



Mining Repository Data to Debug Software Development Teams

GOTO Berlin 2016
Dr. Elmar Jürgens

About Me

Research

- Clone Detection, Architecture Analysis
- Effectiveness & Efficiency of QA-measures



Consulting

- Founder
- Quality Assessment & Quality-Controlling



Gesellschaft für Informatik

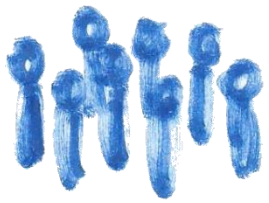
- Junior-Fellow
- Exchange Research <-> Practice

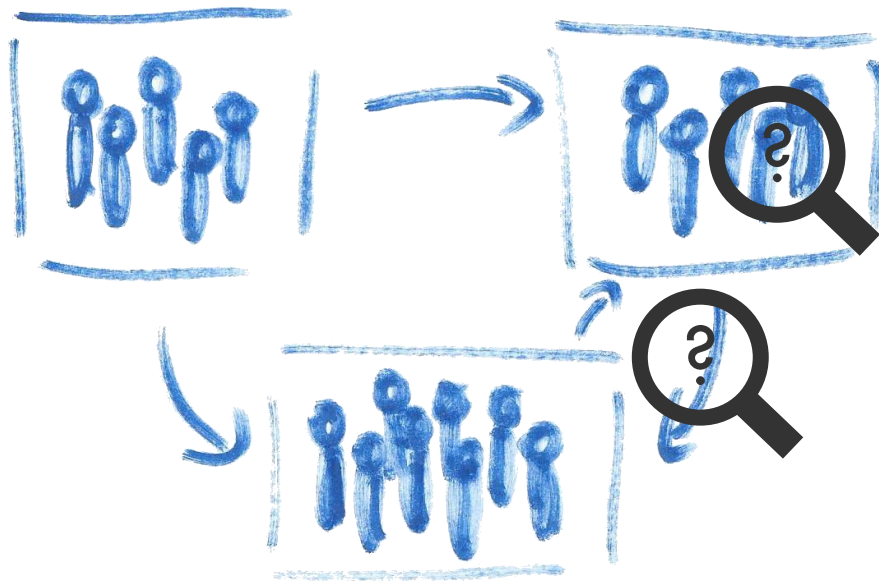


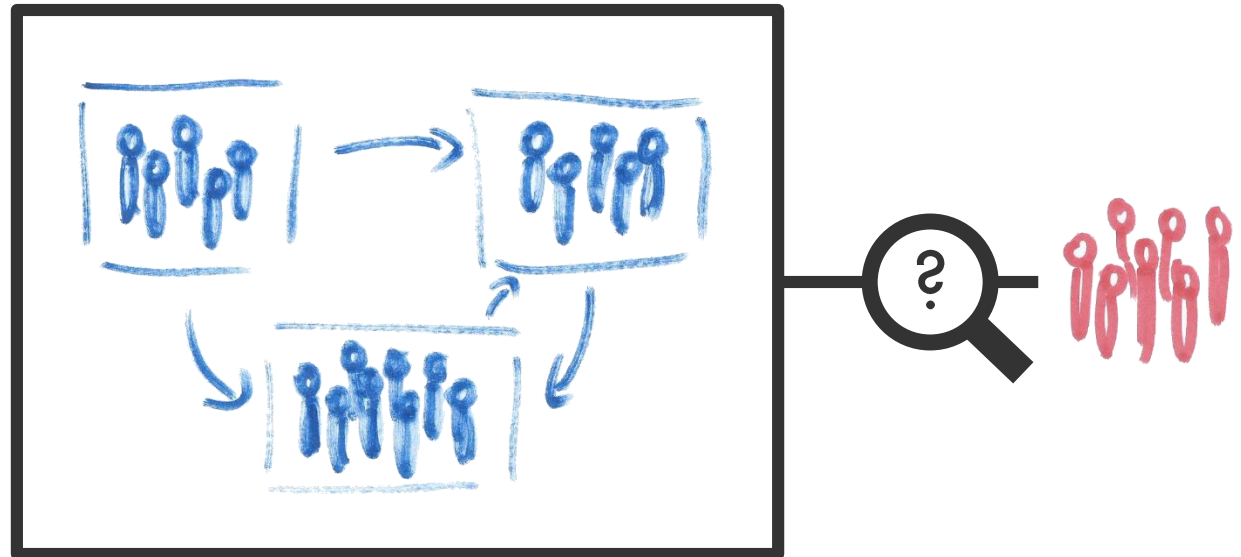
Conway's „Law“

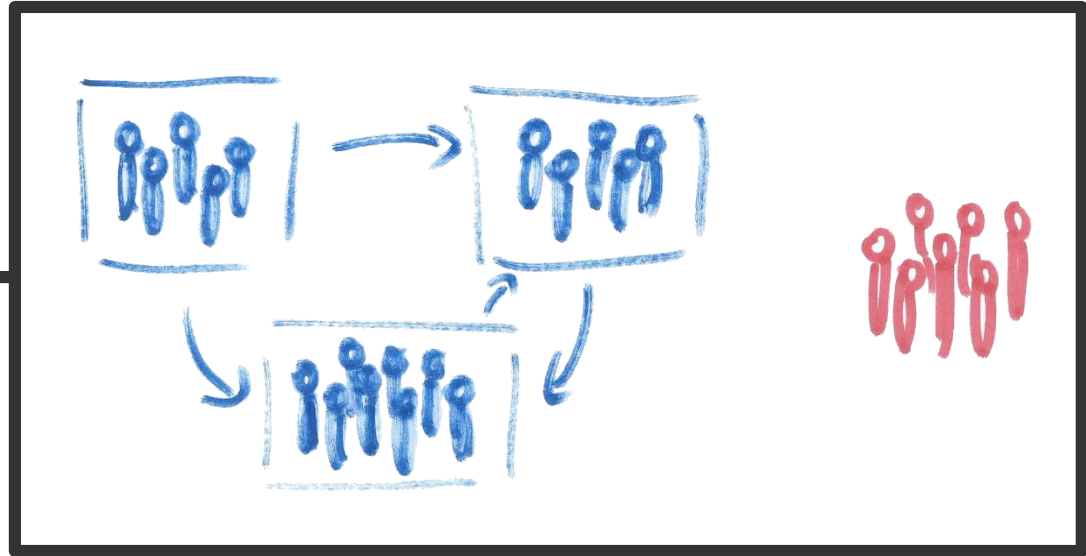
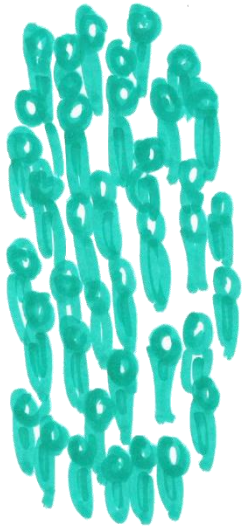
Organizations which design systems ... are constrained to produce designs which are copies of the communication structures of these organizations.

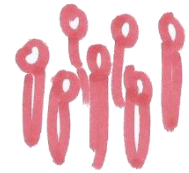
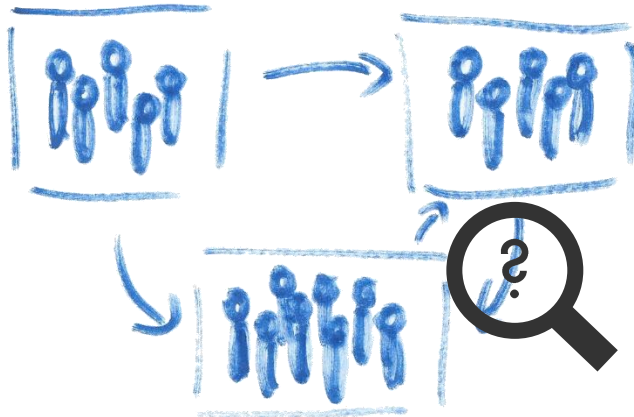
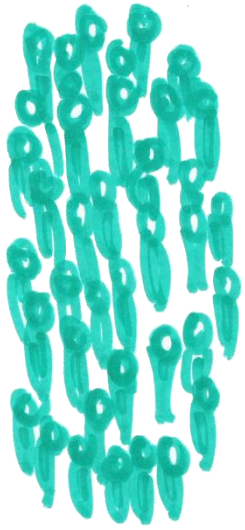
Melvin Conway, 1968



