

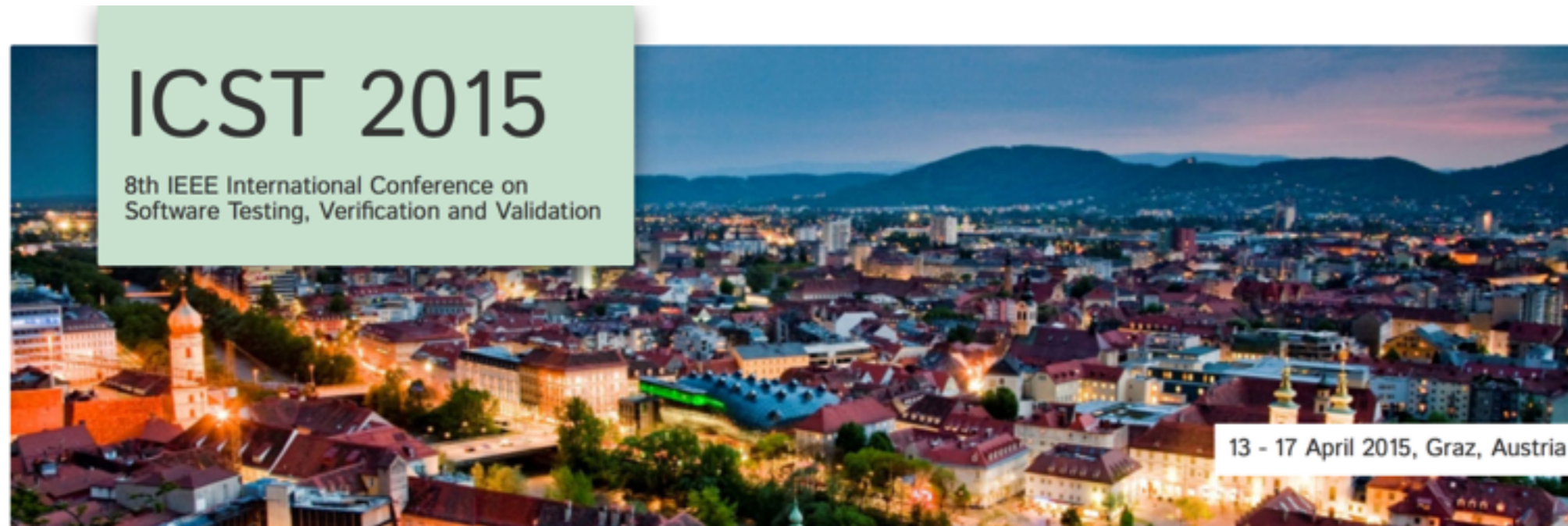
# Senaste trenderna från testforskningen: Passar de industrin?

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**DEPARTMENT**  
OF SOFTWARE  
ENGINEERING

# Vad är på gång i forskningen? (ICST 2015 & 2016)



- Security testing
- Mutation testing
- GUI testing
- Model-based testing
- Search-based testing
- Test automation in general
- Test analysis
- “Big Data” in Testing

**Tech: Quick Test Suites by Reduction**

**Test/Quality Management/Planning: Optimising Testing  
based on Test Result Analytics**

**Samt några korta nedslag i lite andra nya resultat**

# Creating Quick Test Suites

## Different testing modes:

30 sec test (on every file change/compilation)

5 mins (small breaks, “getting coffee”)

Full testing (over night, re-builds, pre-release)

## Quick Test Problem:

Given a set of (randomly generated) tests,  
produce test suites for small test budgets  
that maximize selected properties such as

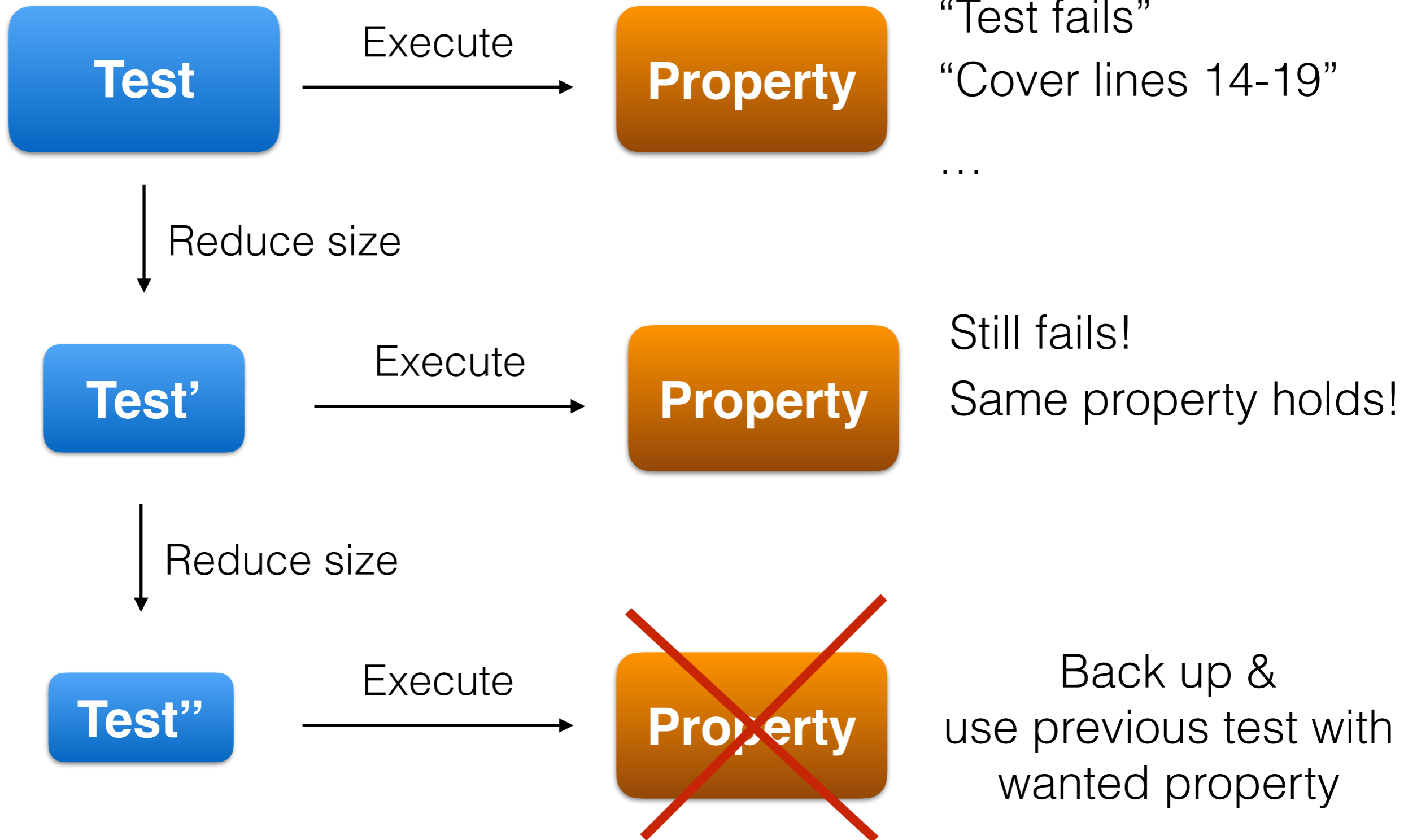
Code coverage,

Found Failures,

Distinct faults,

...

