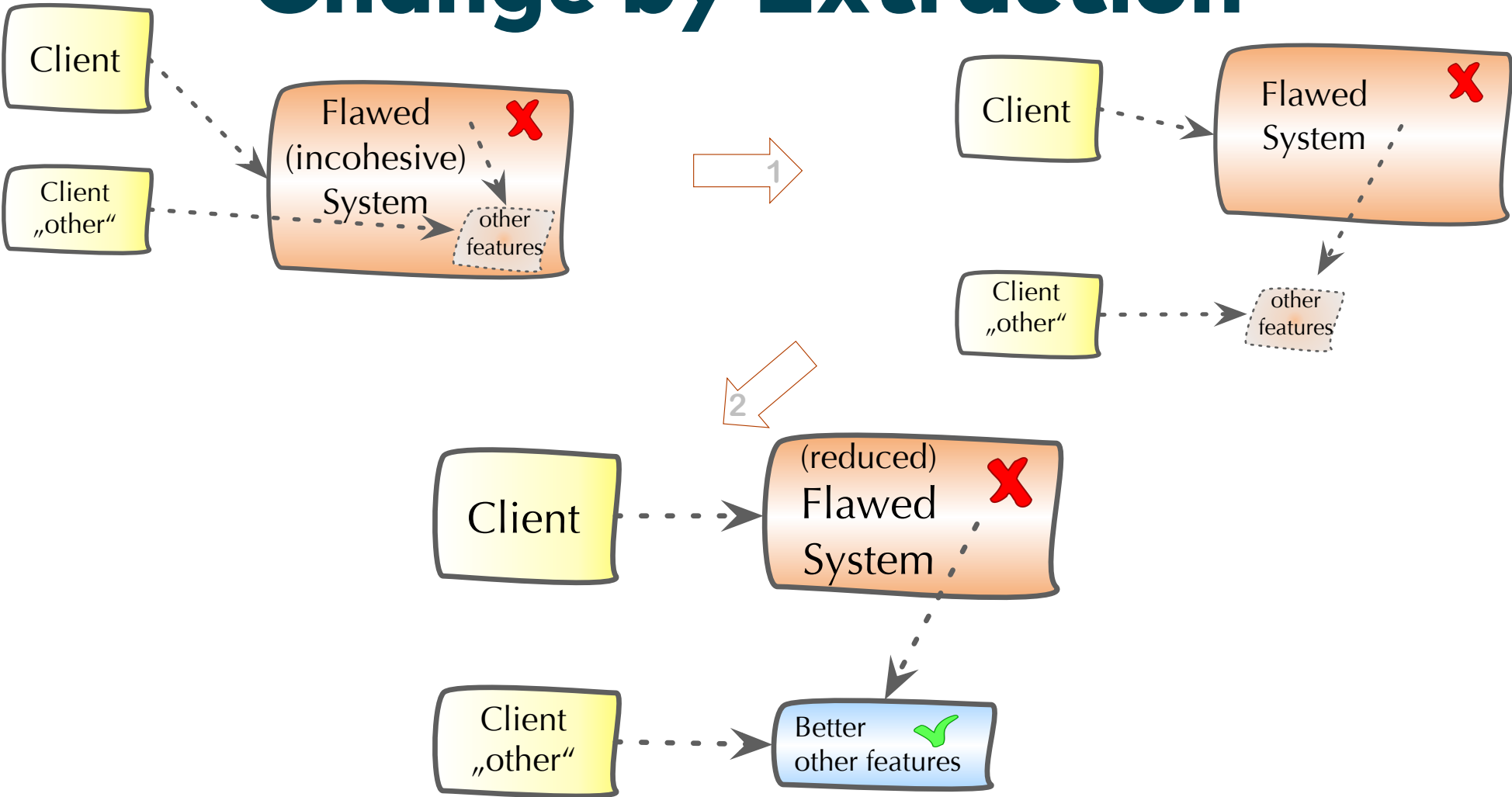
time



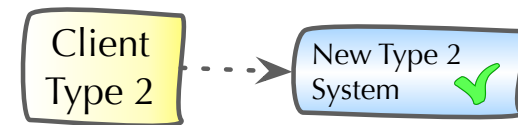
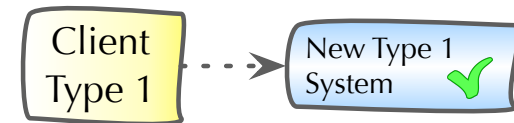
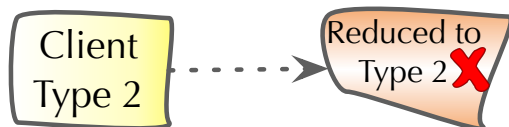