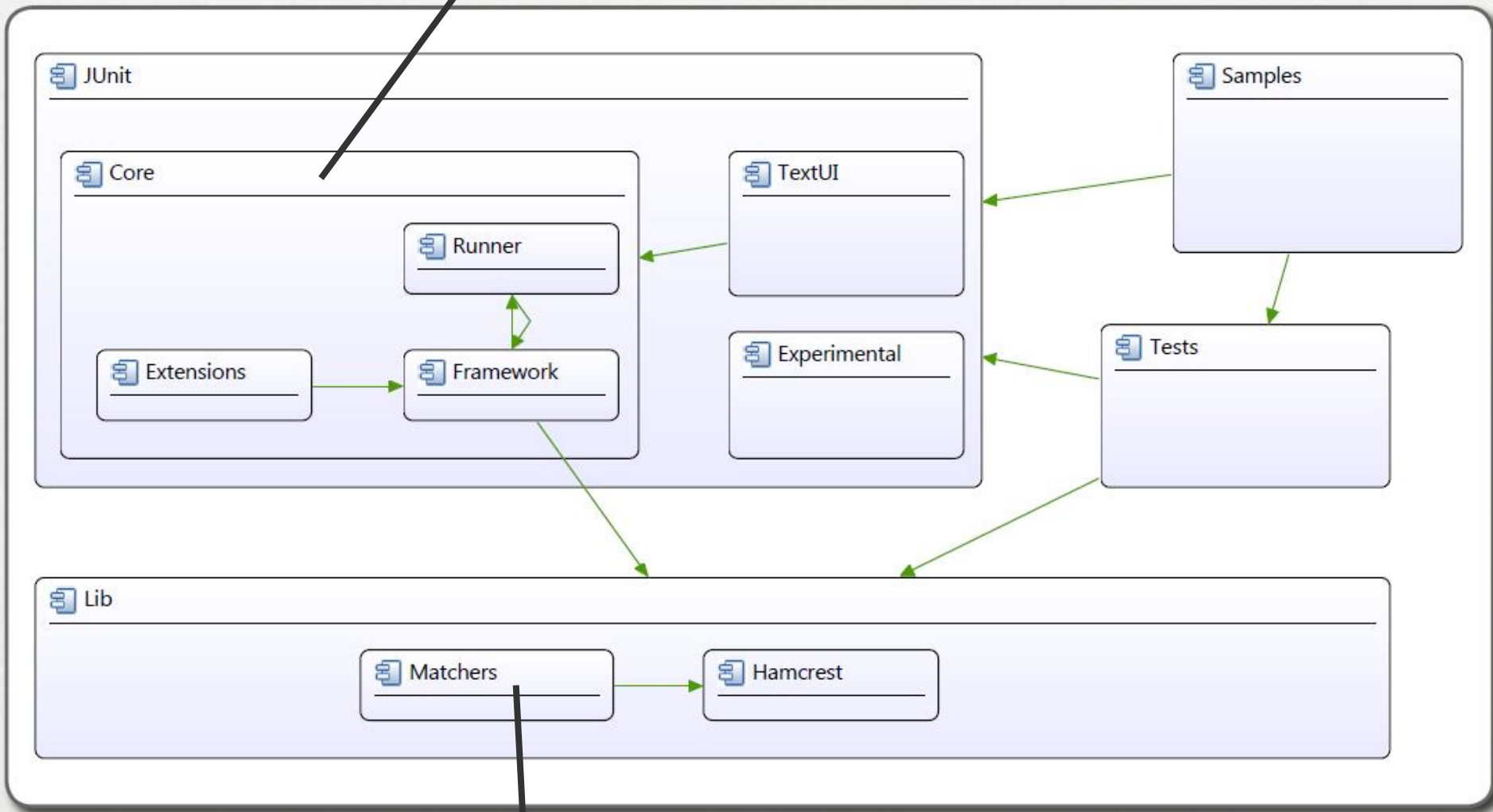








org.junit.core.*



org.junit.matchers.*

JUnit

Core

Runner

TextUI

Extensions

Framework

Experimental

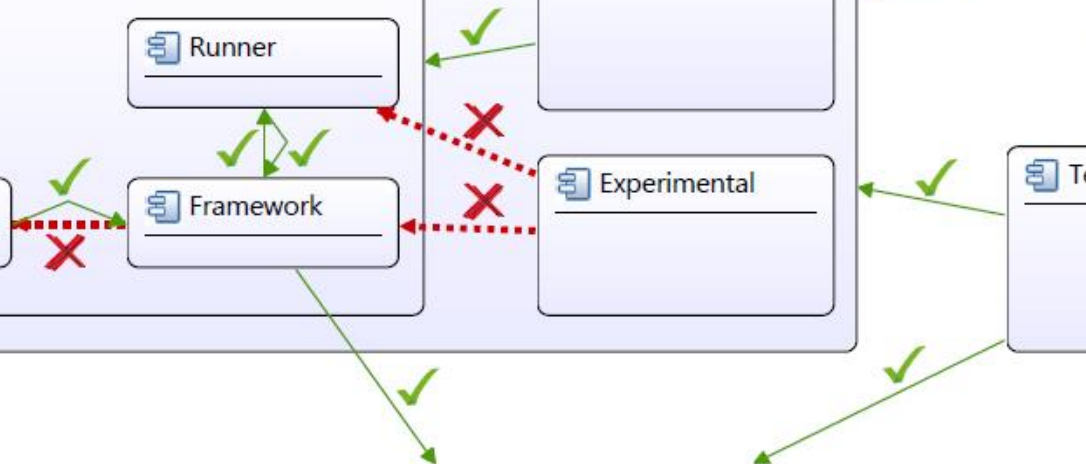
Samples

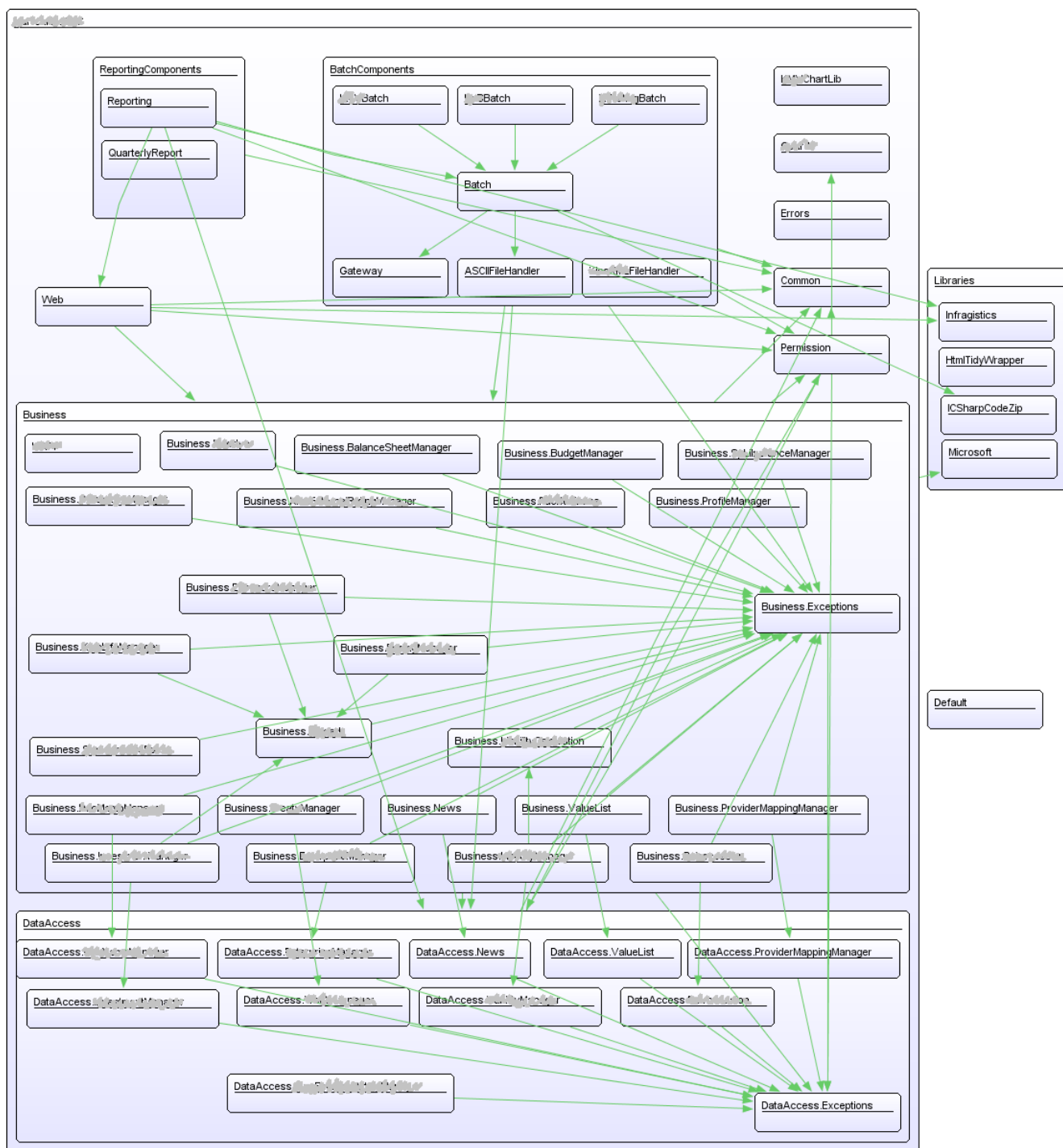
Tests

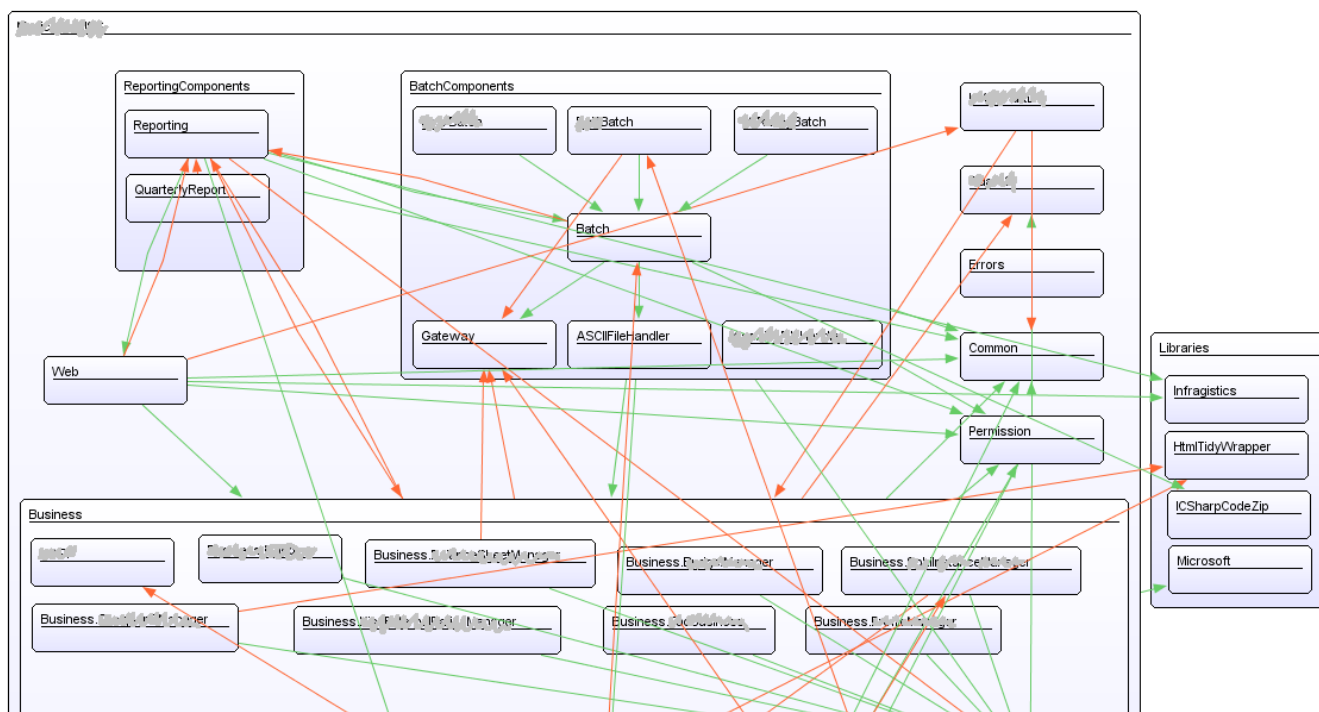
Lib

Matchers

Hamcrest





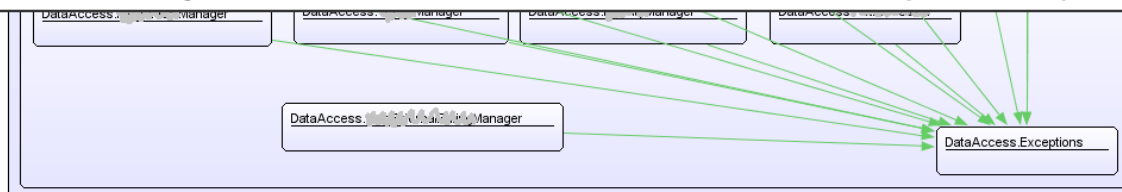


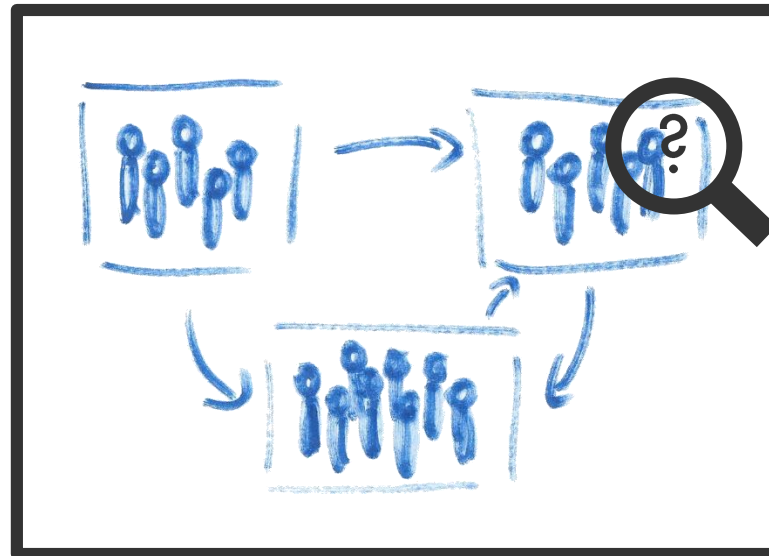
Case Study

Munich Re

- Omissions in Documentation
- Revealed bugs
- Basis for architecture discussions

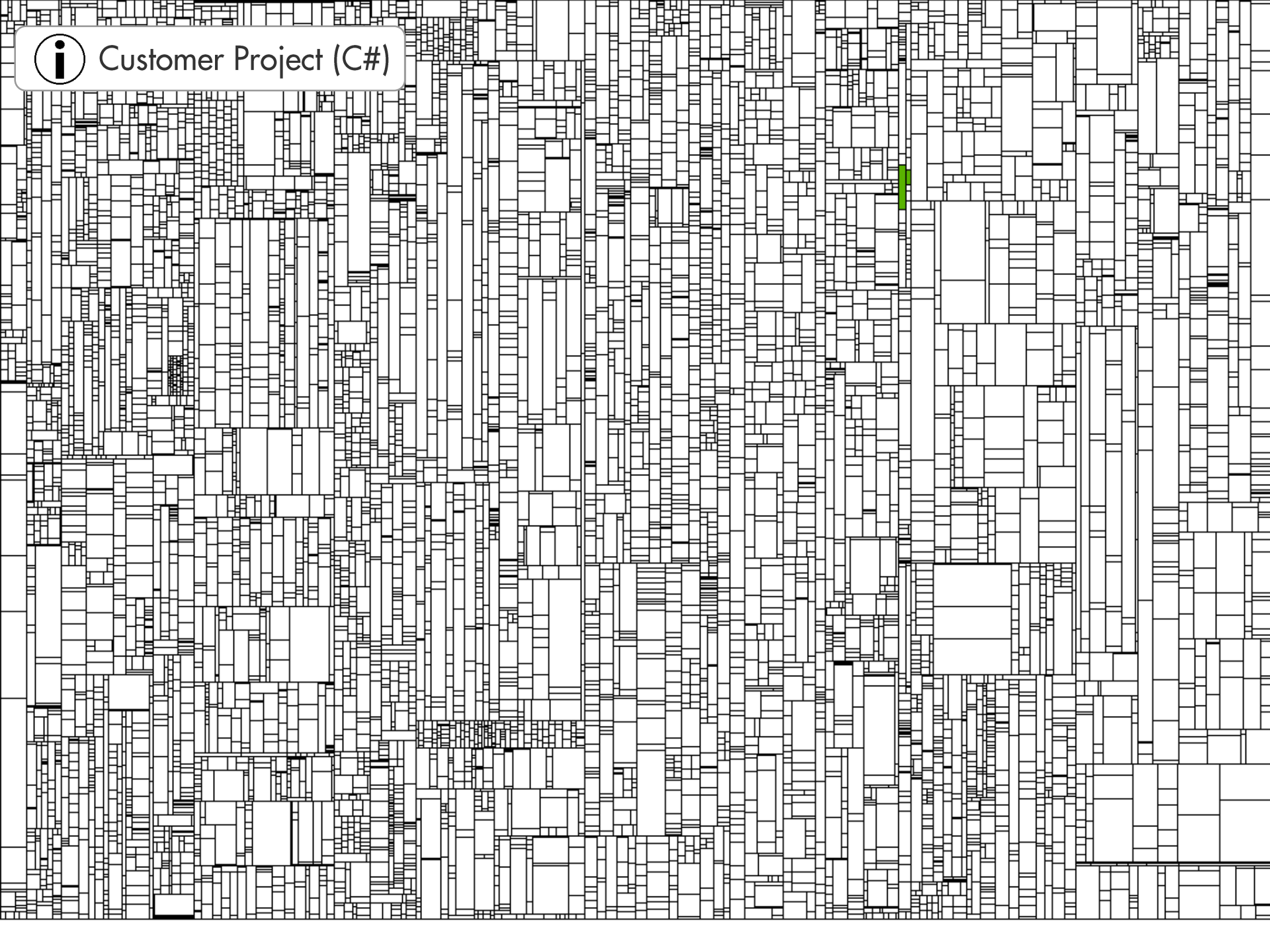
Feilkas, Juergens et al: *Loss of Architectural Knowledge During Evolution* ICPC 2009