# ddmin - Delta Debugging Test Reduction



# Results (Test Reduction, Mozilla SpiderMonkey)

	<b>Num Tests</b>	<b>Time</b>	<b>Stmt Cov</b>	<b>Num Failing Tests</b>	<b>Num Distinct Faults</b>
<b>Full</b>	13,323	4h	19,091	1631	22
<b>Min Stmt Cov</b>	13,323	1h	19,091	1631	43
<b>Min Fn Cov</b>	13,323	40min	19,091	1627	39
<b>Min Failures</b>	1019	3min	16,020	1019	22
<b>Greedy +Min</b>	168	25sec	19,091	12	8

# Quick Test Suites: Summary

**Can reduce the size of test cases and test suites a lot**

**While keeping properties such as coverage & fault finding**

**This helps create “specialized” test suites for quick testing**

**Critical for any type of random automated testing**

**Our group investigates a generalisation:  
Test Effect Exploration**

**Can both reduce size and increase size  
to explore changes in properties**

### **Tech: Quick Test Suites by Reduction**

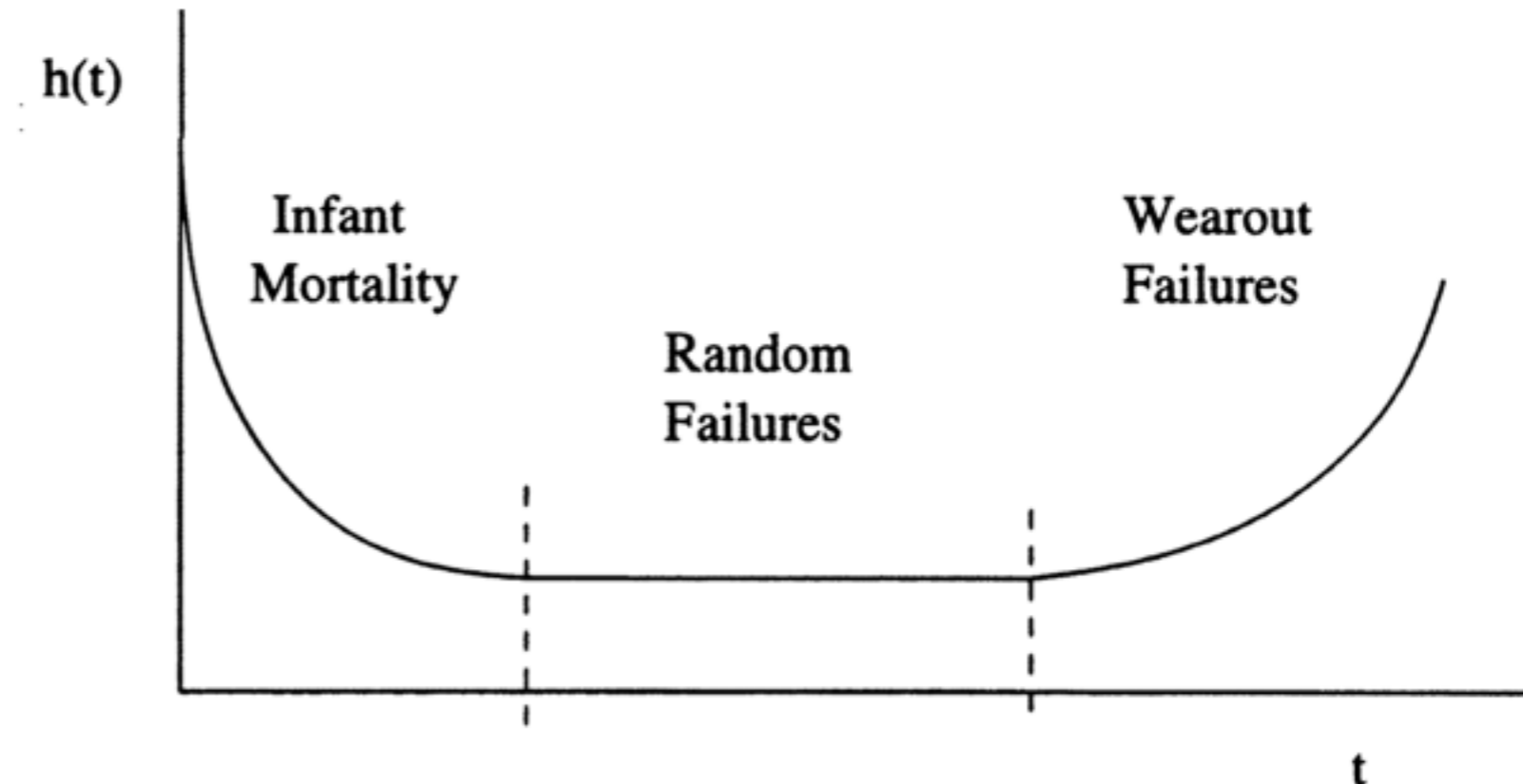
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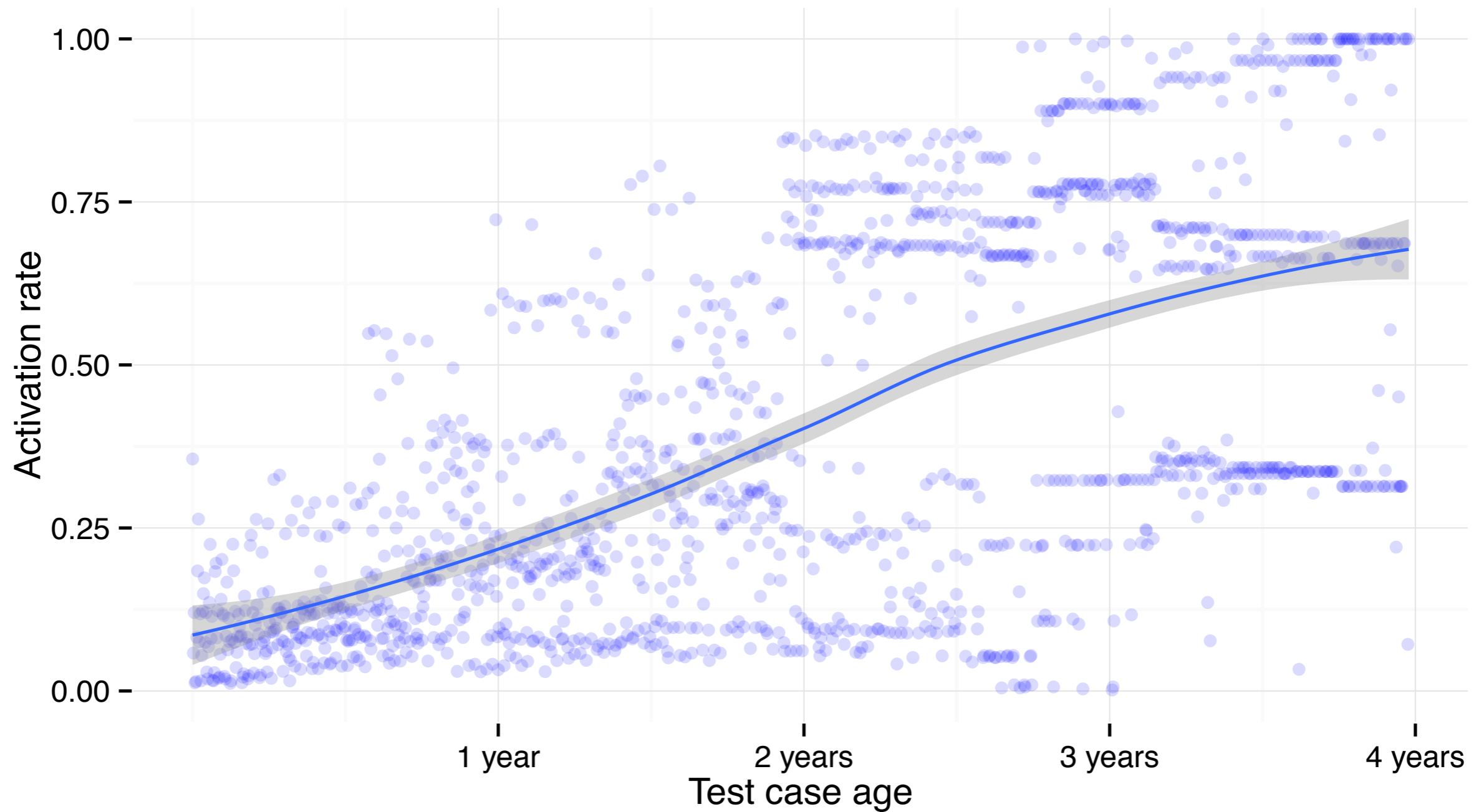
## Blir testfall gamla?

