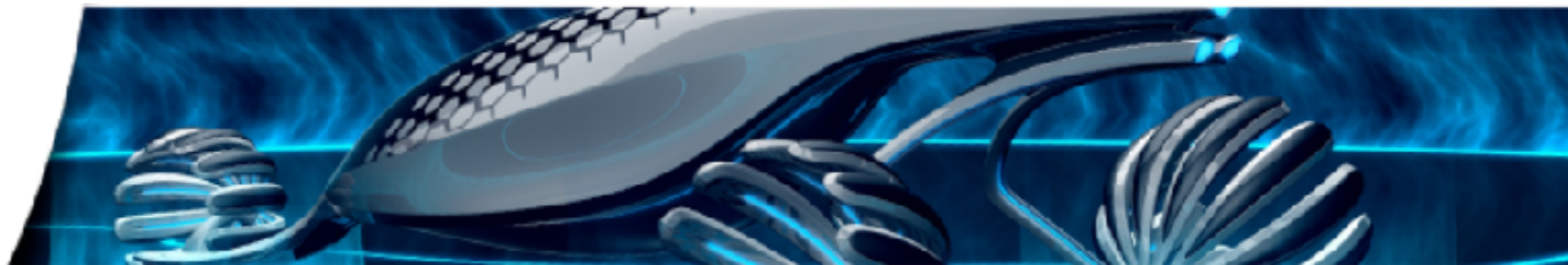


Agile Software Engineering

Opportunities for Industry 4.0

Prof. Serge Demeyer
(September 2017 — Launching Sabbatical in Lille)

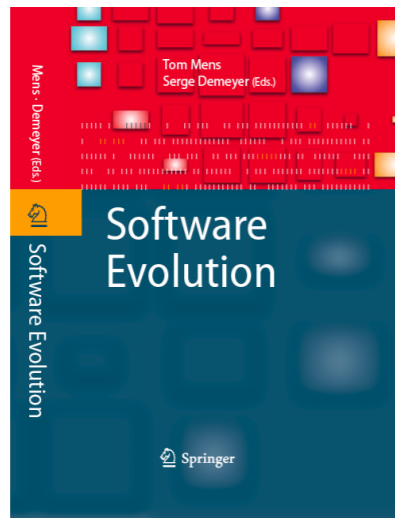
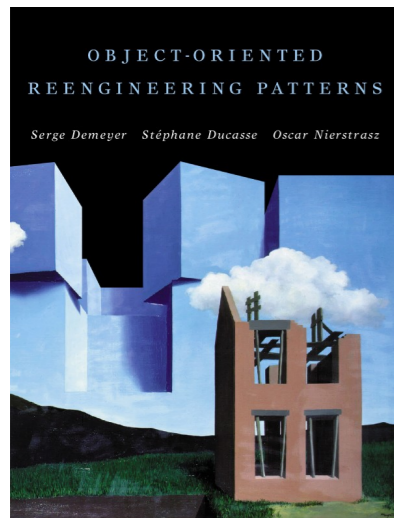


Google Scholar

Citation indices	All	Since 2011
Citations	5299	2045
h-index	38	23
i10-index	74	48



Top Publications



Spin Off & Start Up

Books

- 2 books
- 3 proceedings (editor)



Best Teacher's Award



in vitro

in vivo



Agile Software Engineering

Opportunities for Industry 4.0



Cyber Physical Systems



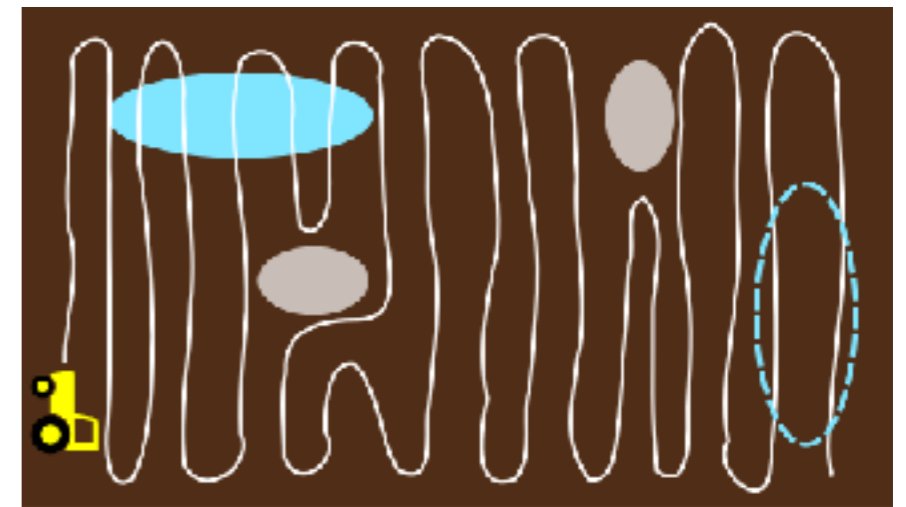
- sensors
 - ... enumerable
- moves
 - ... efficiently
- physics
 - ... modelling
- manufacturing
 - ... industrially viable

smart !

Smart Logistics



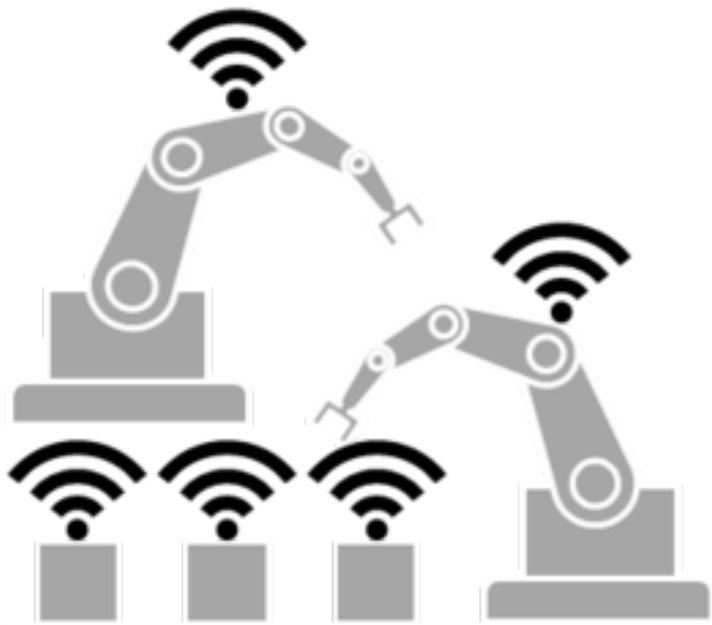
Smart Agriculture



FLANDERS
MAKE
MANUFACTURING INNOVATION NETWORK



 **iMinds**



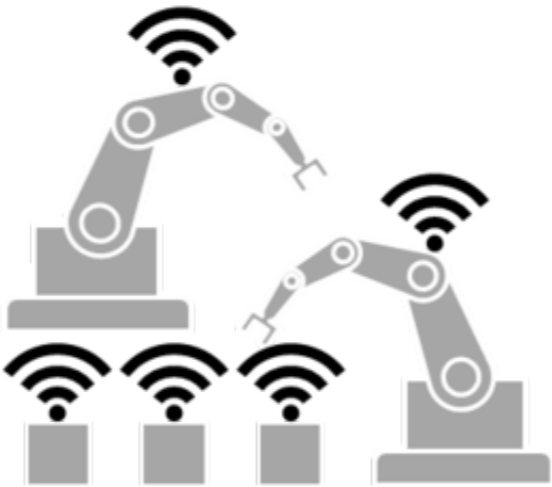
Industry 4.0



Internet of
Things

variability

"lot size 1"



safety

- IEC 62061 (mechatronics)
- RTCA/DO-178C (avionics)
- IEC 62304 (medical)
- ISO 26262 (automotive)

agility

rapid customer feedback
faster release cycles

DJIA ▼ 19885.73 -0.03%

U.S. 10 Yr ▼ 0/32 Yield 2.397%

Euro ▼ 1.0602 -0.39%



THE WALL STREET JOURNAL.