Customer Project (C#)





conqat.org

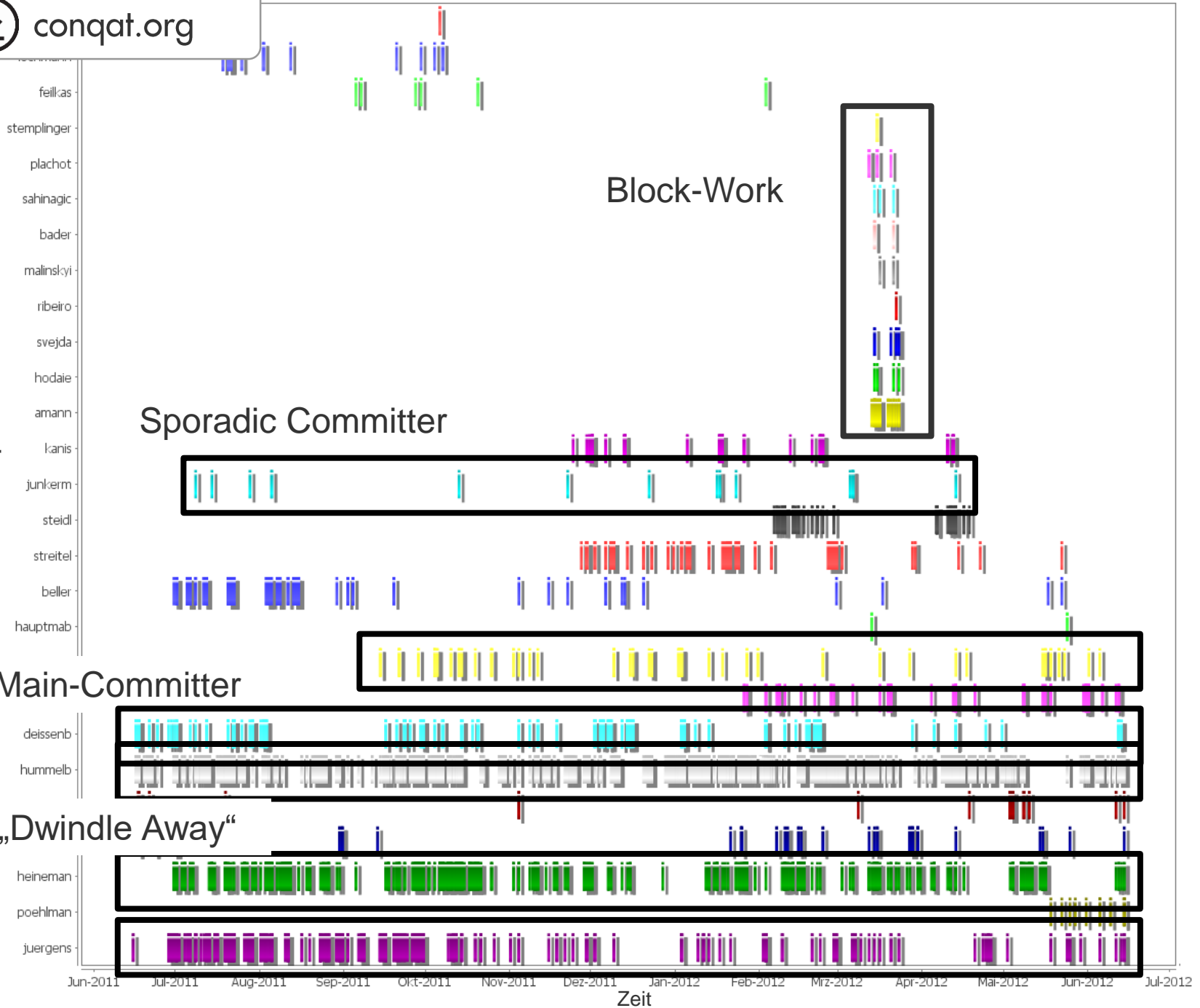
Developer

Block-Work

Sporadic Committer

Main-Committer

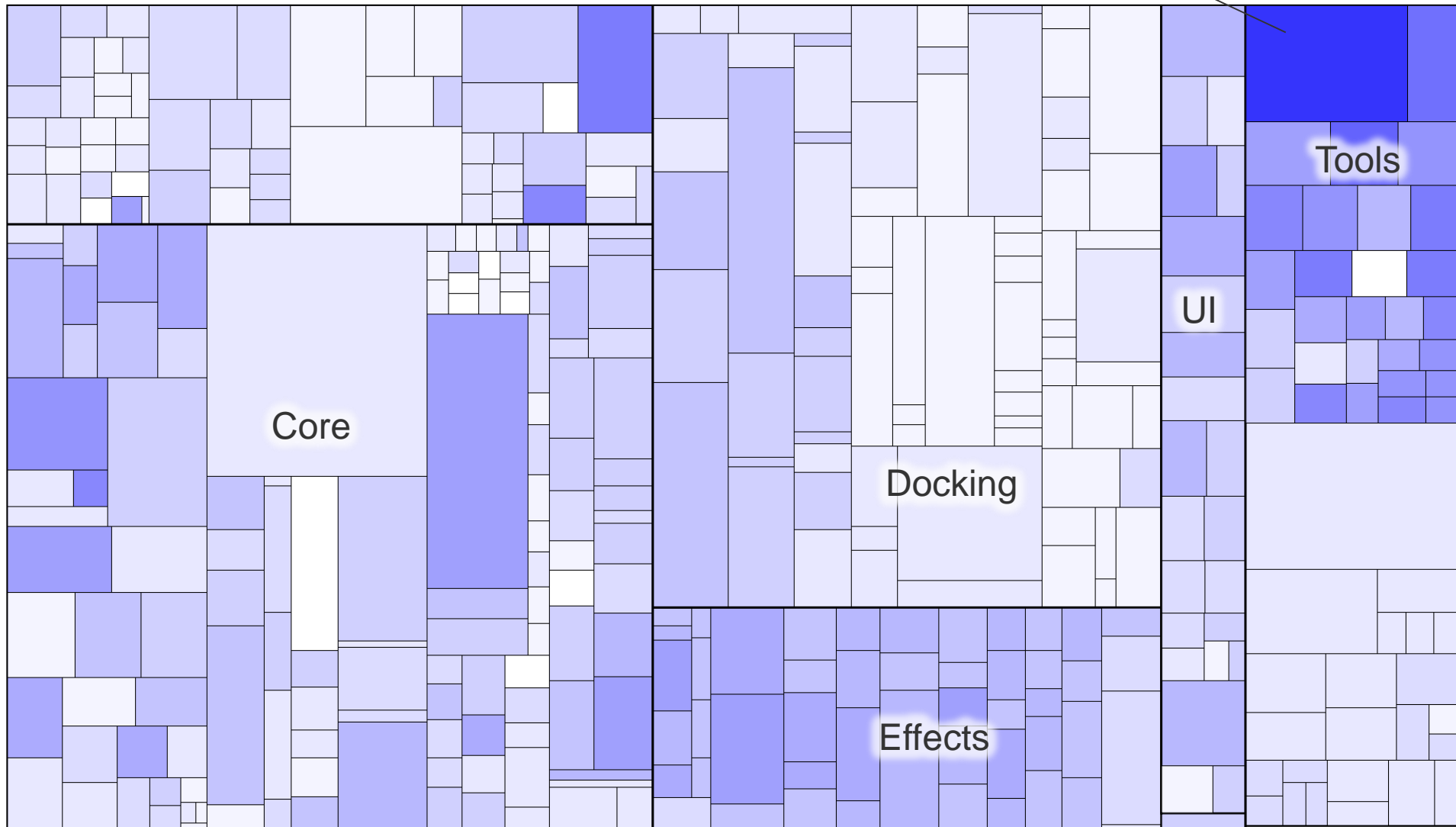
„Dwindle Away“





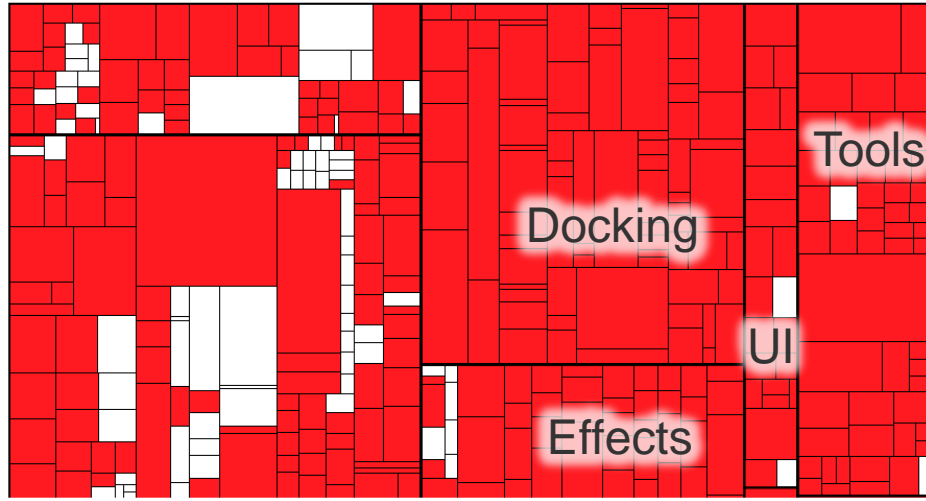
TextTool.cs (17 Developers)

Ownership Distribution for [pinta](#)

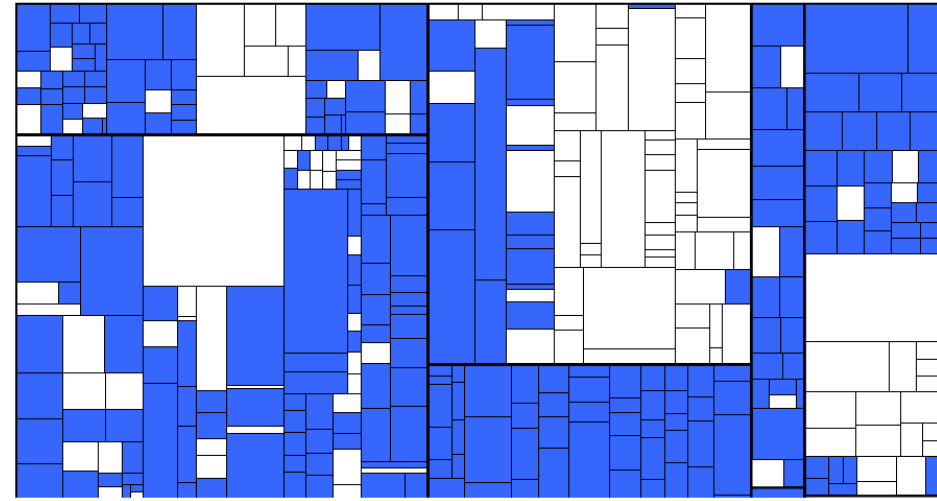




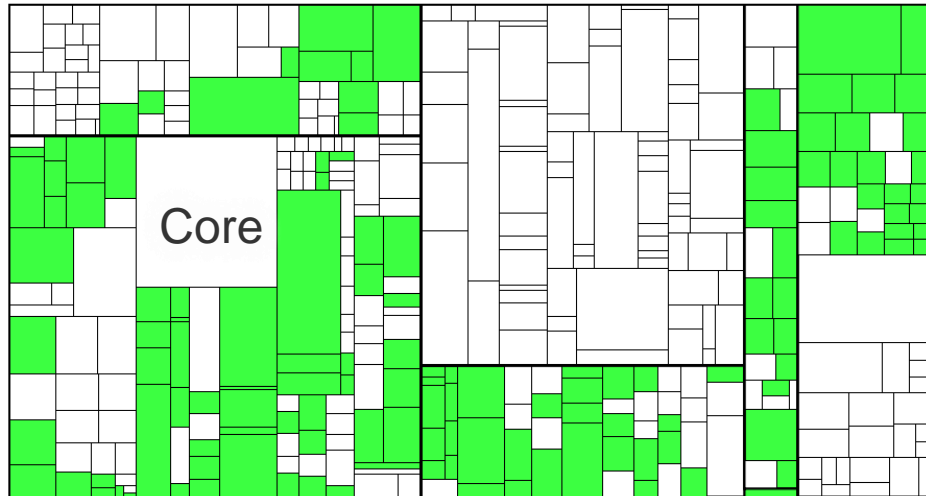
Ownership Cameron White (#1)



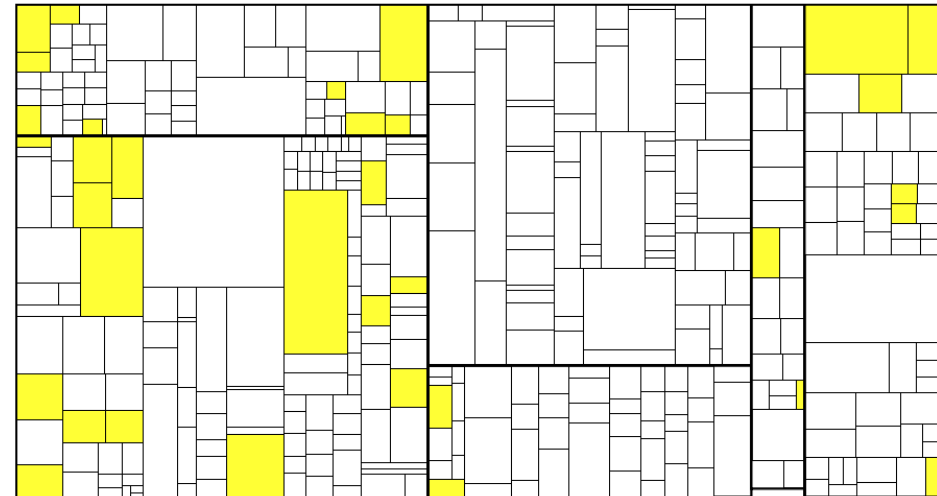
Ownership Jonathan Pobst (#2)

