80/20 Optimierung von Test-Suites

Erfahrungen aus Forschung und Praxis

CQSE

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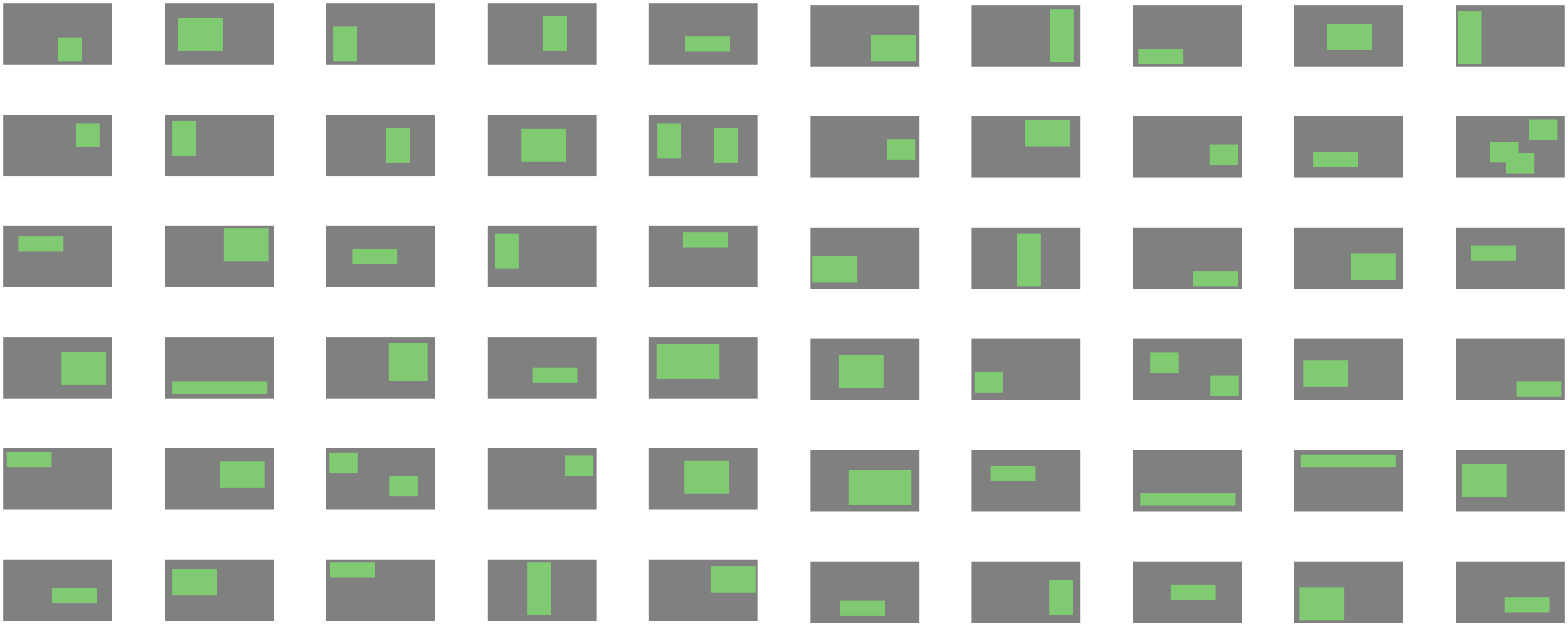
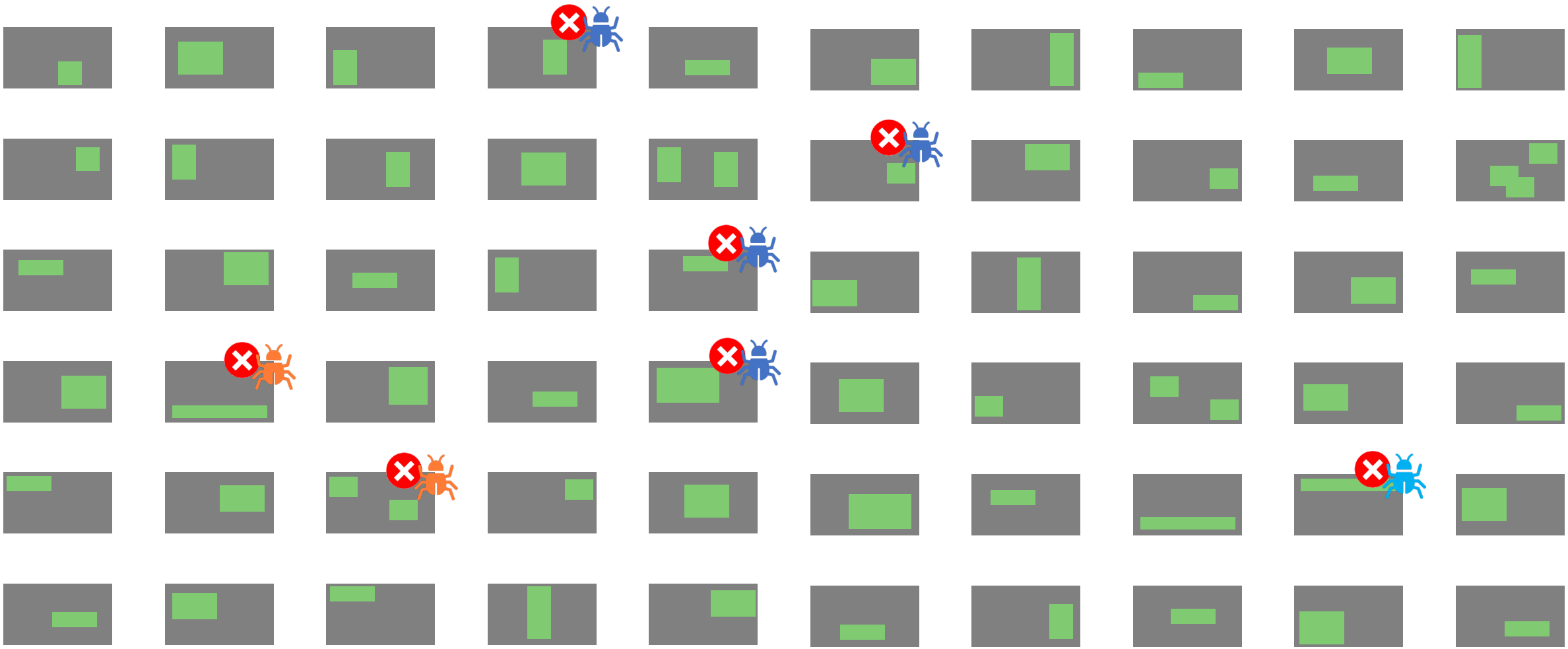
Raphael Nömmer

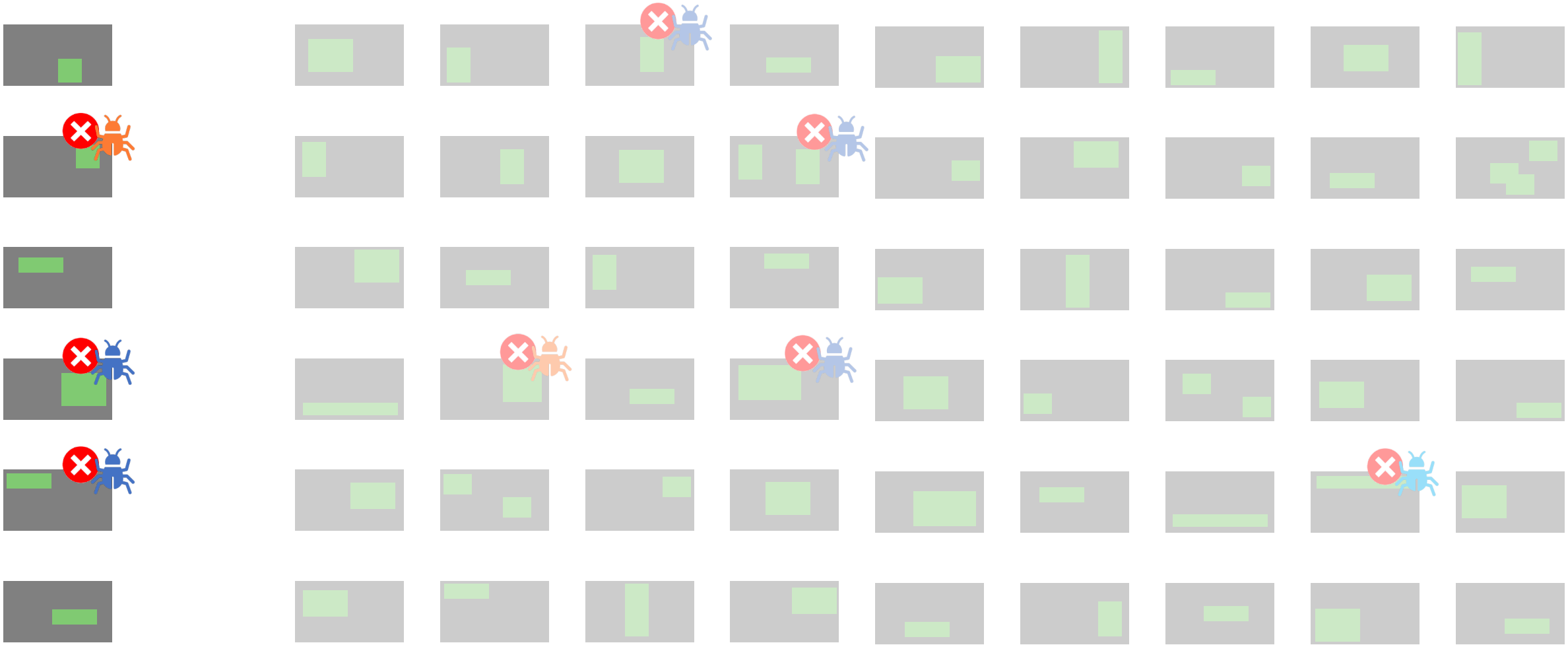
Test Suites dauern zu lang

- Hardware in the Loop
- Manuelle Tests
- Ui Tests

https://www.technica-engineering.de/produkte/bts-body-electronic-test-system







Warum gibt es hier Optimierungspotential?