ESSAY

Why Software Is Eating The World

By MARC ANDREESSEN

August 20, 2011

Six decades into the computer revolution, four decades since the invention of the microprocessor, and two decades into the rise of the modern Internet, all of the technology required to transform industries through software finally works and can be widely delivered at global scale.

Agile Software Engineering

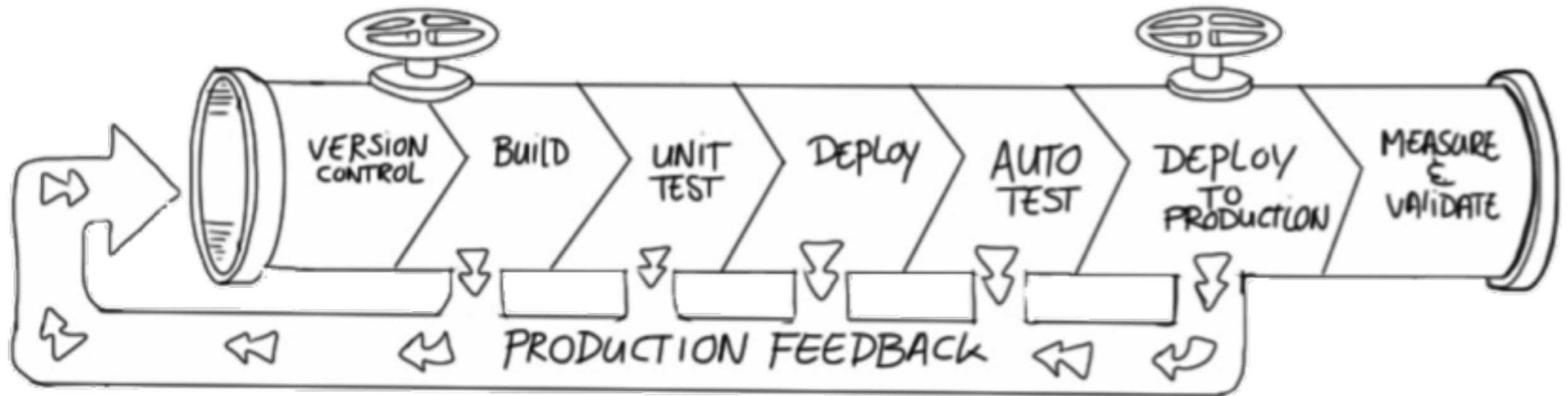
—
Opportunities for Industry 4.0



No Silver Bullet

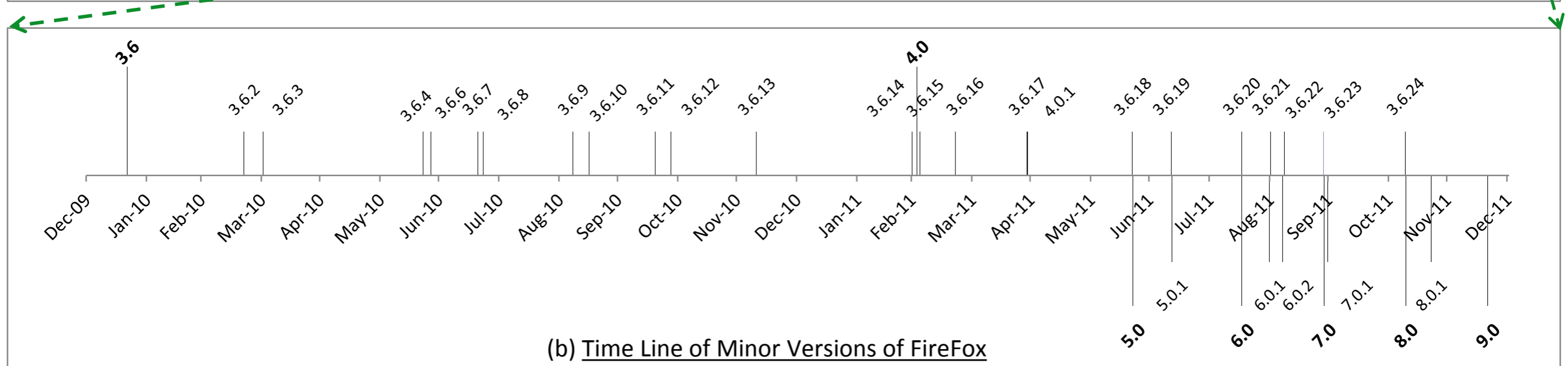
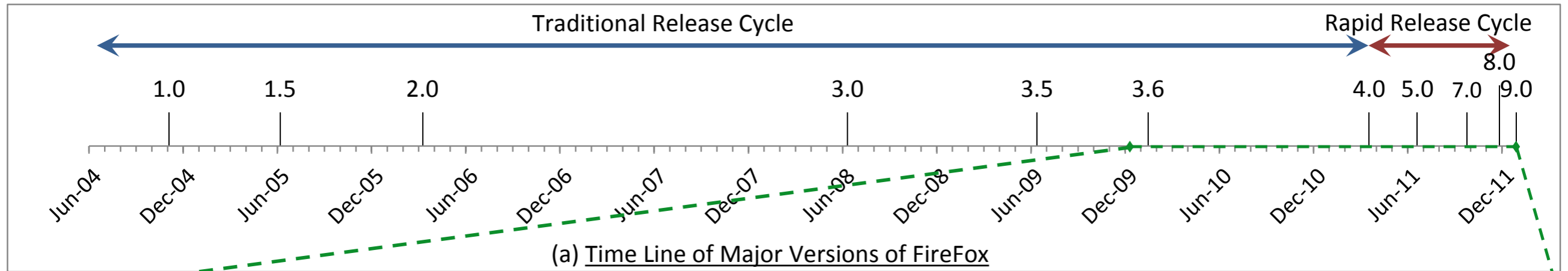
**Essence and Accidents of
Software Engineering**