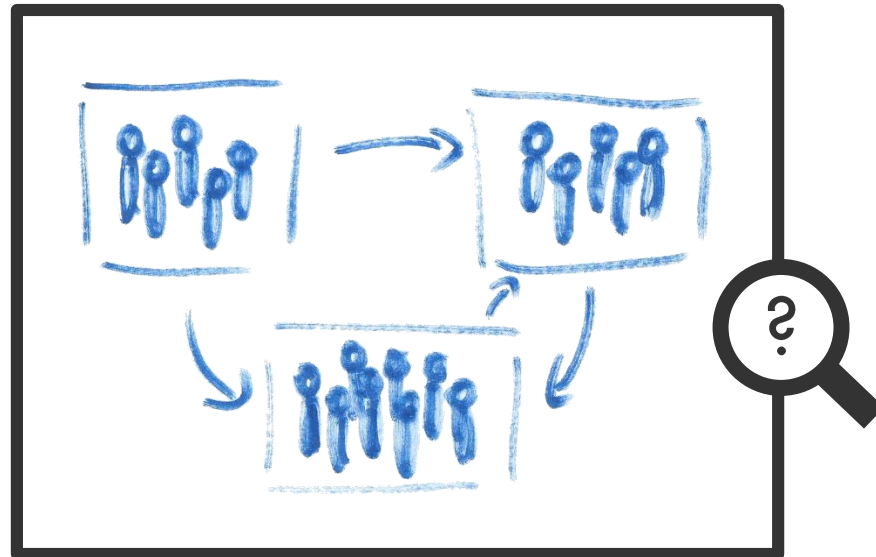


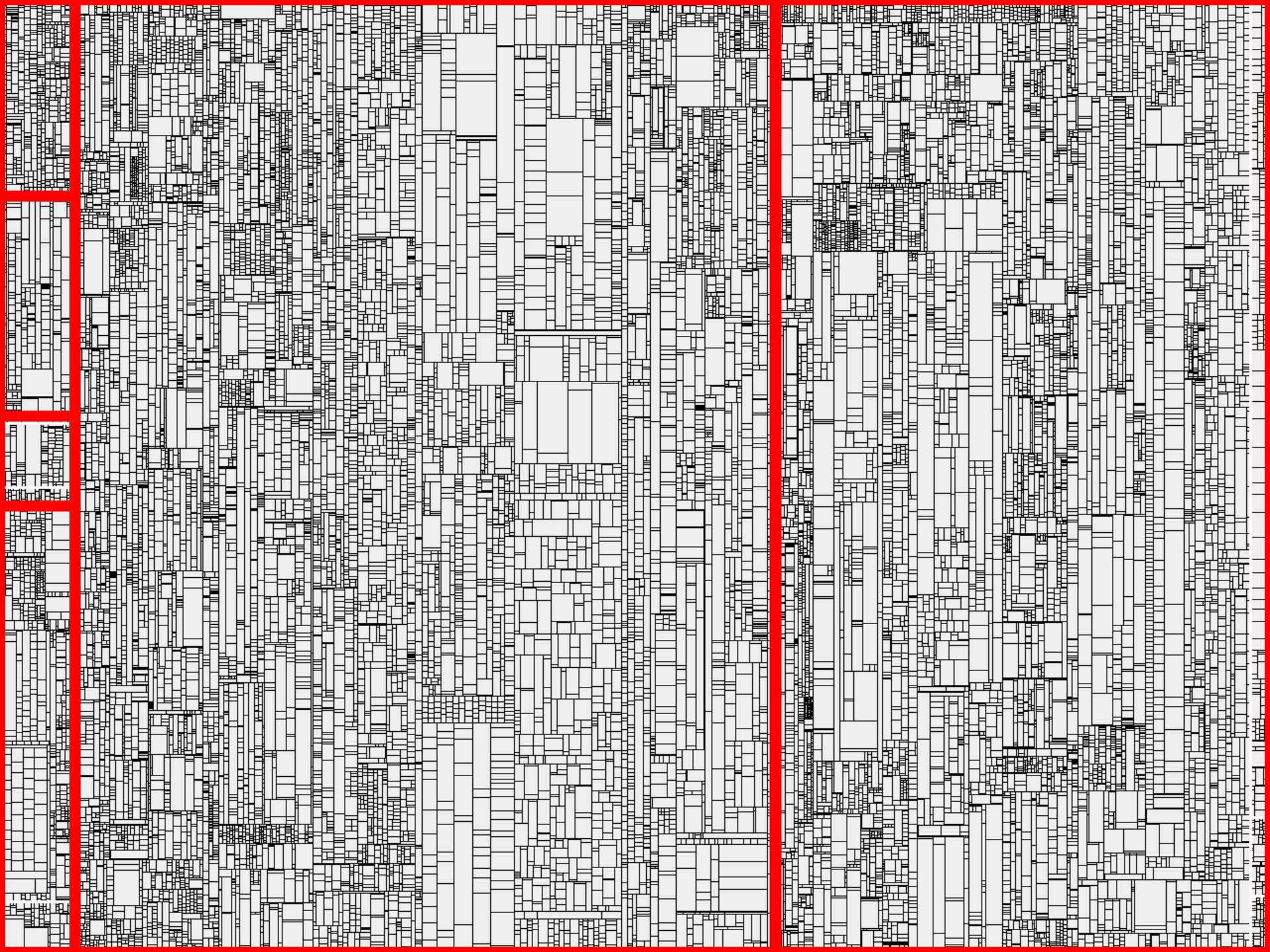
Ownership Olivier Dufour (#3)

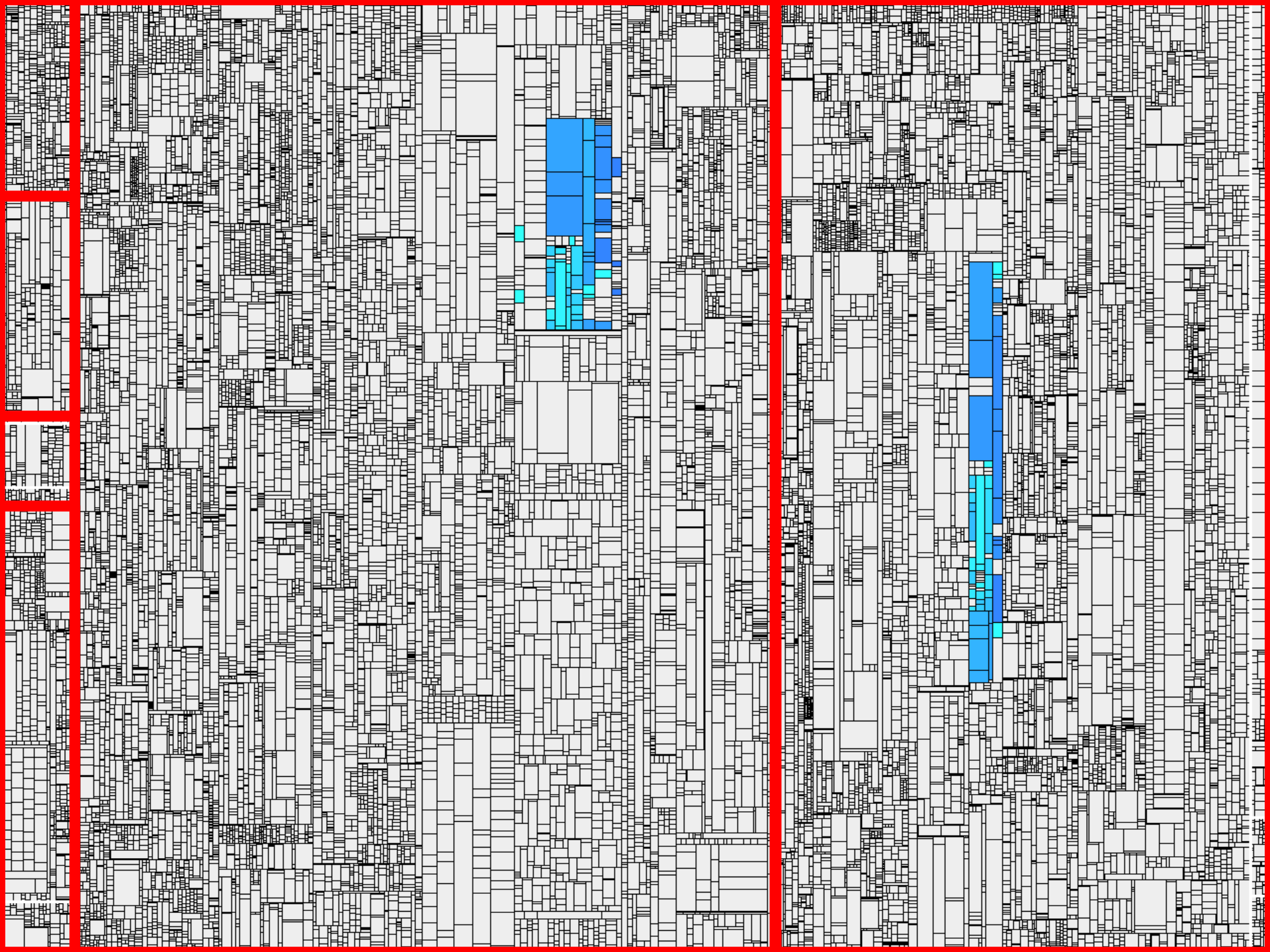


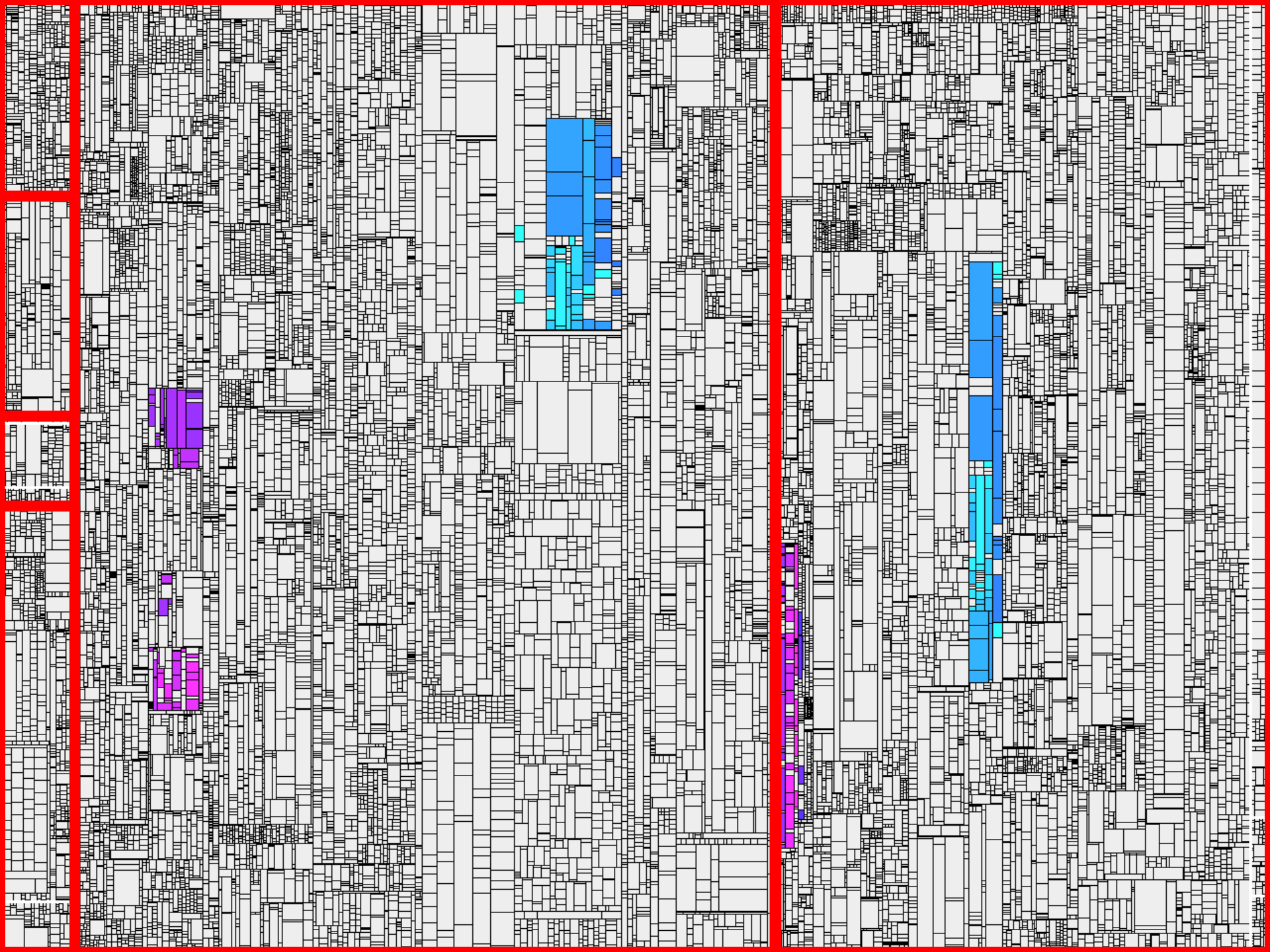
Ownership Robert Nordan (#4)



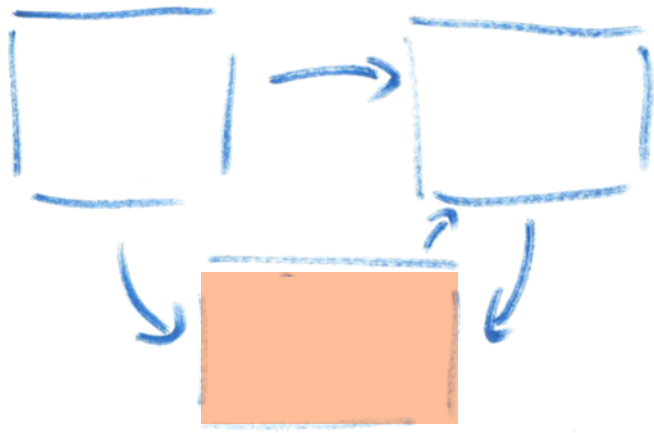
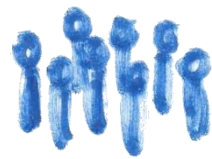
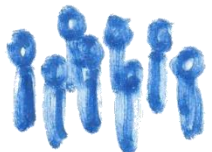