- Ja, sannolikhet hitta fel minskar drastiskt med tid
- Halveringstiden är 5-12 månader där vi mätt
- Testfall används allt mer över tid



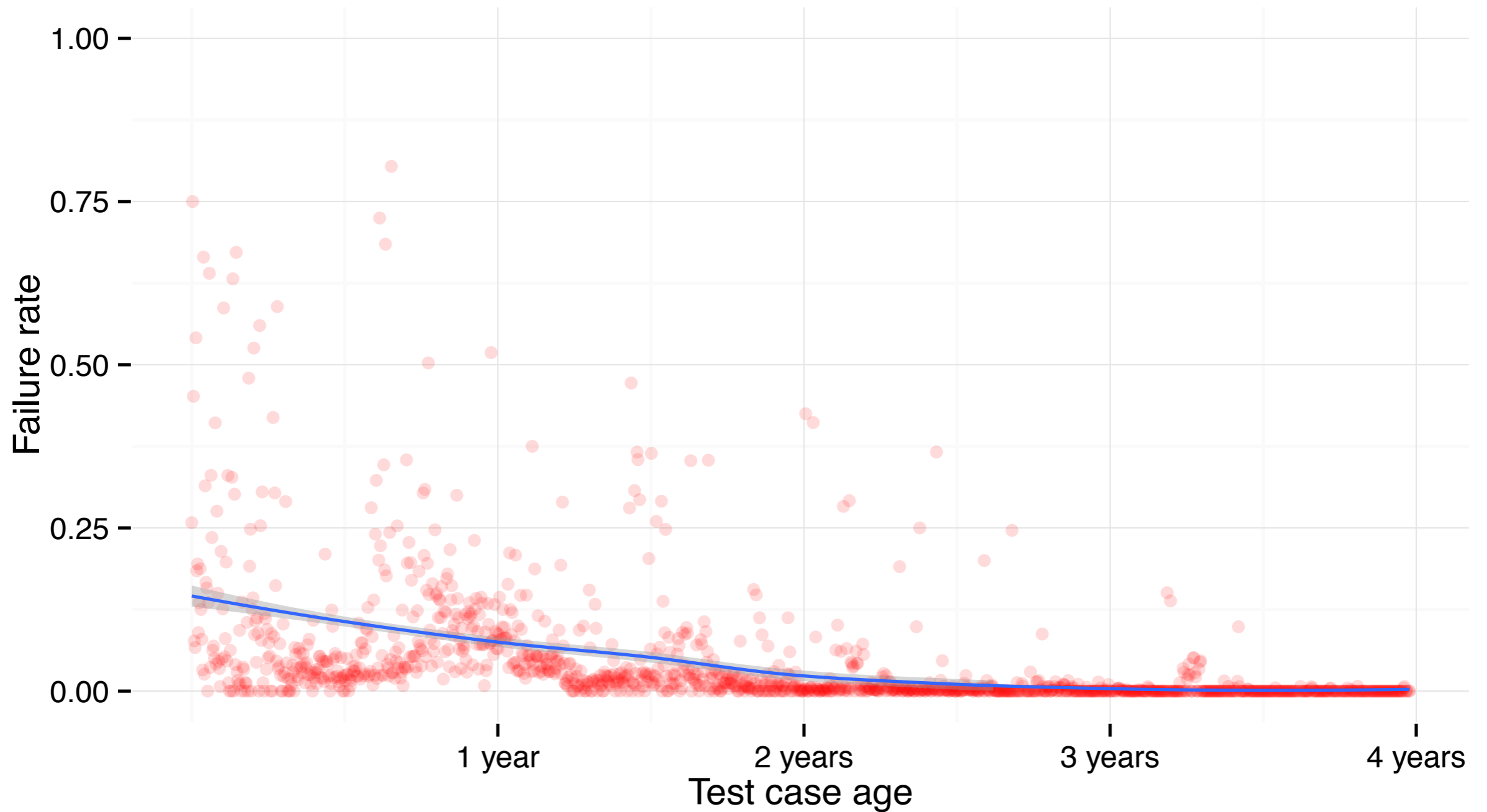
**Test cases stay active!**

# Test case **Activation** curve



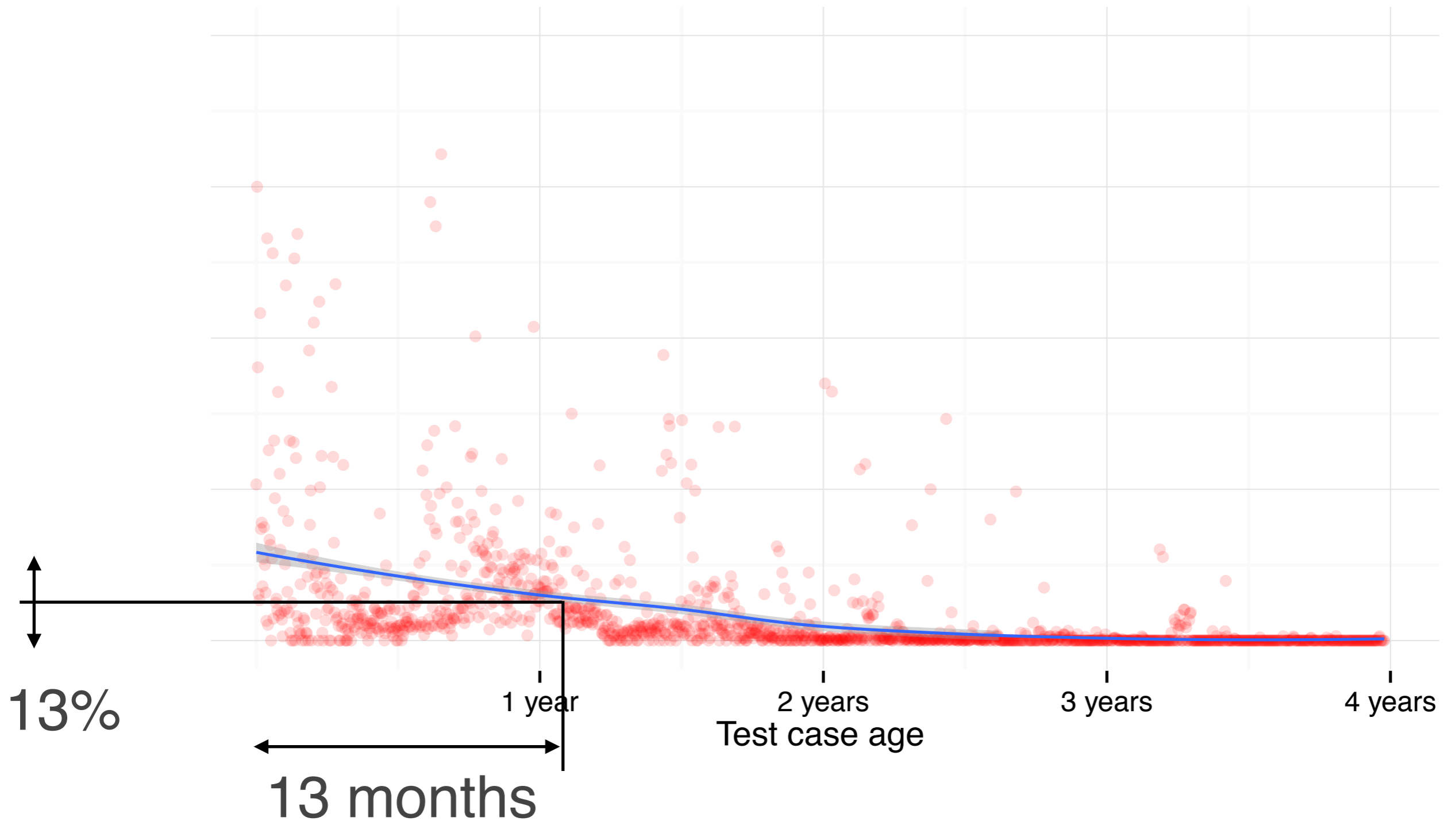