Picture1.png - Pixelitor 4.2.3

File Edit Layer Select Image Color Filter View Help

Sample Only the Active Layer/Mask

Untitled1 × Picture1.png ×

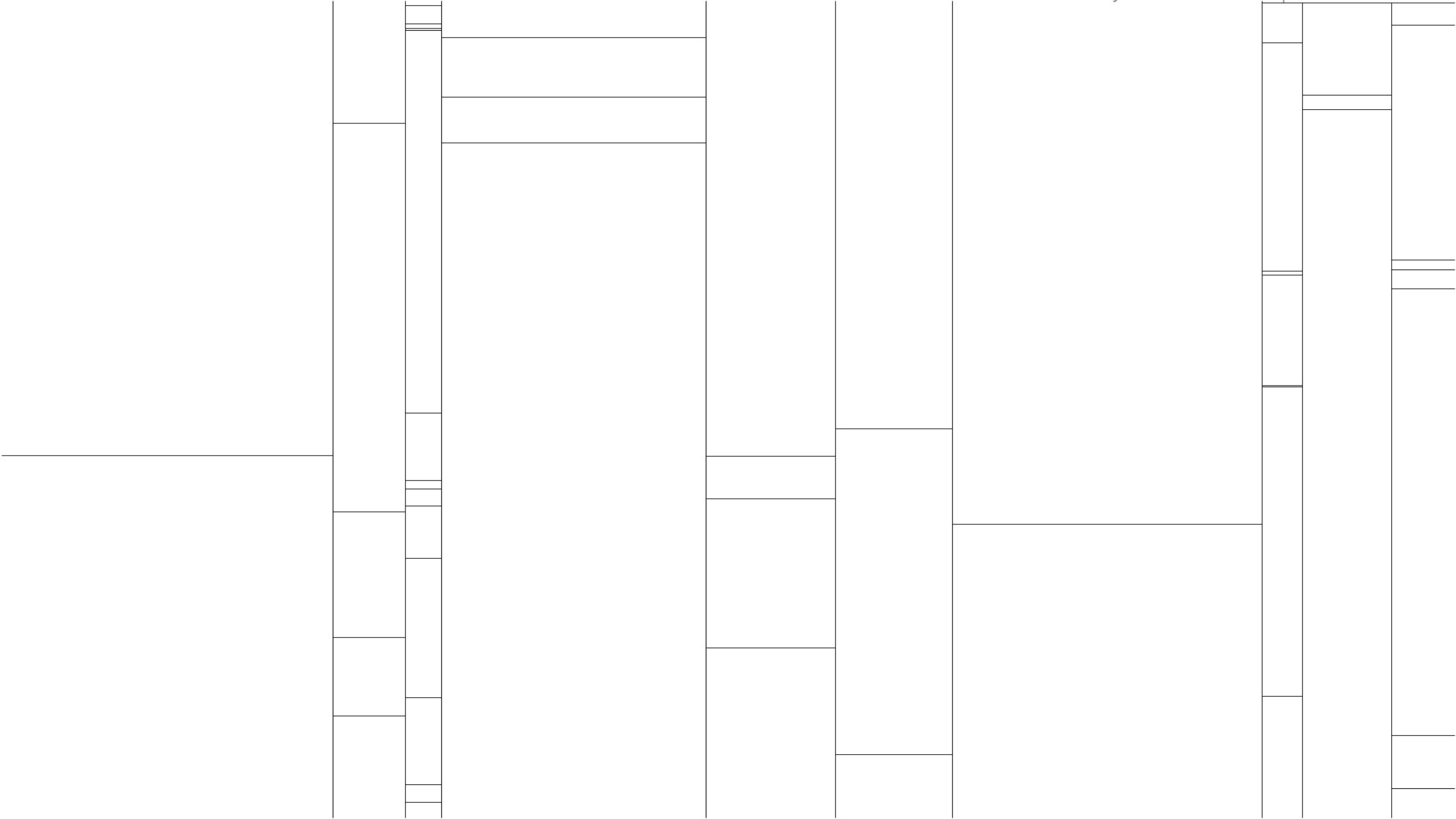
Layers

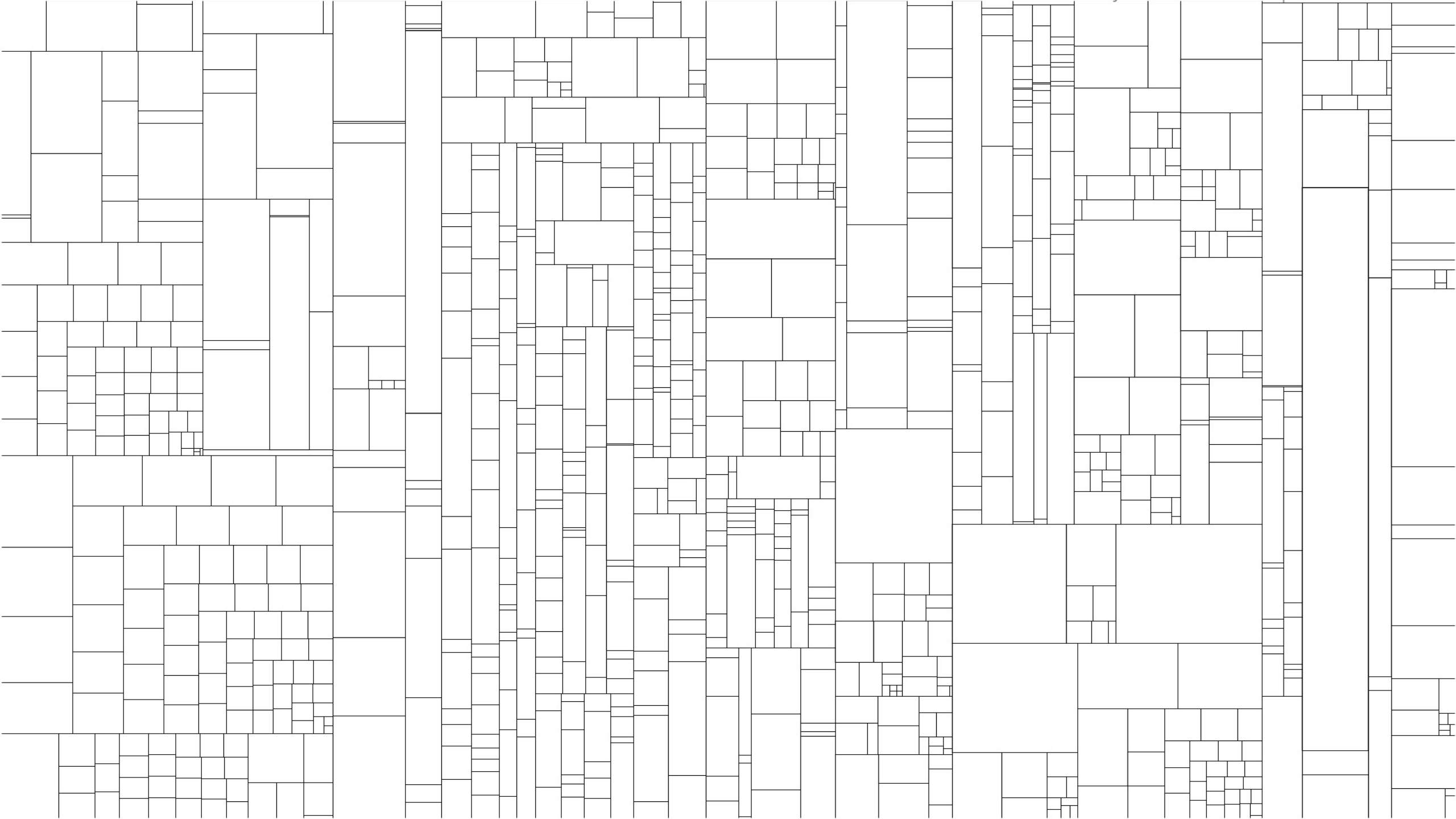
Opacity: 100 % Normal

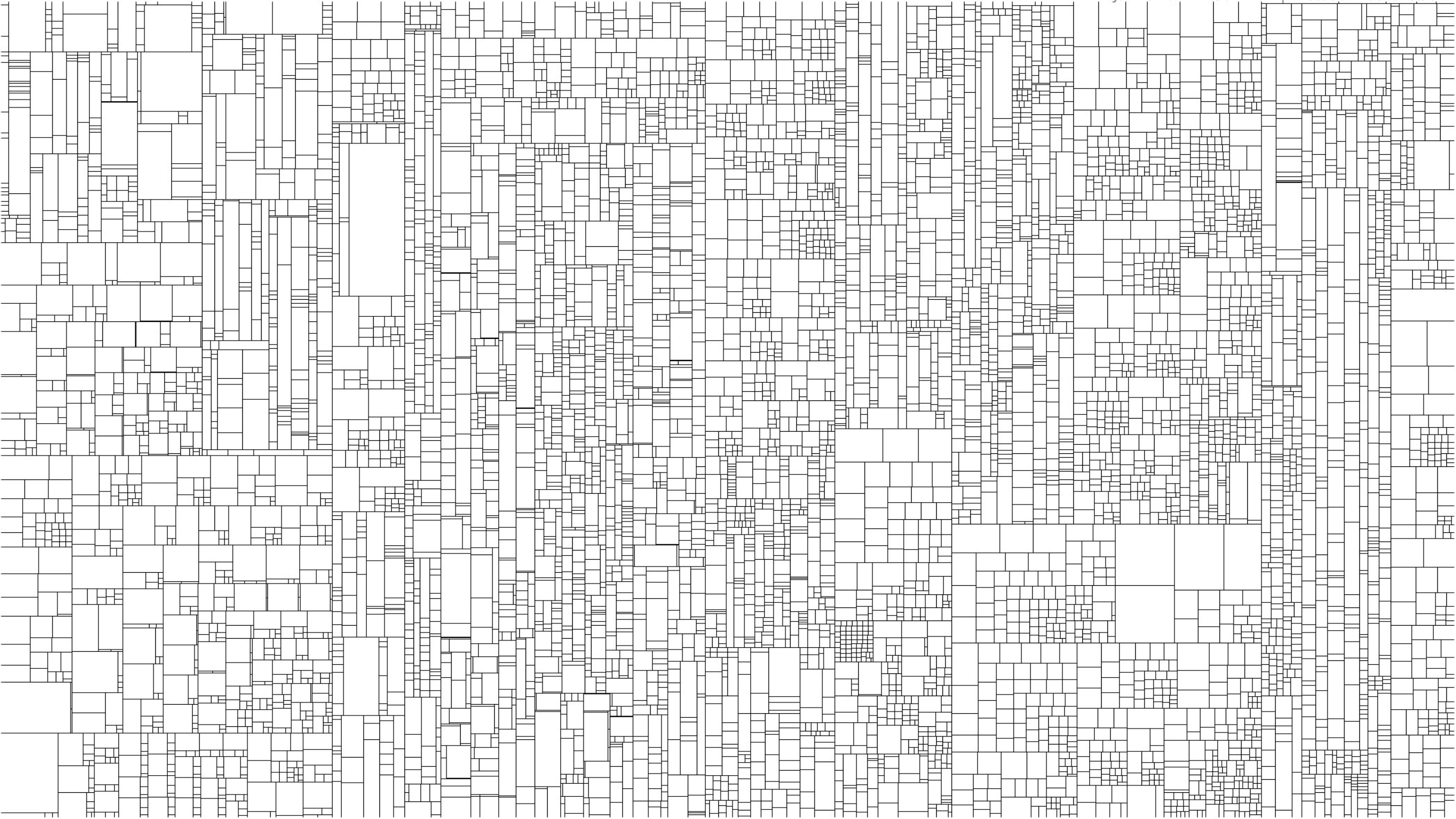
layer 1

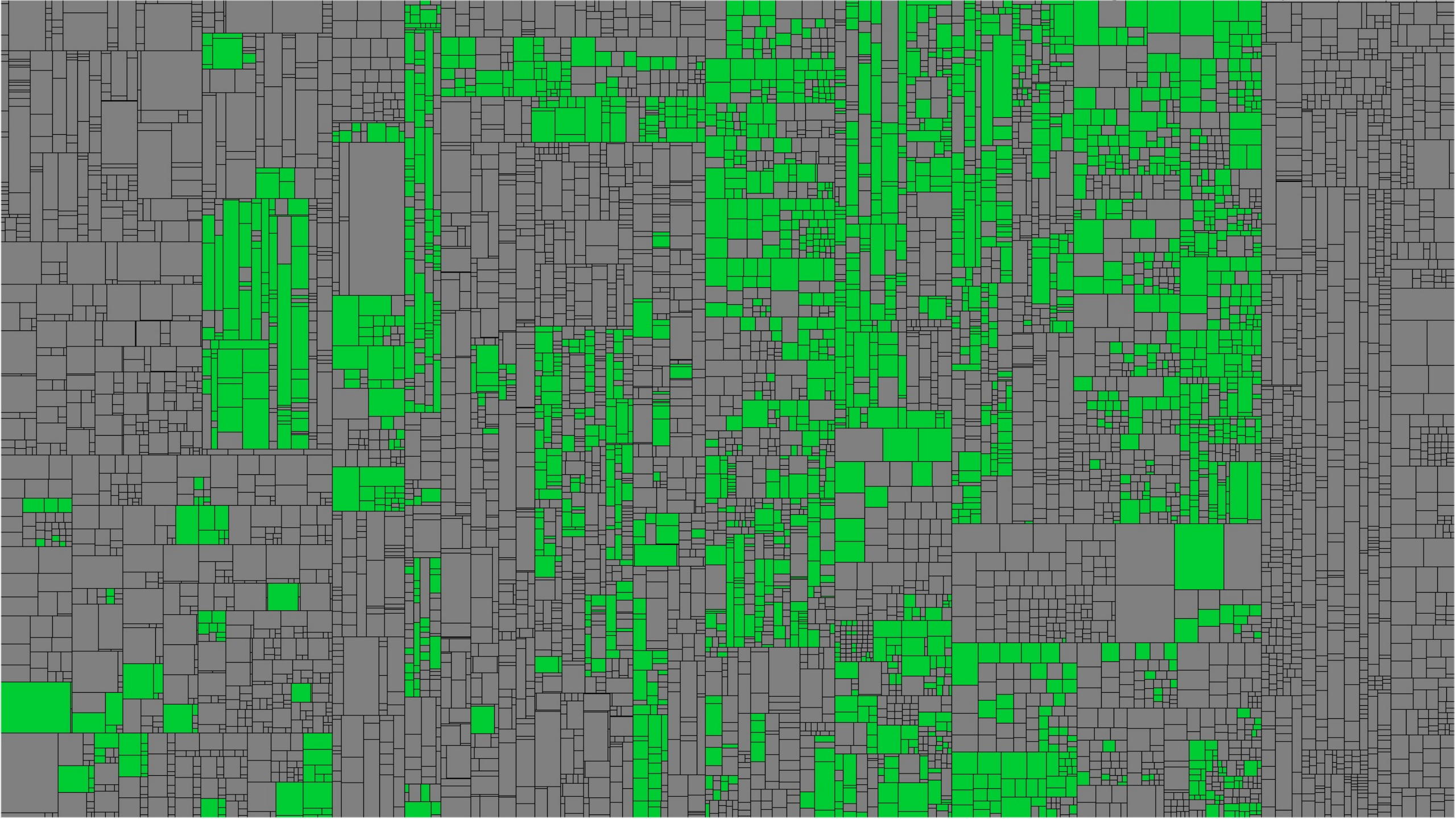
Picture1.png was opened.