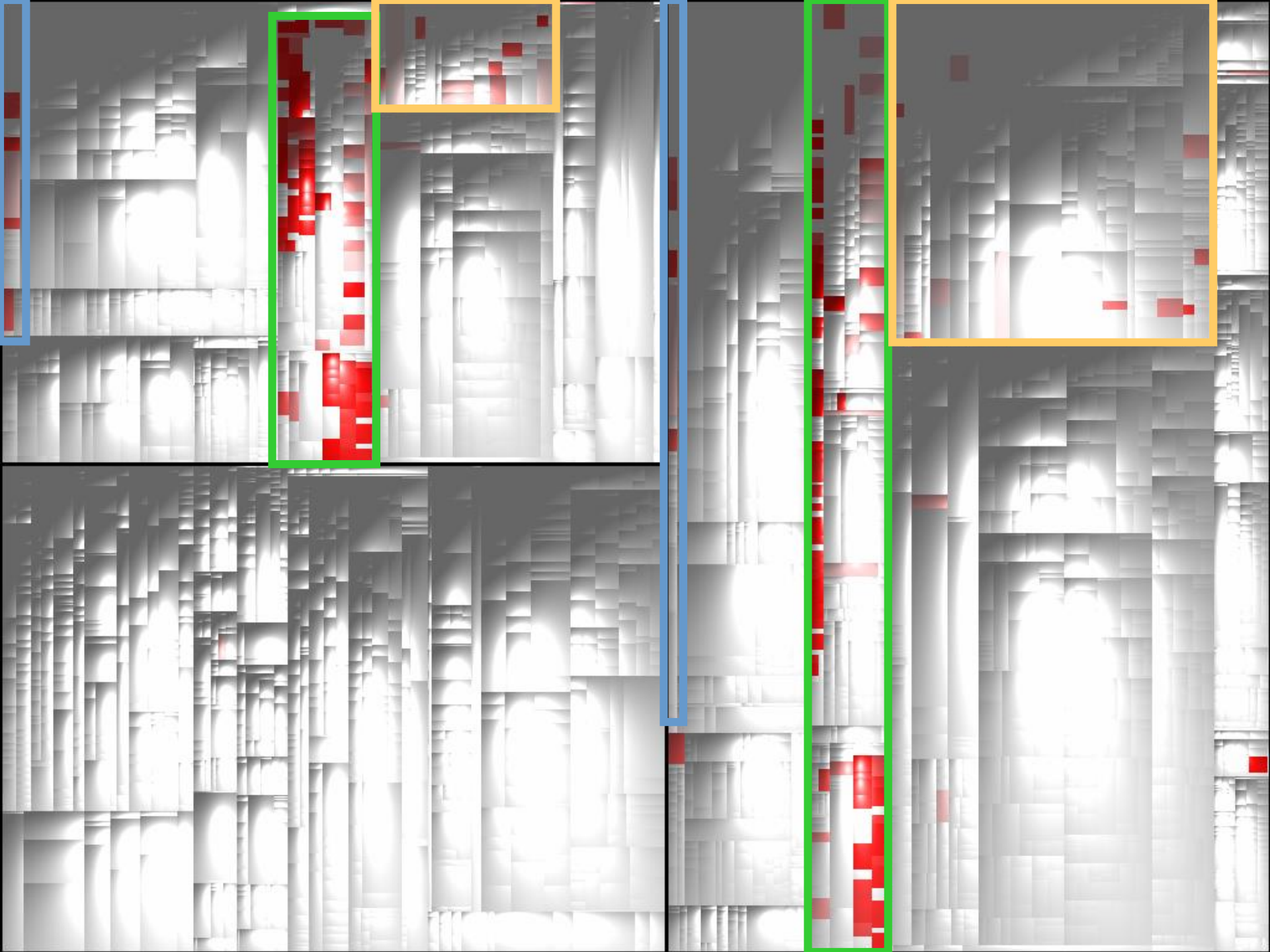


Multiple Applications in one Department

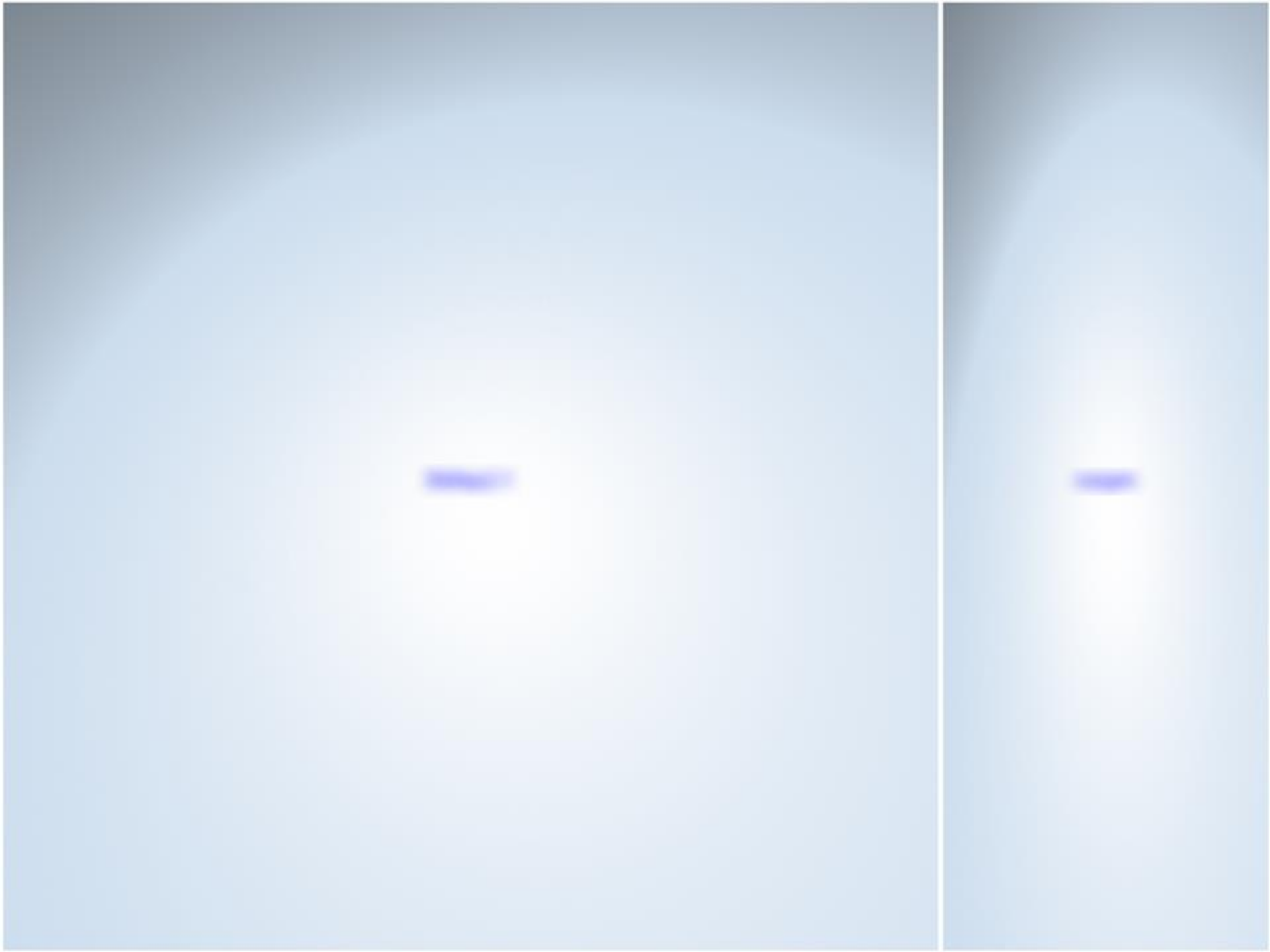
375 kloc

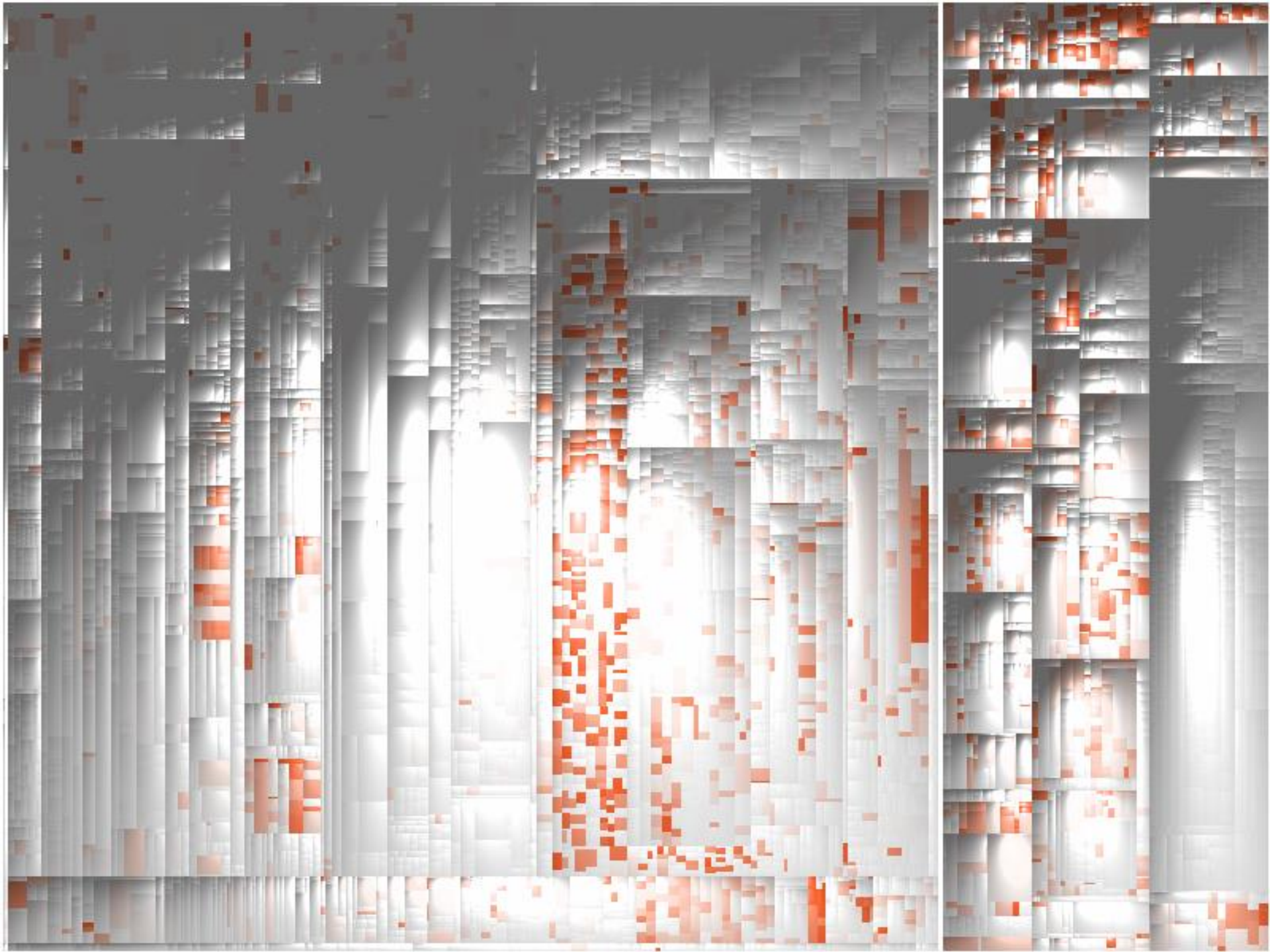
795 kloc

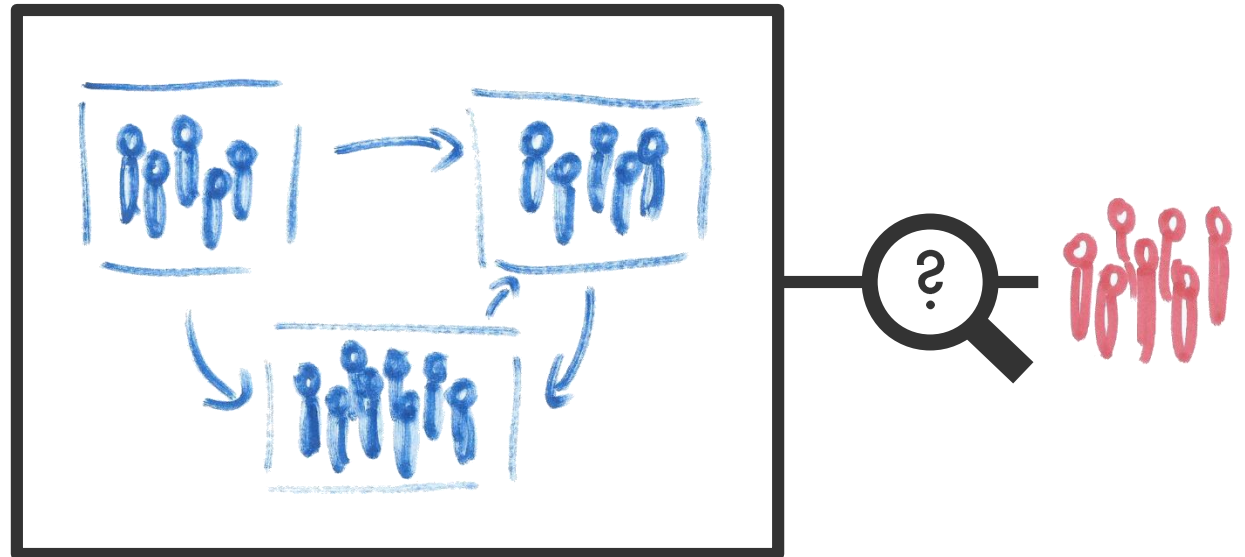
430 kloc



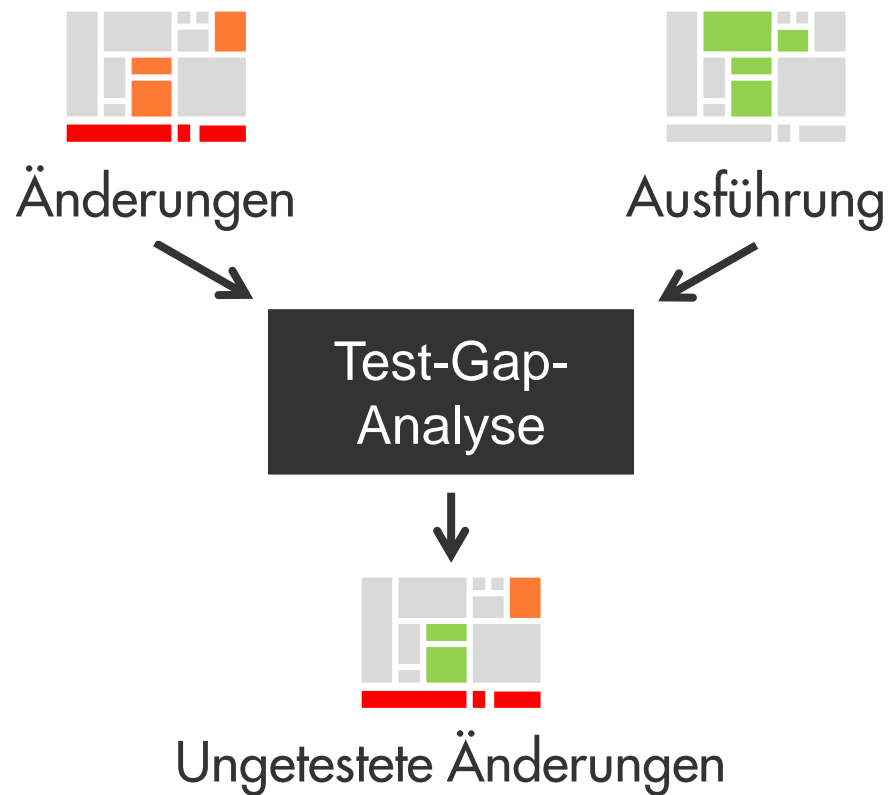
Architecture of a Product Family