**Failure rates decline!**

# Test case Hazard curve



# Summarizing failure rate decay in one value

## Test case Half life



Data

+

Visualisation

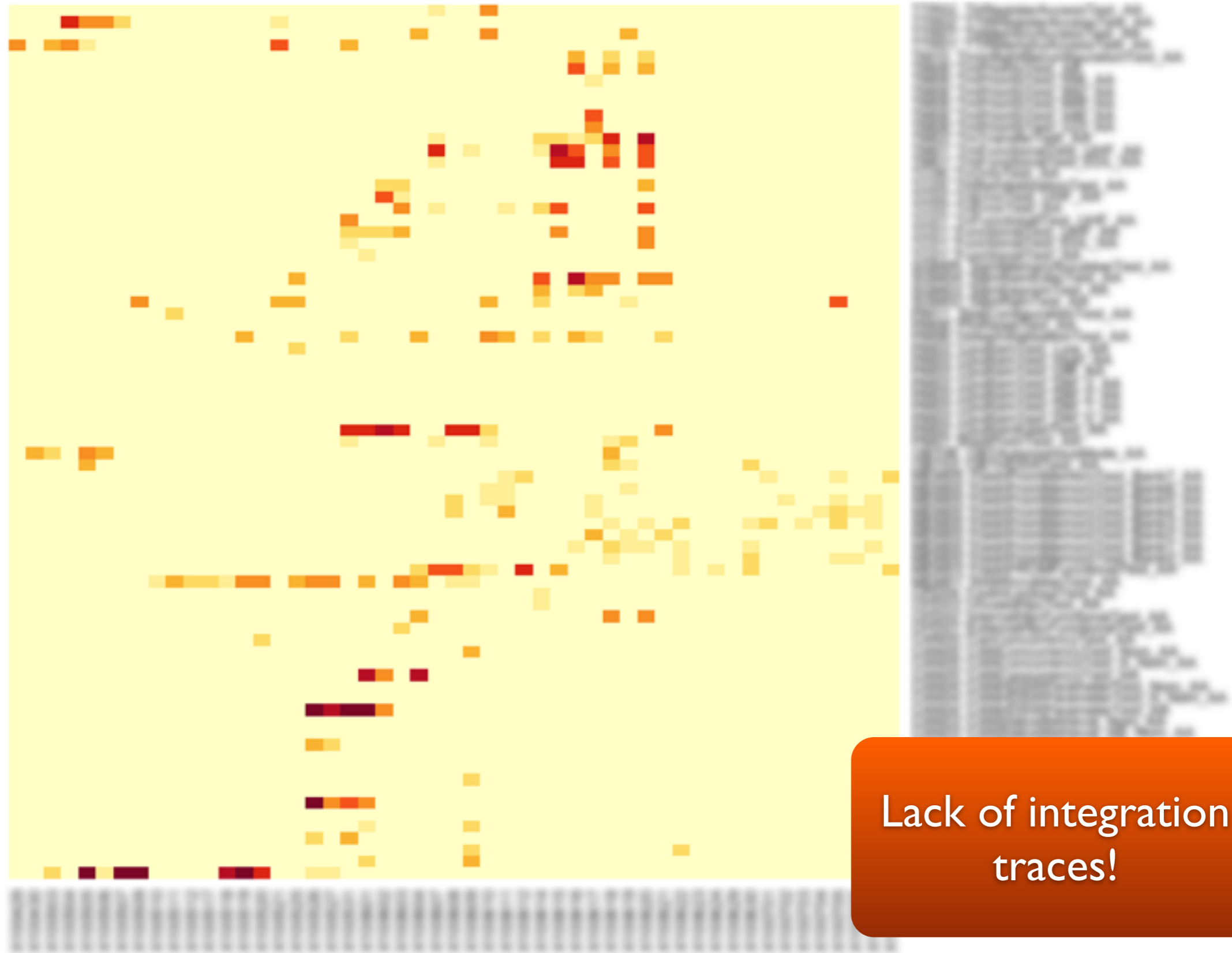
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Discussions