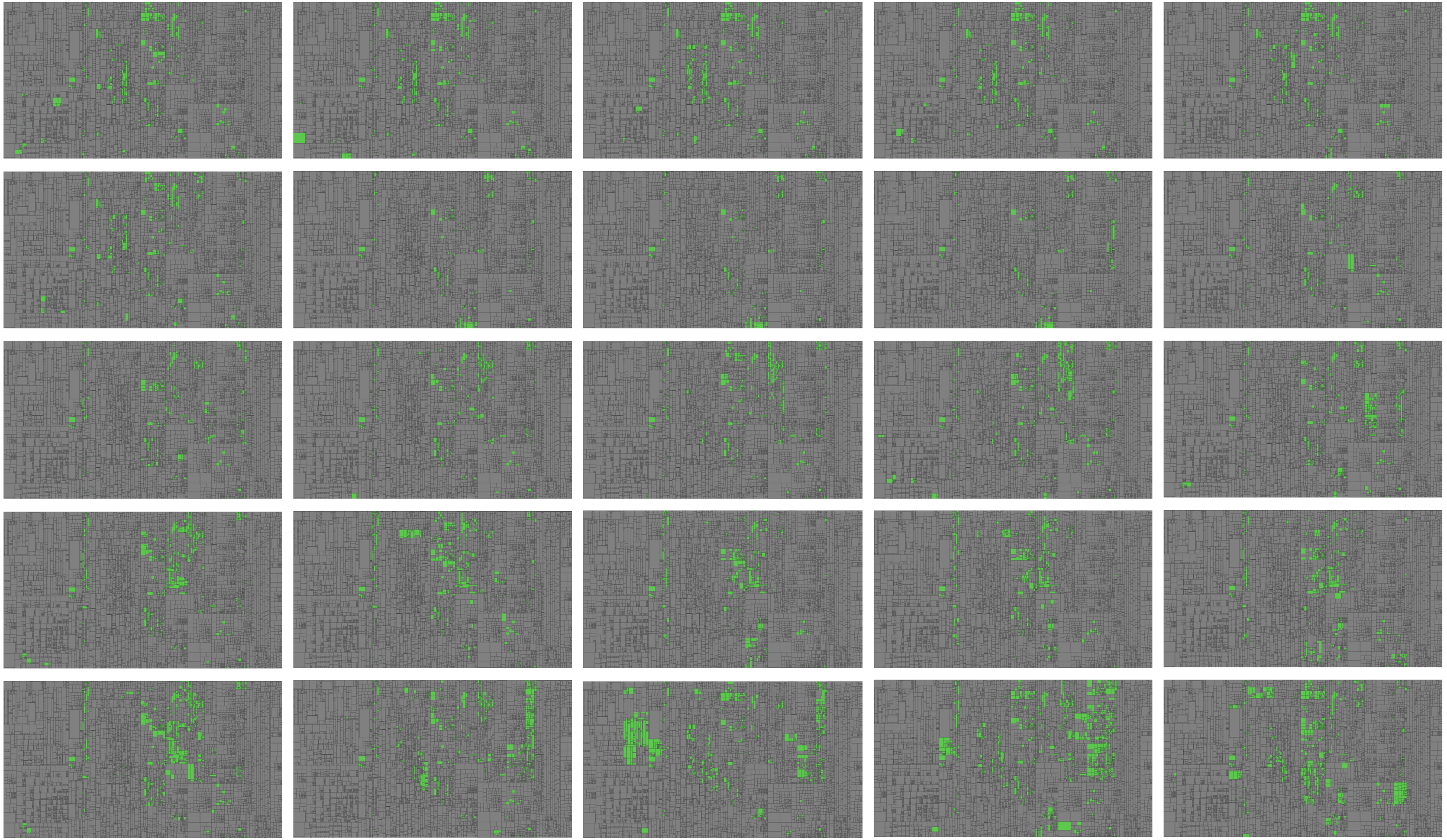
Zoom: 100% Fit 100%



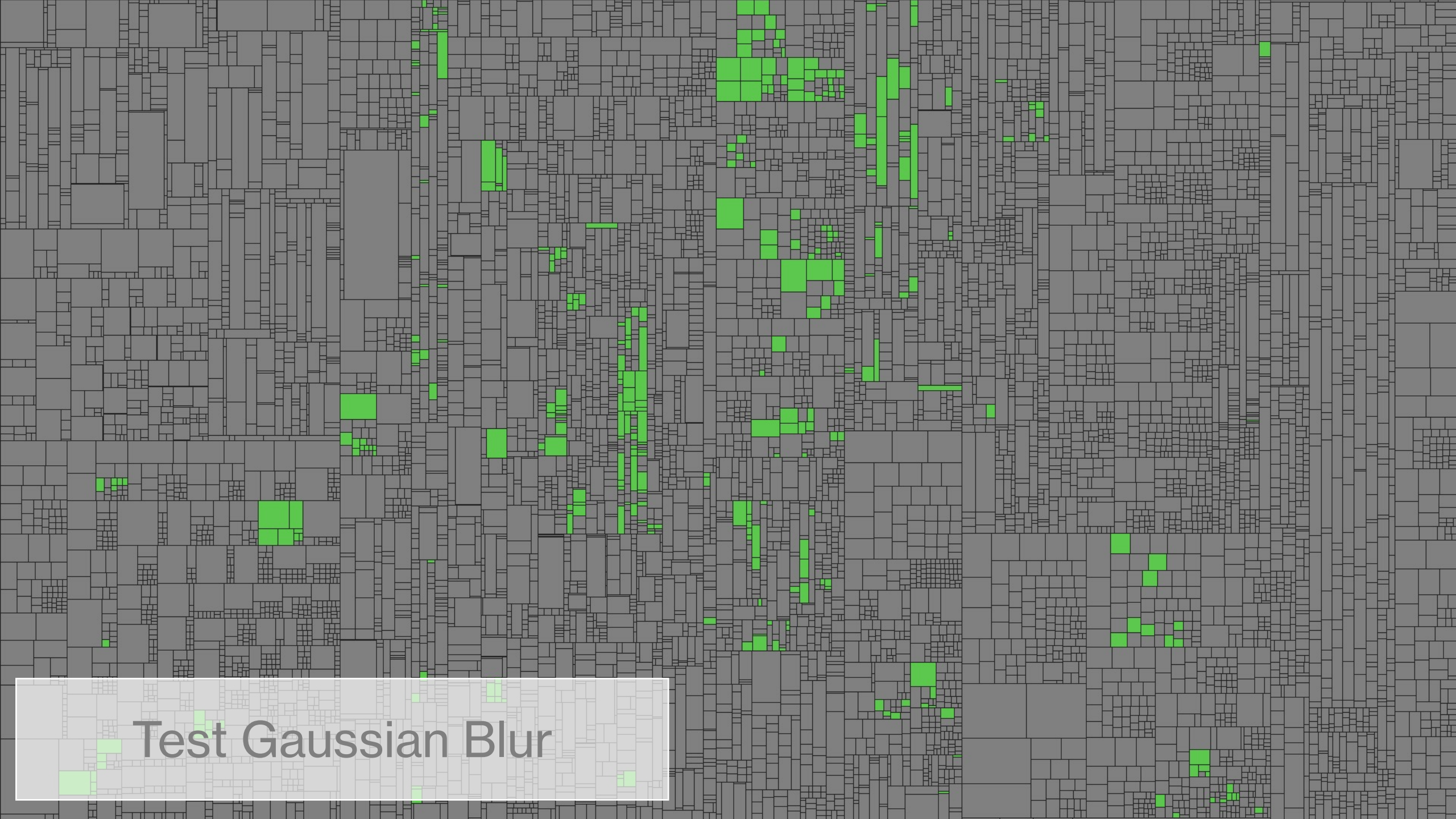


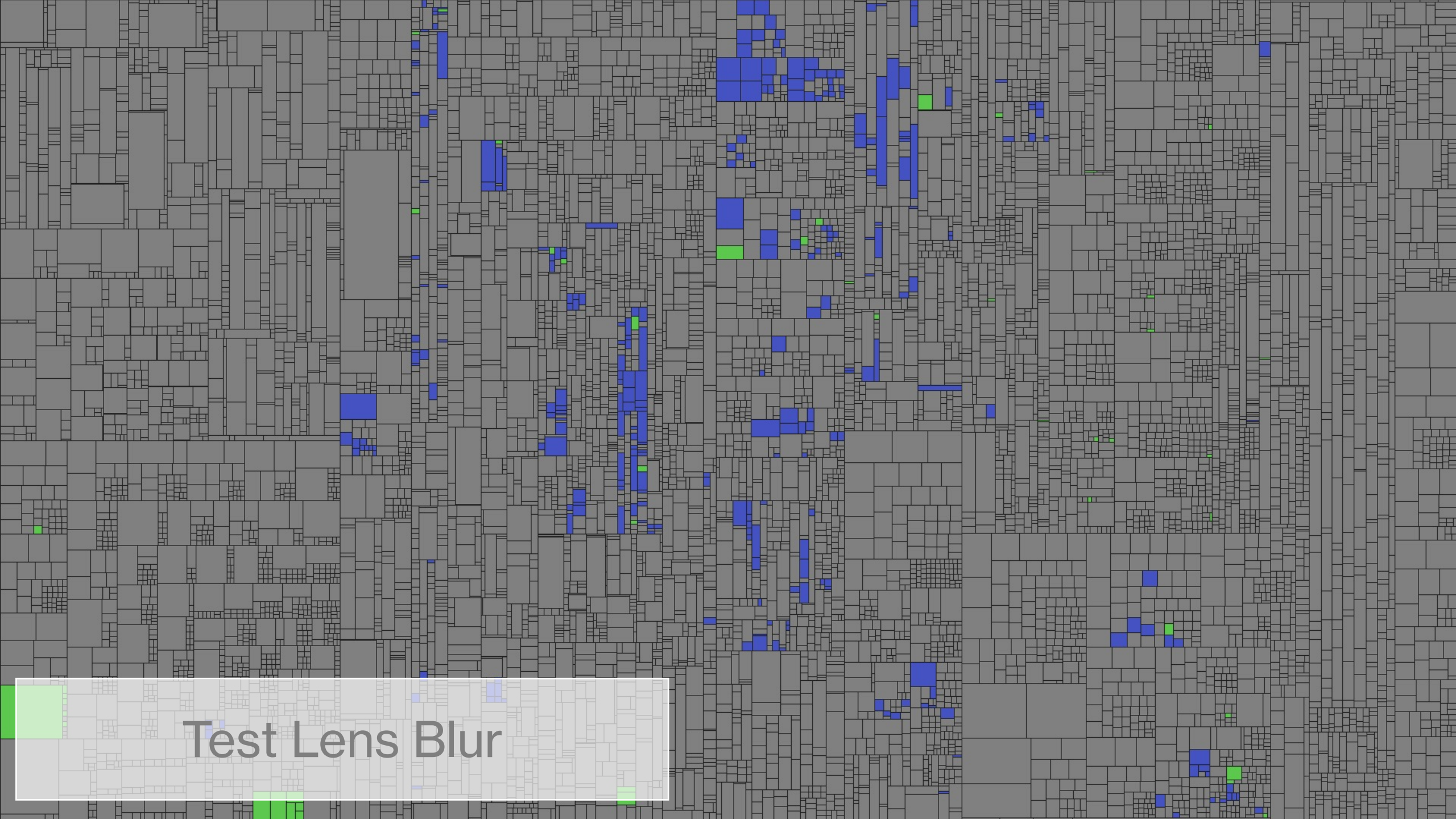


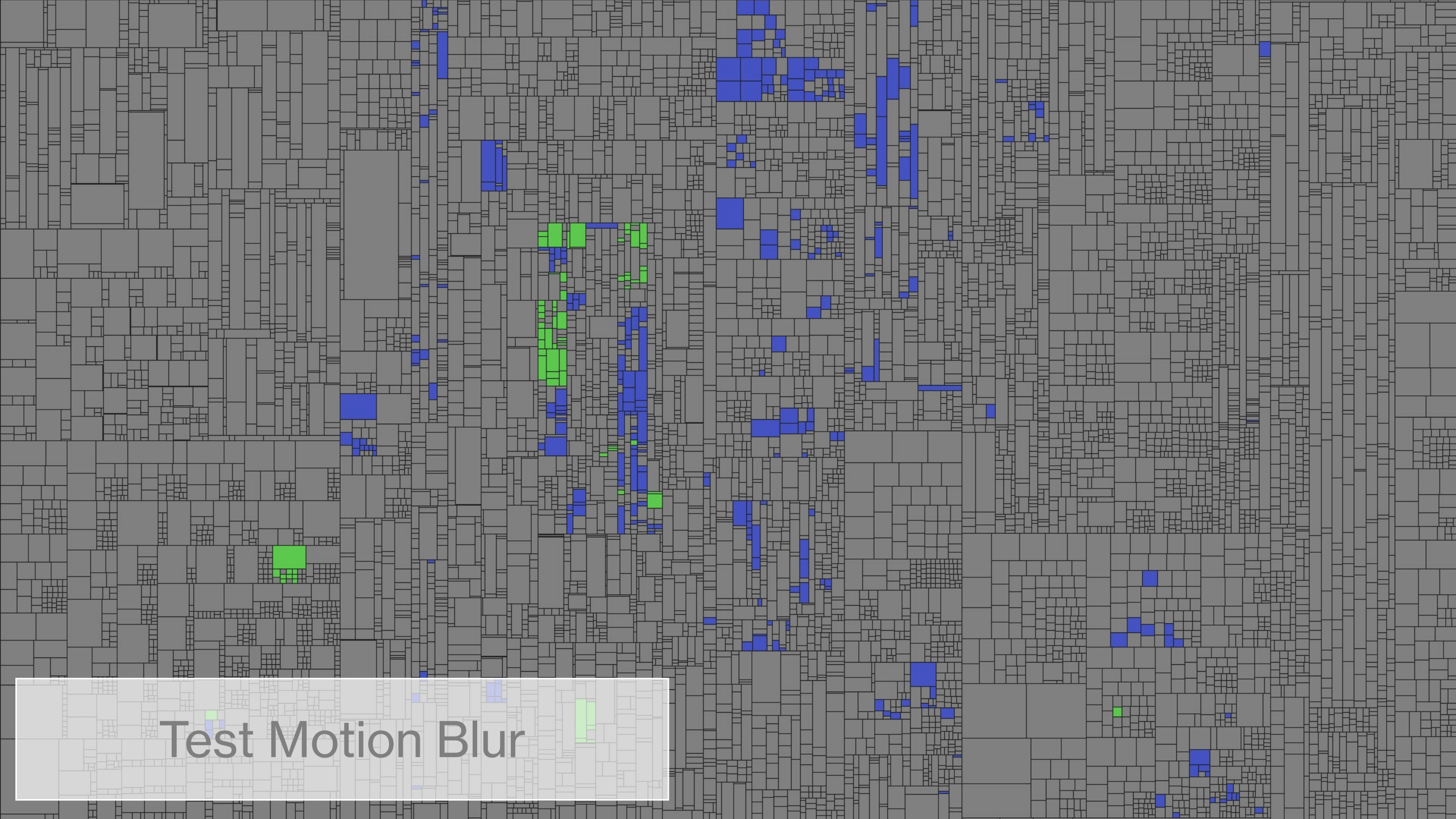


