

# Test Intelligence

für historisch gewachsene Systeme

Dr. Elmar Jürgens



Slower  
More Flaky



Faster  
More stable

**Total Count**  
13687

**Total Duration**  
~11,4h

**Count**

**Duration [s]**

1.050

UI Tests

34.000

1.025

System Tests

3.750

2.114

Integration Tests

2.500

9.498

Unit Tests (Java, JS, C#, ...)

900

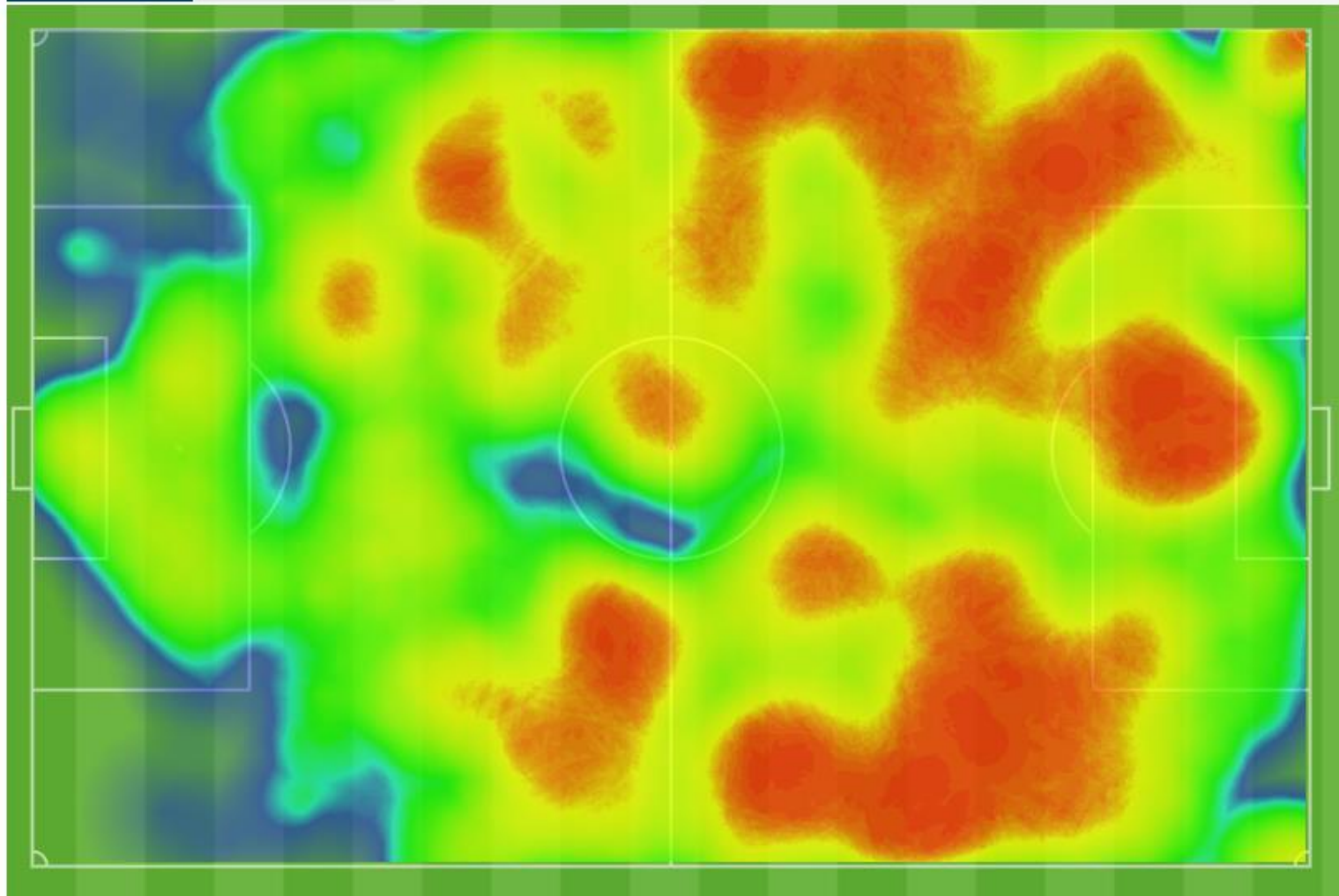




## FC Bayern München

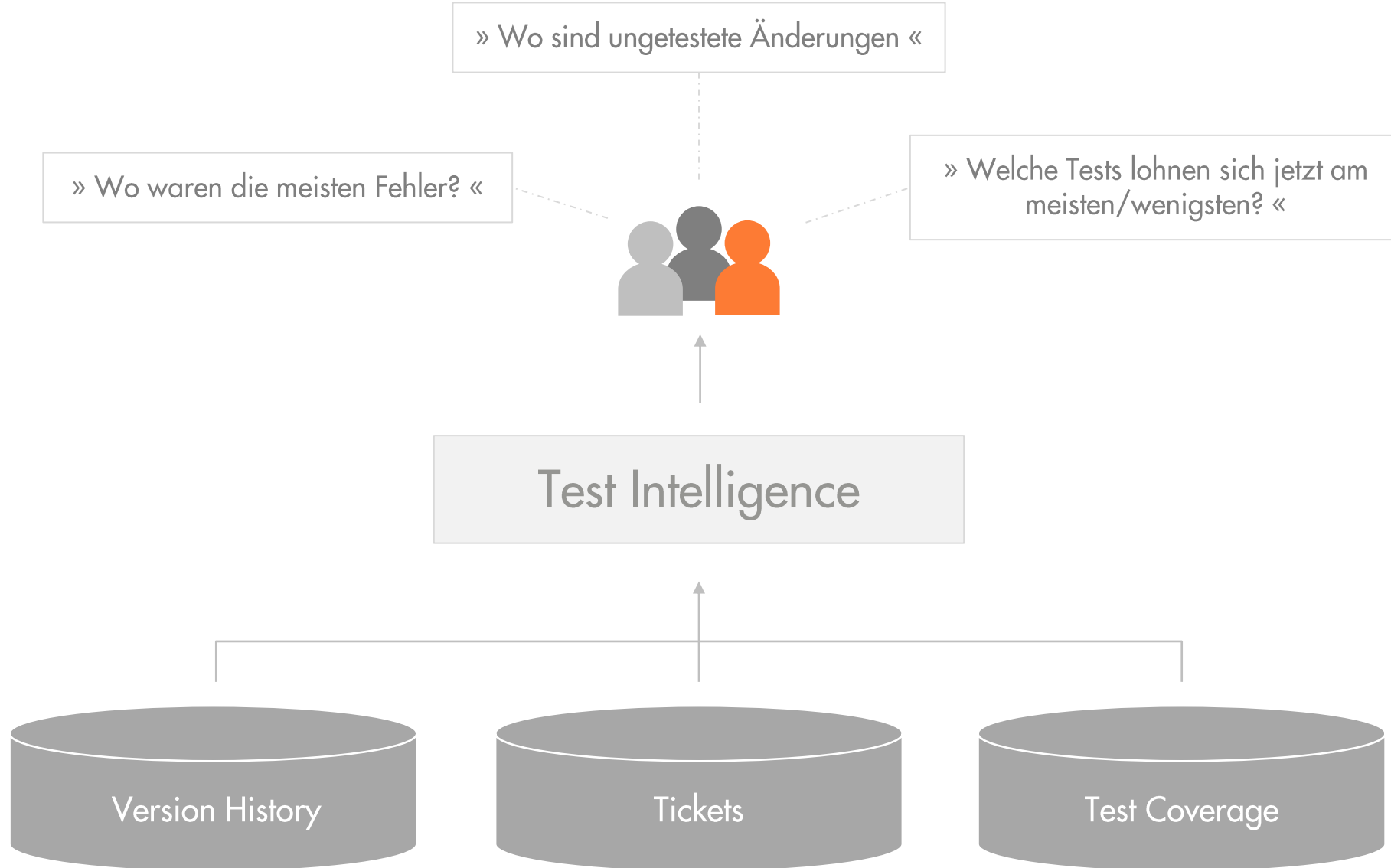
- FC Bayern München
- TW 1 Manuel Neuer
- AW 21 Lucas Hernández
- AW 5 Benjamin Pavard
- AW 4 Niklas Süle
- AW 27 David Alaba
- MF 29 Kingsley Coman
- MF 10 Leroy Sané
- MF 25 Thomas Müller
- MF 6 Joshua Kimmich
- MF 18 Leon Goretzka
- ST 13 Eric Maxim Choupo-Moting
- Einwechsellspieler
- 17 Jérôme Boateng
- 19 Alphonso Davies

## Heatmap Touchmap



## Paris Saint-Germain

- Paris Saint-Germain
- TW 1 Keylor Navas
- AW 5 Marquinhos
- AW 31 Colin Dagba
- AW 22 Abdou Diallo
- AW 3 Presnel Kimpembe
- MF 23 Julian Draxler
- MF 27 Idrissa Gueye
- MF 10 Neymar
- MF 15 Danilo Pereira
- MF 11 Ángel Di María
- ST 7 Kylian Mbappé
- Einwechsellspieler
- 25 Mitchel Bakker
- 18 Moise Kean
- 21 Ander Herrera
- 12 Rafinha