Anatomy of Test Gap Analysis



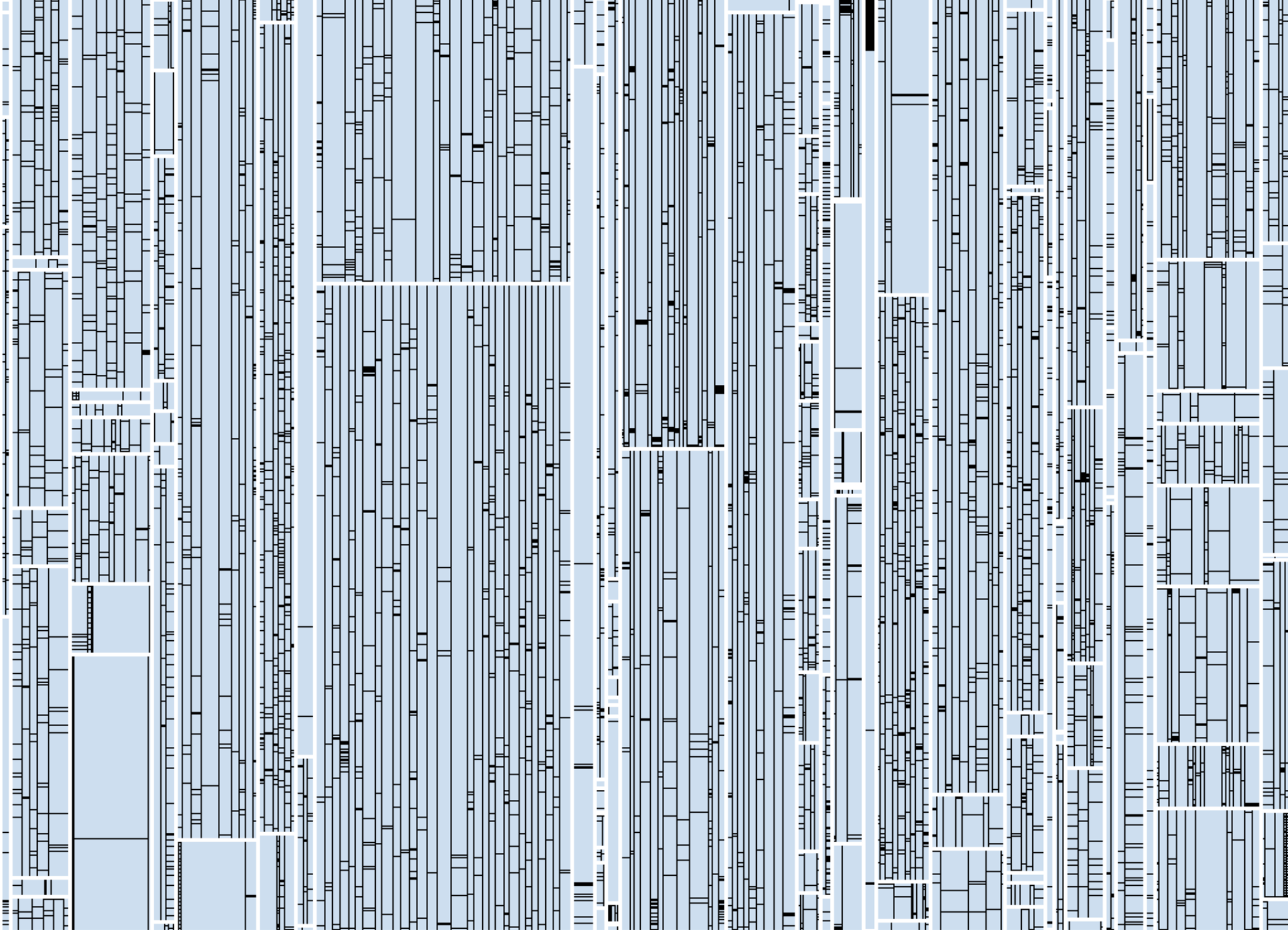
GUI.Dialogs

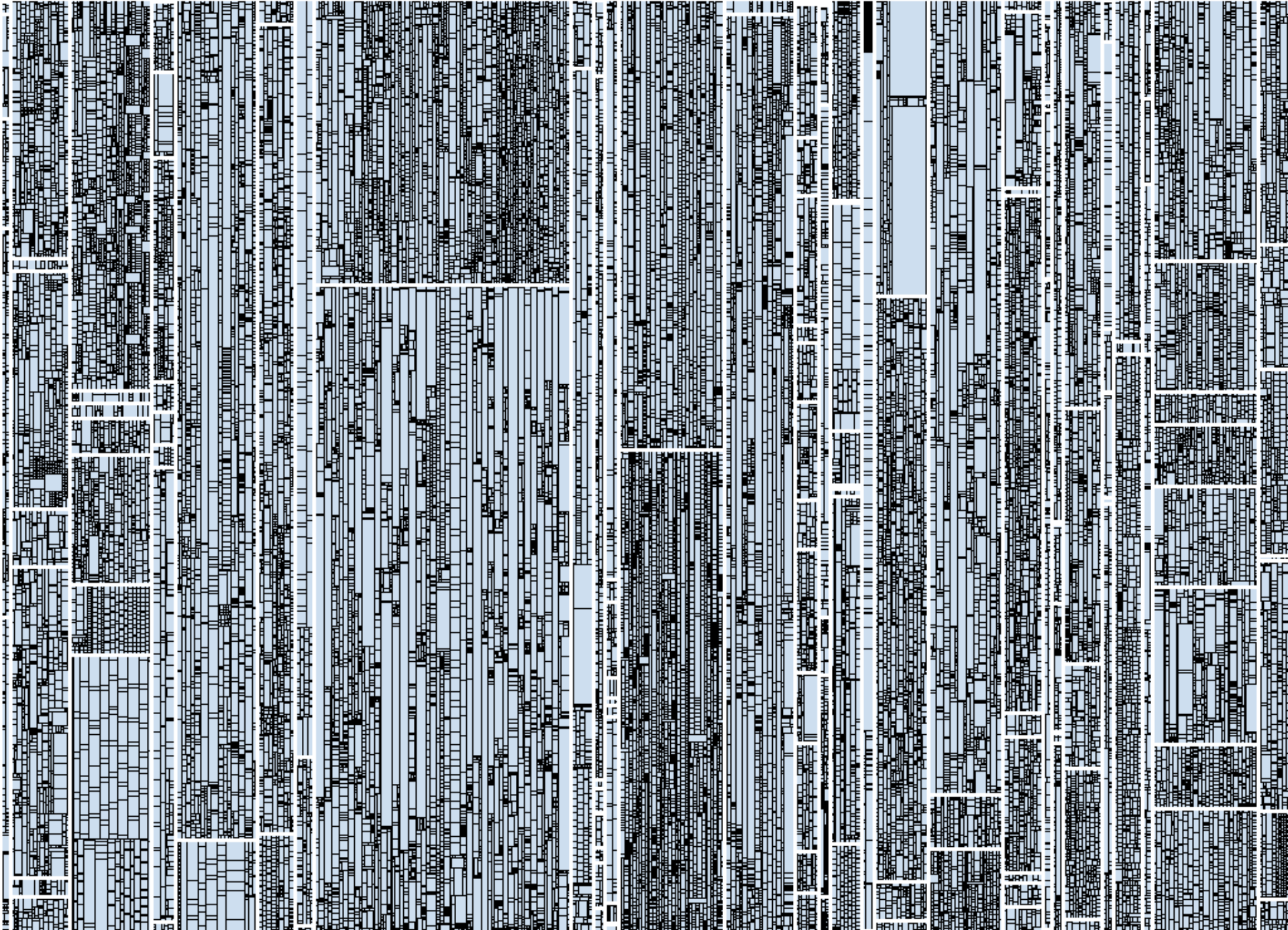
Authentication

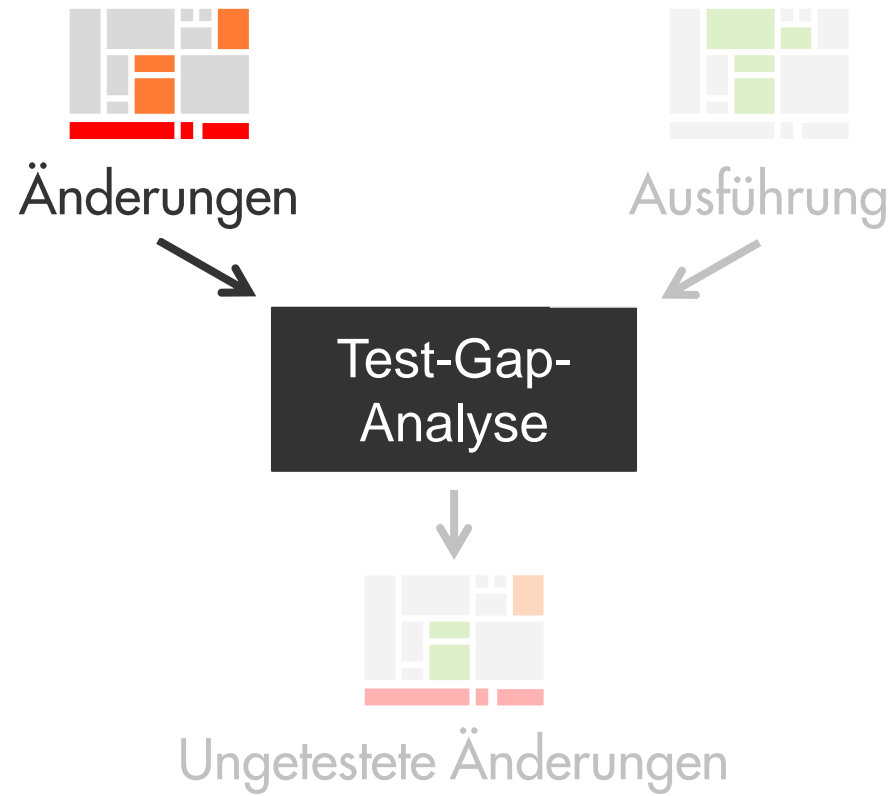
UI Controls

GUI.Base

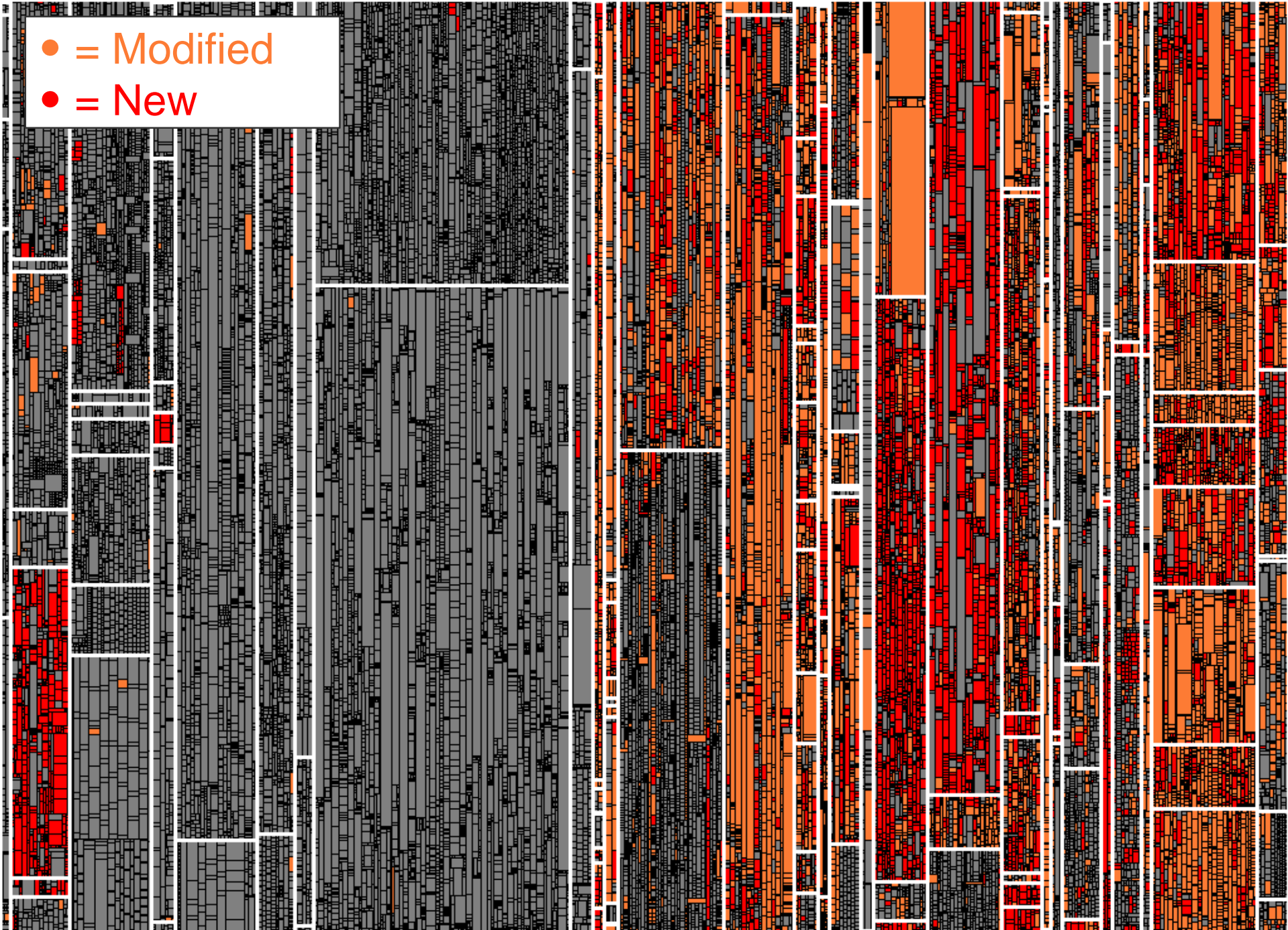
**Data
Validation**

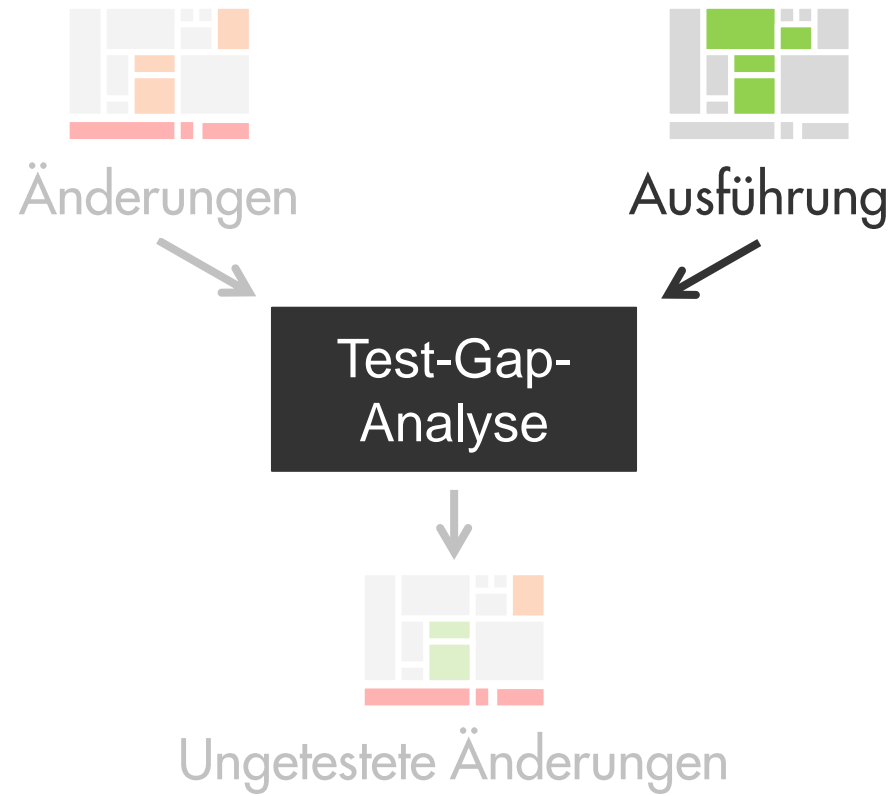




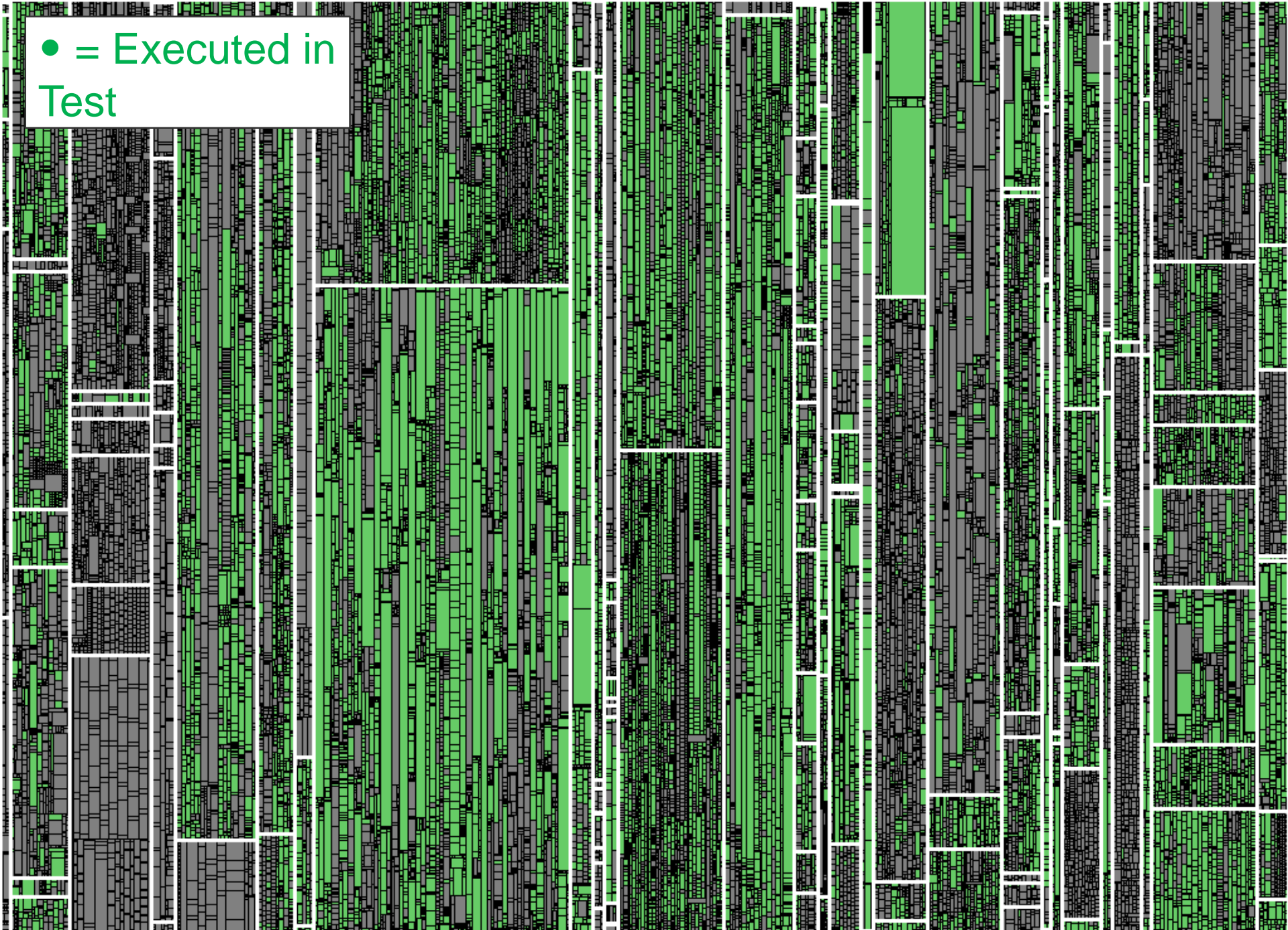