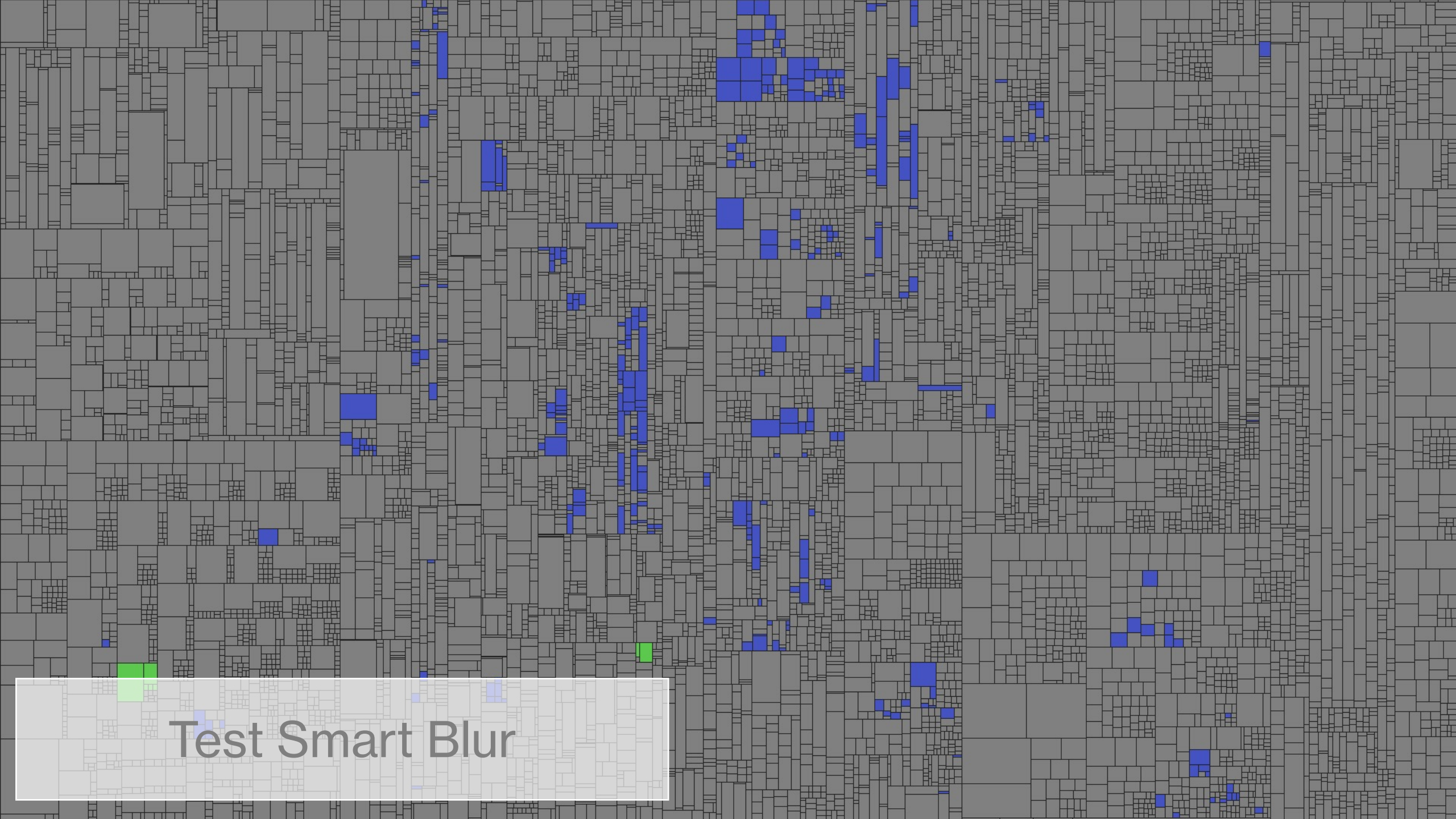


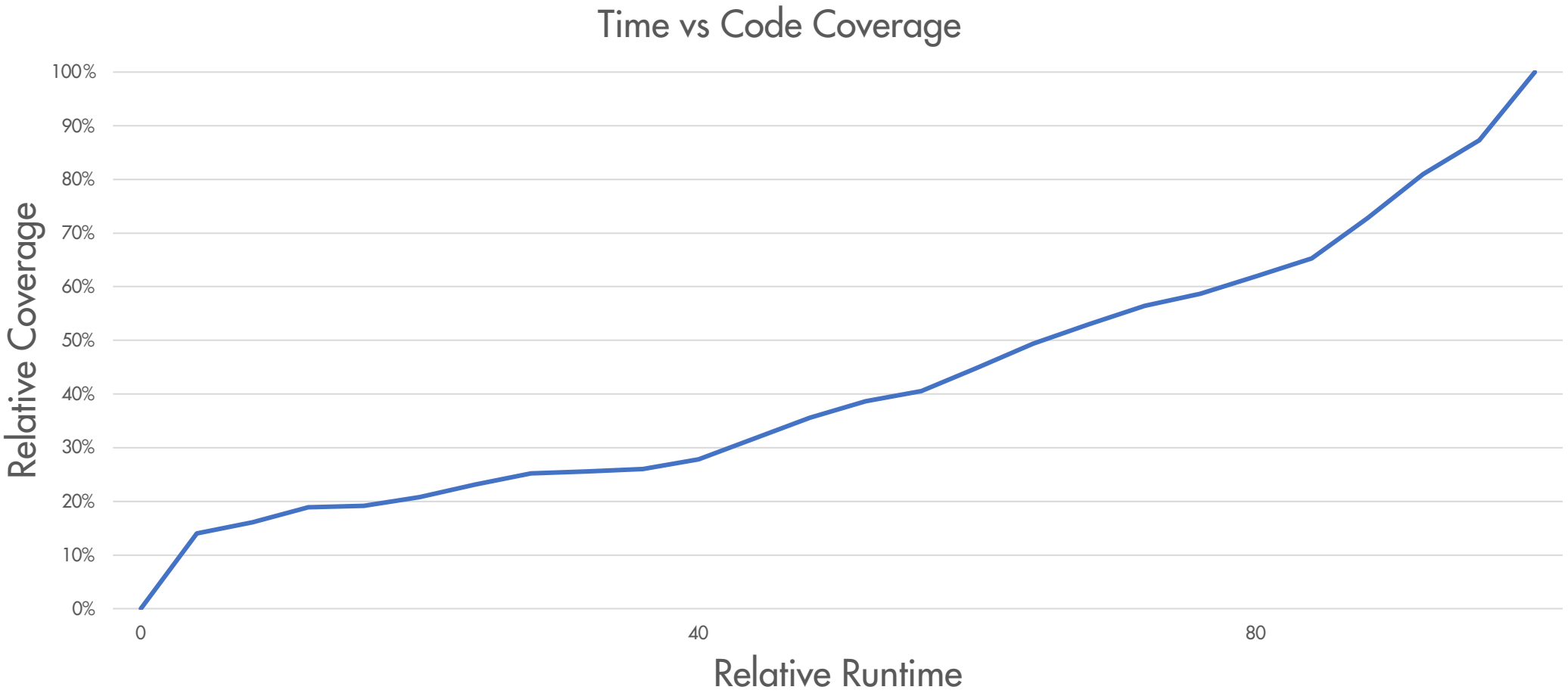
Welchen Einfluss hat die Reihenfolge der Ausführung von Software Tests?