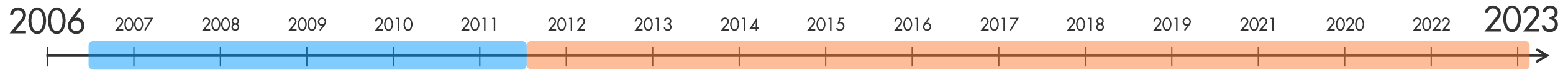


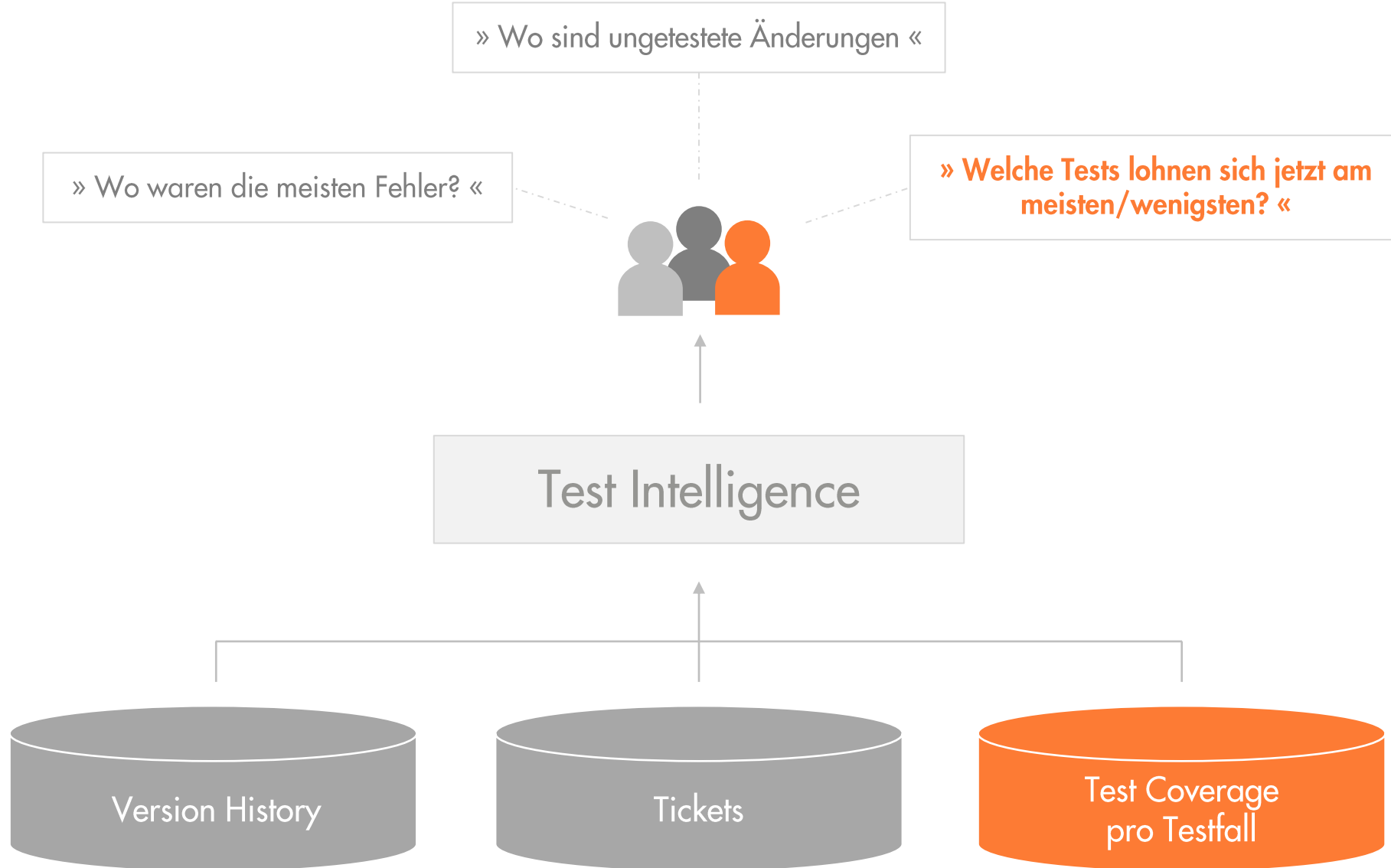


TUM



CQSE







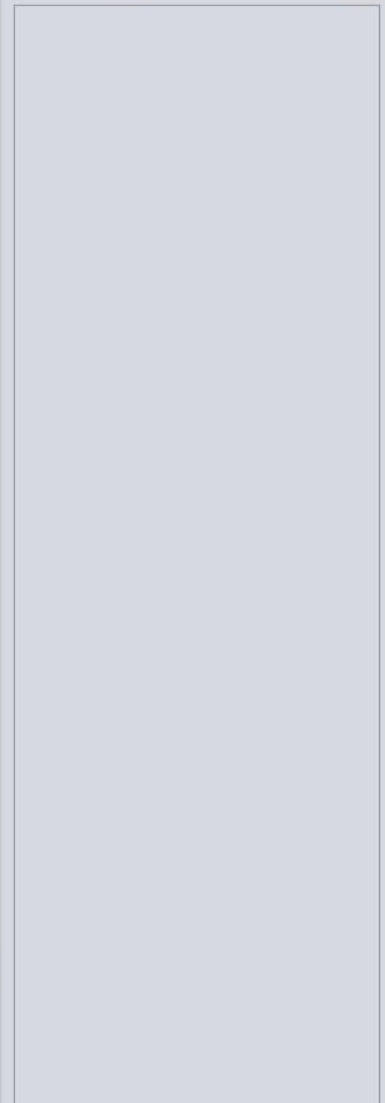
Sample Only the Active Layer/Mask

Untitled1 x Picture1.png x



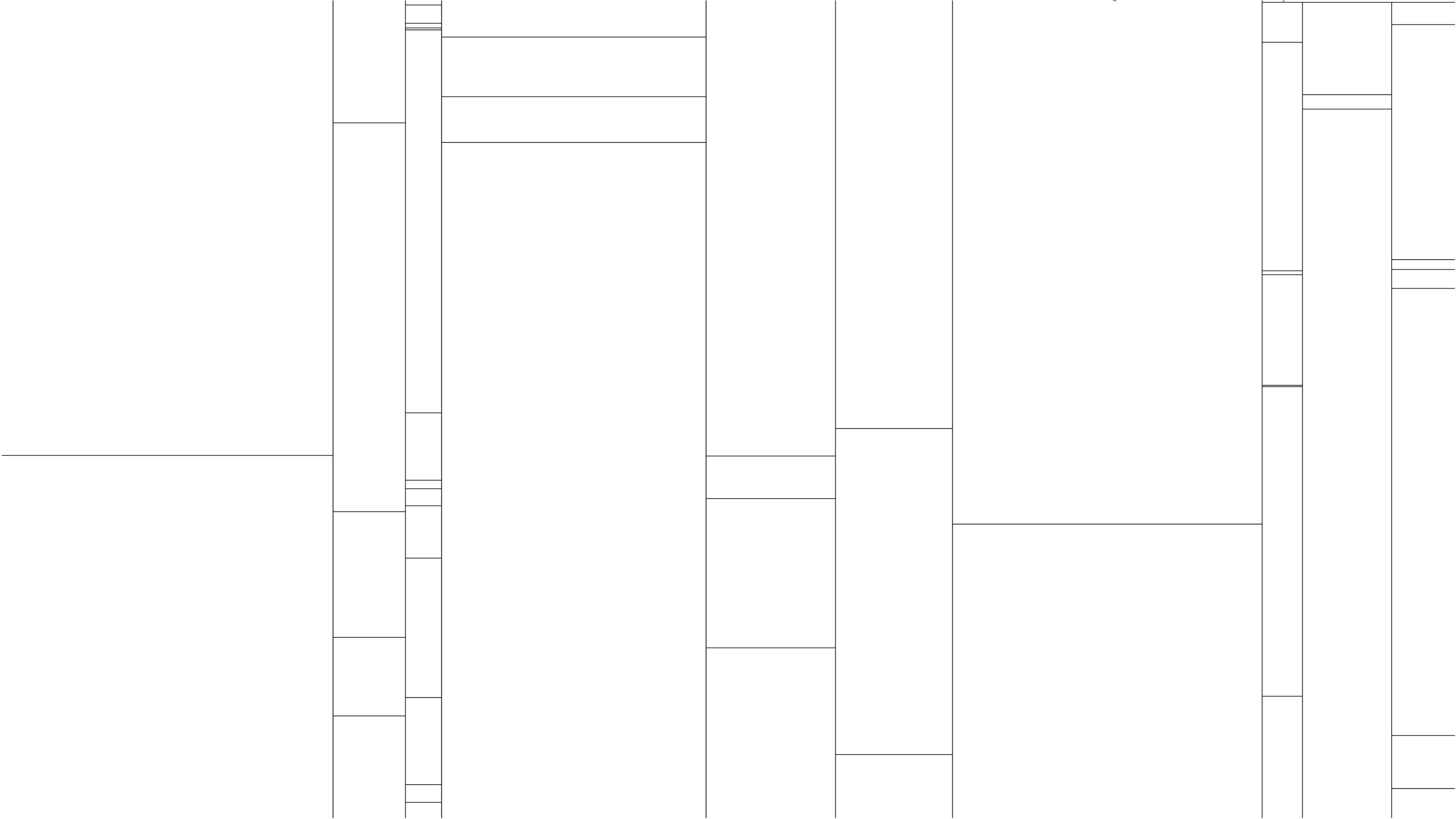
Layers

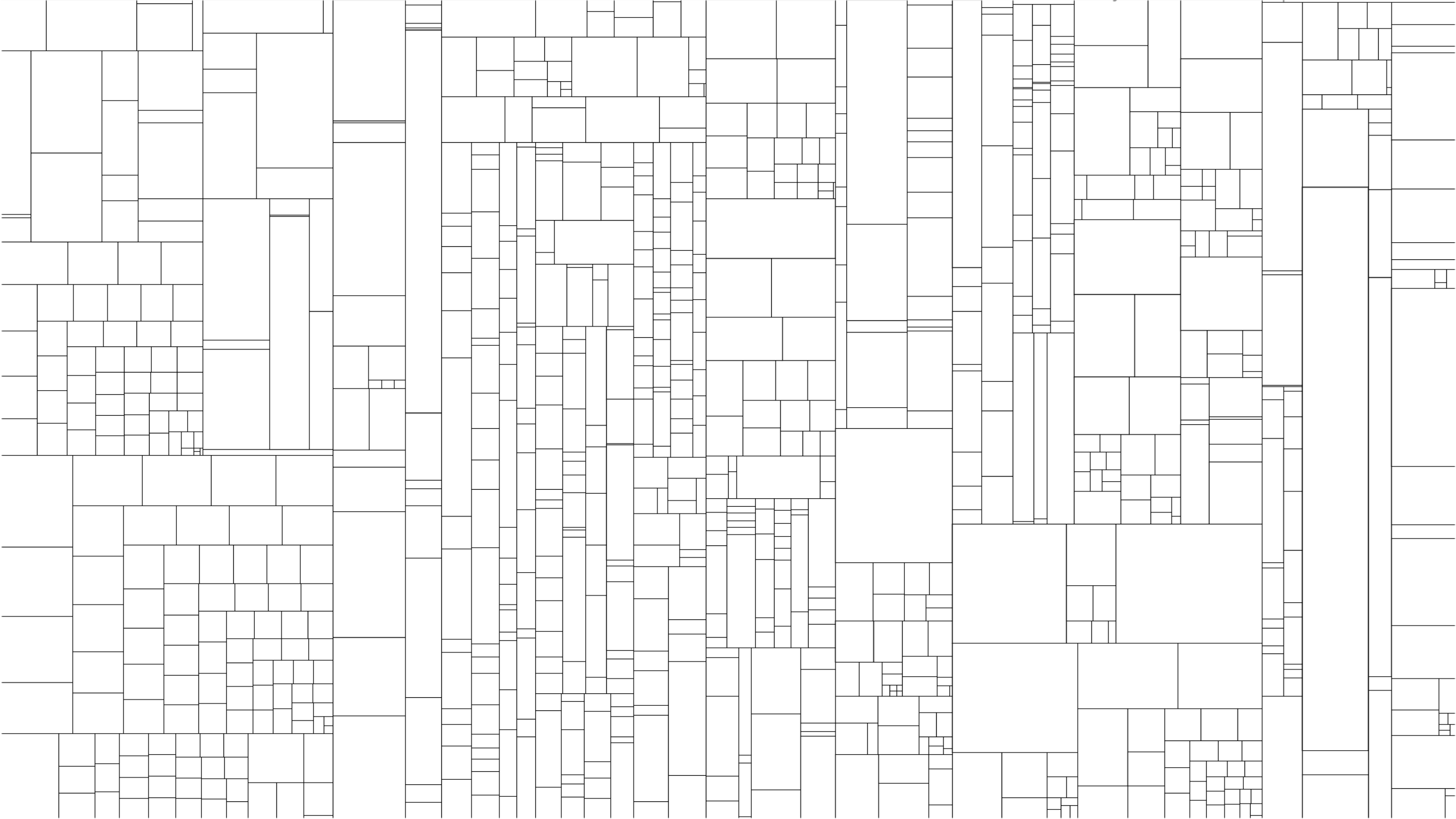
Opacity: 100 % Normal