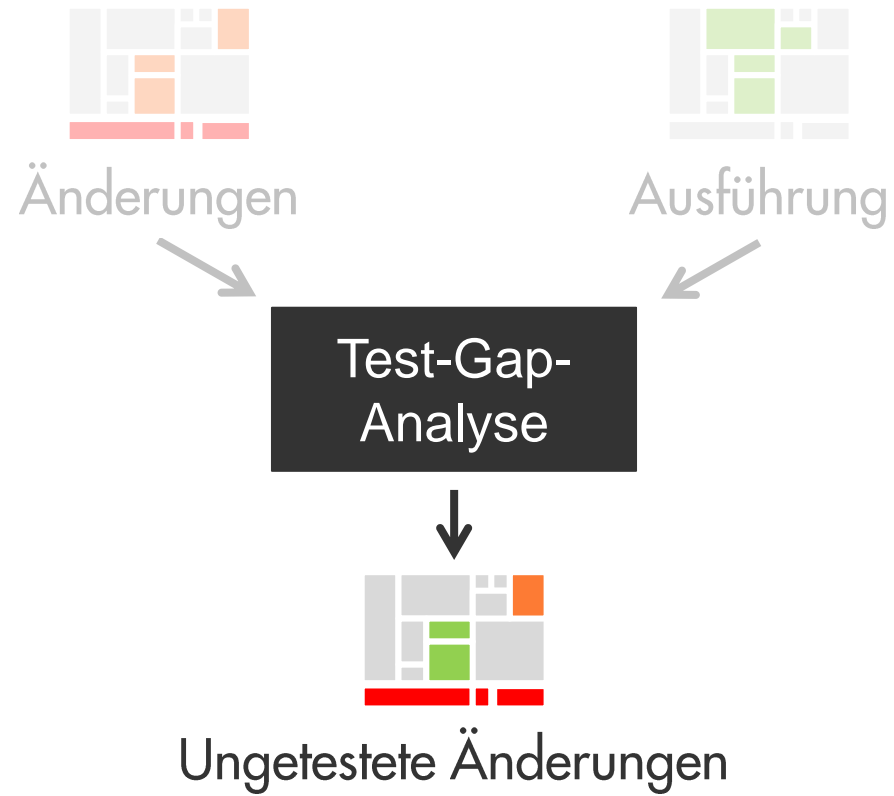
- = Modified
- = New



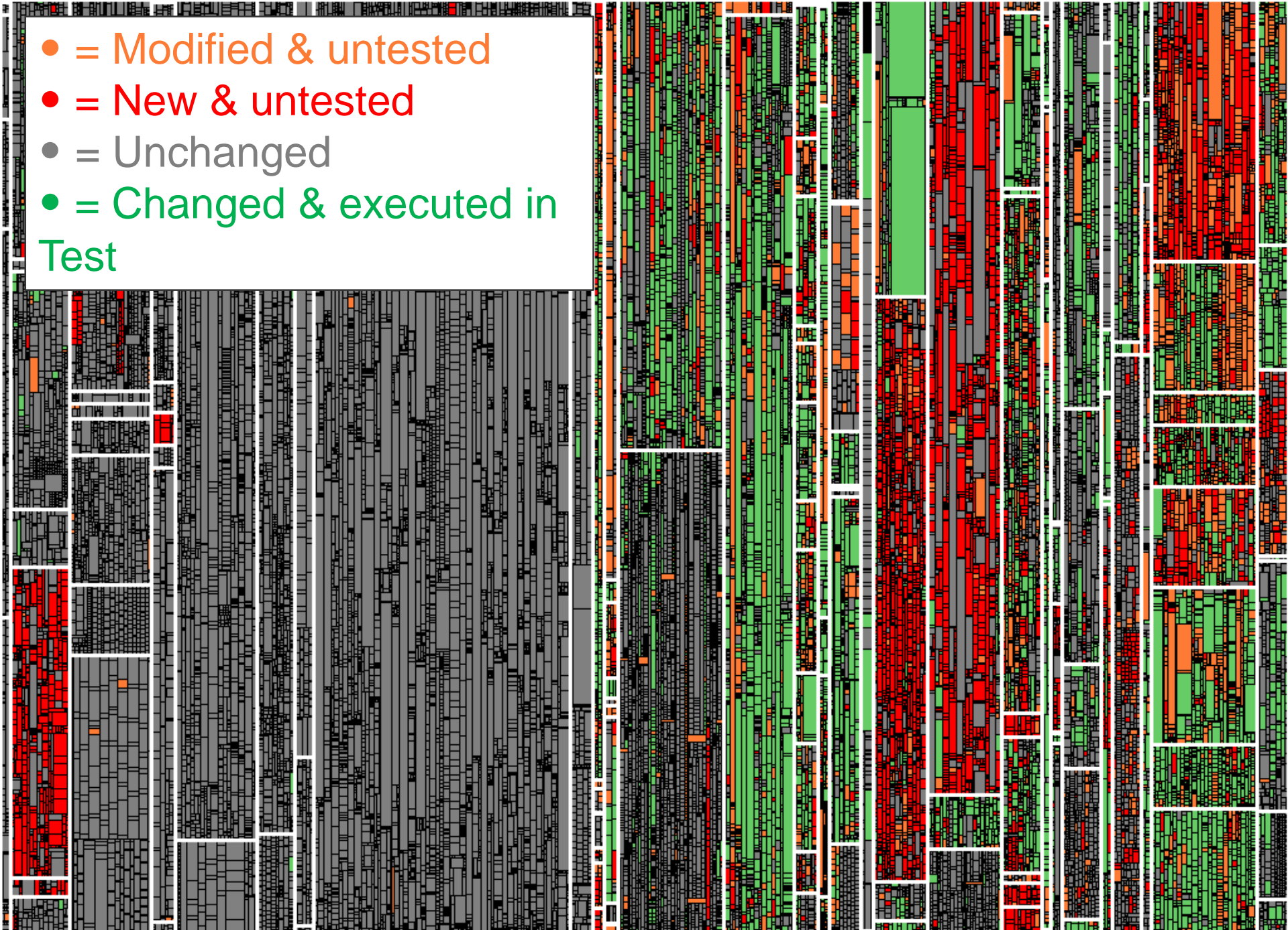


● = Executed in
Test

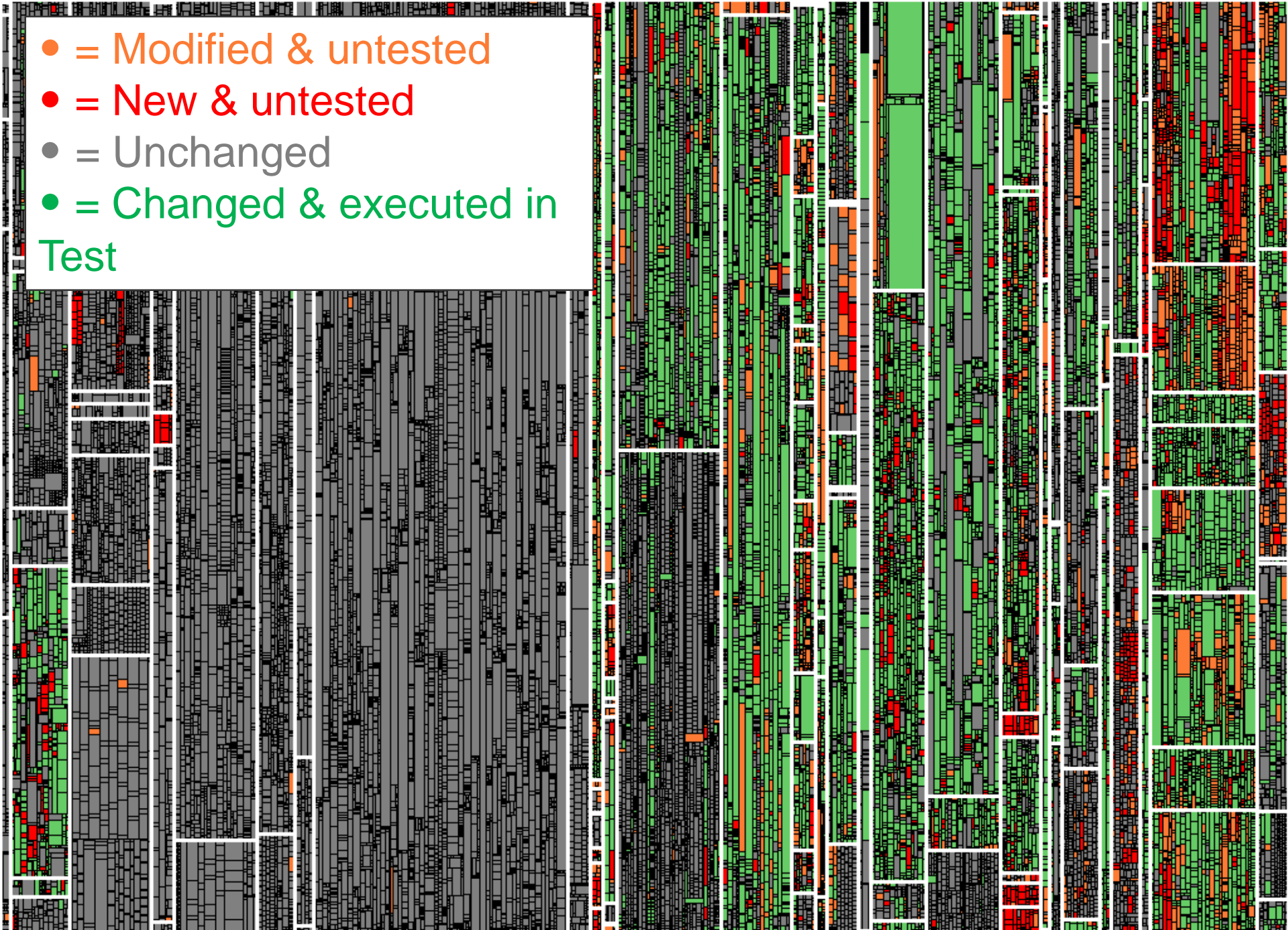




- = Modified & untested
 - = New & untested
 - = Unchanged
 - = Changed & executed in Test
- Test



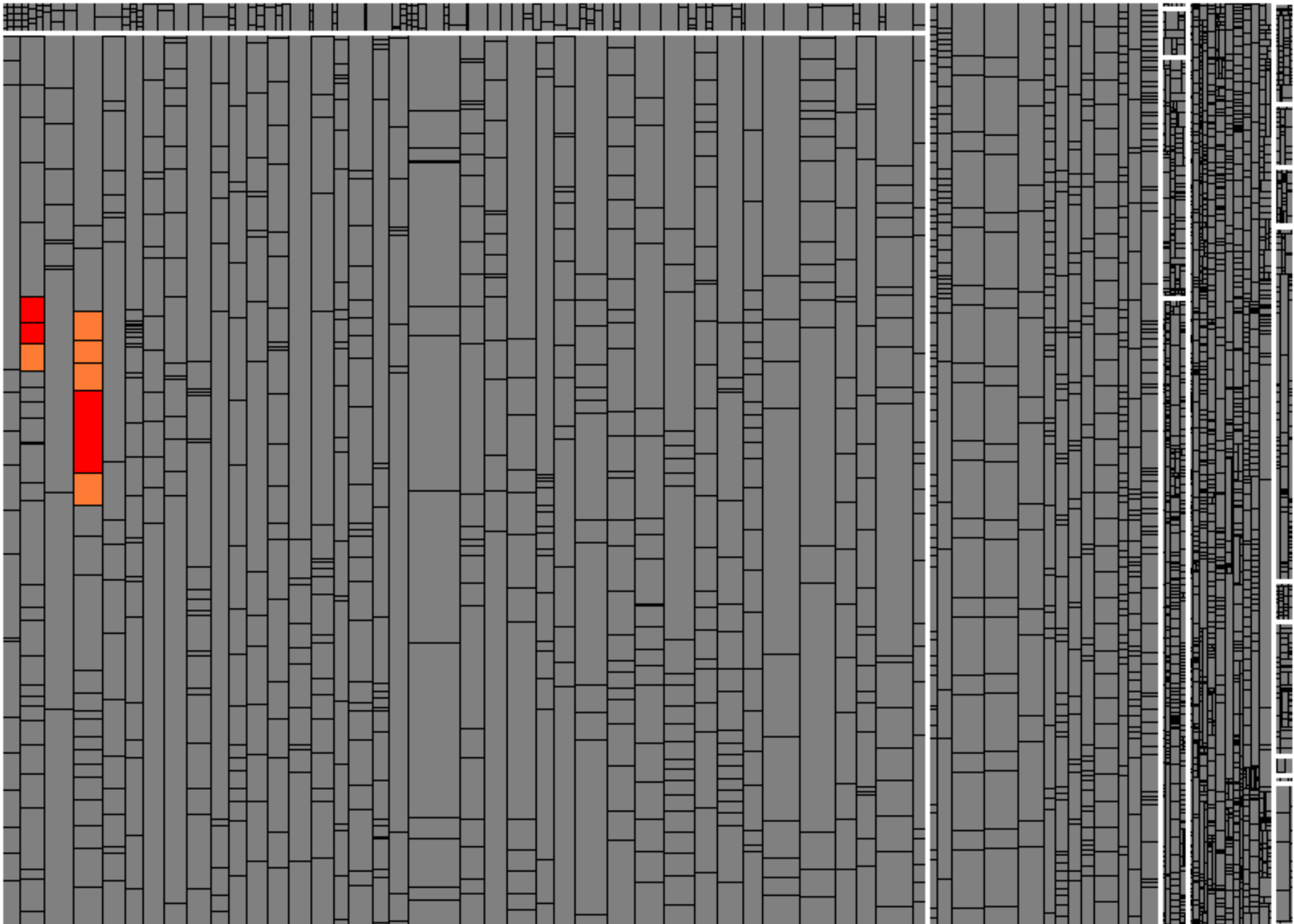