Test Gaussian Blur

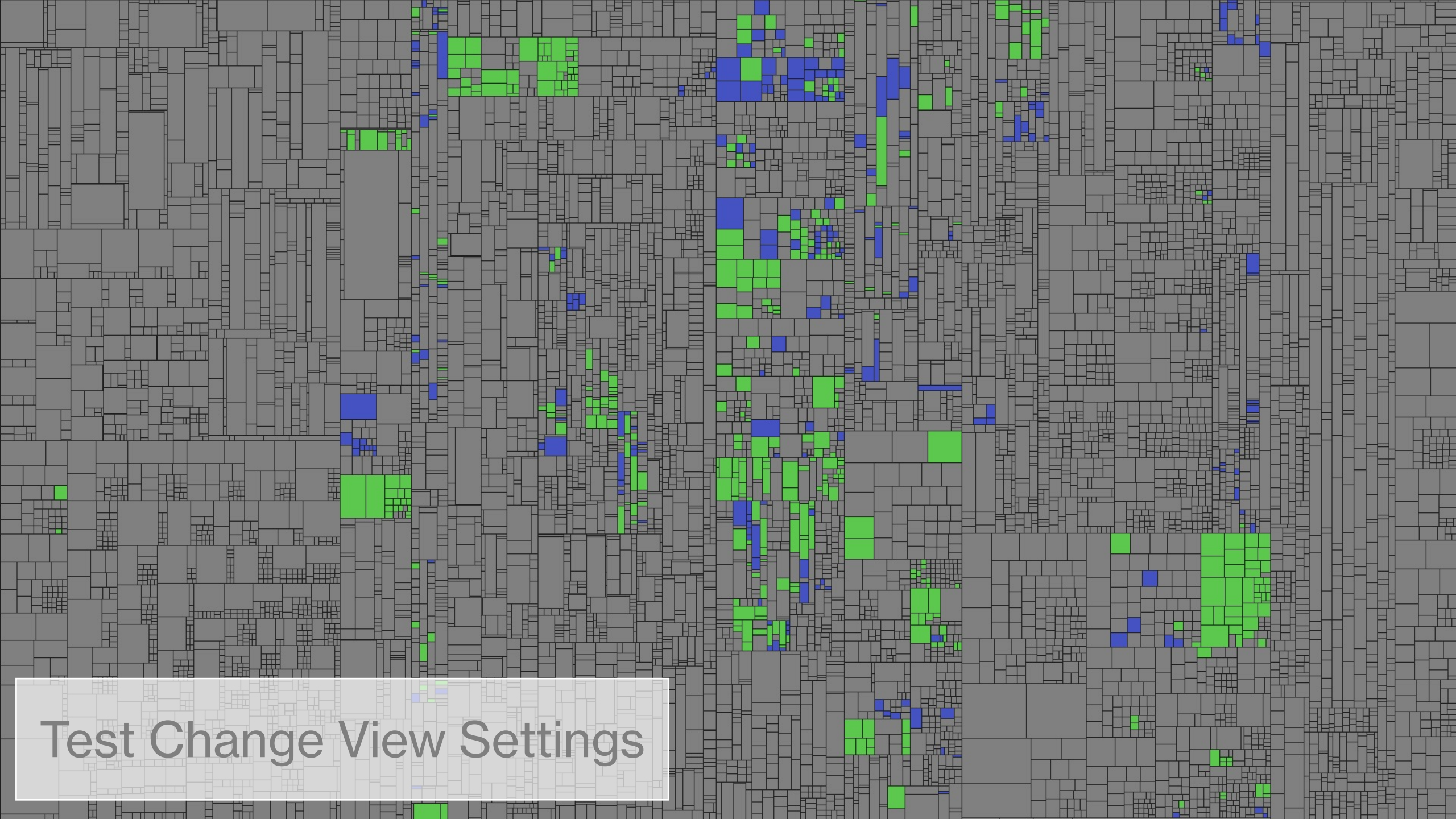

Test Lens Blur

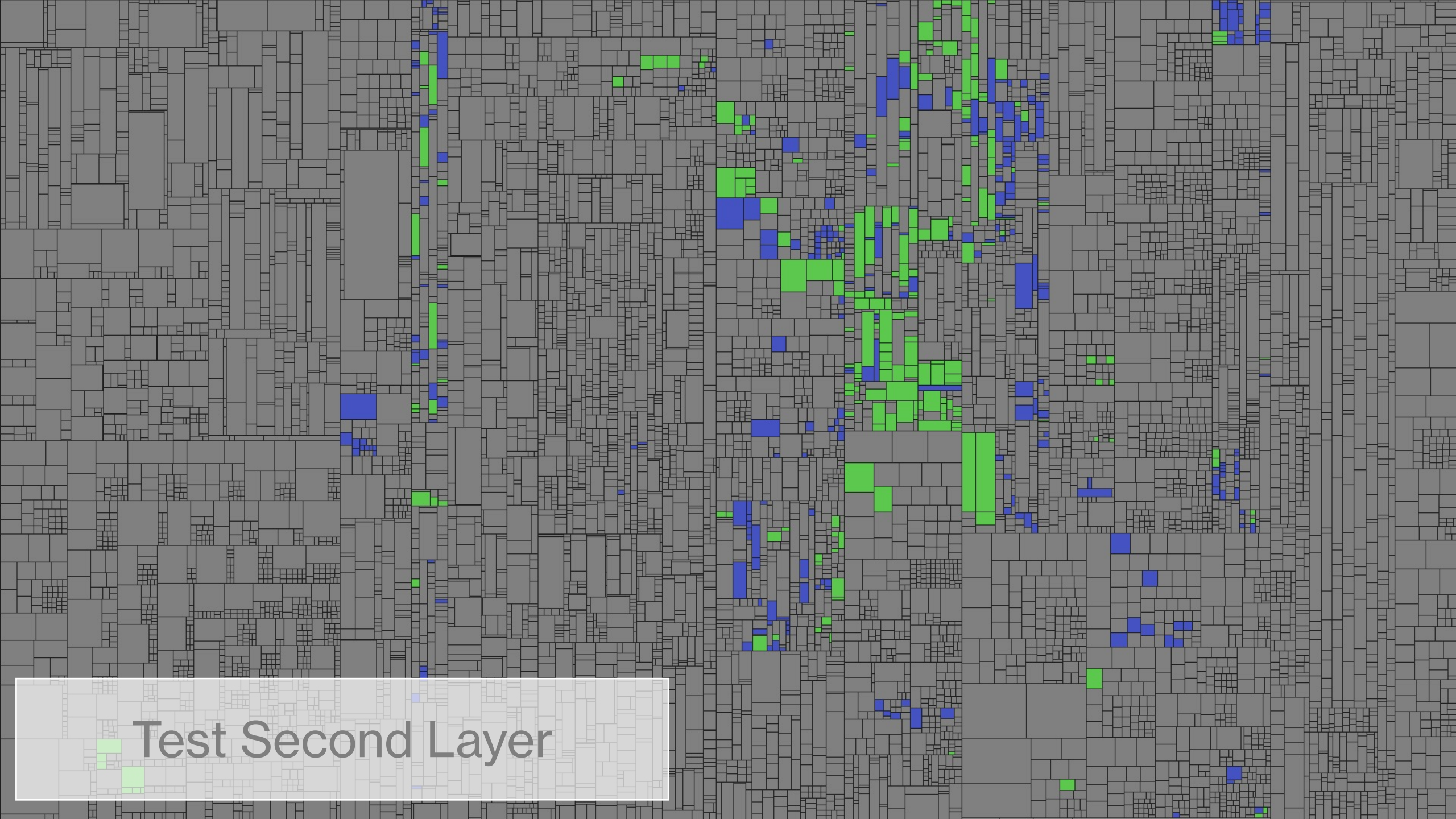

Test Motion Blur

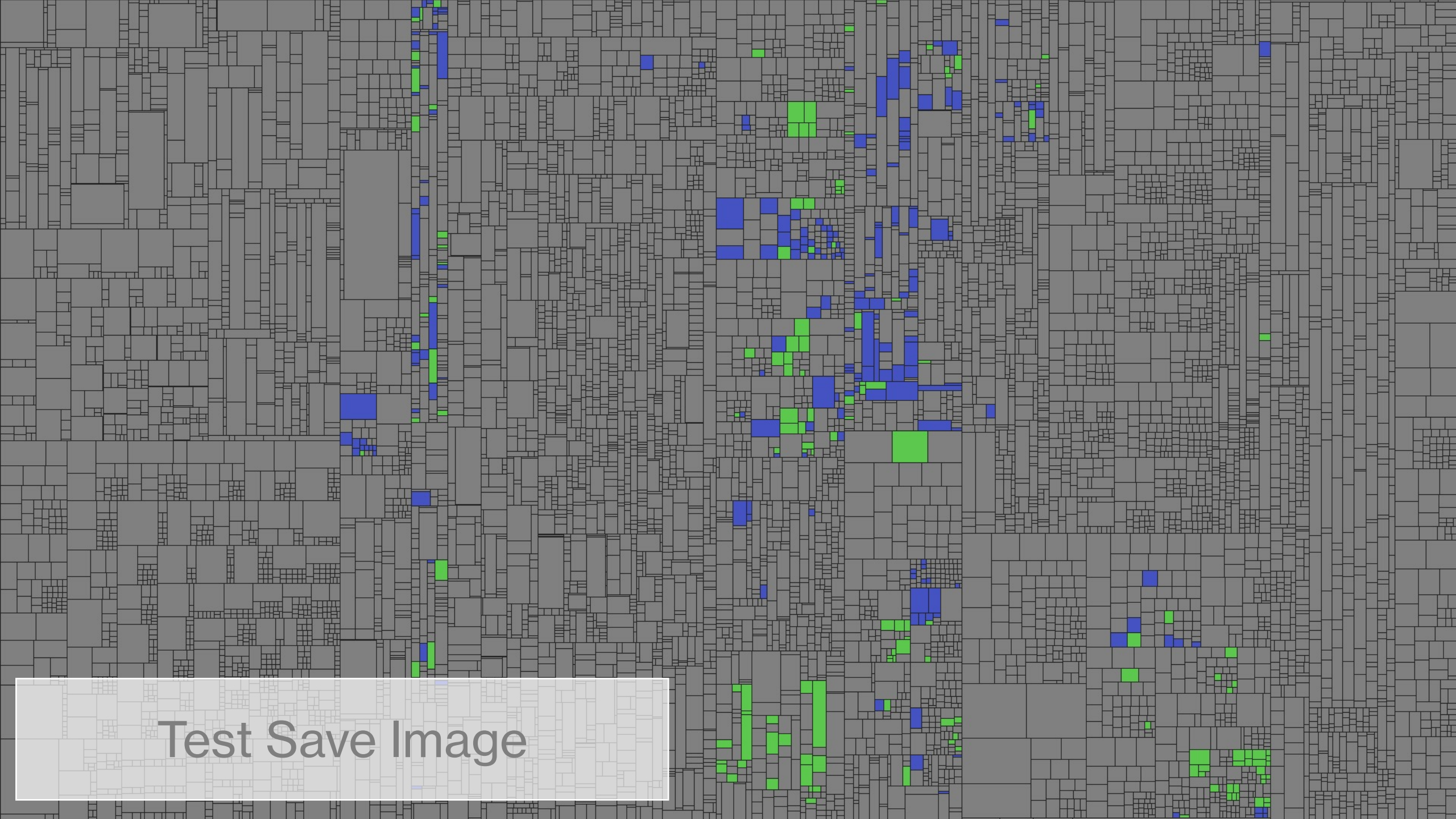

Test Smart Blur

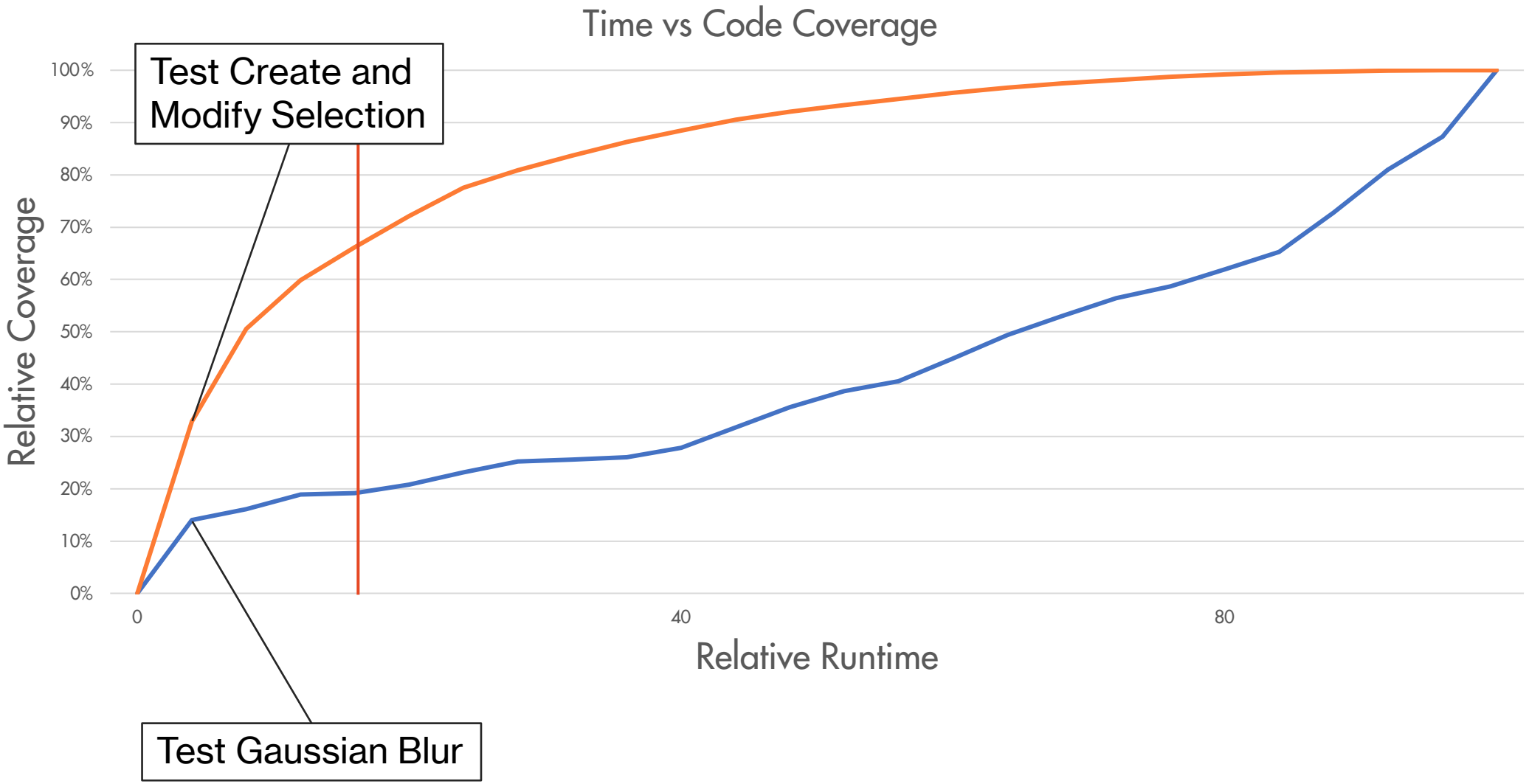

Time vs Code Coverage
Relative Coverage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
40
80
Relative Runtime


Test Create and Modify
Selection

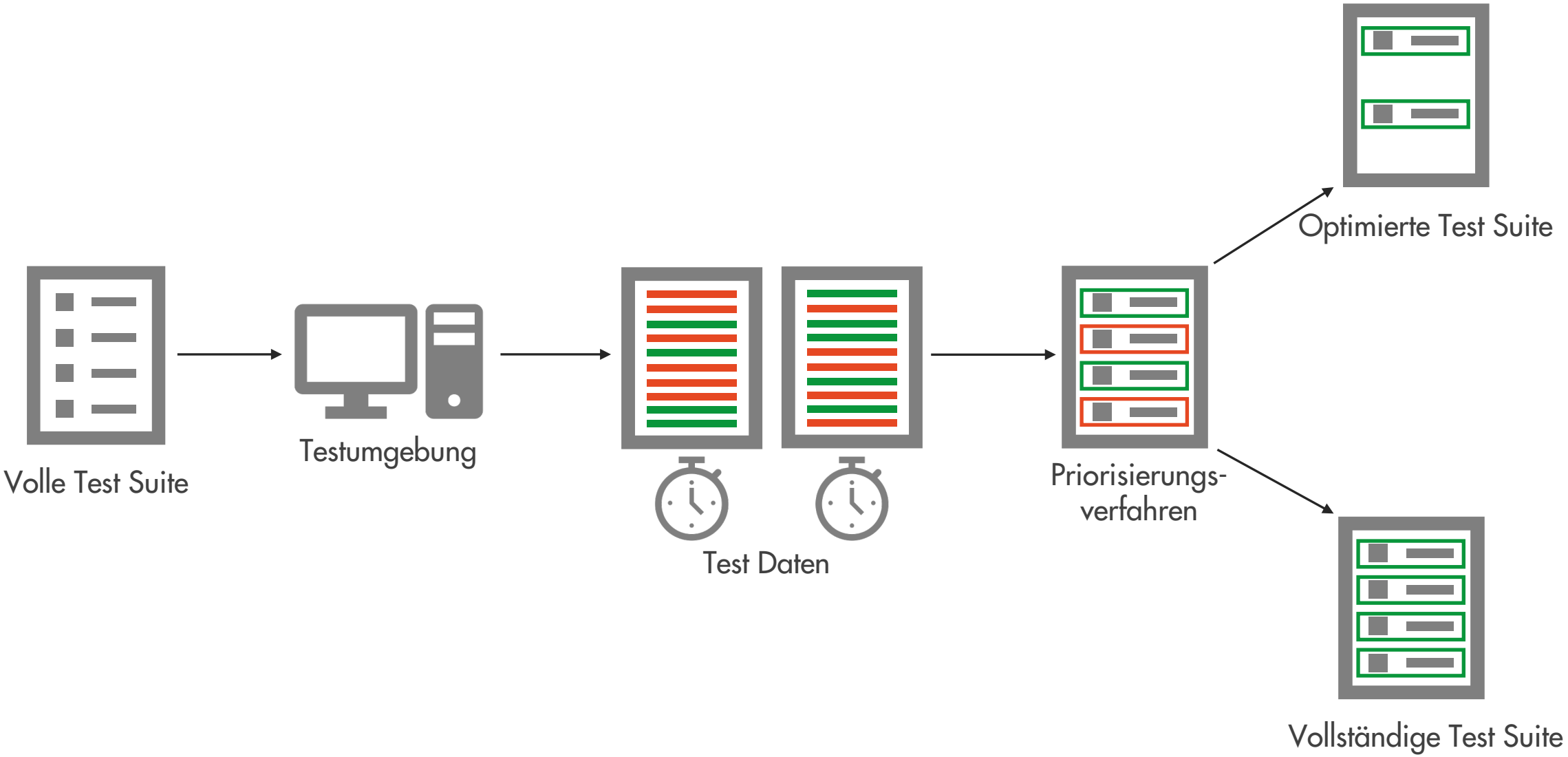

Test Change View Settings