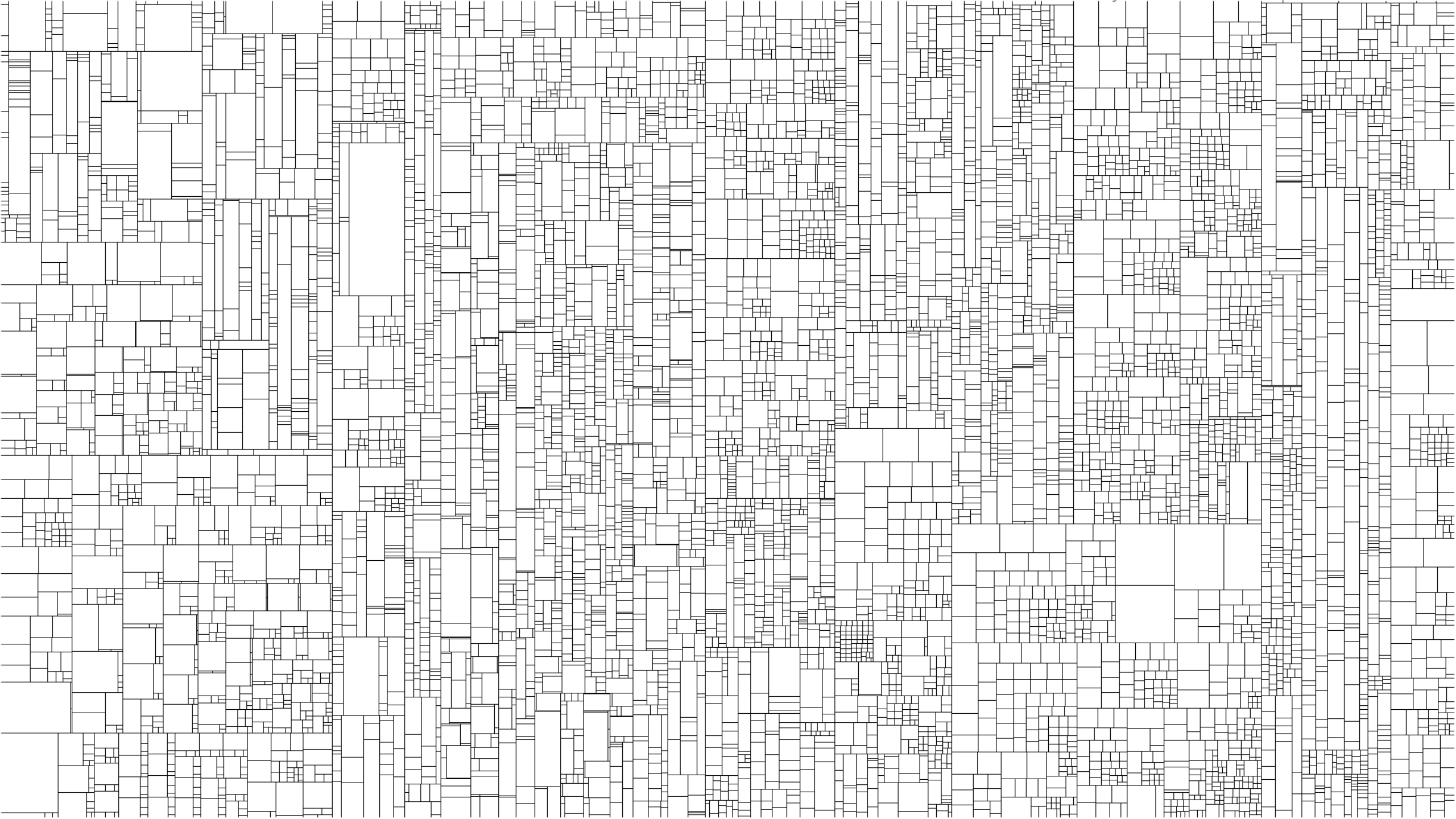


layer 1

+ - [ ] T





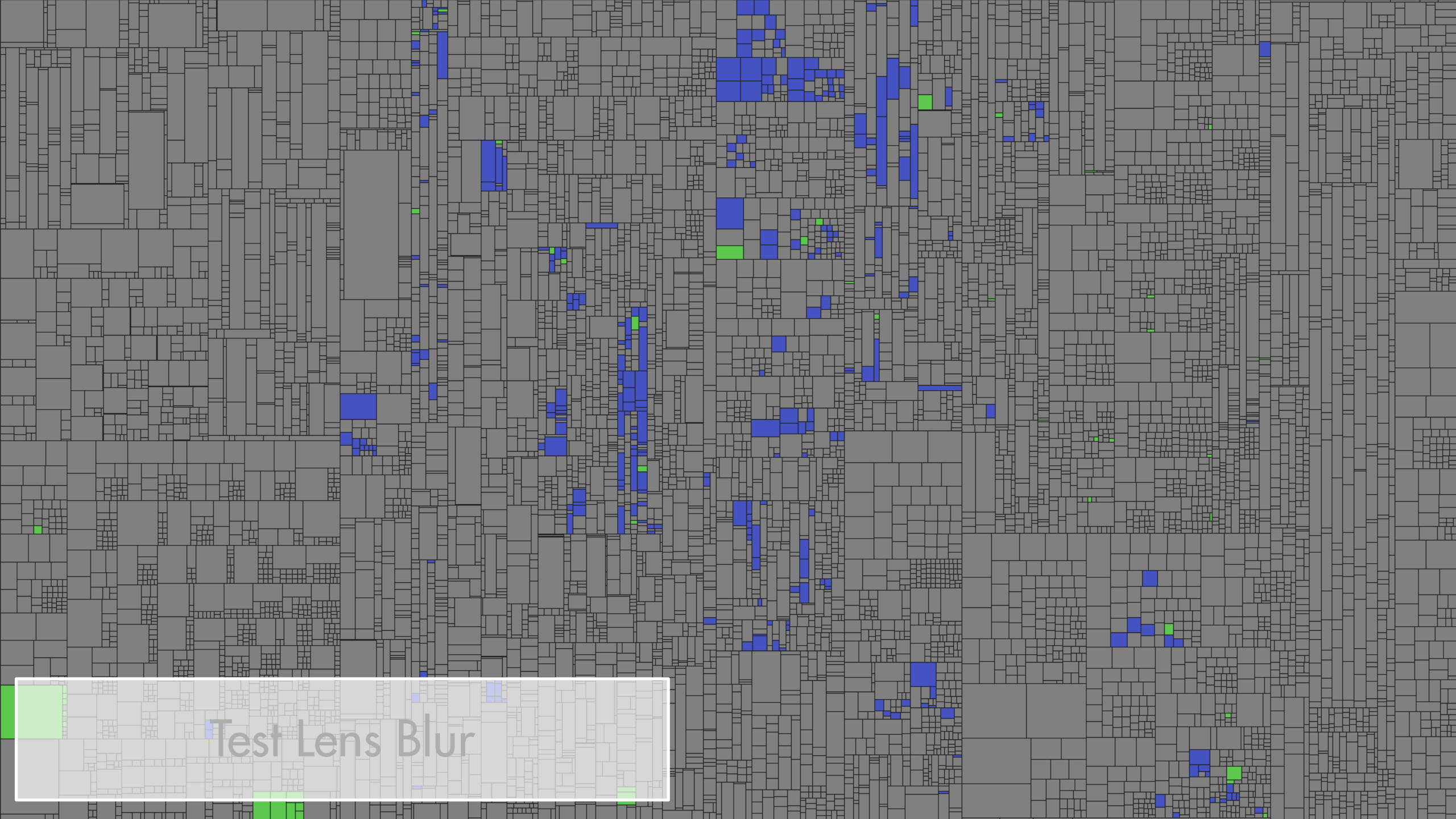




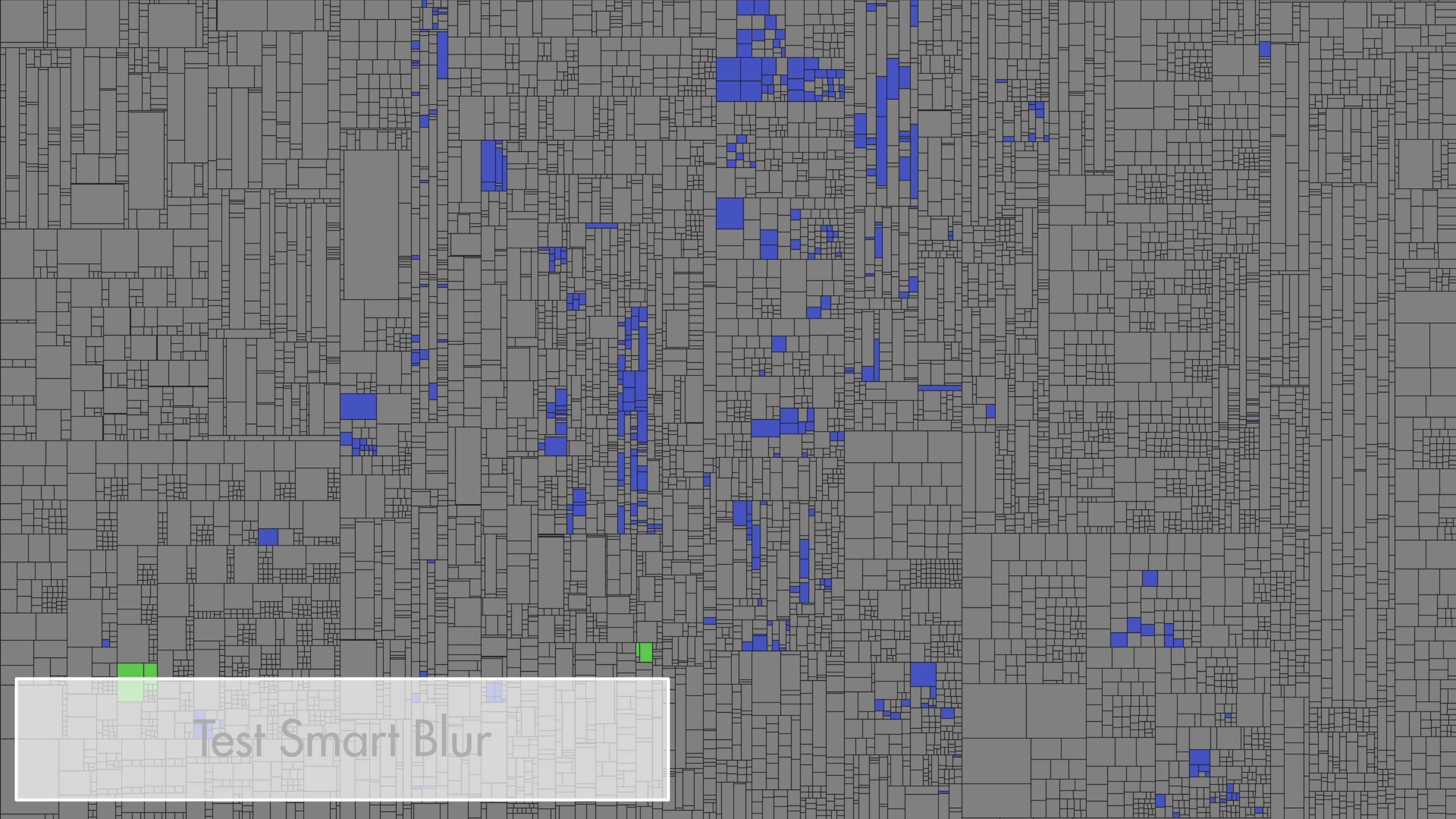
Test Gaussian Blur



Test Motion Blur

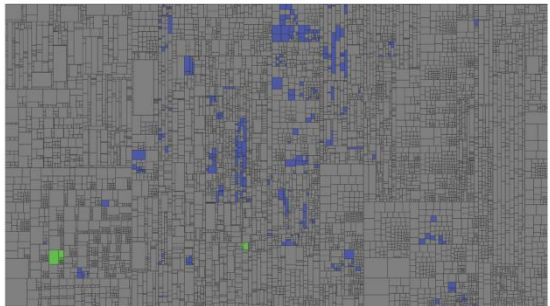
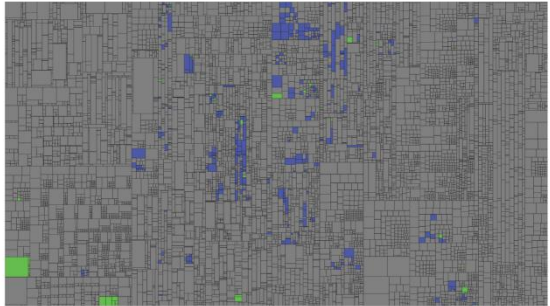
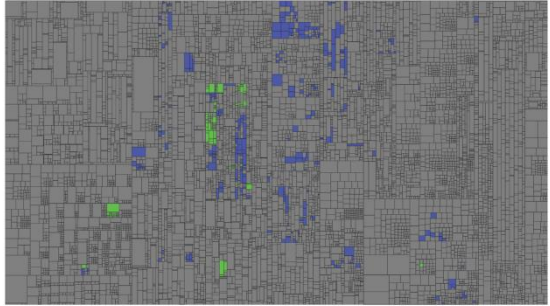
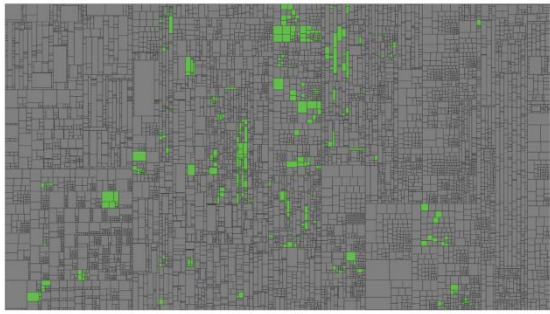