Continuous Integration / Deployment

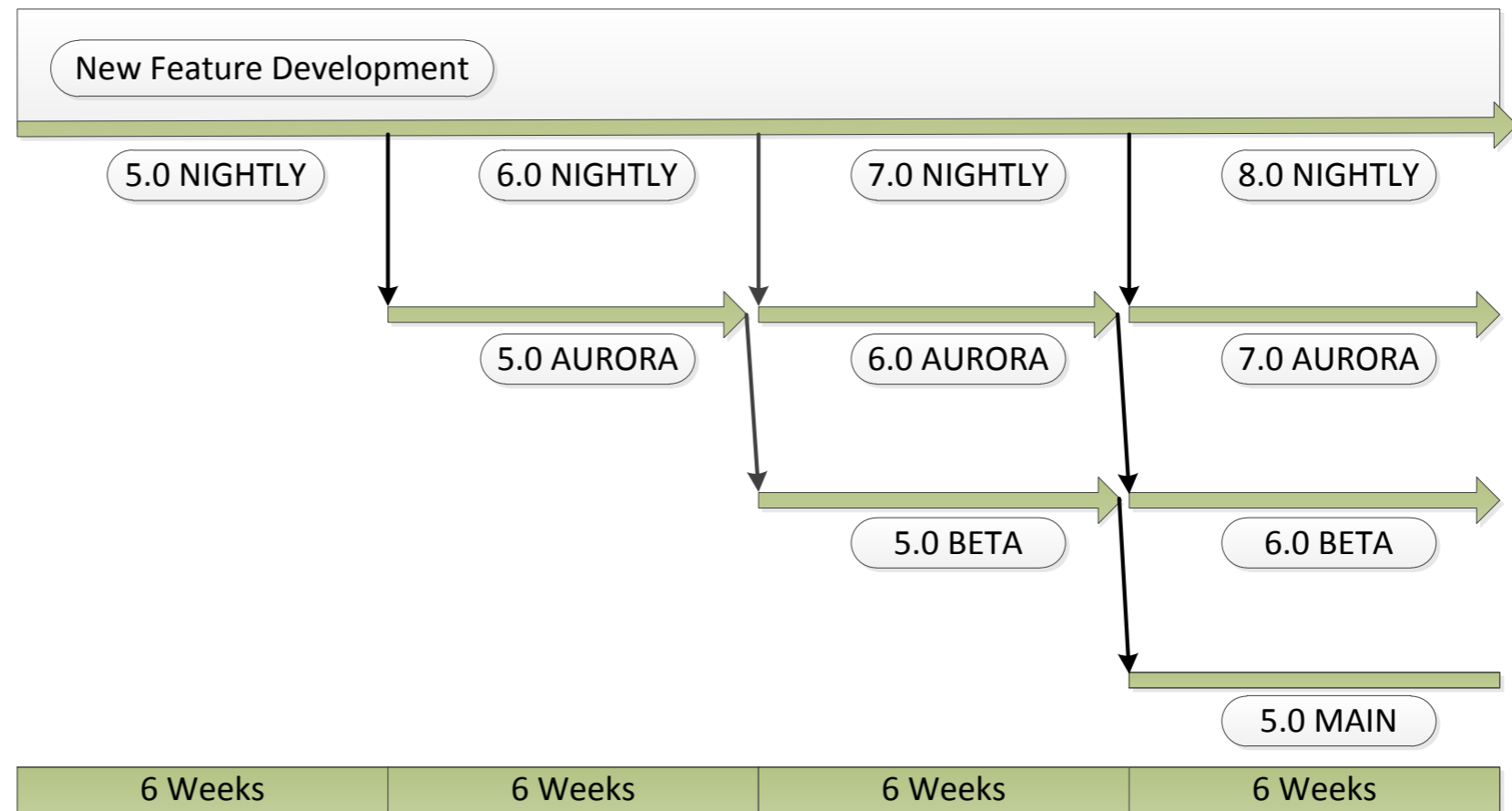
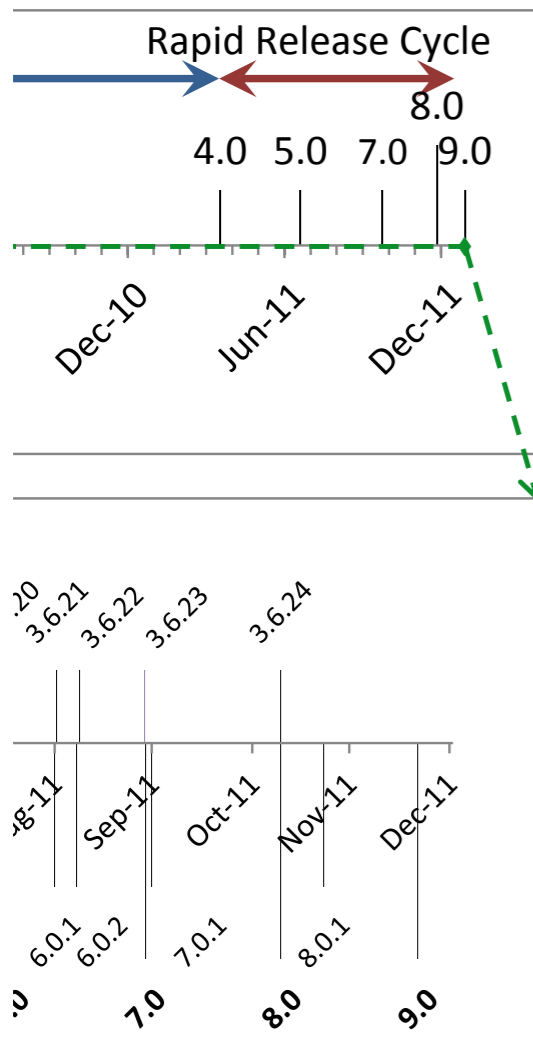


<<Breaking the Build>>





[Khom2014] Khomh, F. Adams, B, Dhaliwal, T and Zou, Y Understanding the Impact of Rapid Releases on Software Quality: The Case of Firefox, Empirical Software Engineering, Springer. <http://link.springer.com/article/10.1007/s10664-014-9308-x>



- ✓ bugs are fixed faster
(but ... harder bugs propagated to later releases)
- ✓ amount of pre- & post-release bugs \pm the same
- ✓ the program crashes earlier
(perhaps due to recent features)

Software Repositories & Archives

Version Control

- CVS, Subversion, Git, ...
- Rational ClearCase
- Perforce,
- Visual Source Safe
- ...

Automate the Build

- make
- Ant, Maven
- MSBuild
- OpenMake
- Build Forge



All of a sudden empirical research has what any empirical science needs: a large corpus of objects to analyze.

[Bertrand Meyer's technology blog]

Issue Tracking

- Bugzilla
- BugTracker.NET
- ClearQuest
- JIRA
- Mant
- Visual Studio Team Foundation Server
- ...

Automated Testing

- HP QuickTest Professional
- IBM Rational Functional Tester
- Maveryx
- Selenium
- TestComplete
- Visual Studio Test Professional
Microsoft 2010
- ...

... mailing archives, newsgroups, chat-boxes, facebook, twitter, ...

Agile Software Engineering

—
Opportunities for Industry 4.0

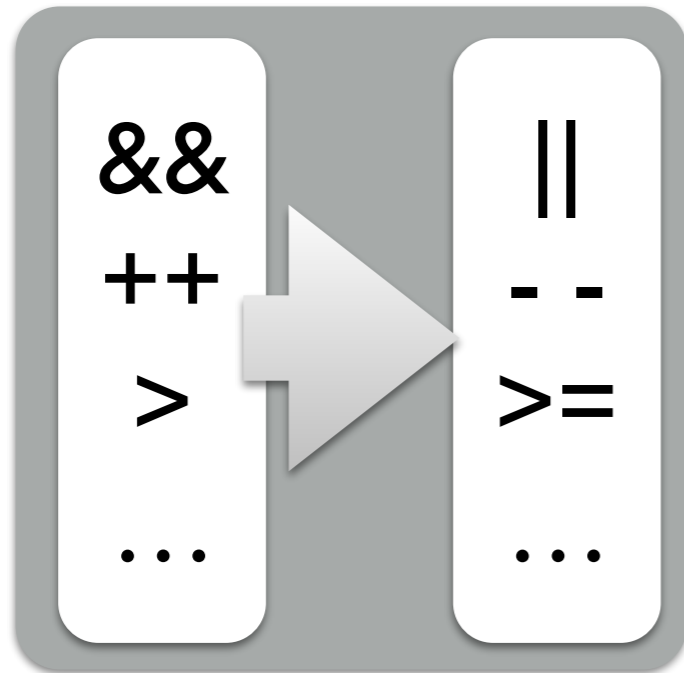


No Silver Bullet

Essence and Accidents of Software Engineering

Mutation Testing

mutators



source code

```
public static int search(int key, int[] a) {
    int lo = 0;
    int hi = a.length - 1;
    while (lo <= hi) {
        // Key is in a[lo..hi] or not present.
        int mid = lo + (hi - lo) / 2;
        if (key < a[mid]) hi = mid - 1;
        else if (key > a[mid]) lo = mid + 1;
        else return mid;
    }
    return -1;
}
```