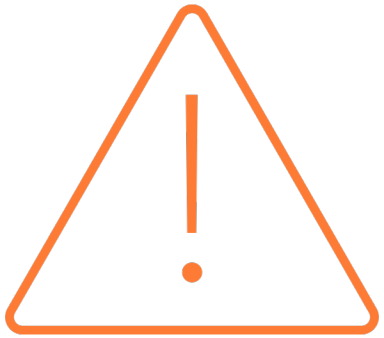

Test Second Layer


Test Save Image


Time vs Code Coverage
Test Create and Modify Selection
Test Gaussian Blur
Relative Coverage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
40
80
Relative Runtime

Wie wählen wir die besten Tests aus?

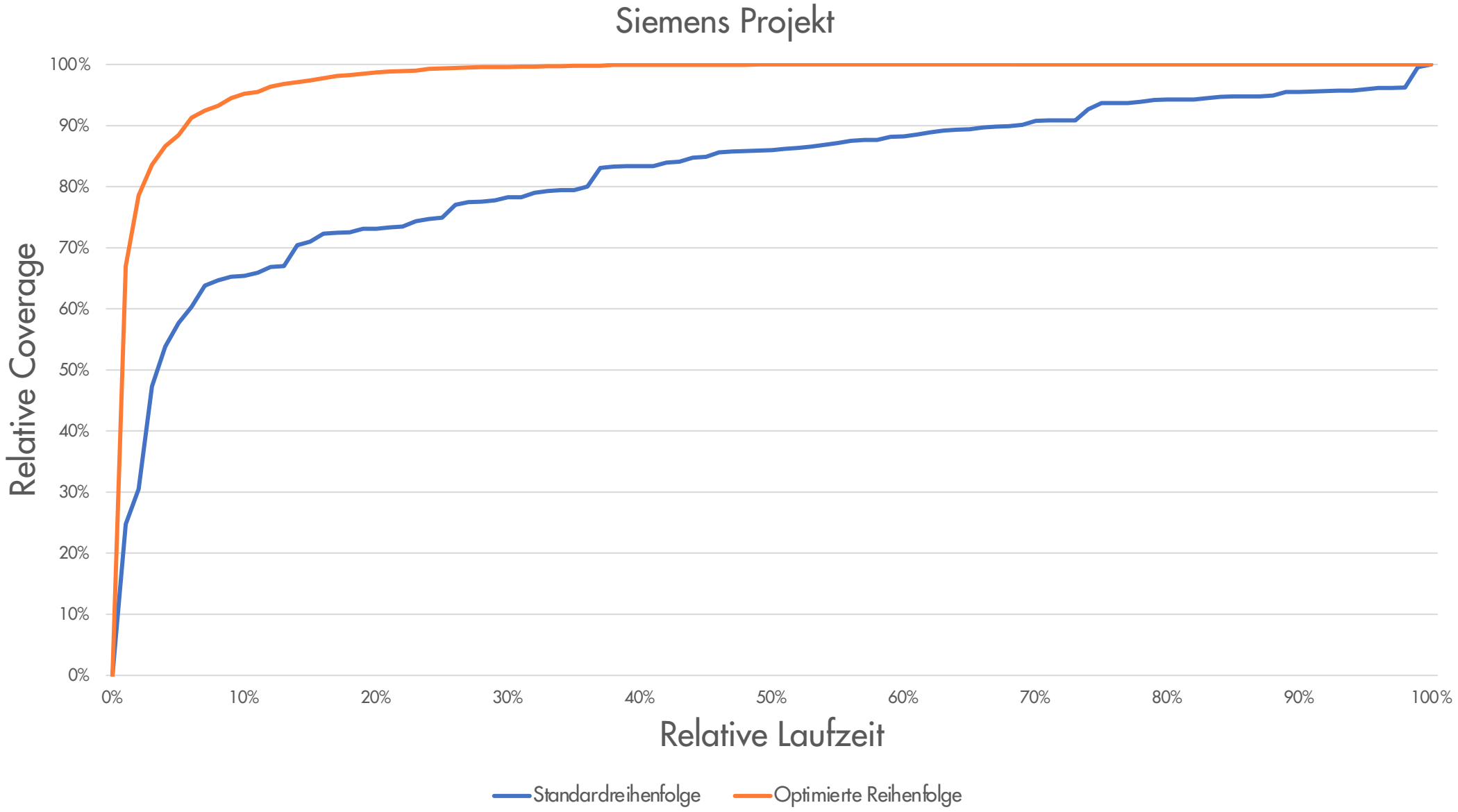

Volle Test Suite
Testumgebung
Test Daten
Priorisierungs-
verfahren
Optimierte Test Suite
Vollständige Test Suite