=

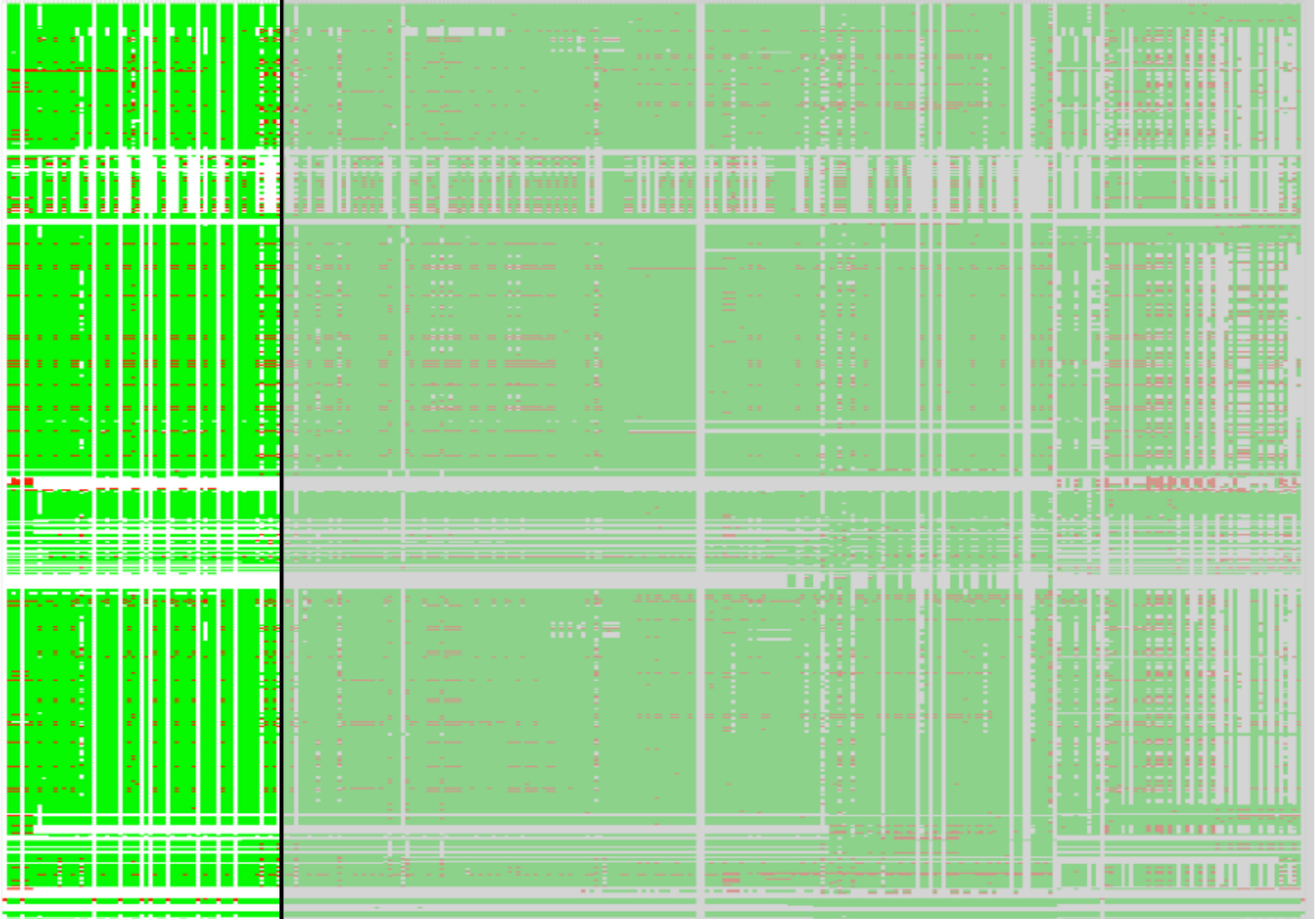
Insights

# Test failures

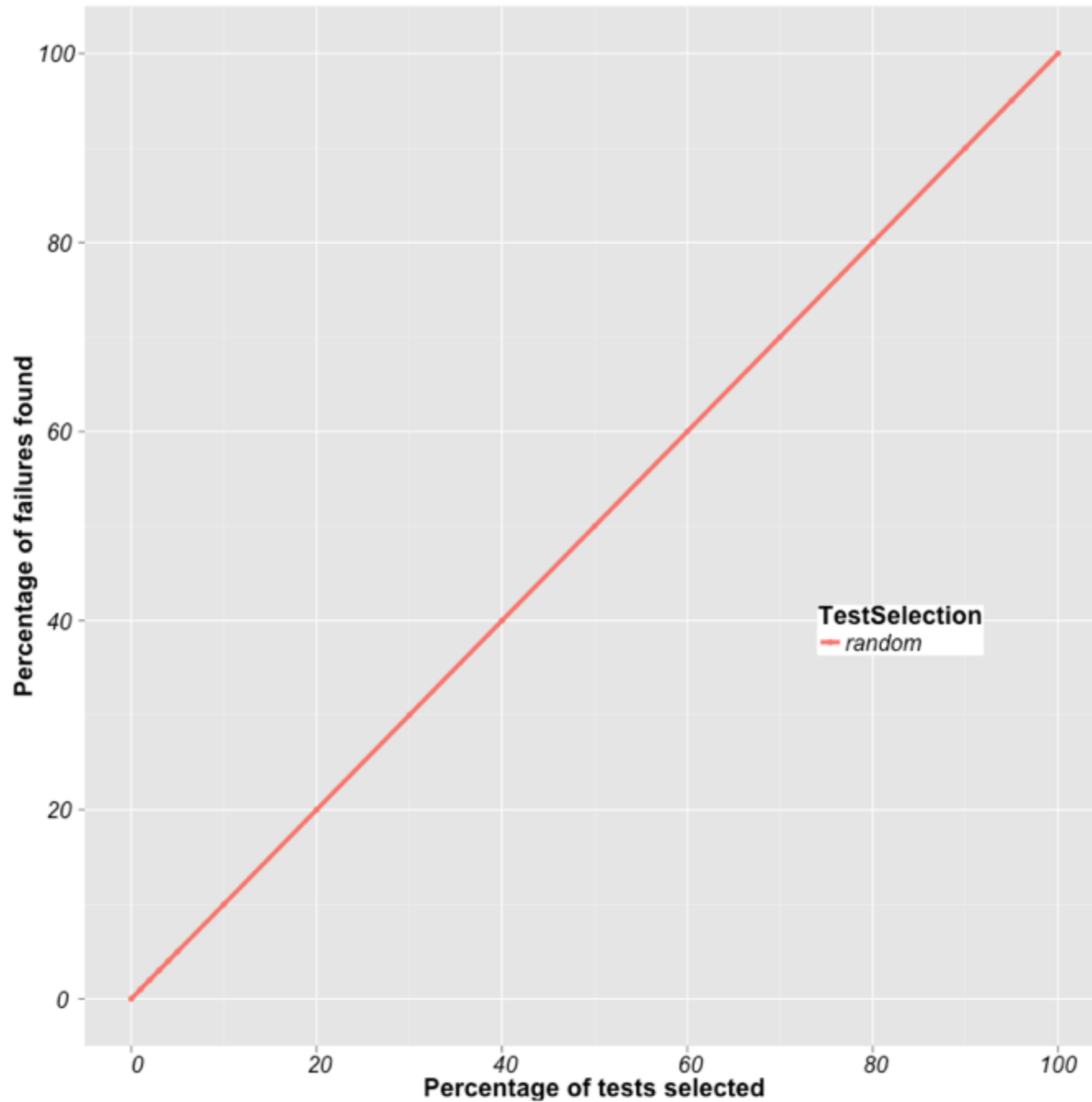


Model

Model++