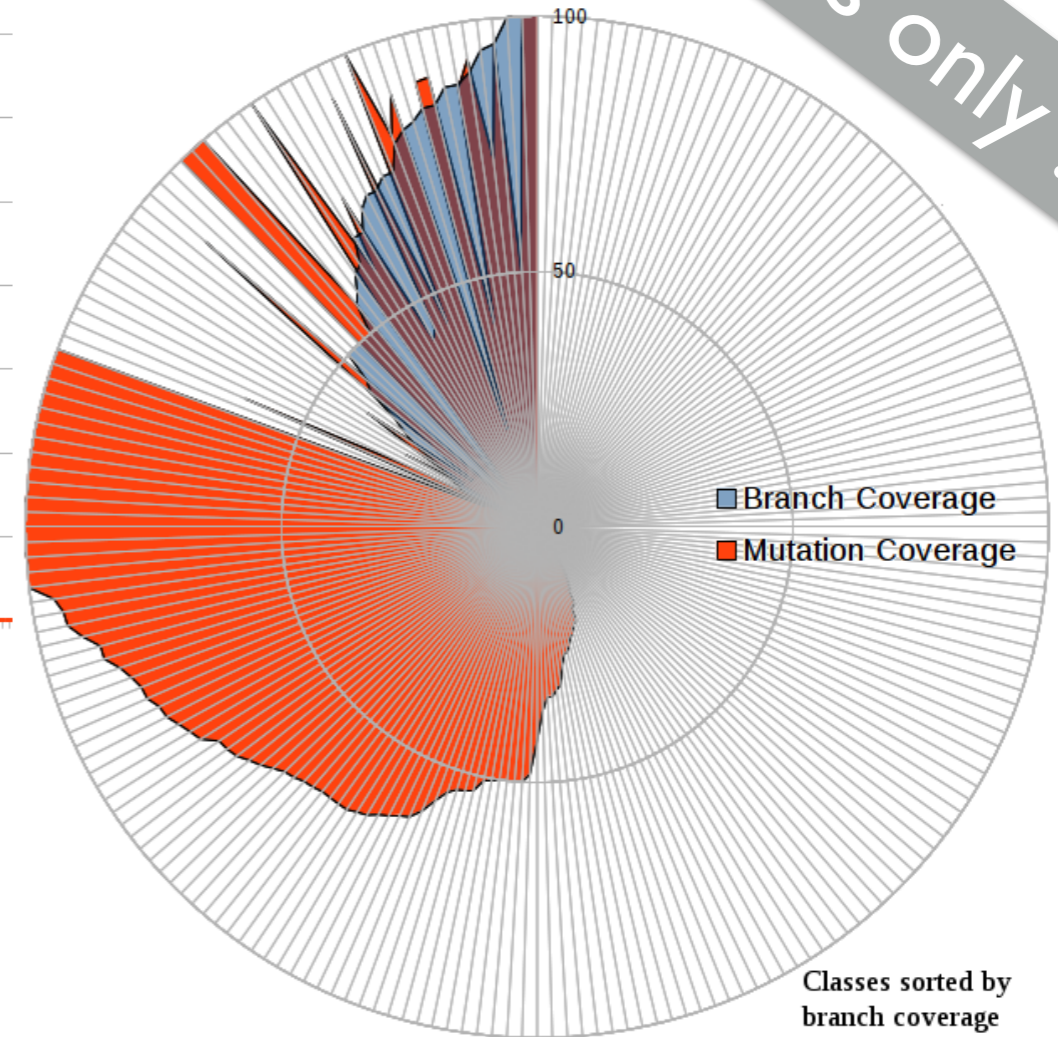
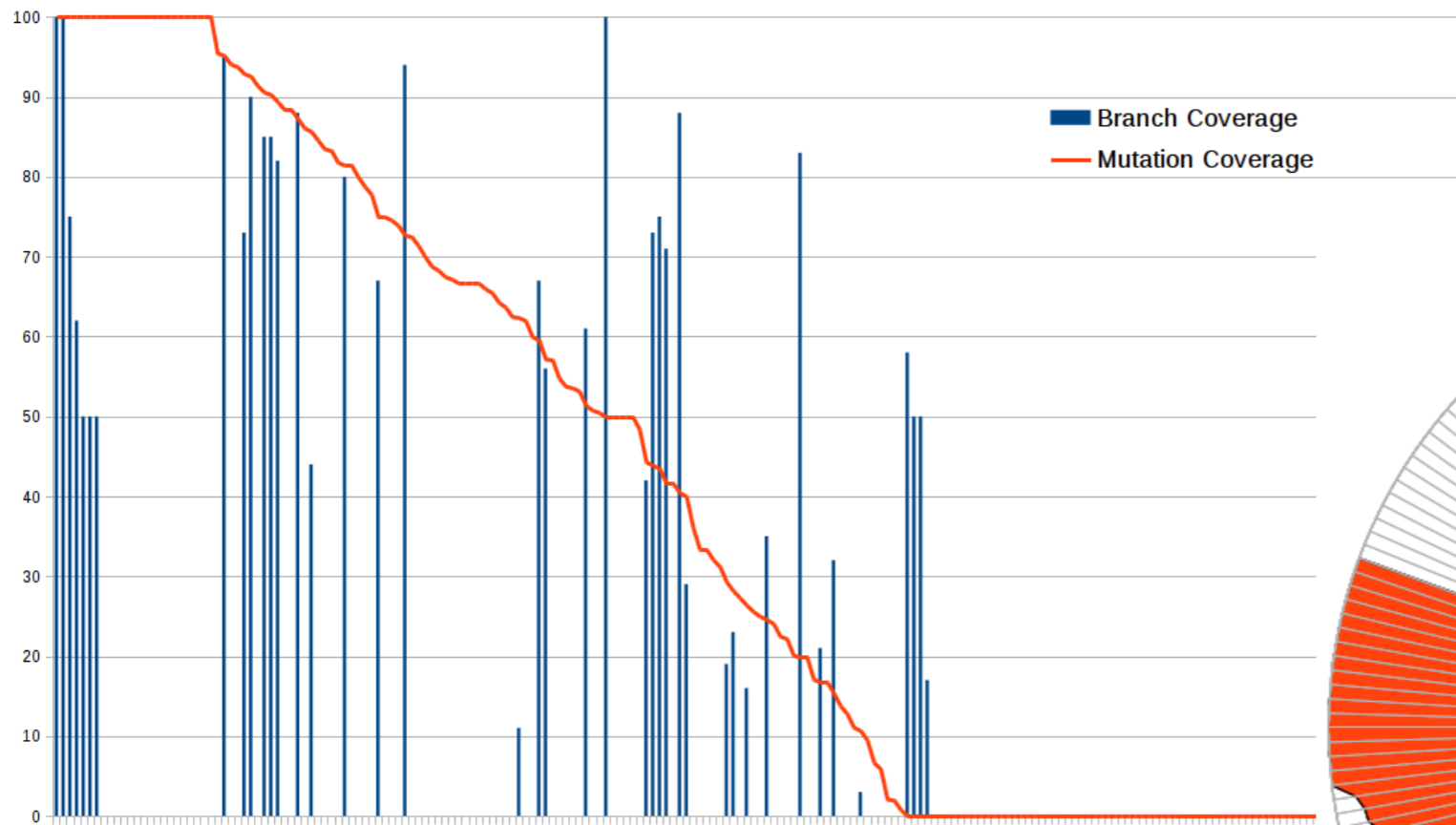
mutant 1

```
public static int search(int key, int[] a) {
    int lo = 0;
    int hi = a.length - 1;
    while (lo <= hi) {
        // Key is in a[lo..hi] or not present.
        int mid = lo + (hi - lo) / 2;
        if (key <= a[mid]) hi = mid - 1;
        else if (key > a[mid]) lo = mid + 1;
        else return mid;
    }
    return -1;
}
```

mutant 2

```
public static int search(int key, int[] a) {
    int lo = 0;
    int hi = a.length - 1;
    while (lo <= hi) {
        // Key is in a[lo..hi] or not present.
        int mid = lo + (hi - lo) / 2;
        if (key < a[mid]) hi = mid - 1;
        else if (key >= a[mid]) lo = mid + 1;
        else return mid;
    }
    return -1;
}
```