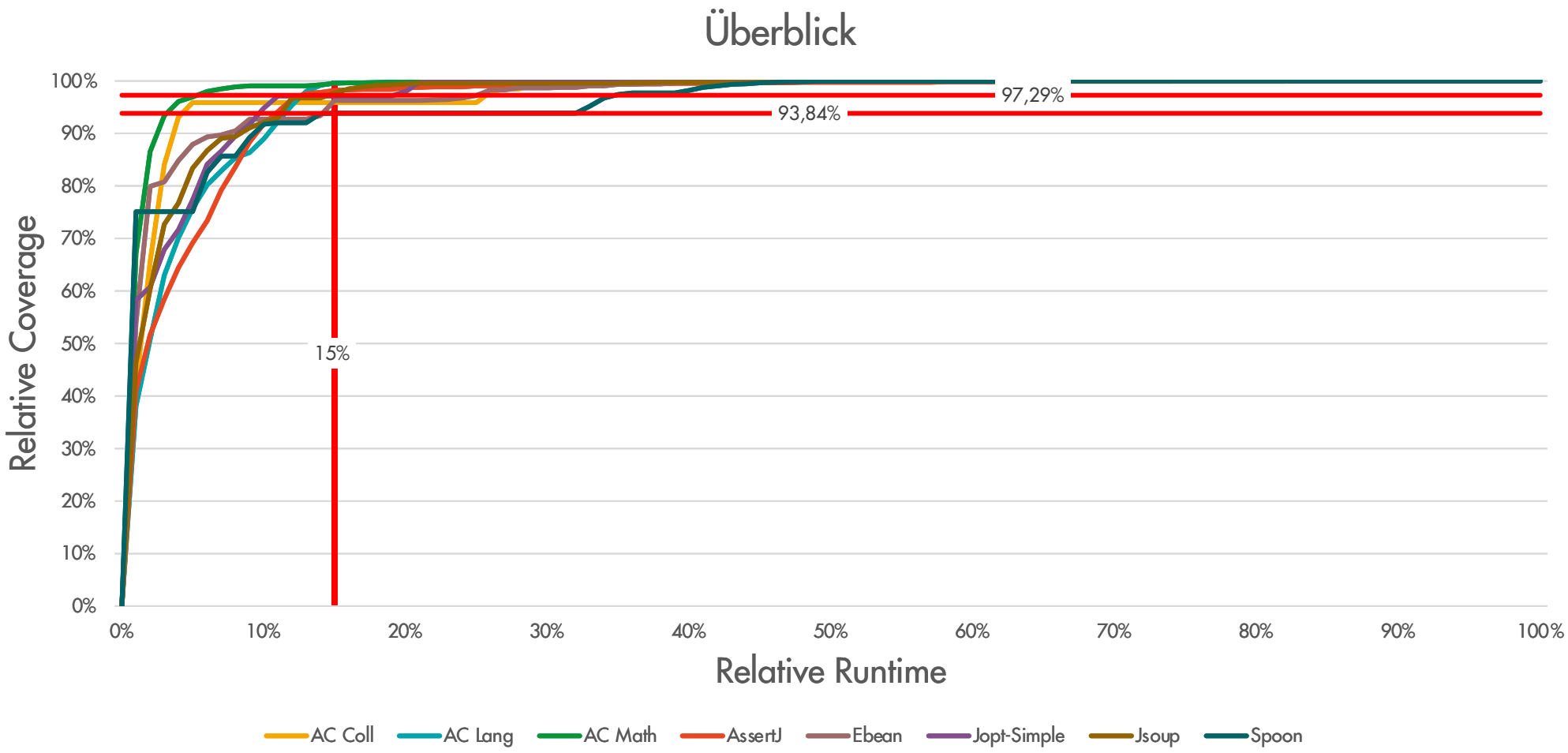


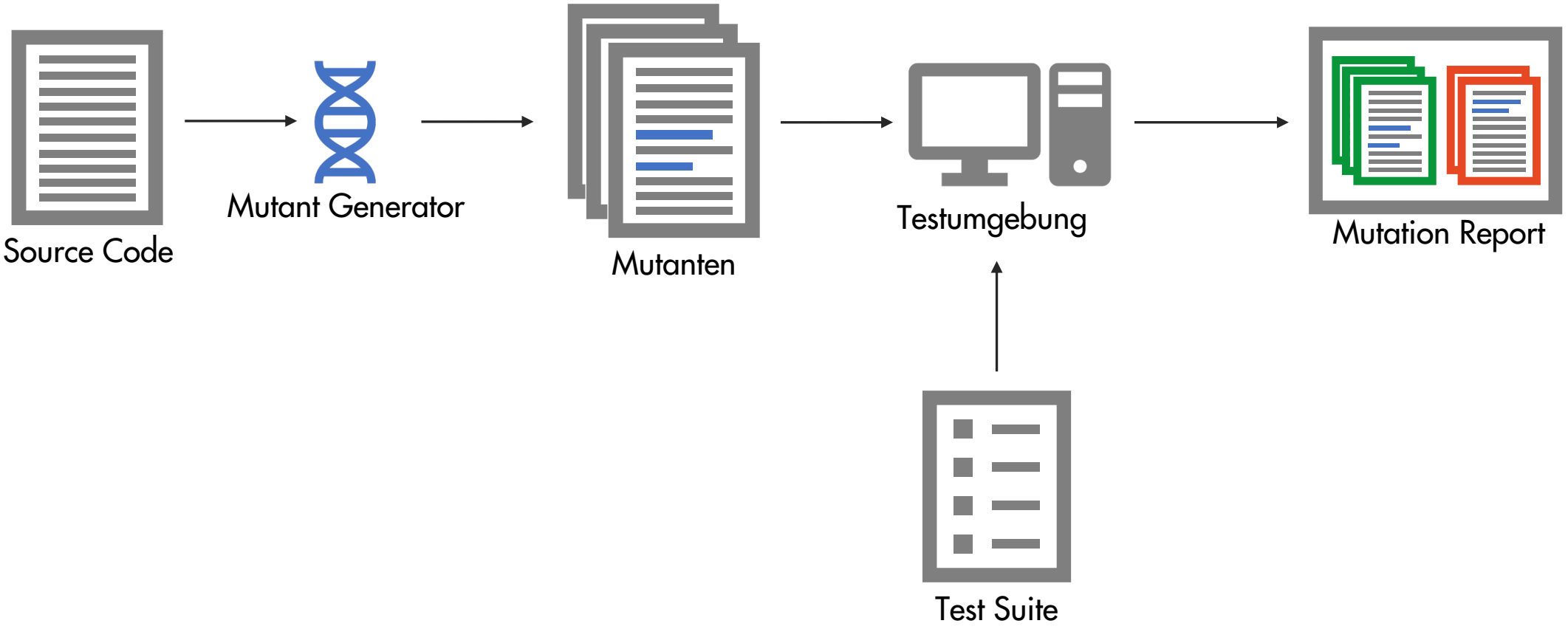
Potentielle Einschränkungen in der Ausführungsreihenfolge

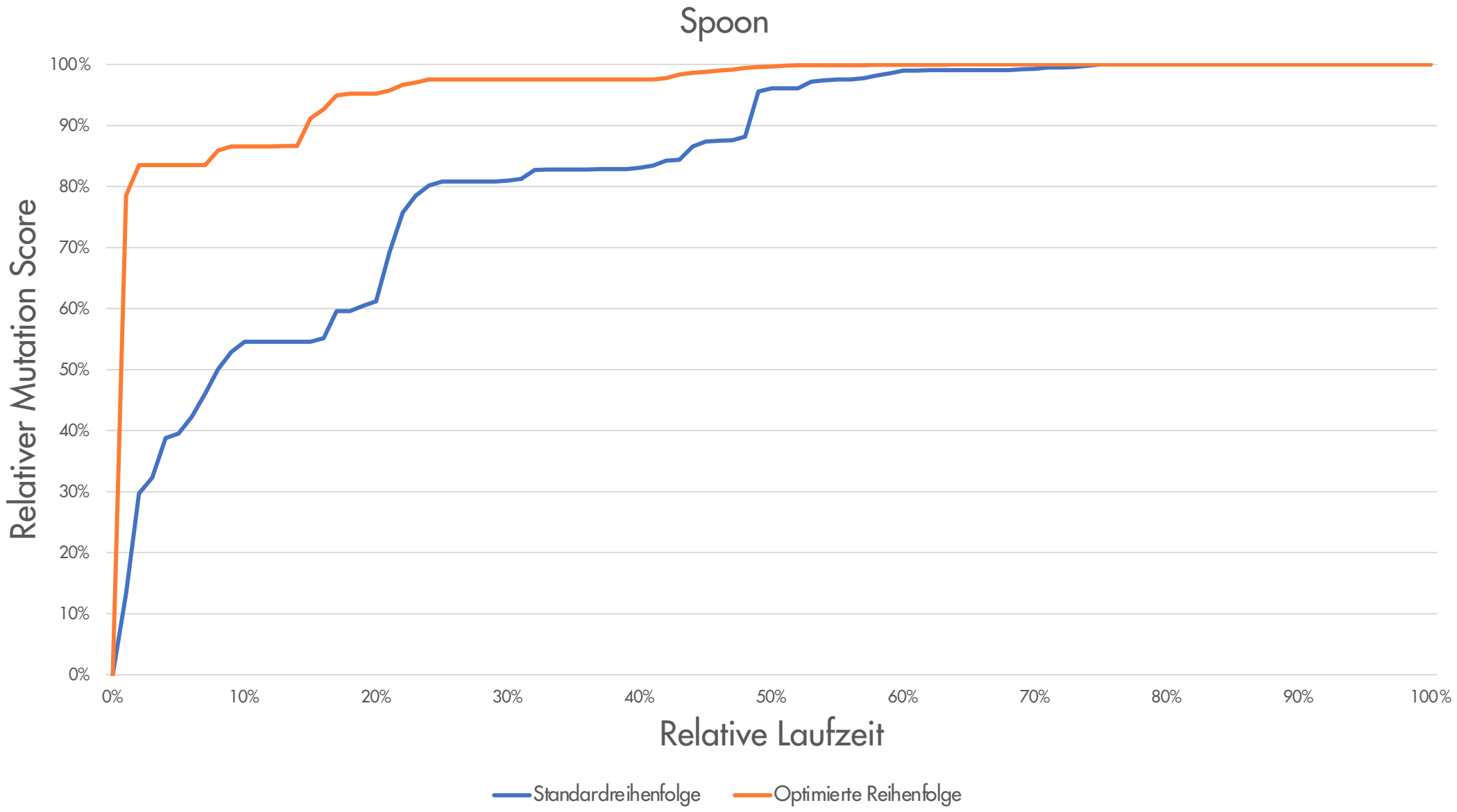
Wie gut funktioniert das ganze für echte Test Suites?

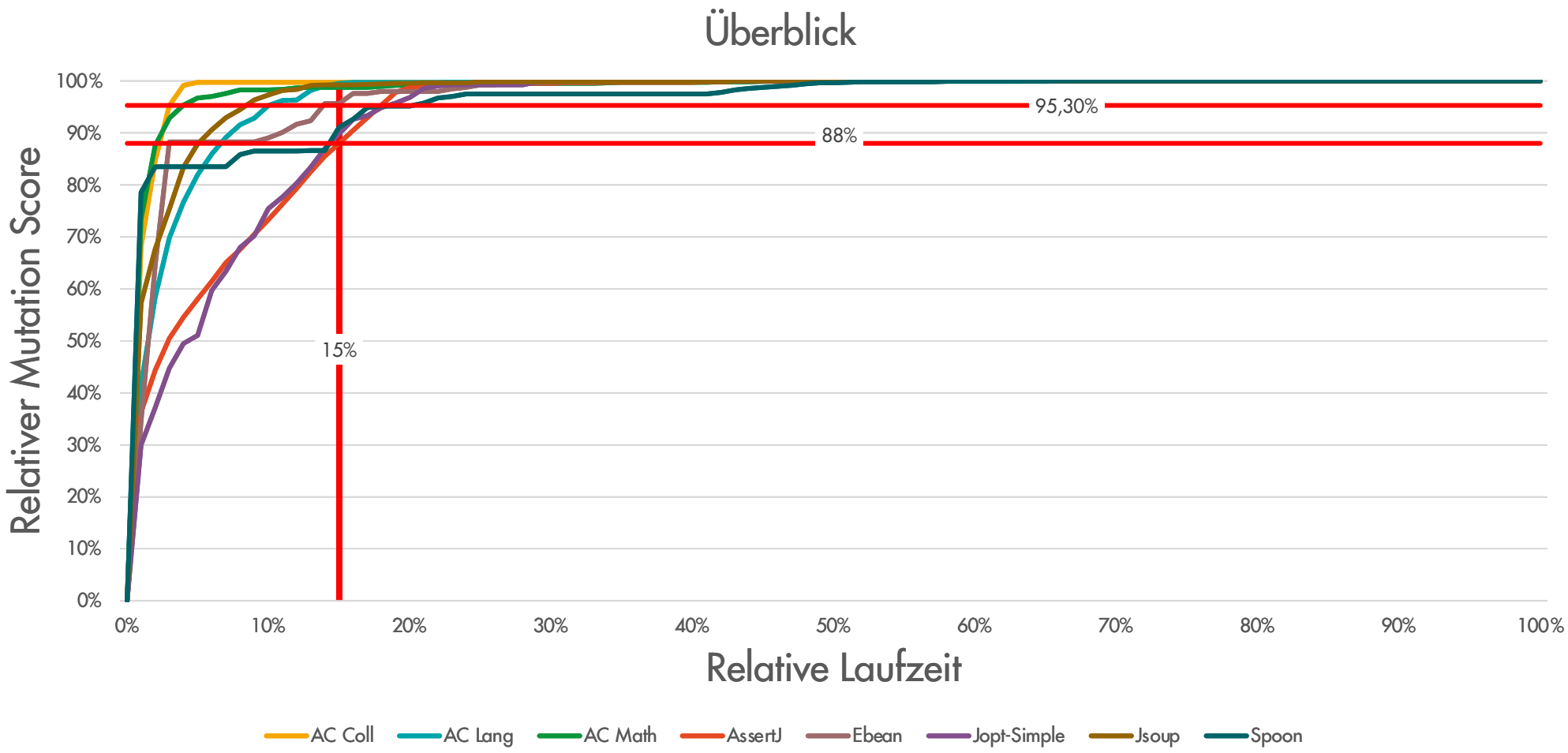
Open-Source Project	SLOC	# Tests	Code Coverage
AC Collections	62,934	15,183	86%
AC Lang	75,467	3,484	95%
AC Math	174,522	4,828	92%
AssertJ	161,306	14,685	91%
EBean	170,656	2,618	77%
JoptSimple	9,433	838	98%
Spoon	112,650	1,619	83%
Closed-Source Project			
Siemens	>>203,964	5,366	75%
CQSE	516,949	2,979	76%