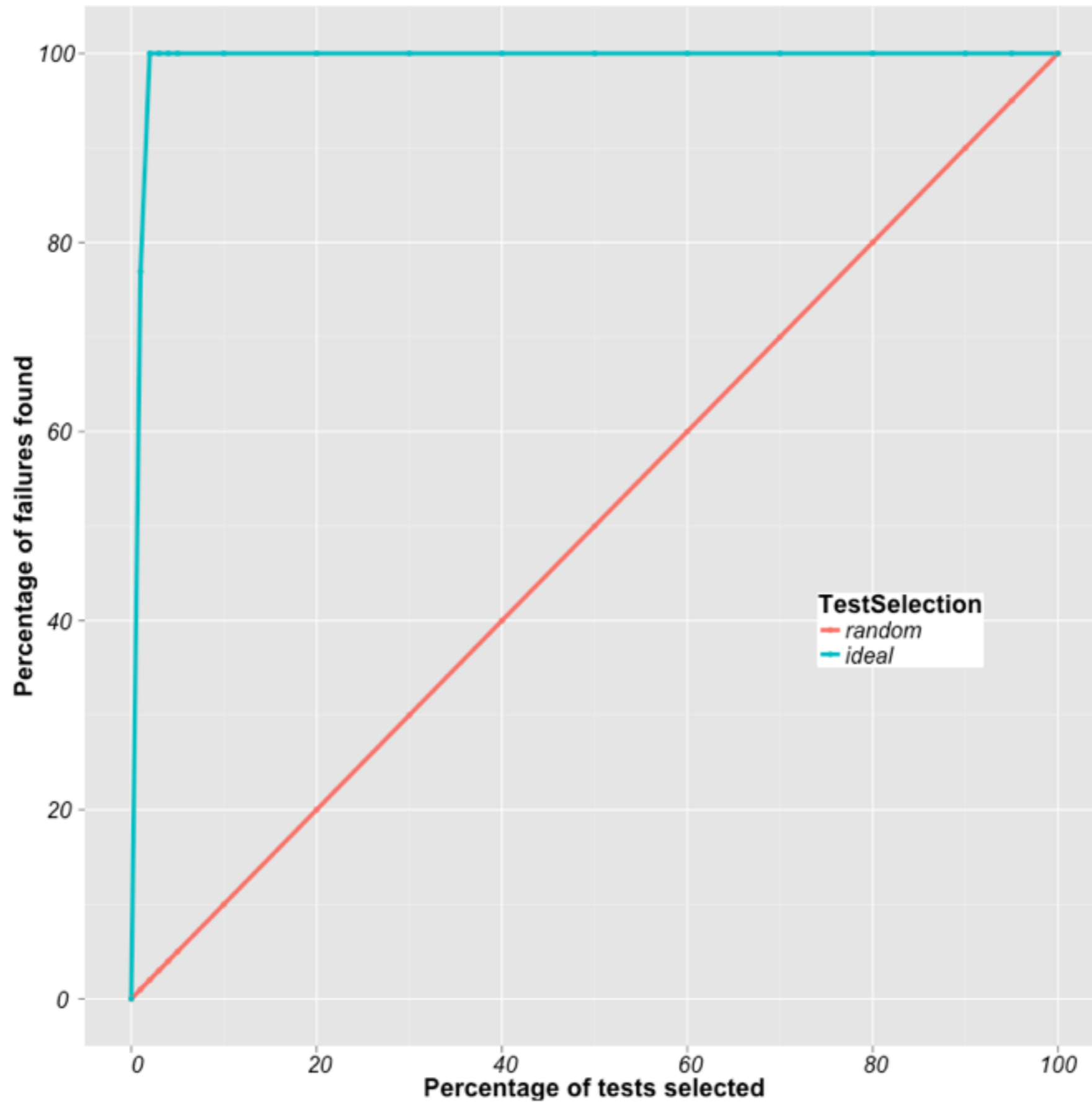


# Testing only what is likely to fail

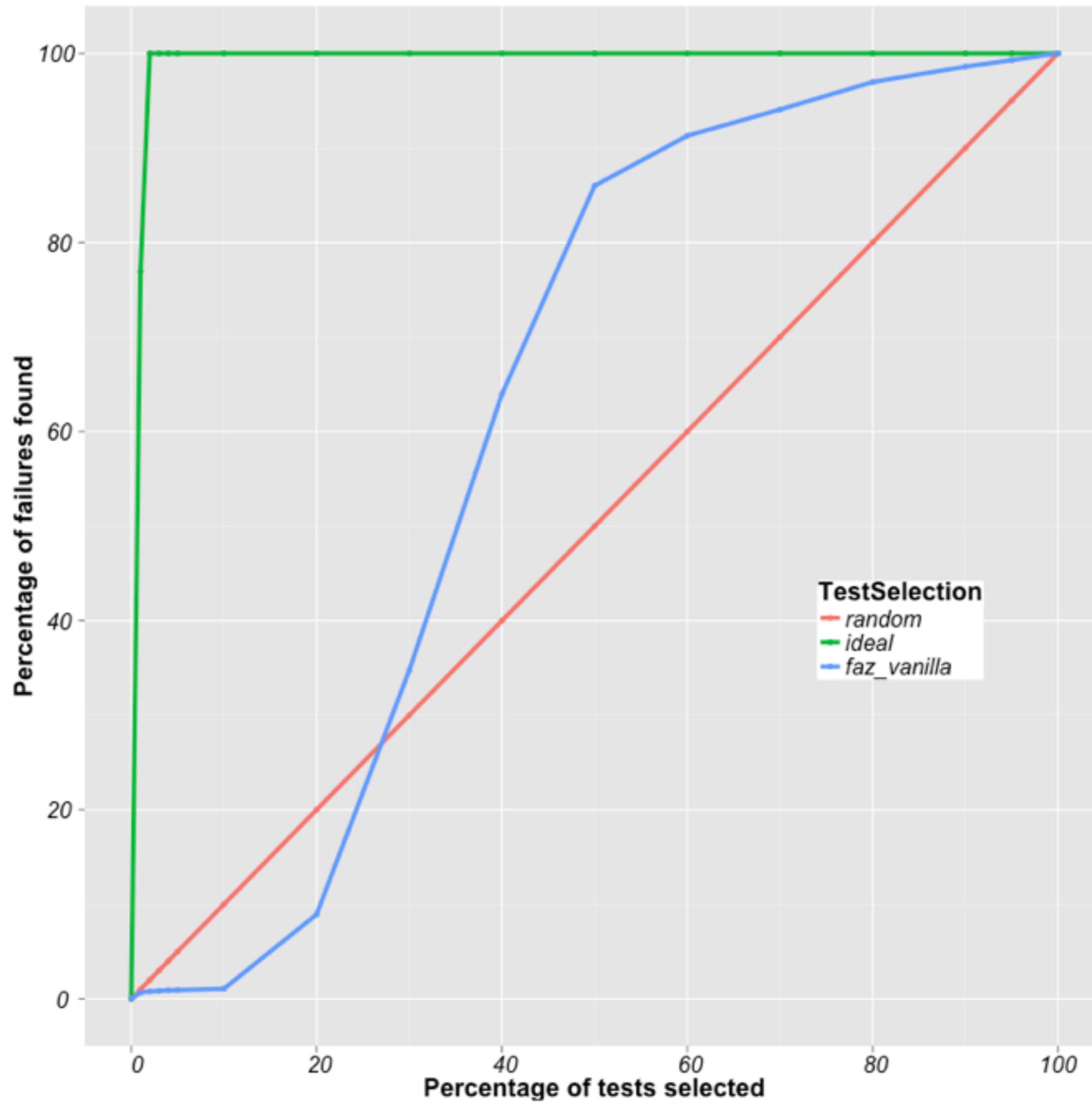