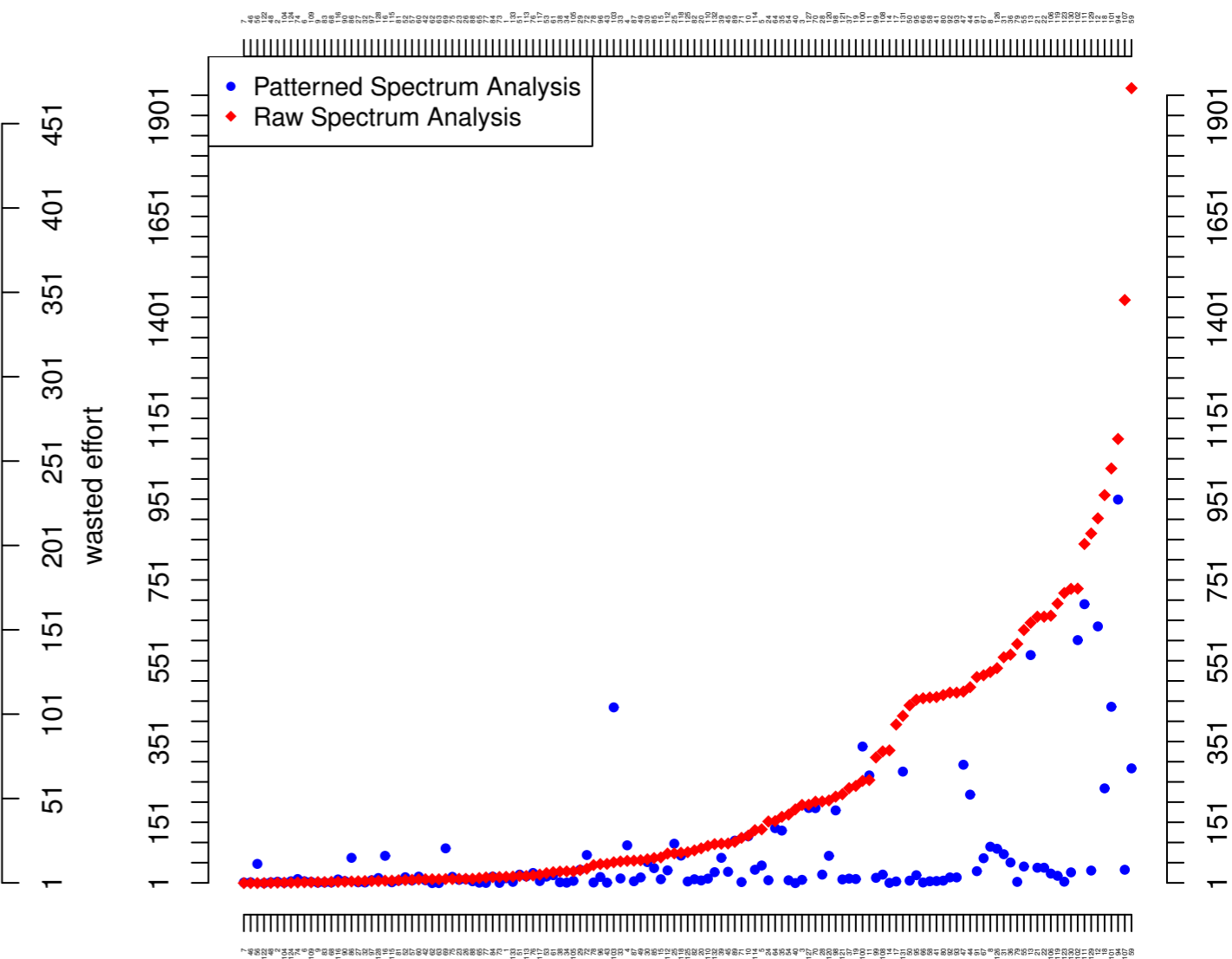
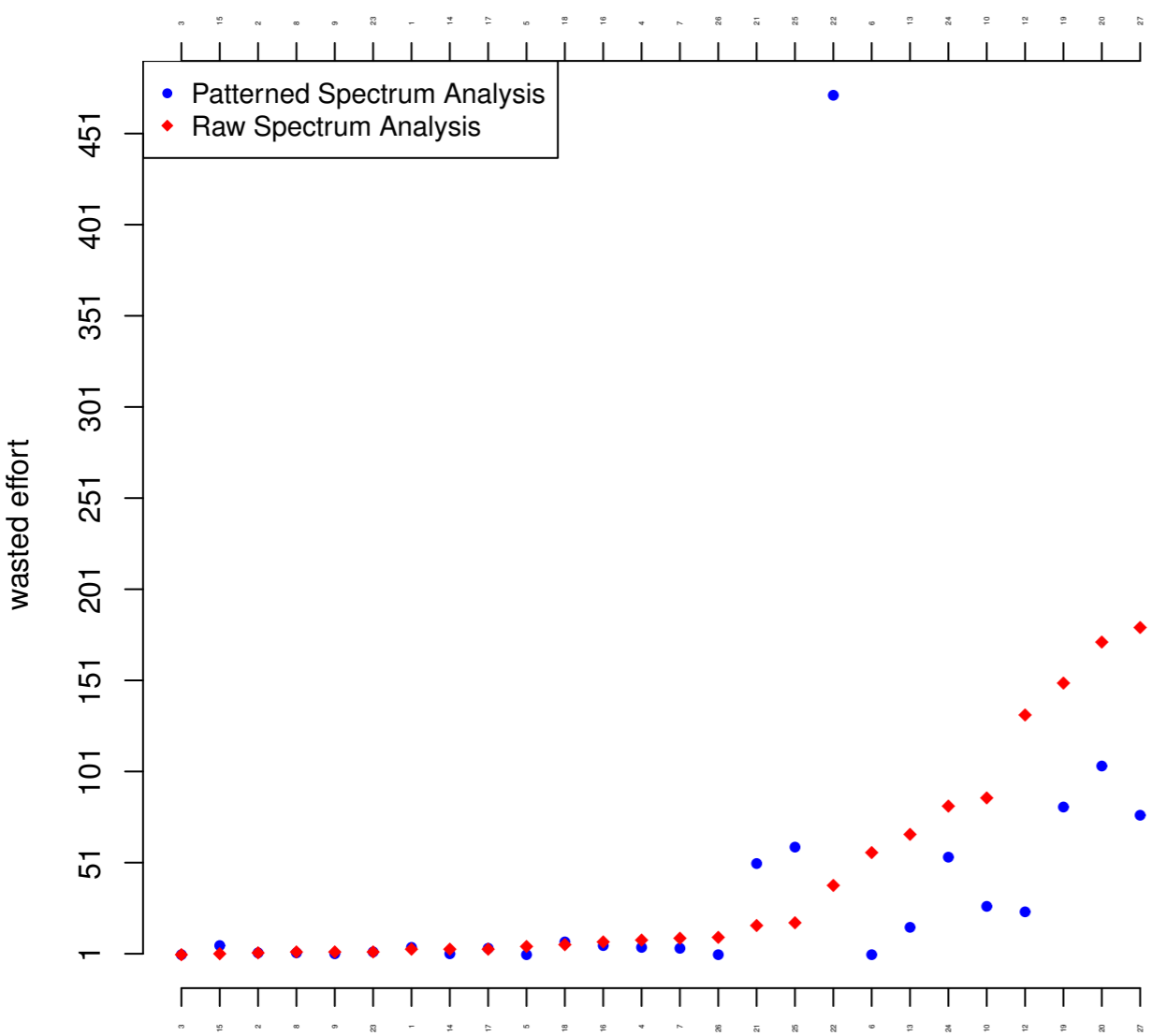
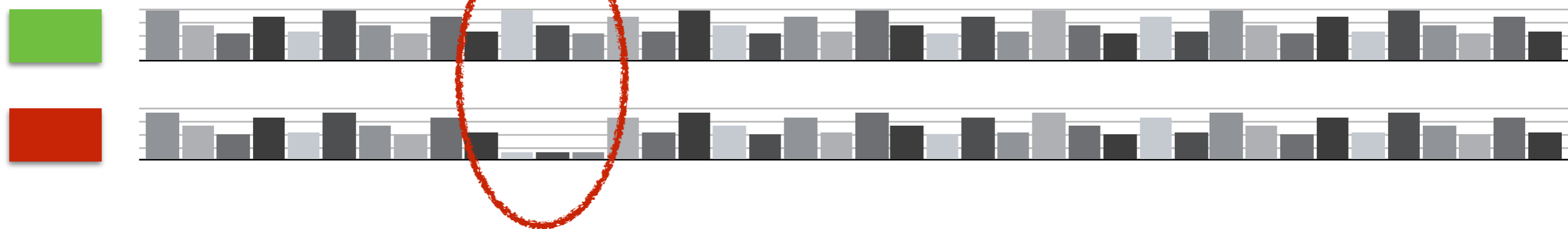