Test Lens Blur



Test Smart Blur



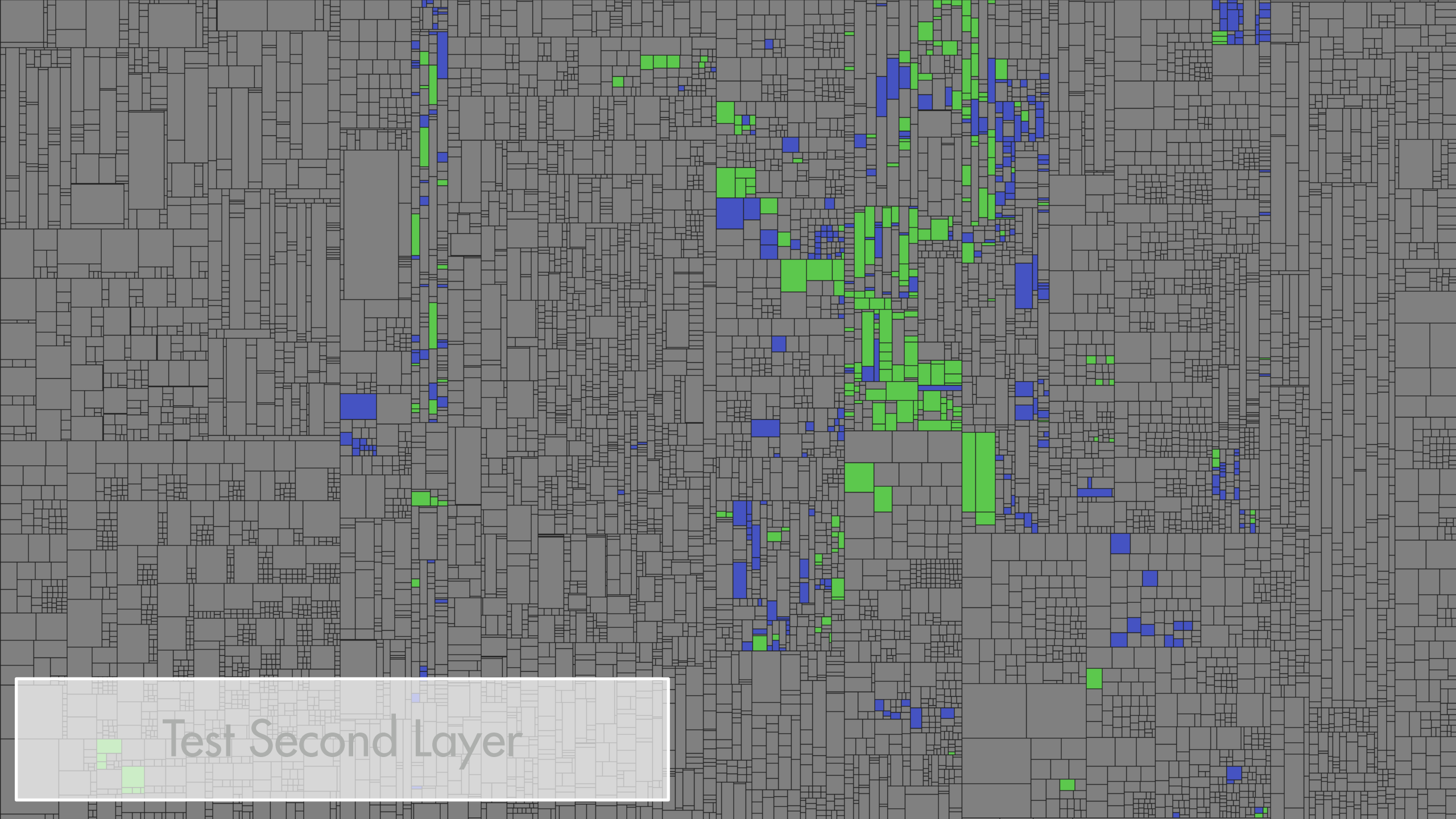




Test Create and Modify  
Selection



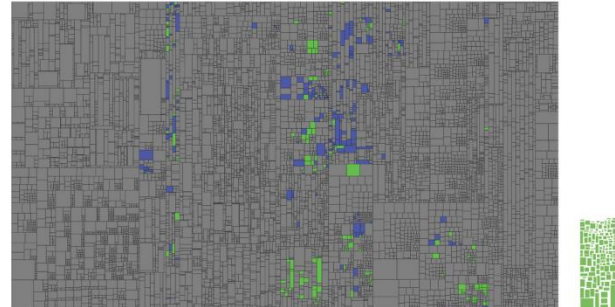
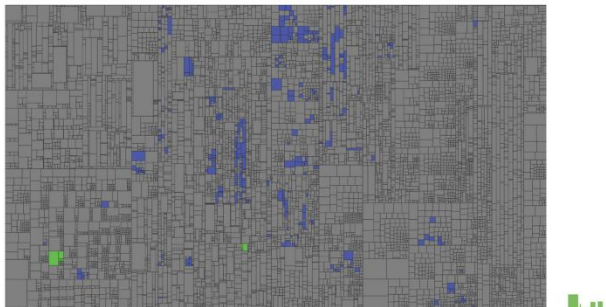
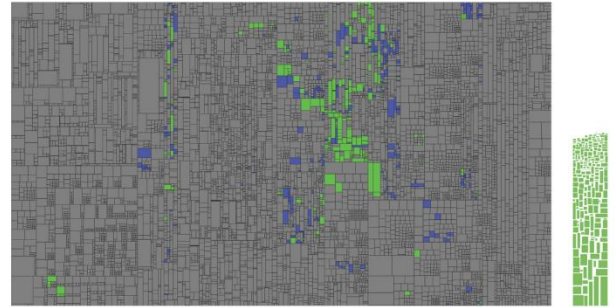
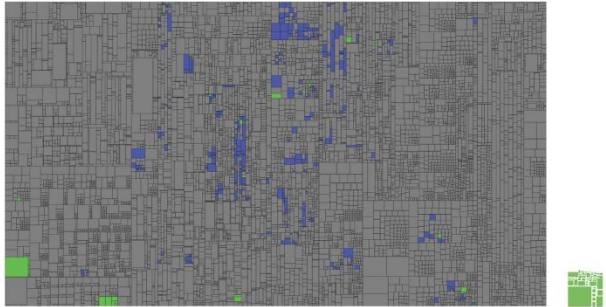
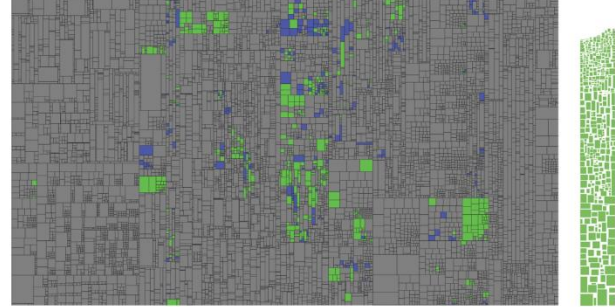
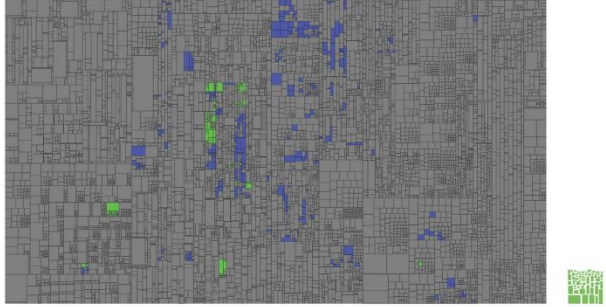
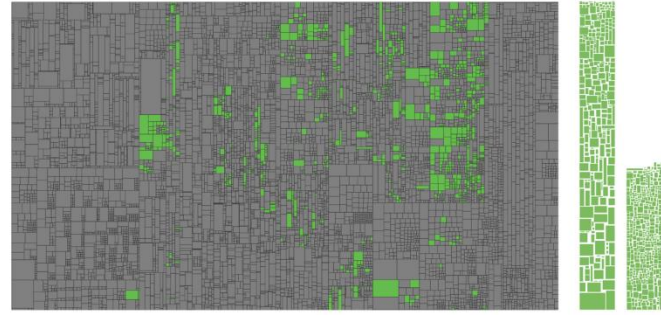
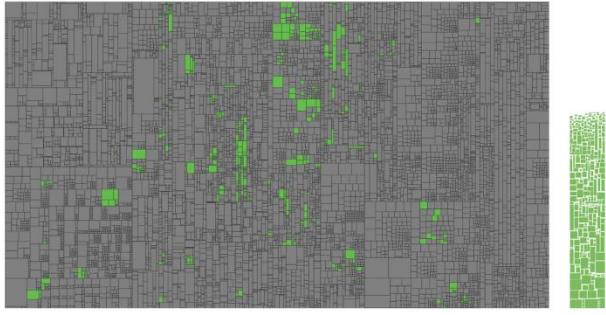
Test Change View Settings

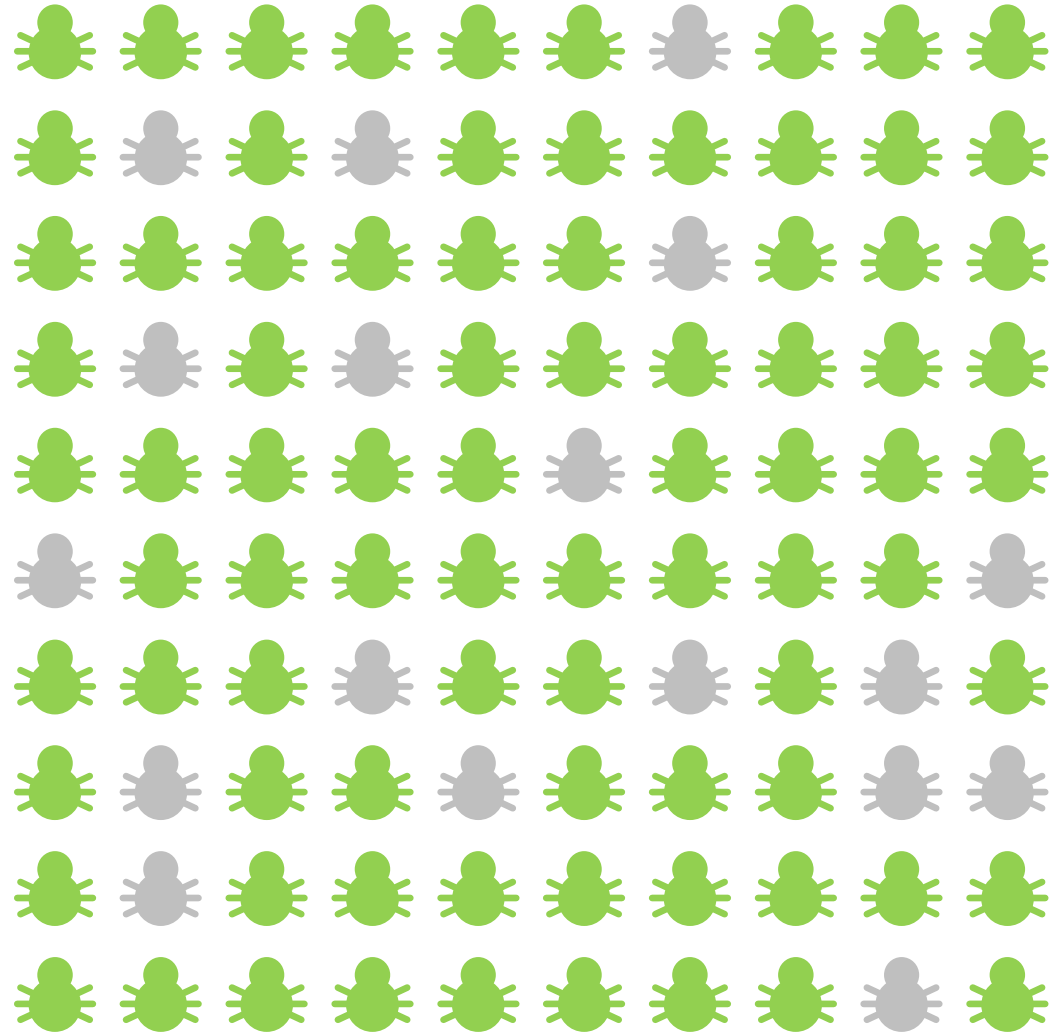


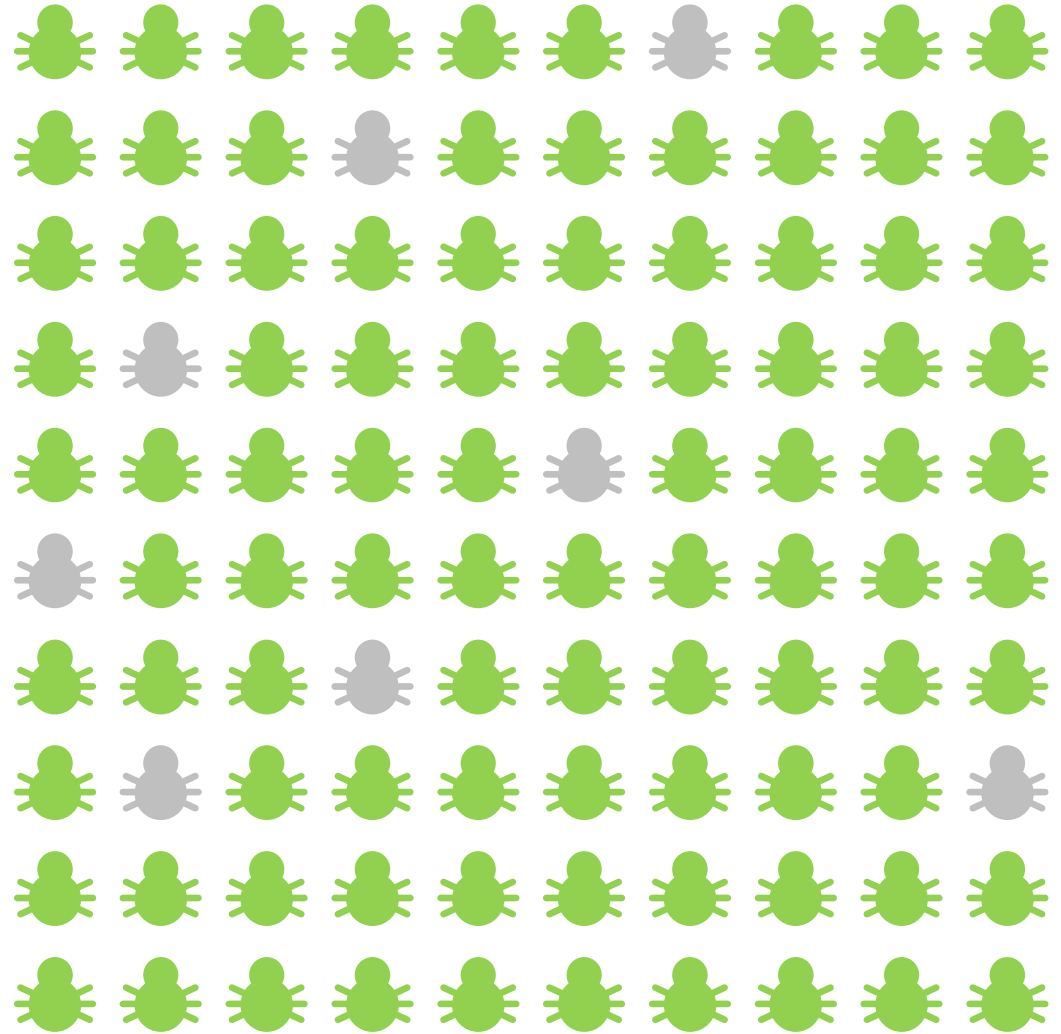
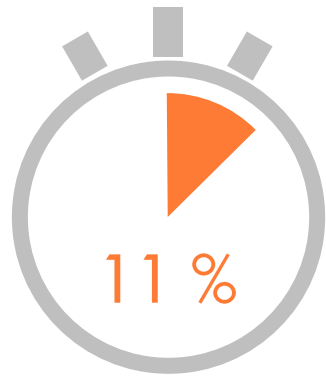
Test Second Layer

The image consists of a dense, overlapping grid of gray rectangles of various sizes and orientations. Scattered throughout this grid are several smaller rectangles in blue and green. The blue rectangles are more numerous and appear in various sizes and orientations, often forming small clusters or lines. The green rectangles are fewer in number and also appear in various sizes and orientations, some appearing as single blocks and others as small segments. The overall effect is a complex, textured pattern of gray, blue, and green rectangles.