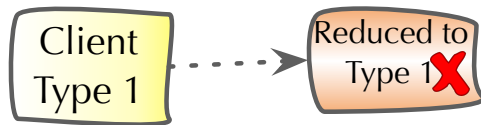
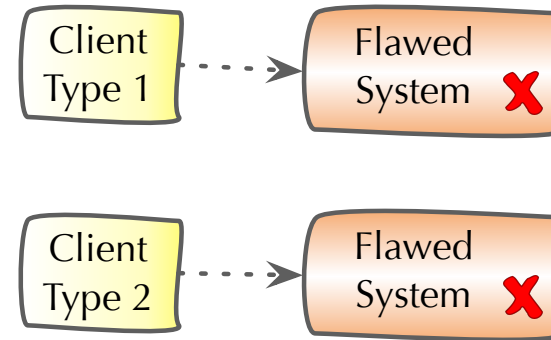
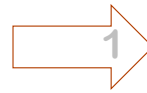
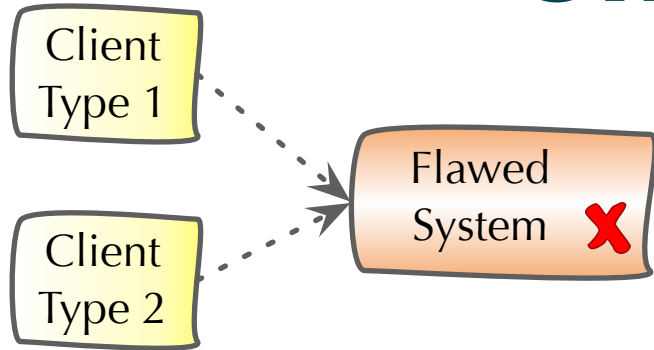
Categories of long-term improvements...