Branch Coverage vs. Mutation Coverage



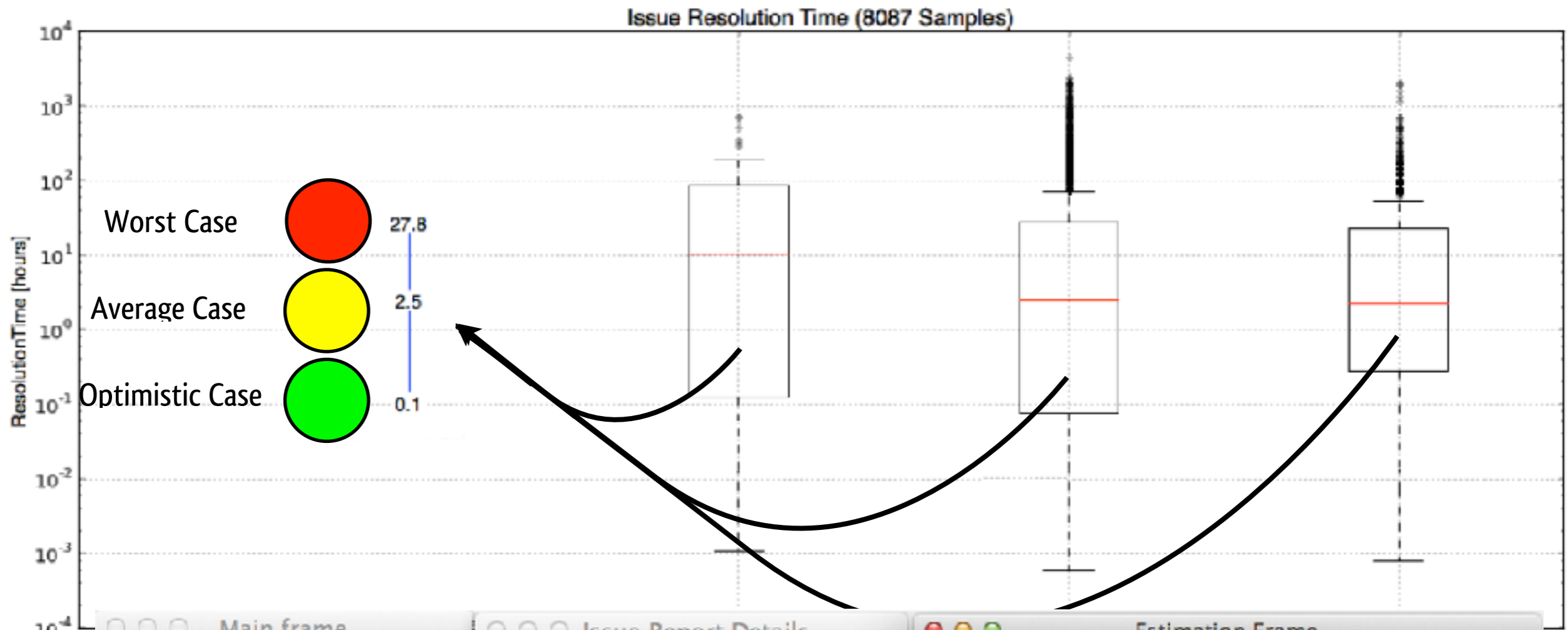
Unit tests only !

Classes sorted by branch coverage

Spectrum Based Fault Localisation



Estimating "Time to Fix"



Main frame

Issue Report Details

Estimation Frame

Exit

Close

Saved

10111 - subtask test, this i

10112 - sub requirement 1

10132 - mise en forme du tex

10133 - NEW SCT PLAYOUT: bou

10154 - Add order to materia

10161 - When a user tries to

10176 - Remove file names

10187 - Vue globale des jeux

10214 - Show amount of waste

10220 - Sofie

Compute Estimation

issueID : 10176

projName : 'TVN Requirements'

assignee : [REDACTED]

priority : '3'

type : 'Request'

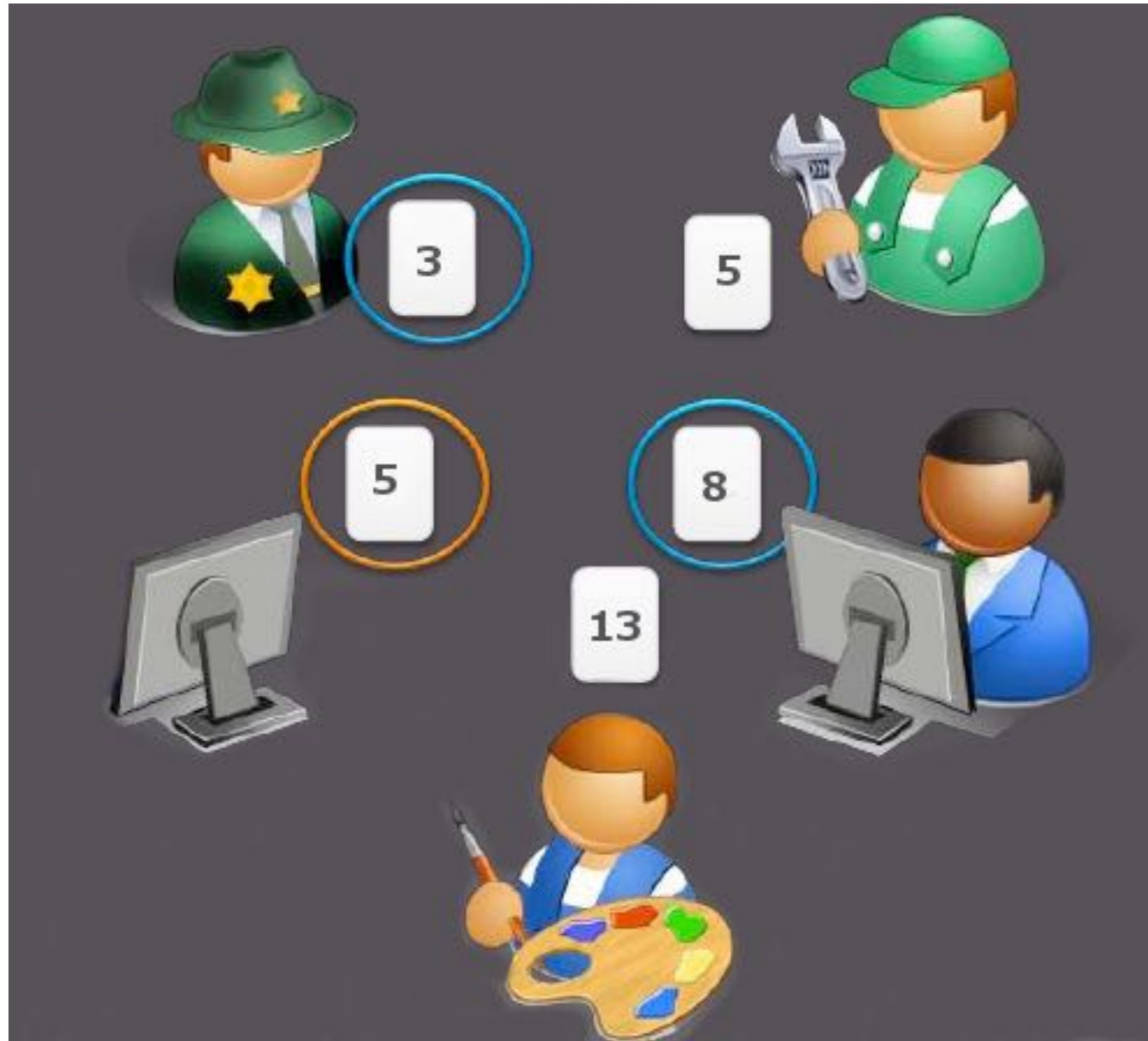
reporter : [REDACTED]