Test Save Image









# Pareto-Testliste in der CI

Vorher: **nächtlich** „Re-run all“

Feedback erst spät am nächsten Tag



Tagsüber **1 h Testbudget** für Pareto-Testliste

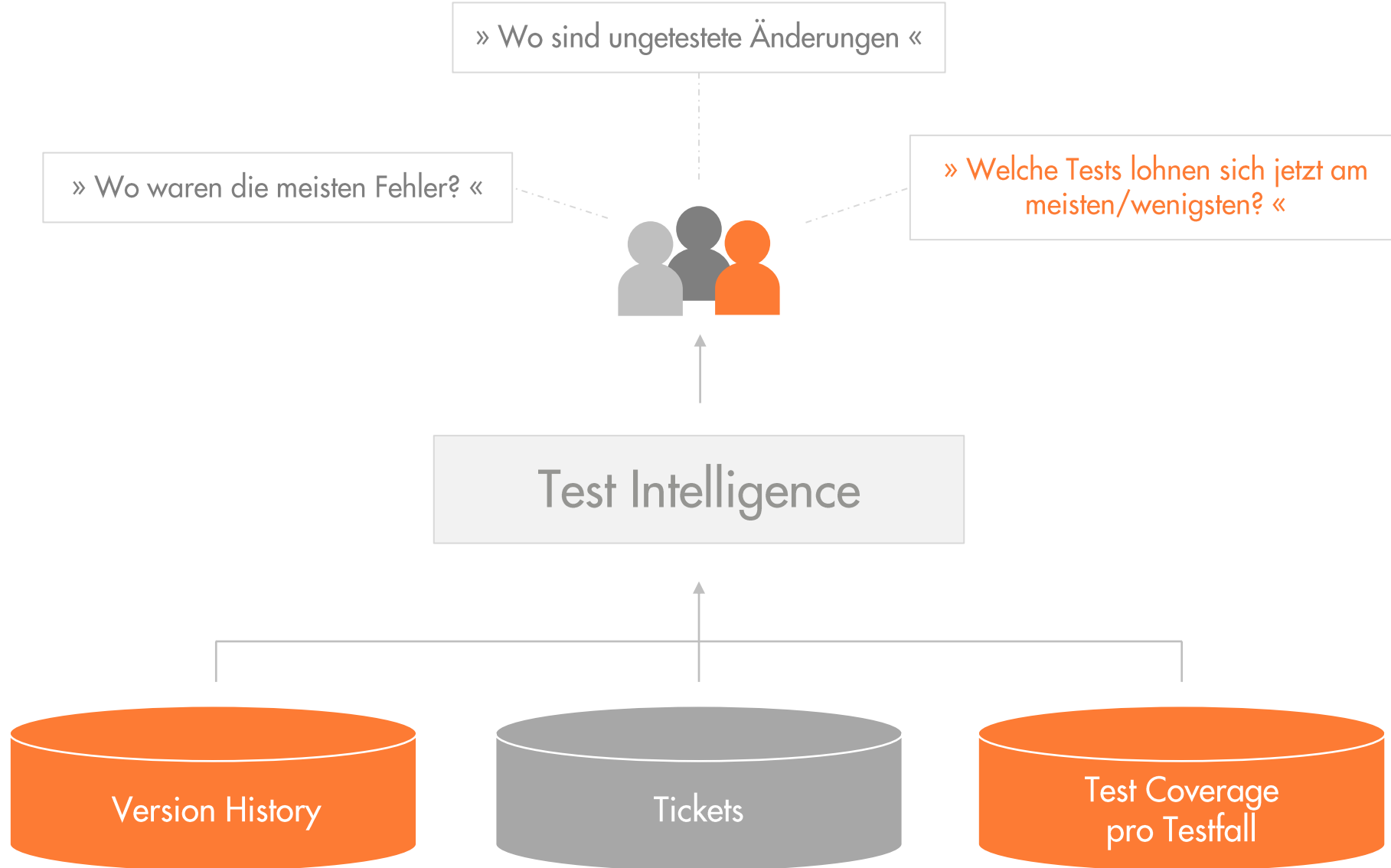


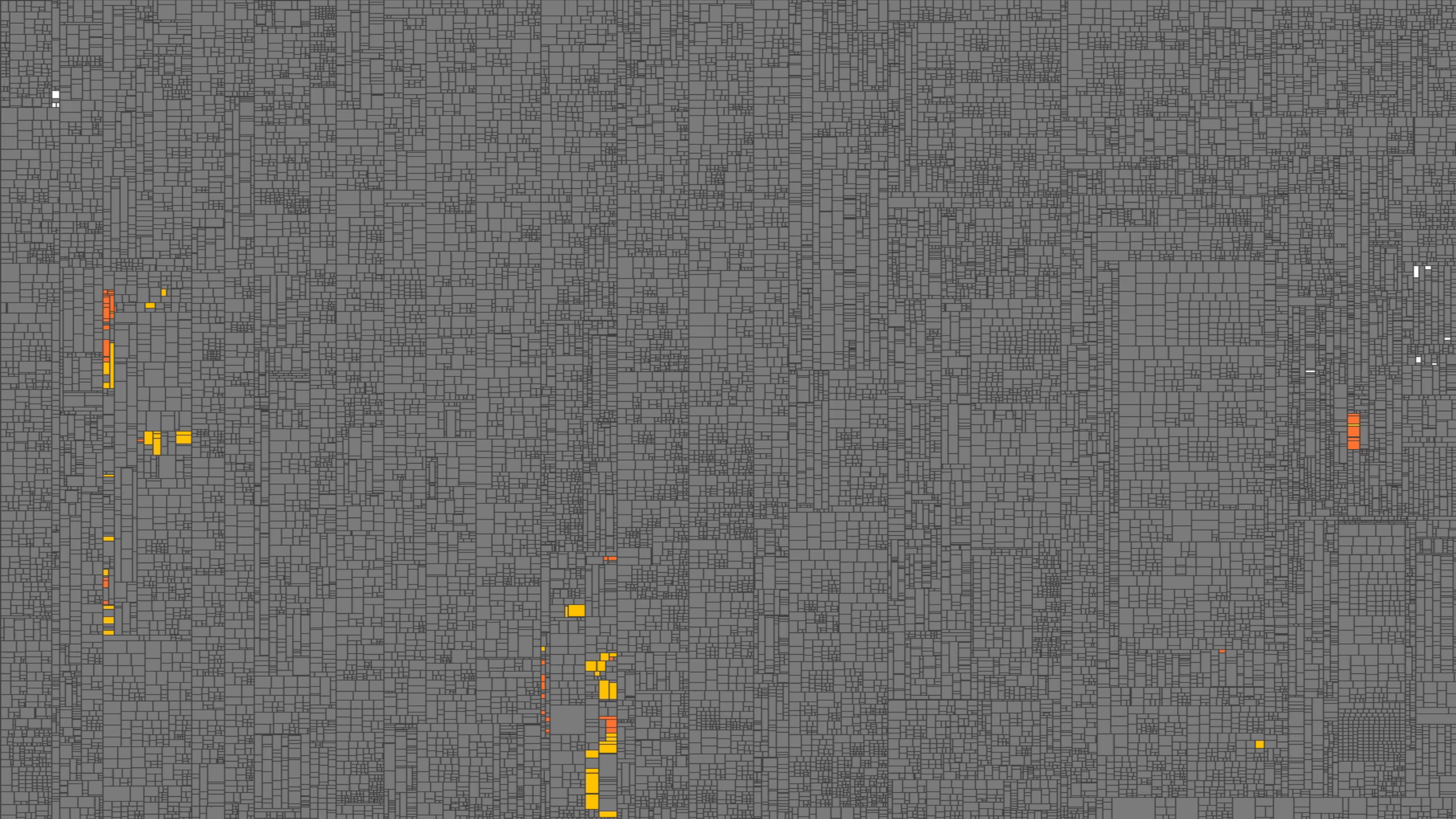
Weiterhin: **nächtlich** „Re-run all“

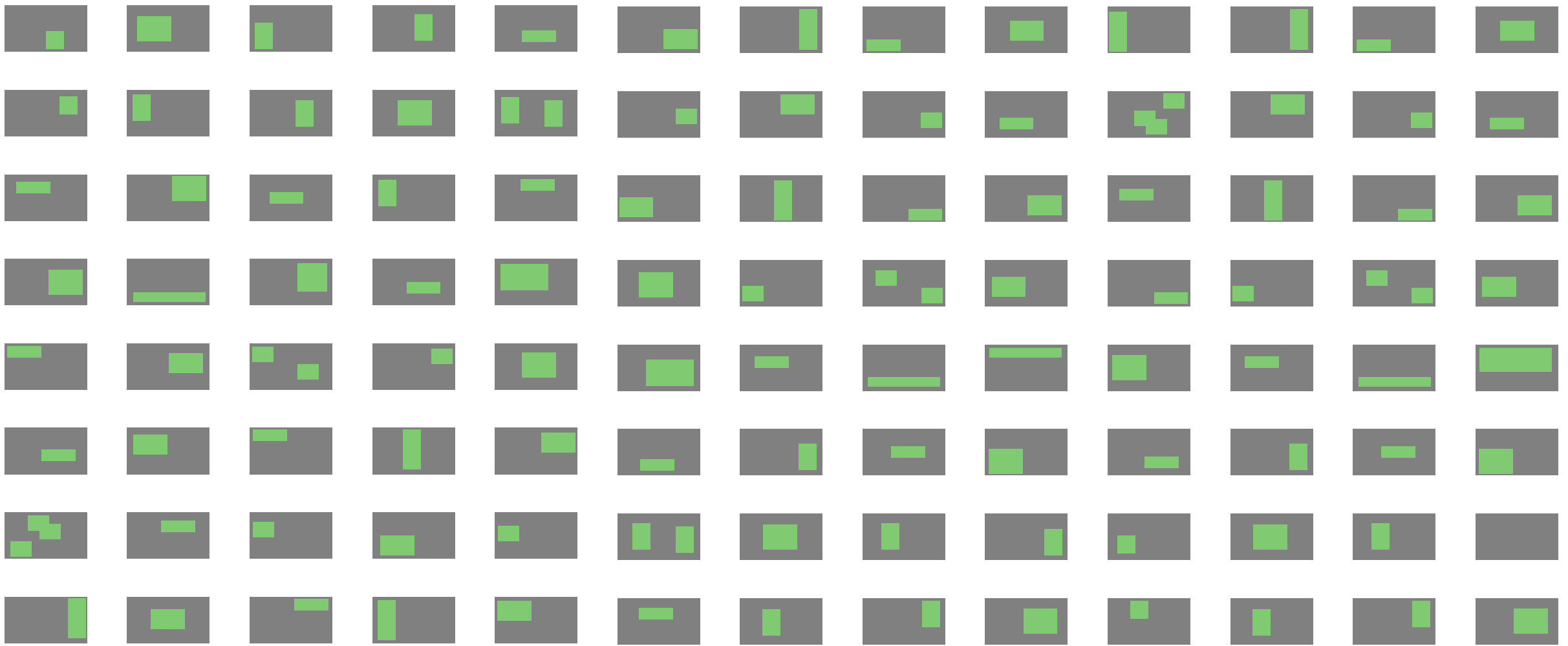


Mit nur 5% der  
Testlaufzeit finden wir  
**70% der  
fehlgeschlagenen  
Commits**





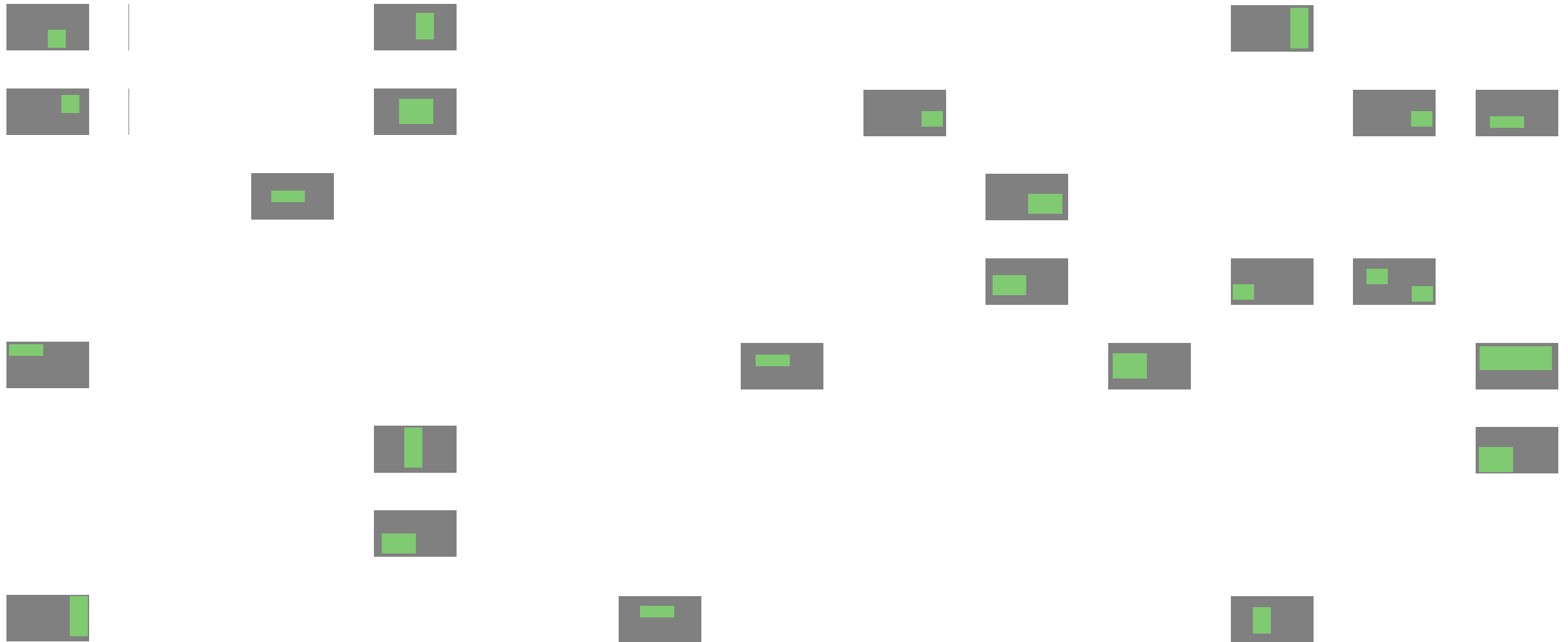




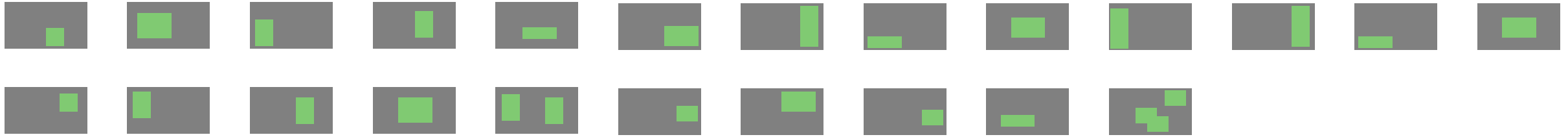
# Schritt 1: Selektion betroffener Testfälle



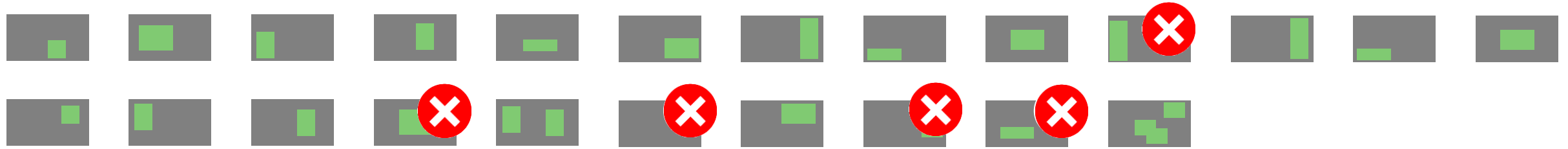
# Schritt 1: Selektion betroffener Testfälle



# Schritt 1: Selektion betroffener Testfälle



## Schritt 2: Priorisierung selektierter Testfälle













Testlaufzeiten von 3-12 Stunden durch eine Vielzahl von Parameterkombinationen.