Change by Extraction

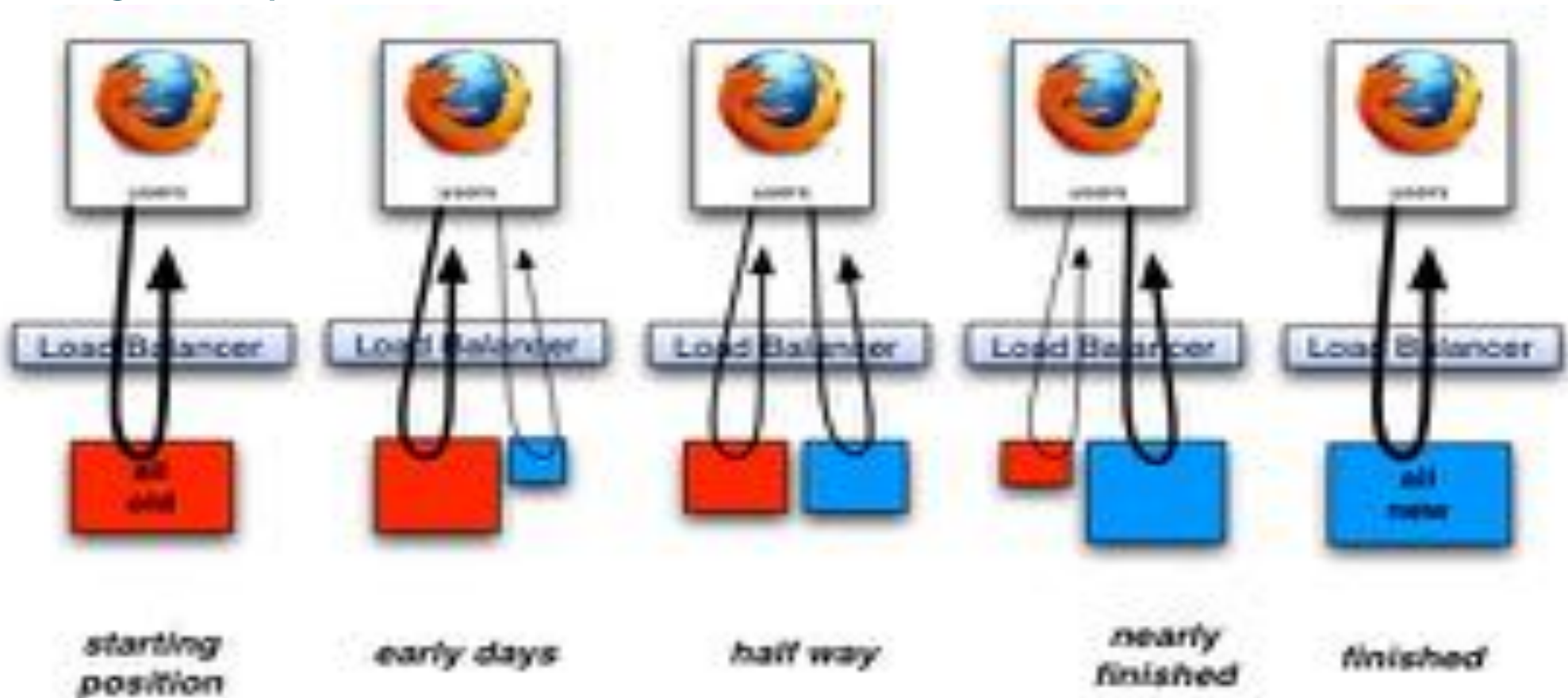


Change by Split



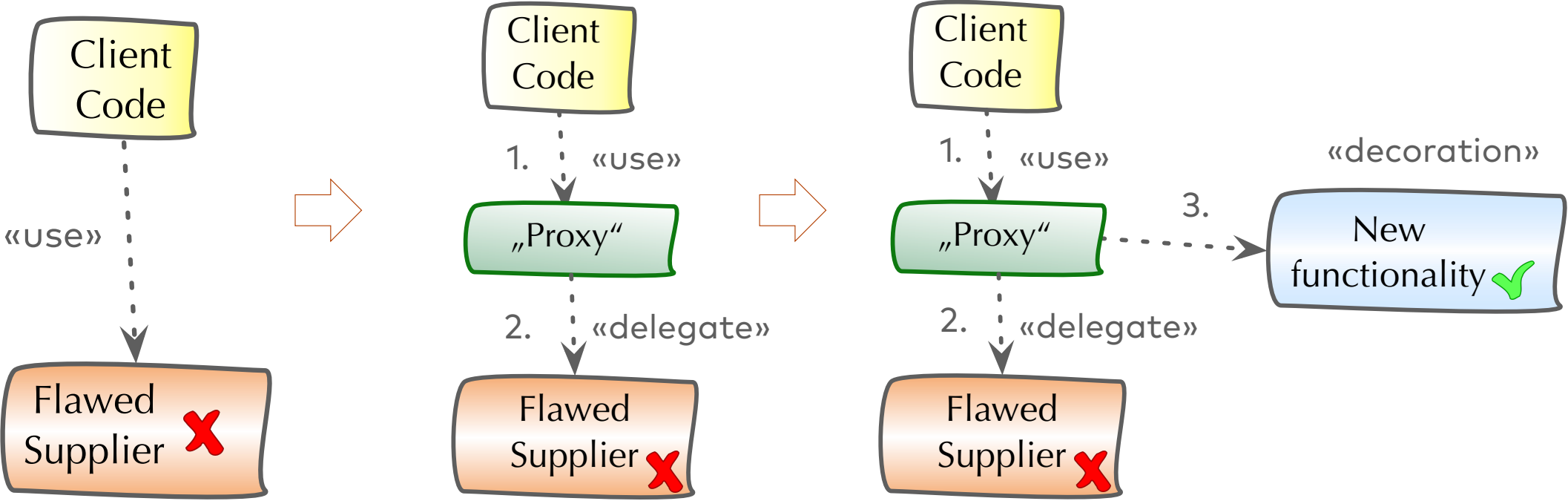
Change by Switch („Strangulizer“)

Original by Paul Hammant:



<http://paulhammant.com/2013/07/14/legacy-application-strangulation-case-studies/>

Decorating Collaborator



Beware of the database...

**it's usually harder to improve
than the code**



Summary

1. Identify problems
2. Prioritize
3. Change



<https://aim42.org>

Thankx.

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