Certainty: [Low (25%), Median (50%), High (75%)]

Issue will be fixed in less than [0.99, 3.4, 31.22] hours

↑ ↑ ↑

Planning Poker

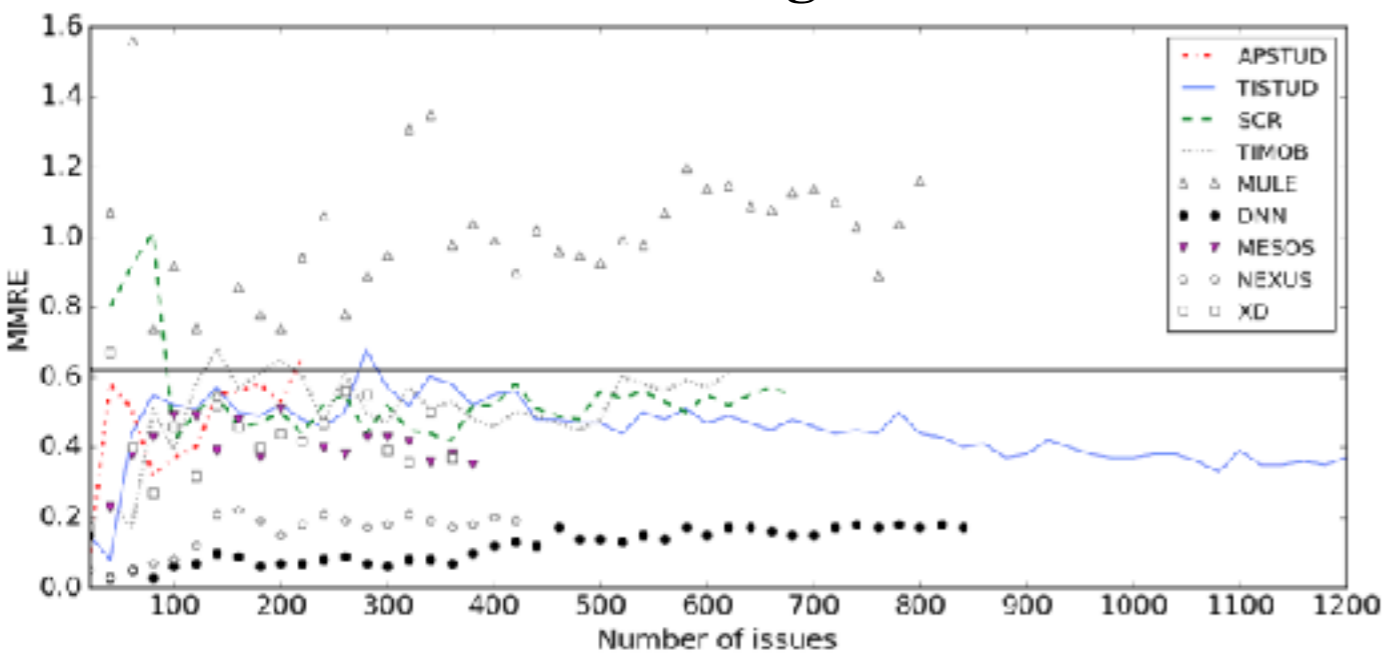


Student Work

Project	Total est.	Correct est.	MMRE	MMRE
APSTUD	228	143	0.61	0.22
XD	360	223	0.42	0.17
MESOS	387	223	0.39	0.16
NEXUS	421	341	0.16	0.07
TIMOB	634	380	0.6	0.19
SCR	699	413	0.5	
MULE	805	416	1.07	0.66
DNN	858	669	0.16	0.08
TISTUD	1215	810	0.35	0.19
<i>mean</i>	<i>623</i>	<i>402</i>	<i>0.47</i>	

Human
MMRE: **0.48**

Learning Curve



Emotion Analysis

"you're one of the worst offenders"

"It's been too scary for years"

"scolding people [...] is not likely to encourage people [...] to become senior developers"

"I like offending people, because I think people who get offended should be offended"

PARENTAL
ADVISORY
EXPLICIT CONTENT

Emotion Analysis — Results

Can human raters agree on the presence or absence of emotions in issue reports?

	%agreement (#)	%agreed presence (#)	%agreed absence (#)	lower κ	Cohen κ	upper κ
love	92.35±5 (362)	5.61±5 (22)	86.73±5 (340)	0.41	0.55	0.69
joy	82.40±5 (323)	3.83±5 (15)	78.57±5 (308)	0.07	0.20	0.33
surprise	89.54±5 (351)	0.77±5 (3)	88.78±5 (348)	-0.06	0.07	0.21
anger	90.56±5 (355)	0.26±5 (1)	90.31±5 (354)	-0.10	0.00	0.10
sadness	91.58±5 (359)	3.57±5 (14)	88.01±5 (345)	0.25	0.41	0.58
fear	87.76±5 (344)	1.02±5 (4)	86.73±5 (340)	-0.05	0.08	0.21

Can't push to Heroku (non-fast-forward) [Rails]




▲ 0 ▼
 I'm having troubles pushing some code to Heroku. I'm still in the process of learning how all of these tools work, so I'm going to paste what I just did.

```
[...]
saasbook@saasbook:~/typo$ git push heroku master
To https://git.heroku.com/still-ravine-4135.git
! [rejected]        master -> master (non-fast-forward)
error: failed to push some refs to 'https://git.heroku.com/still-ravine-4135.git'
To prevent you from losing history, non-fast-forward updates were rejected
Merge the remote changes (e.g. 'git pull') before pushing again. See the
'Note about fast-forwards' section of 'git push --help' for details.
saasbook@saasbook:~/typo$ git push origin master
Username for 'https://github.com': FranGoitia
Password for 'https://FranGoitia@github.com':
Everything up-to-date
[...]
```

Any help would be really appreciated. Thanks

asked Jan 26 at 13:48

 **FranGoitia**
 60 ● 1 ● 7

[ruby-on-rails](#) [ruby](#) [git](#) [heroku](#)

2 Answers

T

R active oldest votes

▲ 1 ▼

```
git push origin master
To https://github.com/Joey-proc
! [rejected]        master -> master
error: failed to push some refs to 'https://github.com/Joey-proc'
```

has been discussed here before.

✓ A main reason of this happening remote branch.

Answers [Joey]	Lower	Equal	Higher
Accepted [0.08]	752 (39.1%)	3 (0.2%)	1167 (60.7%)
Up-voted [0.28]	865 (45%)	3 (0.2%)	1054 (54.8%)
Down-voted [0.14]	1693 (88.1%)	0 (0%)	229 (11.9%)

If I remember correctly, one has to use something similar like:

```
git fetch origin; git merge origin/master
```

H [code push to heroku not working](#) might come in handy, which has a link regarding your problem.