Test-Feedback aus der CI innerhalb von 10 Minuten.



Mit TIA

Seit einem Jahre kommt das Test-Feedback immer innerhalb von 10 Minuten, obwohl die Gesamtzahl der Tests im selben Zeitraum um 57% zunahm.

# Test-Impact-Analyse

Tests werden für jeden Lauf **passend zu Änderungen** ausgewählt

90% der Fehler in 2% der Zeit

Erfordert kontinuierliche Messung der Coverage und Integration der Test-Auswahl in die CI / Testautomatisierung.

**Stärkere Beschleunigung des Feedbacks (bei höherem Aufwand)**

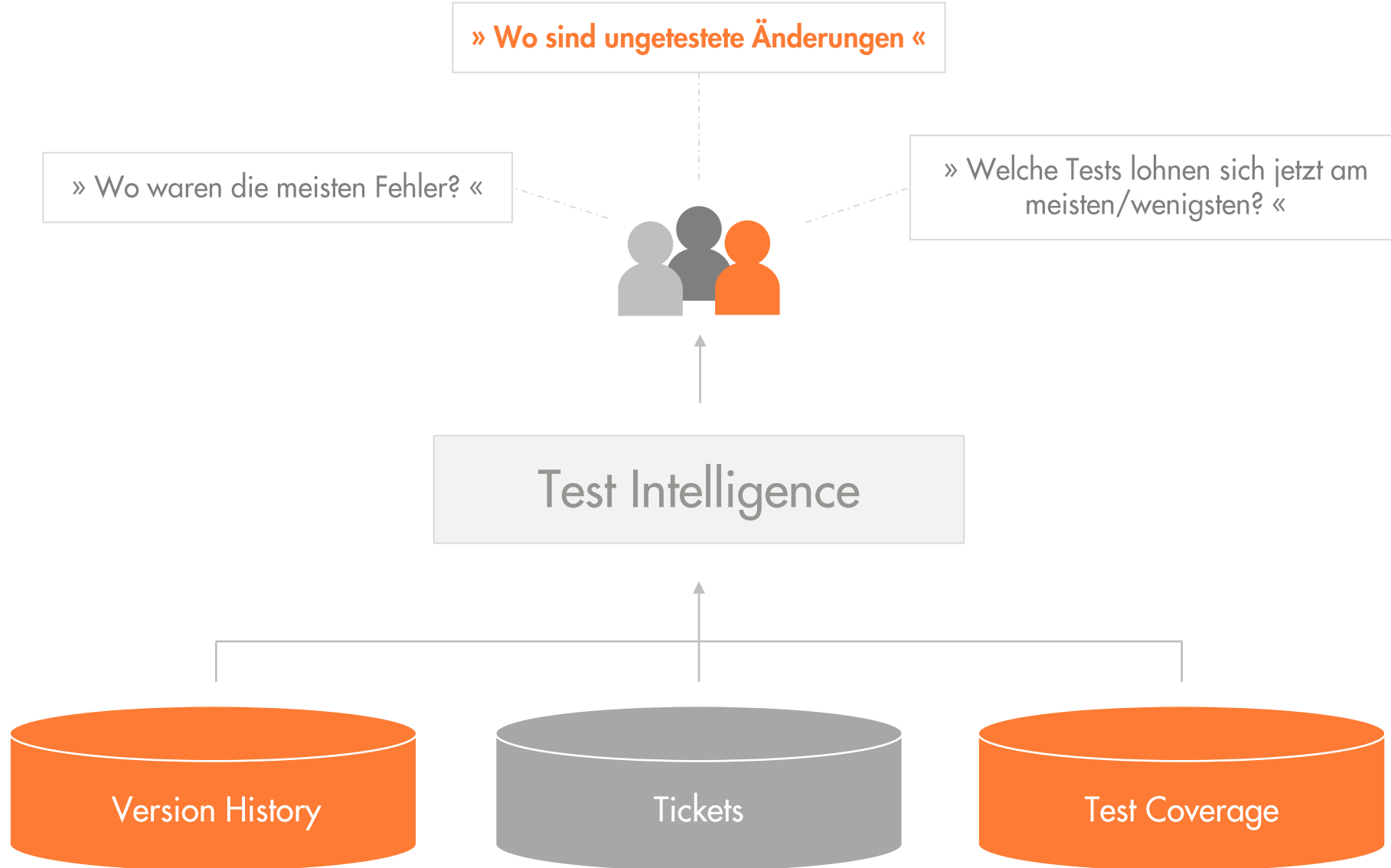
# Pareto-Optimierung

Tests werden **unabhängig von Änderungen** ausgewählt

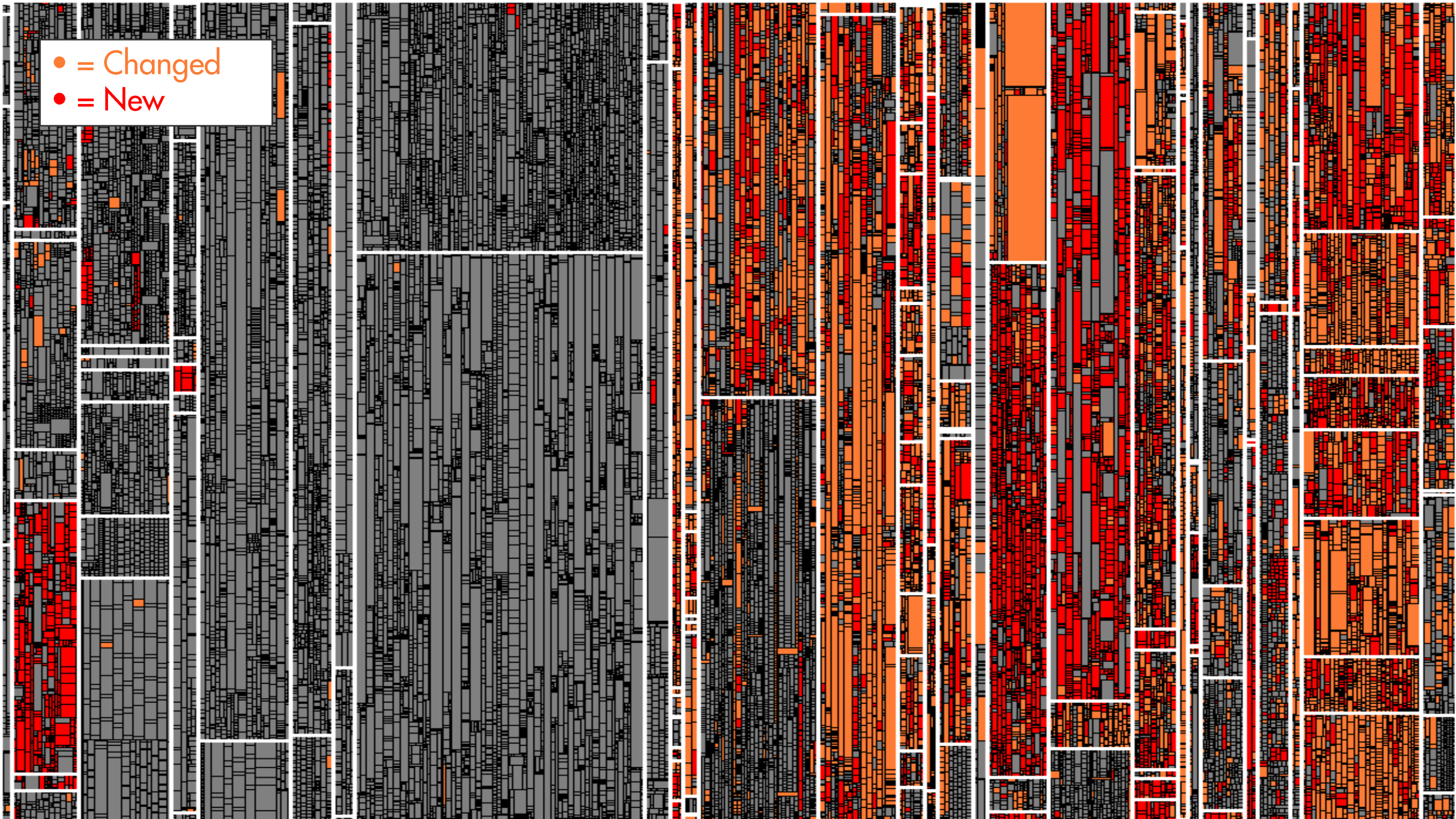
90% der Fehler in 11% der Zeit

Einmalige Messung der Coverage reicht aus.