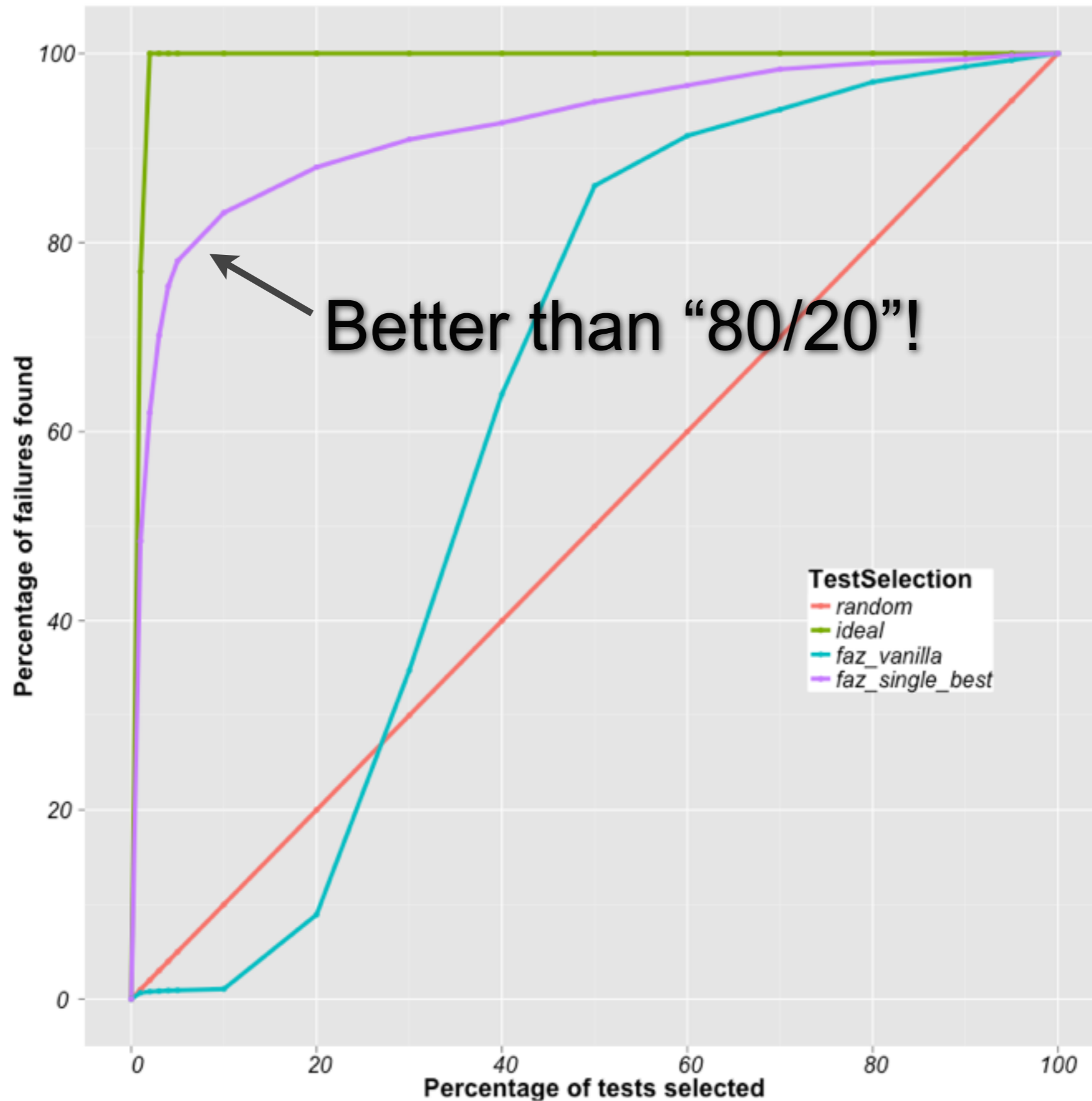
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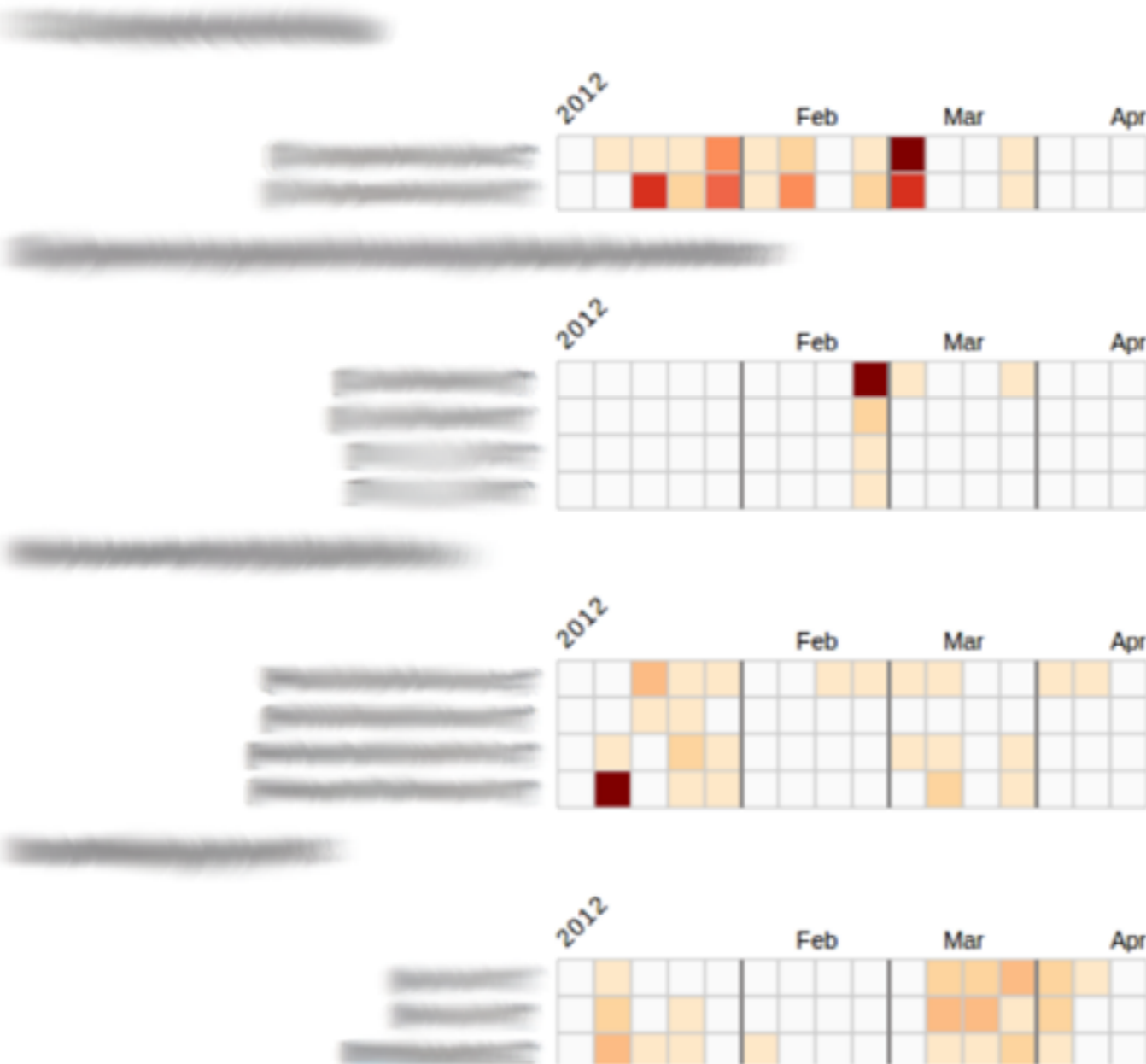