Answers	Joey	Answer_Bot
Accepted	4/50 (0.08)	1/13 (0.08)
Up-voted	14/50 (0.28)	0
Down-voted	7/50 (0.14)	3/13 (0.23)

Thank you very much ! - [FranGoitia](#) Jan 26 at 15:25

Plans

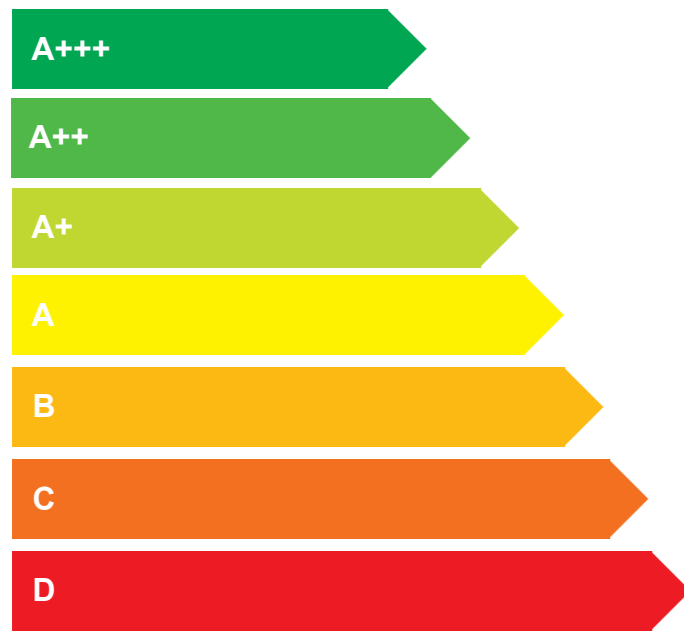


Joint Projects

Publish (or perish)

Review

Talk



Talk

1 on 1 conversation with each one of you

Week x: we make an appointment
Send a couple of key papers in advance

Week x+ 1: We discuss the past, present & future
of your career



Review

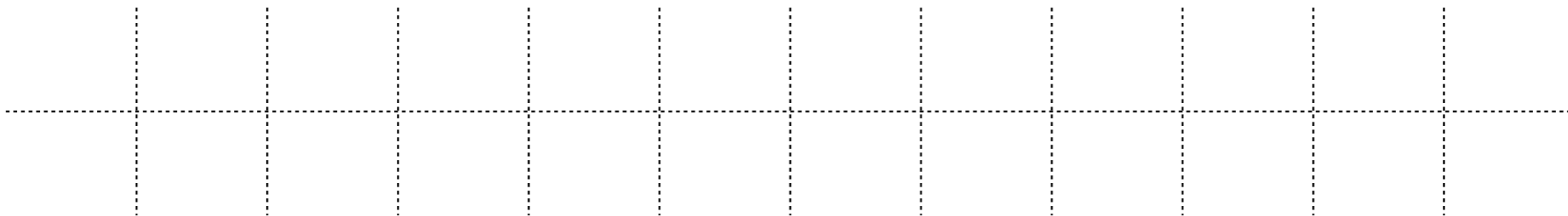
Dry-run review of program committee

- 10 days:
request to review

- 5 days:
send alfa version

- 2 days:
review

Submission
deadline

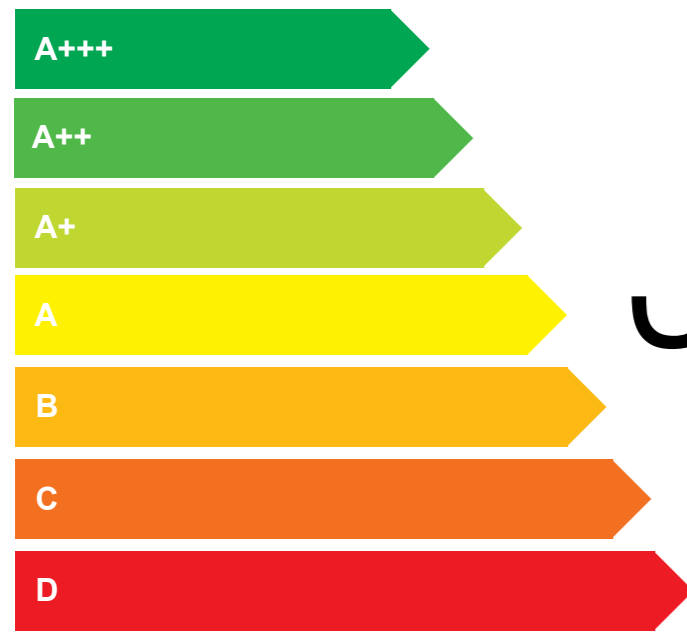




Publish (or perish)

Co-author on your paper

I will rewrite your abstract / intro / conclusion



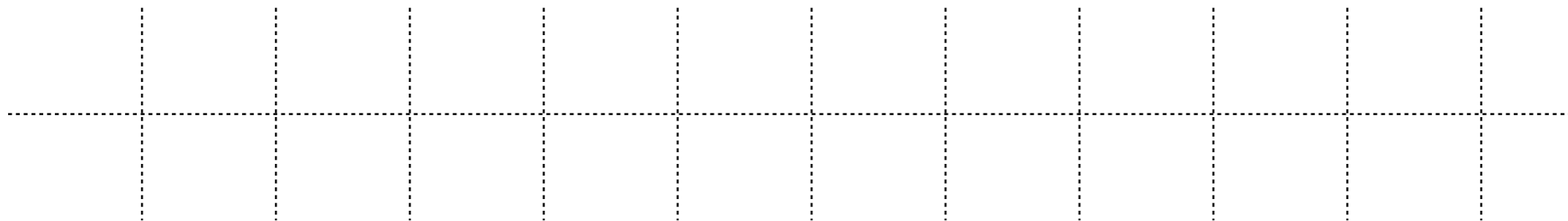
Joint Project 1

Back-in time simulation: effectiveness of mutation testing

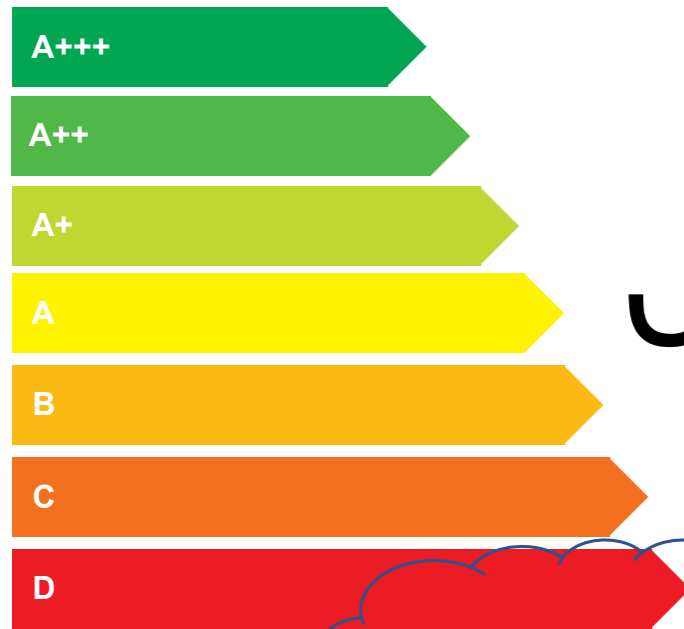
Bug-inducing commit
?? Mutation Analysis ??

Nasty bug: reported

Nasty bug: resolved



Joint Project 2



Automated & Manual

Manual

Business Facing

Functional Tests Examples Story Tests Prototypes Simulation	Exploratory Testing Scenarios Usability Testing Acceptance Testing Alpha / Beta
Unit Tests Component Tests	Performance Testing Load Testing Security Testing "ility" Testing

Supporting Team

Critique Product

Automated

Tools

Technology Facing

Extend Defects4J

Plans



Joint Projects

Publish (or perish)

Review

Talk