**Viel geringerer Aufwand**

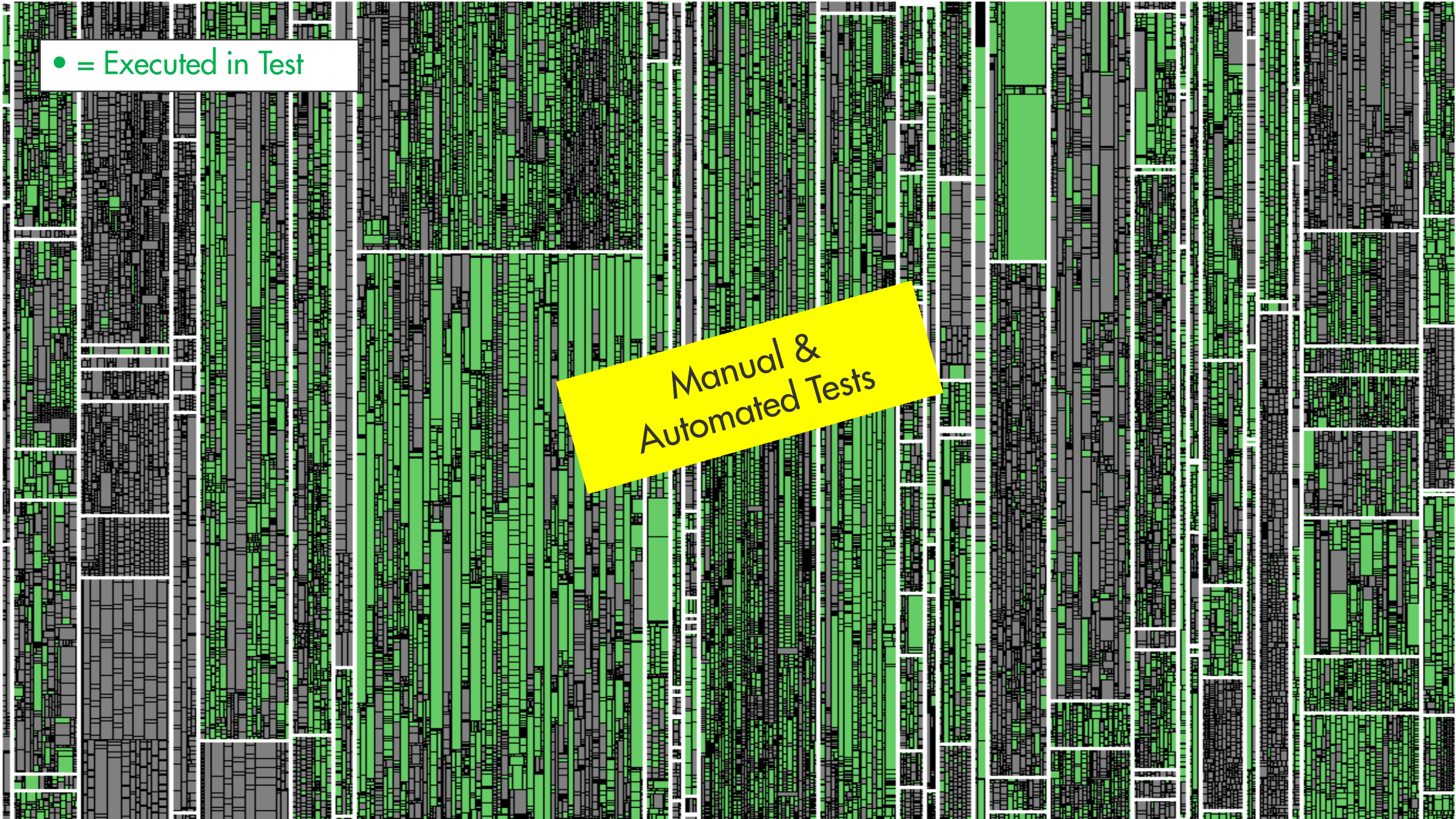


- = Changed
- = New



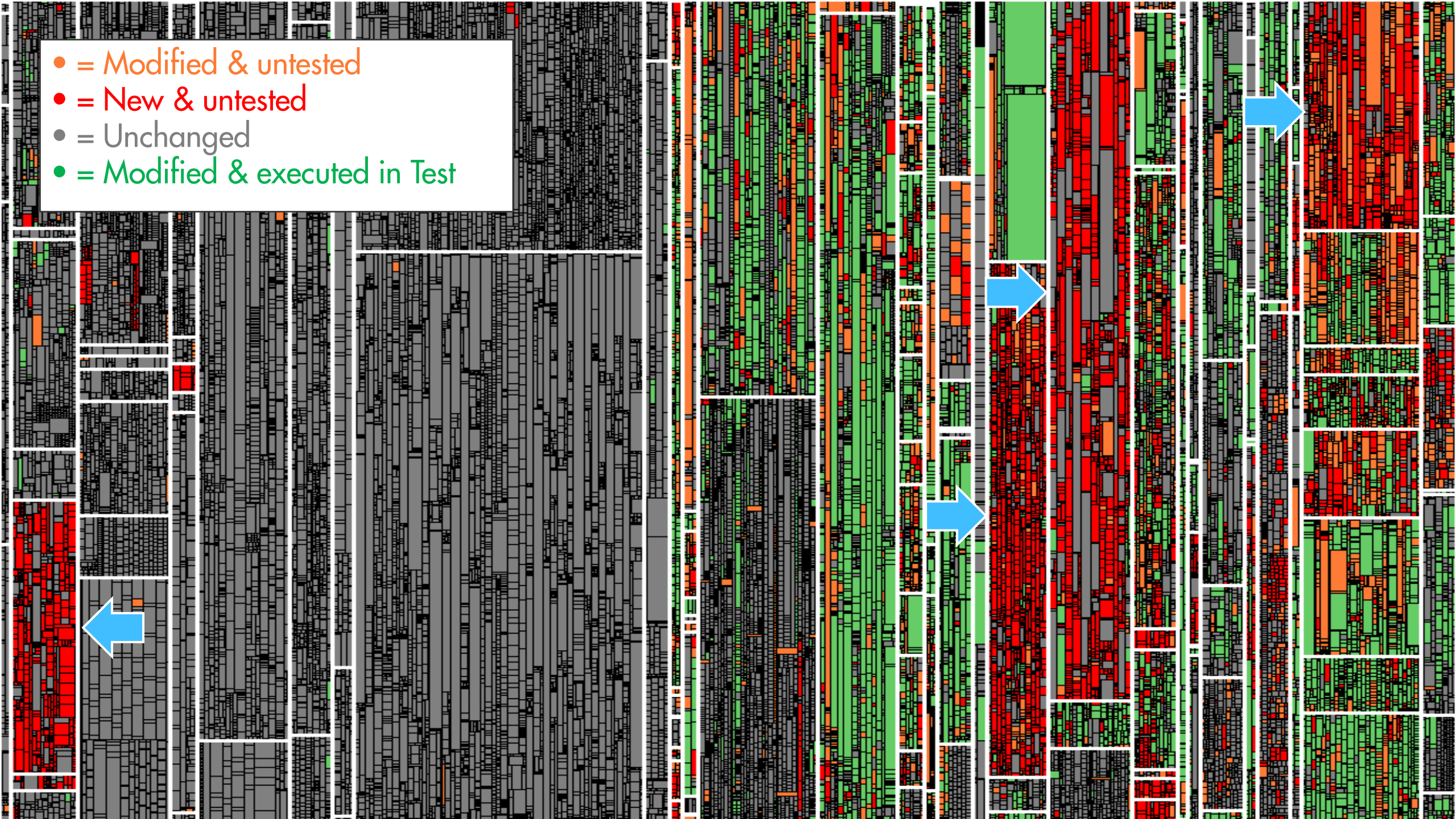
● = Executed in Test


















Manual &  
Automated Tests










- = Modified & untested
- = New & untested
- = Unchanged
- = Modified & executed in Test




Issue # <span>▼</span>	Subject	Done		Test Gap
<a href="#">TS-10549</a>	Undo/Redo for web-based architecture editor	Done		0% 
<a href="#">TS-10784</a>	Fix long method finding in TaintAnalysisRunner	Done		0% 
<a href="#">TS-10923</a>	Implement metric 'Nesting Depth' for Simulink	Done		29% 
<a href="#">TS-11364</a>	External findings are not registered during first upload	Done		14% 
<a href="#">TS-11942</a>	Manual test coverage upload during development	Done		43% 
<a href="#">TS-12050</a>	Tool for transferring findings blacklists and tasks	Done		50% 
<a href="#">TS-12262</a>	Cannot set or alter alias without reanalysis	Done		0% 
<a href="#">TS-13151</a>	Fetch parent relationship of TFS work items	Done		0% 

Issue # ▾	Subject		Test Gap
<a href="#">TS-14421</a>	Get rid of TestGapSynchronizer block	Done 	0% 
<a href="#">TS-14733</a>	Remove Dataflow blocks	Done 	22% 

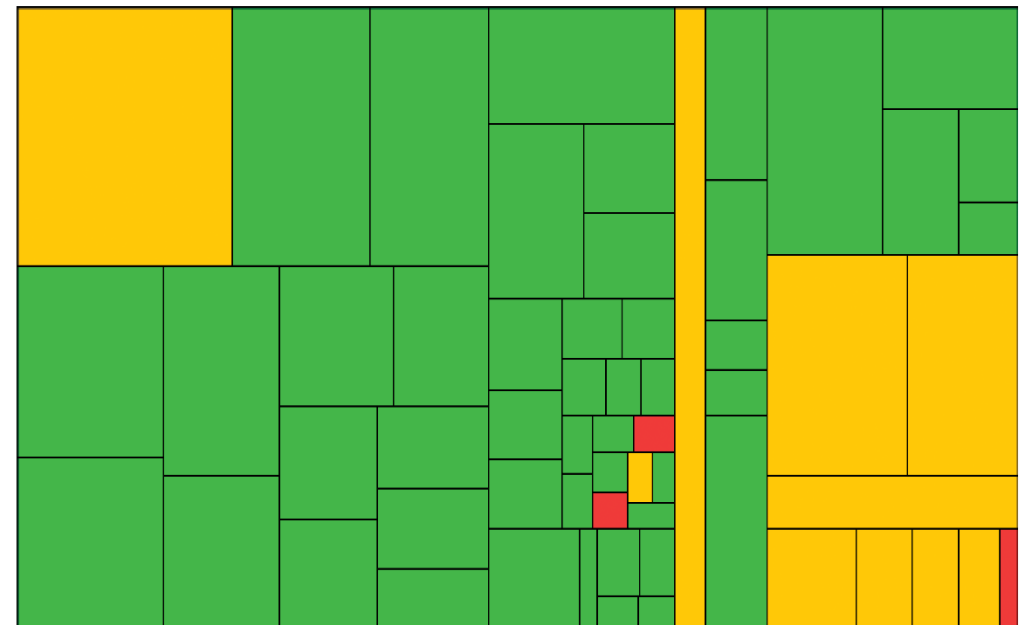
**Done Issue TS-14733 - Remove Dataflow blocks**

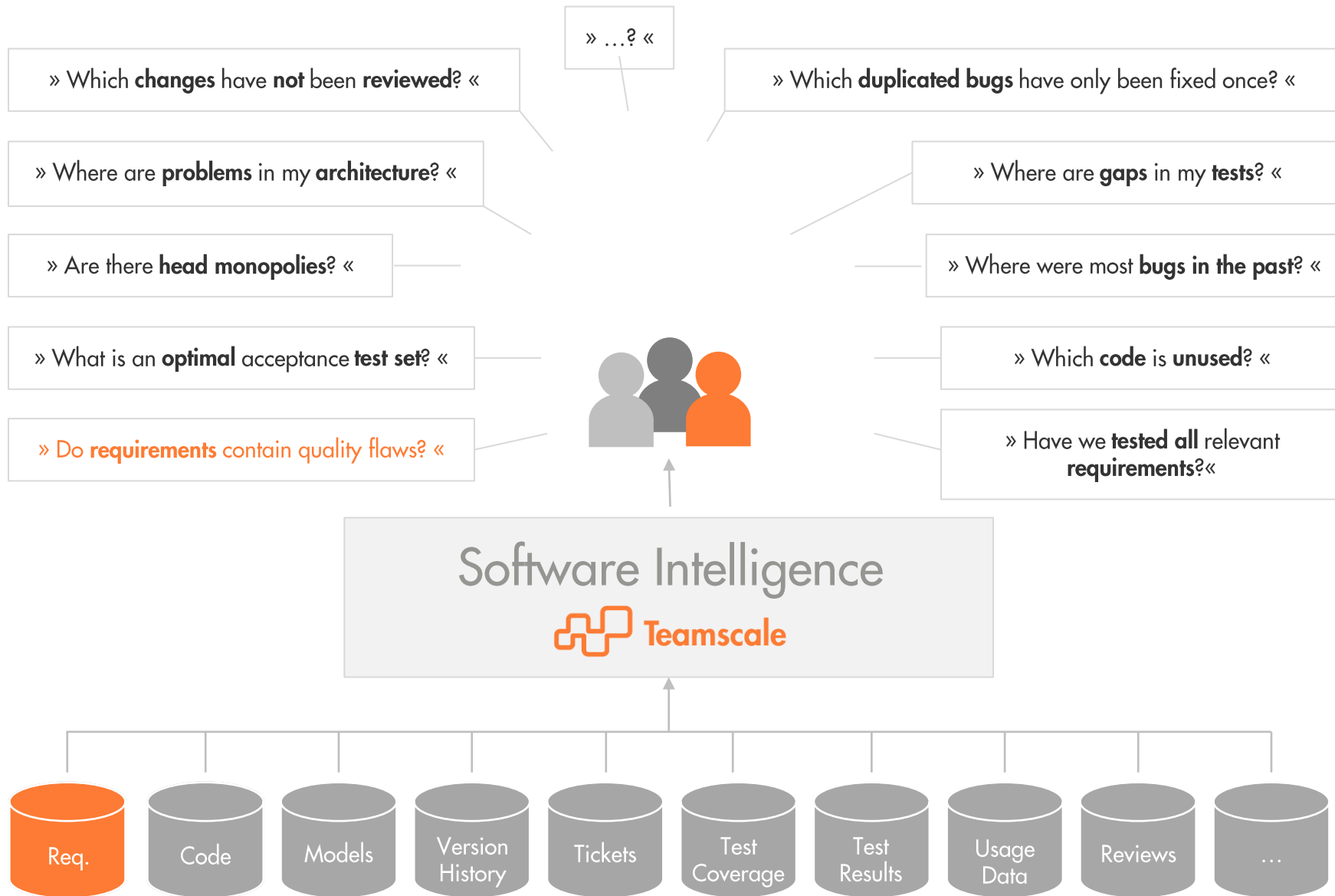
Creator:  (on Apr 06 2018 19:44) Last update: Aug 24 2018 09:32

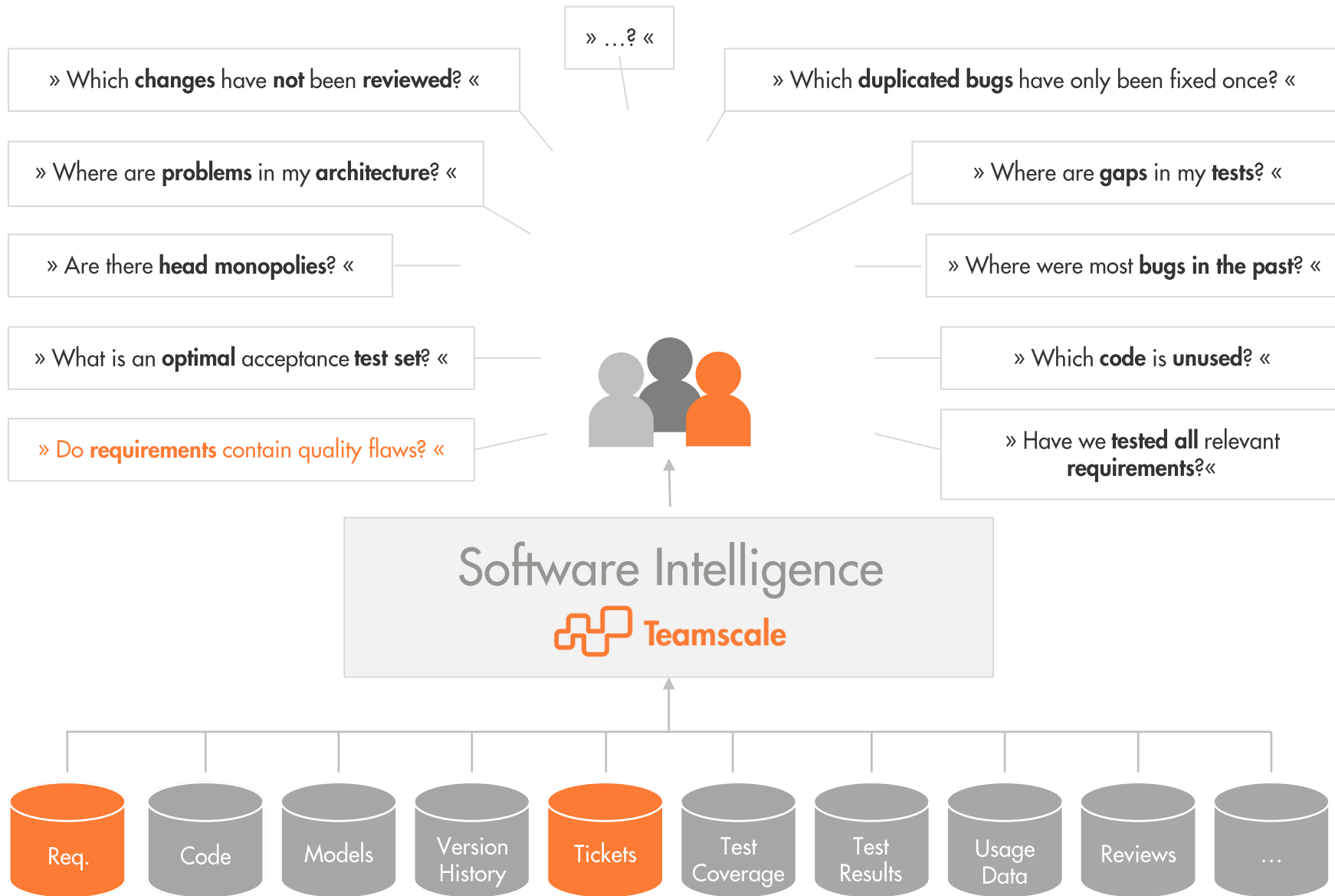
Assignee: 