Siemens Projekt
Relative Coverage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Relative Laufzeit
Standardreihenfolge
Optimierte Reihenfolge


Überblick
Relative Coverage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
97,29%
93,84%
15%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Relative Runtime
AC Coll
AC Lang
AC Math
AssertJ
Ebean
Jopt-Simple
Jsoup
Spoon

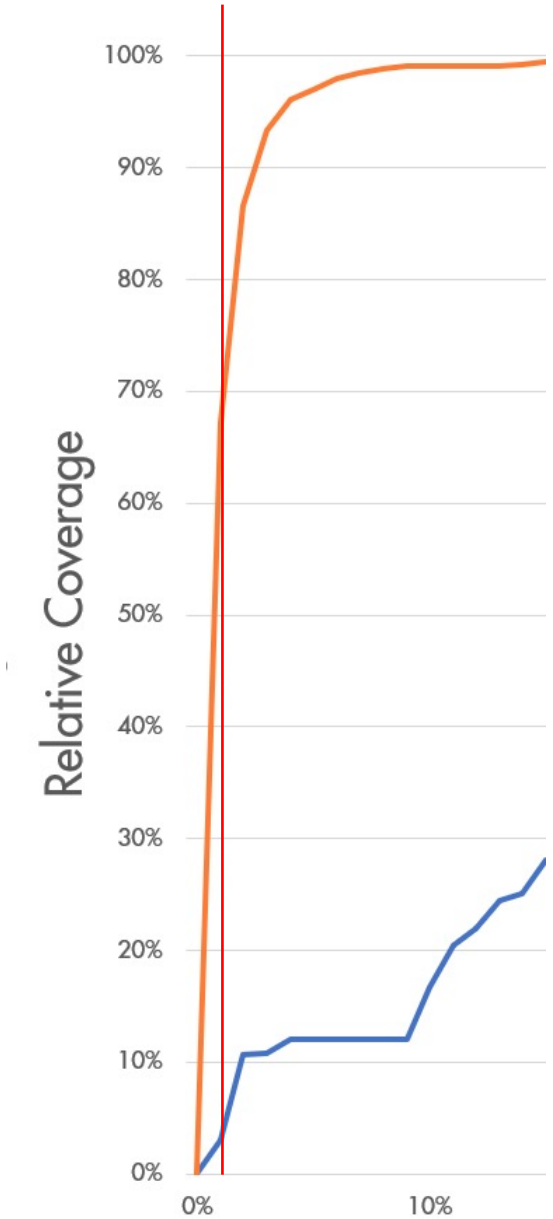

Source Code
Mutant Generator
Mutanten
Testumgebung
Mutation Report
Test Suite

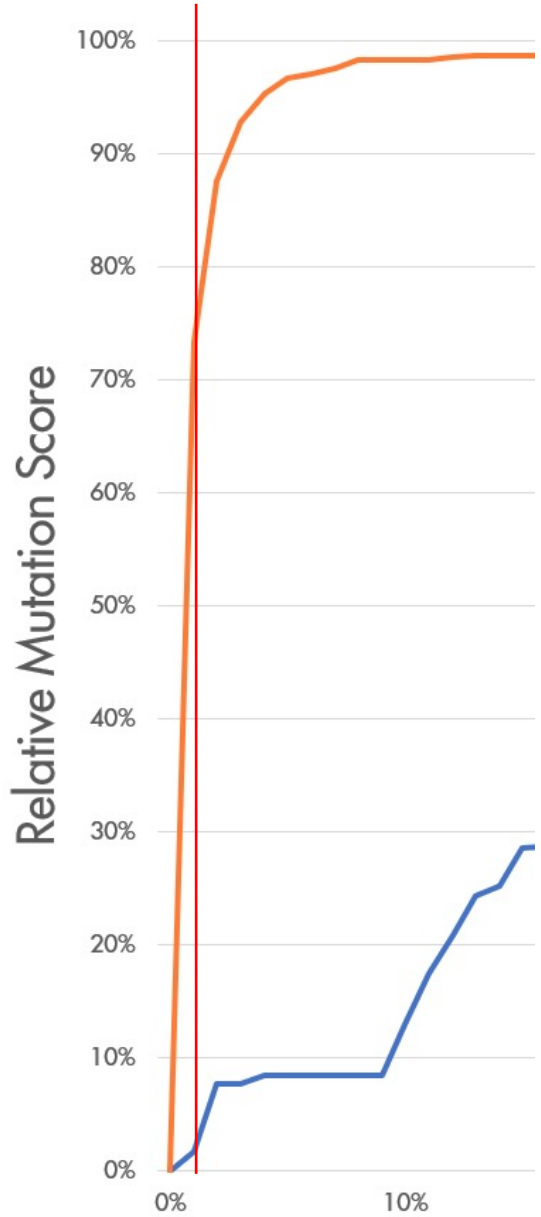

Spoon
Relativer Mutation Score
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Relative Laufzeit
Standardreihenfolge
Optimierte Reihenfolge


Überblick
Relativer Mutation Score
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
95,30%
88%
15%
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Relative Laufzeit
AC Coll
AC Lang
AC Math
AssertJ
Ebean
Jopt-Simple
Jsoup
Spoon

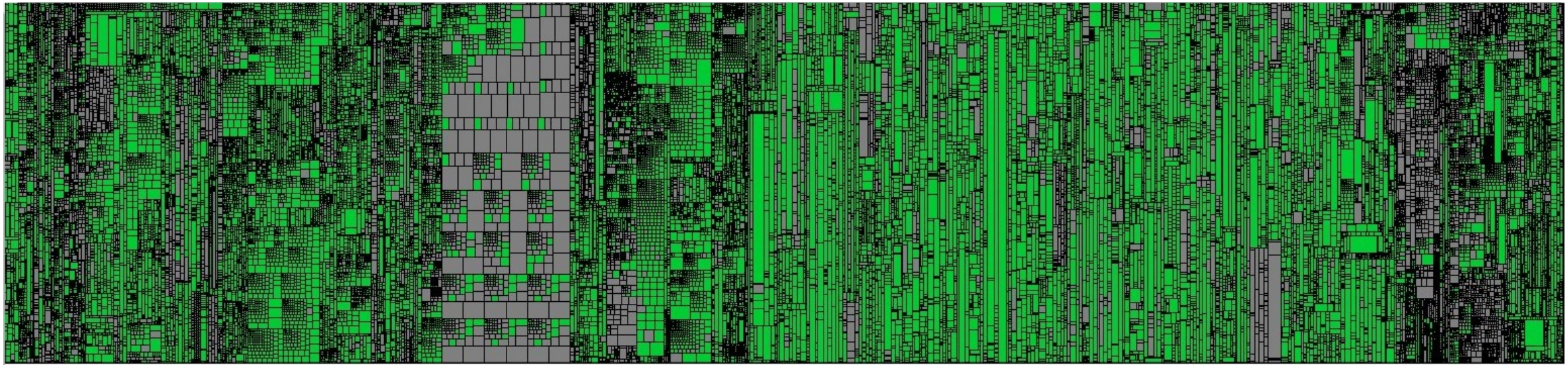
Fazit

- Über 95% der coverage und Mutanten in 15% der Zeit
- Je ineffektiver die Test-Suite, desto stärker ausgeprägt der Effekt
- Anwendbar auf automatisierte und auf manuelle Tests

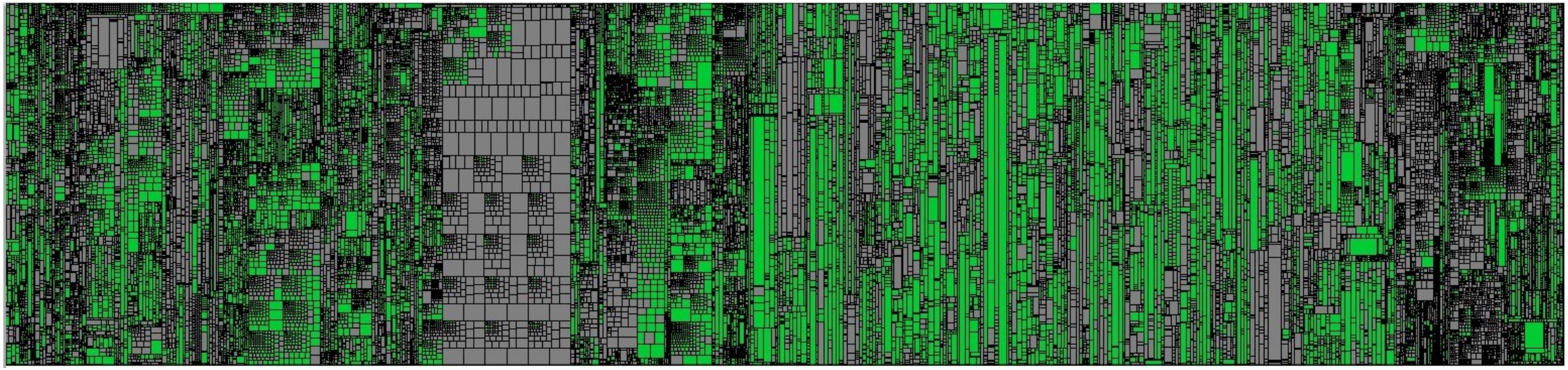

Relative Coverage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0%
10%


Relative Mutation Score
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0%
10%

400+ Stunden Testausführung



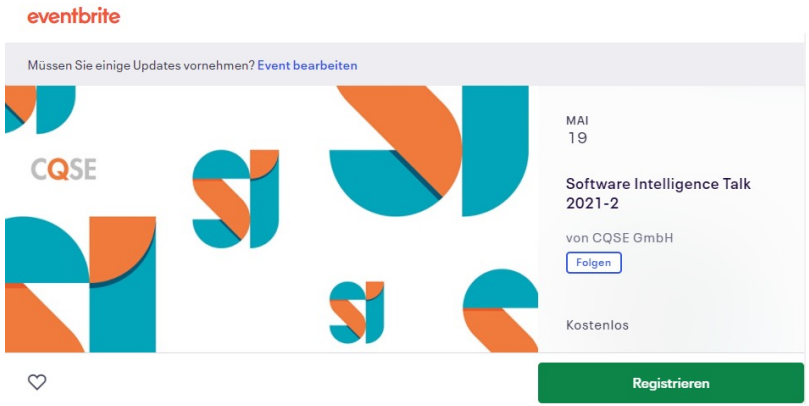
1 Stunde Testausführung: >50% Coverage



Virtueller Workshop

19. Mai 21, 10:30 – 12:00 Uhr

Anmeldung:
http://cqse.eu/si-talks/2gtd1



Zu den Sprechern

Jeannette Wernicke Jeannette Wernicke ist Innovation Managerin im Innovation Lab der Bayerische Versorgungskammer. Sie beschäftigt sich dort damit neue Technologien und Trends auf ihre Anwendbarkeit in der BVK zu untersuchen. Davor war sie als Software-Entwicklerin und -Architektin mit Schwerpunkt Software-Qualität tätig.

Raphael Nömmer hat seinen Master an der Technischen Universität München mit einem Fokus auf Software-Engineering und Software-Qualität abgeschlossen. Er hat seine Masterarbeit zu Test-Suite-Minimierung und Pareto-Testing erstellt und promoviert bei der CQSE in diesem Themenbereich.

Fabian Streitel hat als Leiter des CQSE Piloten-Teams die Test-Analysen bei vielen Kunden erfolgreich eingeführt.

Dr. Elmar Jürgens hat die CQSE mitgegründet und beschäftigt sich sein ganzes Berufsleben mit Qualitätsanalysen von Software.

Wir freuen uns auf Diskussionen ☺

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