# Taking it Online

## Flight code changes [about](#)

 Range from few to many line changes

\* No matching module found



## Test executions [about](#)

 Range from more failed to more successful

Row numbers: Total number of executions.



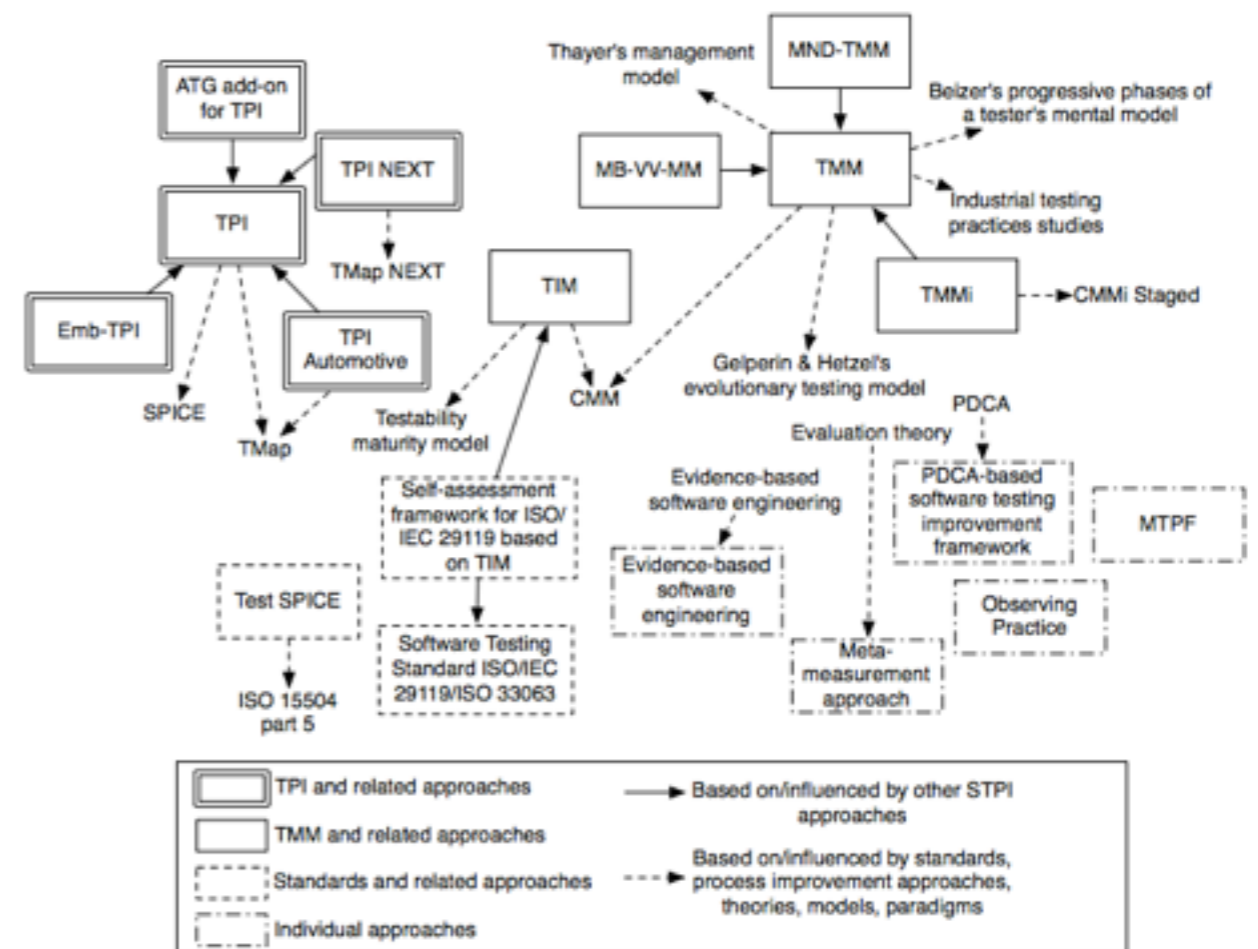
### **Tech: Quick Test Suites by Reduction**

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# Testprocesser

- Listar 19 förbättringsprocesser
- Visar modell för hur man väljer den bästa processen för sin verksamhet



<http://goo.gl/jjW1z4> <http://goo.gl/8zbJyk>

# Exploratory testing (unchartered)

- Det fungerar
- Bättre än alternativet i många fall
- Ingen signifikant skillnad mellan nya och erfarna testare

<http://goo.gl/kyLXYa>

# Conclusions

- There is a LOT of new progress every year; little uptake
- To take SE/ST research to industry methods need to be as simple as possible (while still effective)
- A key determinant of simplicity is the information needed
- Recommendations:
  - Talk to universities, give feedback & ask for help/ideas
  - Invite master theses but also PhD students
  - Open and share your data; researchers are used to this
    - and handle it professionally...
  - Dare to try new things; innovation increasingly the key
    - to stay competitive and have an edge



# Uppdrag: Koppla samman industri med akademi

6 månader?



20 år

# Hur?

## Sam-innovation mellan Forskare och Testare

- Format: Förbättringsprojekt
- Forskare coachar testare m.h.a. senaste forskningskunskapen
  - Studier av andra företag som har löst liknande problem
  - Hjälp att tillämpa avancerad forskningskunskap

### Forskare + Ingenjörer/Testare

- Problem som behöver lösas nu
- Strategiskt centrala kompetenser
  - > Lyckas med förbättring
  - > Specialister där det gör skillnad
  - > Problemlösning som går att räkna hem
  - > Konkurrensfördelar



# Så vad kan man göra?

- Förbättra spårbarhet mellan krav och test (24% snabbare och 50% oftare rätt lösning)
- Ta fram arbetsmetoder för Visuellt GUI-testning
- Förutsäga fel med hjälp av statistiska modeller
- Mätning och förbättring av testprocesser
- Transplantera kod med tester