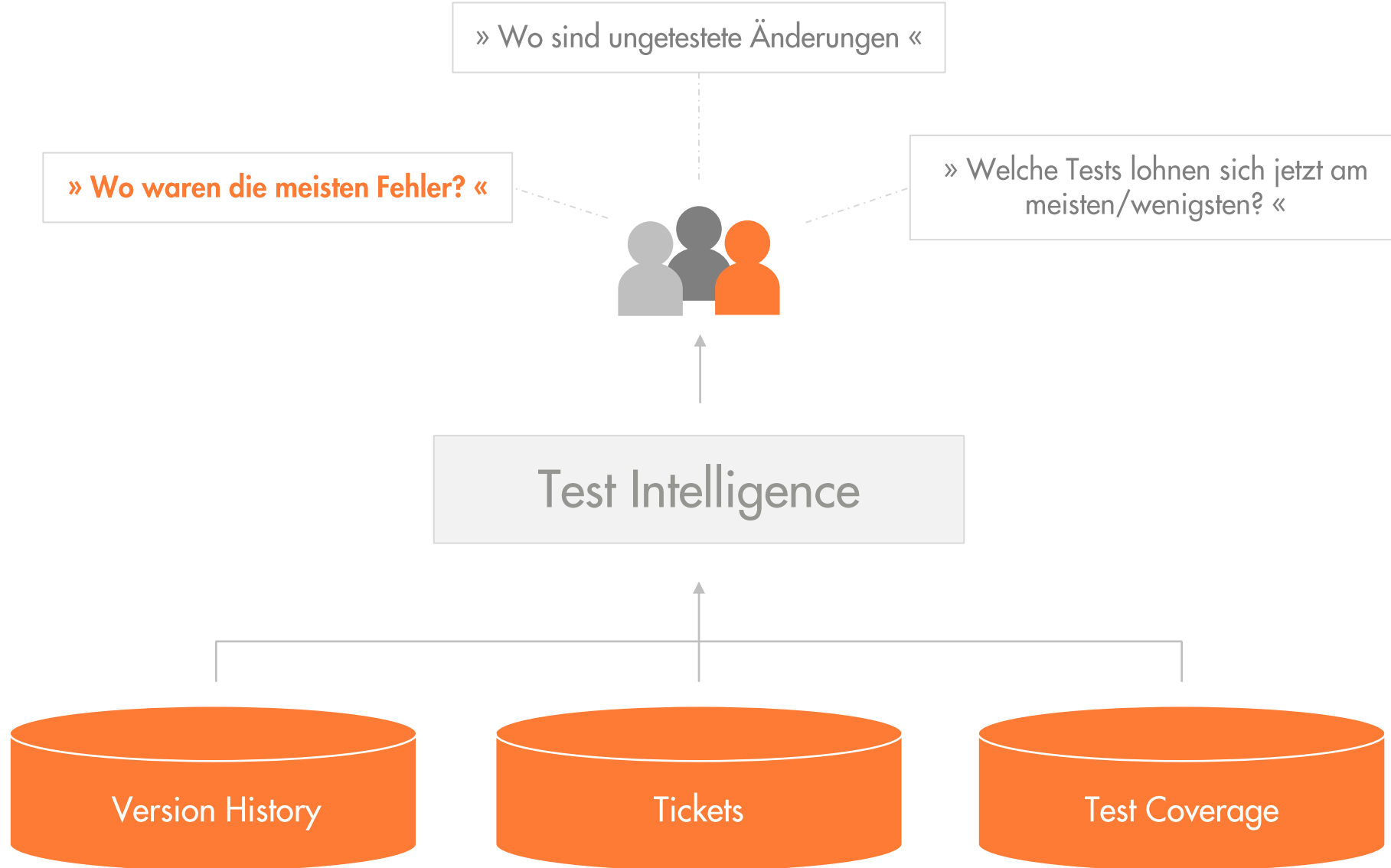
Project	Type	Priority	Resolution	Fix Version
TS	Maintenance	Normal	Green	Teamscale 4.5
Component	Labels	Affected Version	Customer	Customer Issue
Backend	Performance			
Epic Name	Freshdesk URL	Merge Request		
		<a href="https://git.cqse.eu/cqse/teamscale/3621">https://git.cqse.eu/cqse/teamscale/3621</a>		

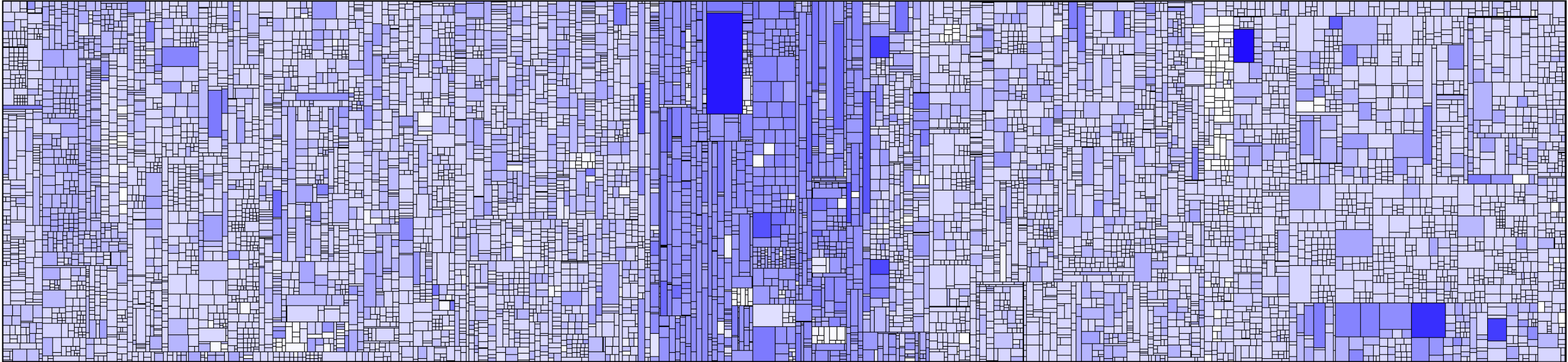
Aug 15 2018 12:37–Now | Test Gap: 22%

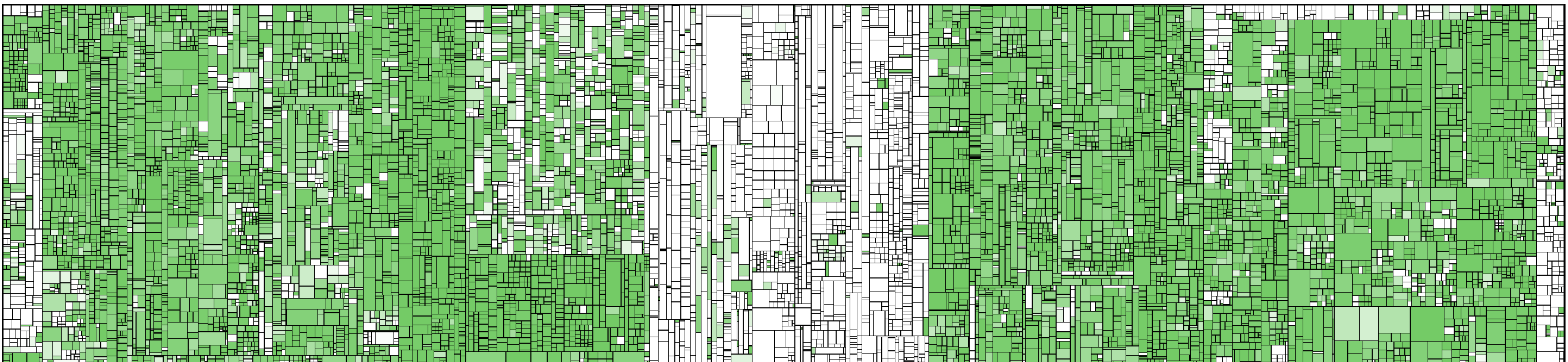




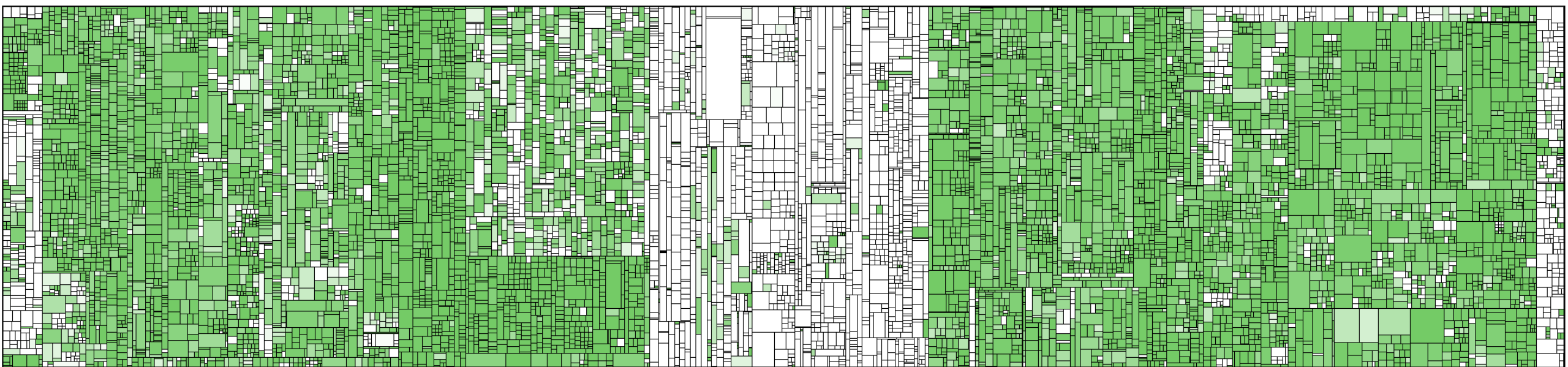
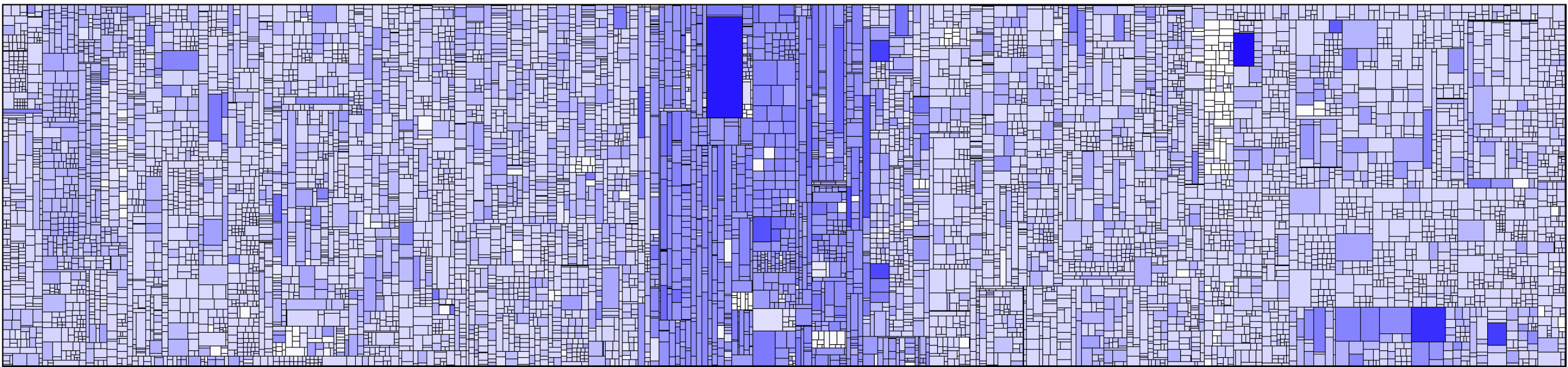












## Test-Gap-Analyse

Ungetestete Änderungen im Quelltext aufdecken



04. Oktober  
10:30-12:00 Uhr  
[cqse.eu/tga-2310-jugs](https://cqse.eu/tga-2310-jugs)



## Schnelles Feedback trotz langsamer Tests

Testselektion für historisch gewachsene Test-Suites



08. November  
10:30-12:00 Uhr  
[cqse.eu/ts-2311-jugs](https://cqse.eu/ts-2311-jugs)



# Contact – Looking forward to discussions 😊



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Link zu Folien

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[www.cqse.eu](http://www.cqse.eu)

**CQSE**