- = Modified & untested
 - = New & untested
 - = Unchanged
 - = Changed & executed in Test
- Test

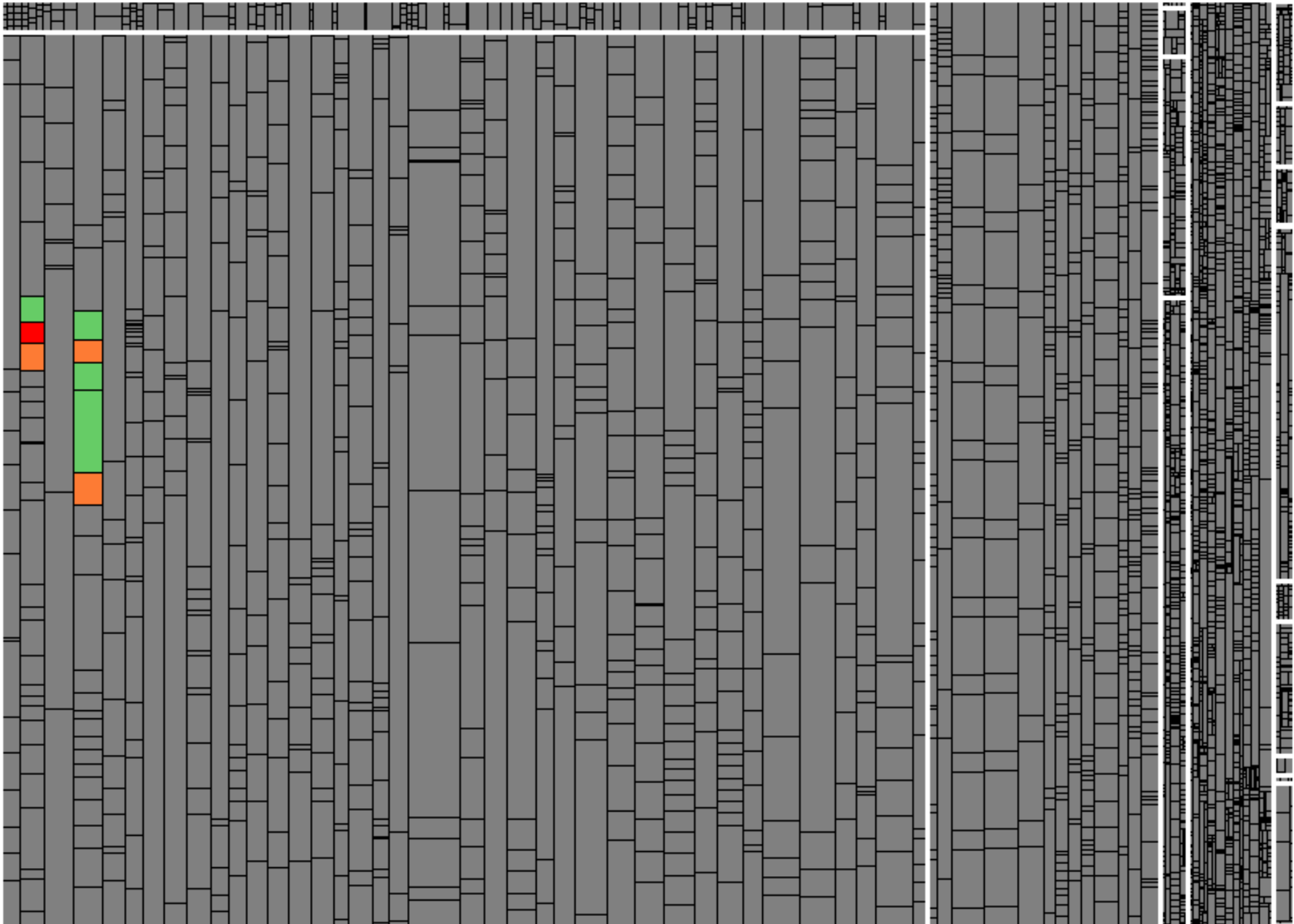


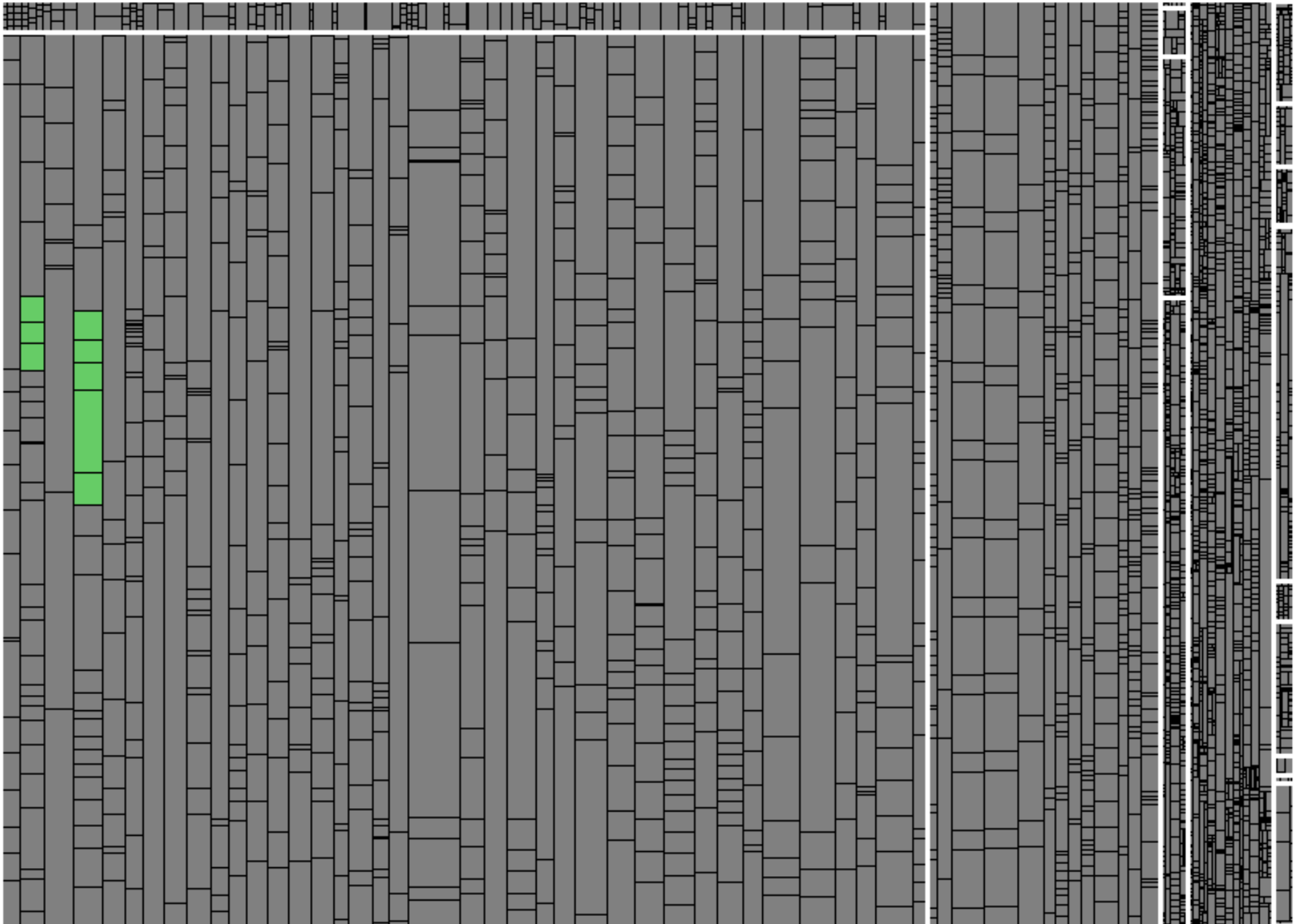
A thick orange diagonal line runs from the bottom-left corner to the top-right corner of the image, passing through the text.

100% Change Coverage → 0 Bugs

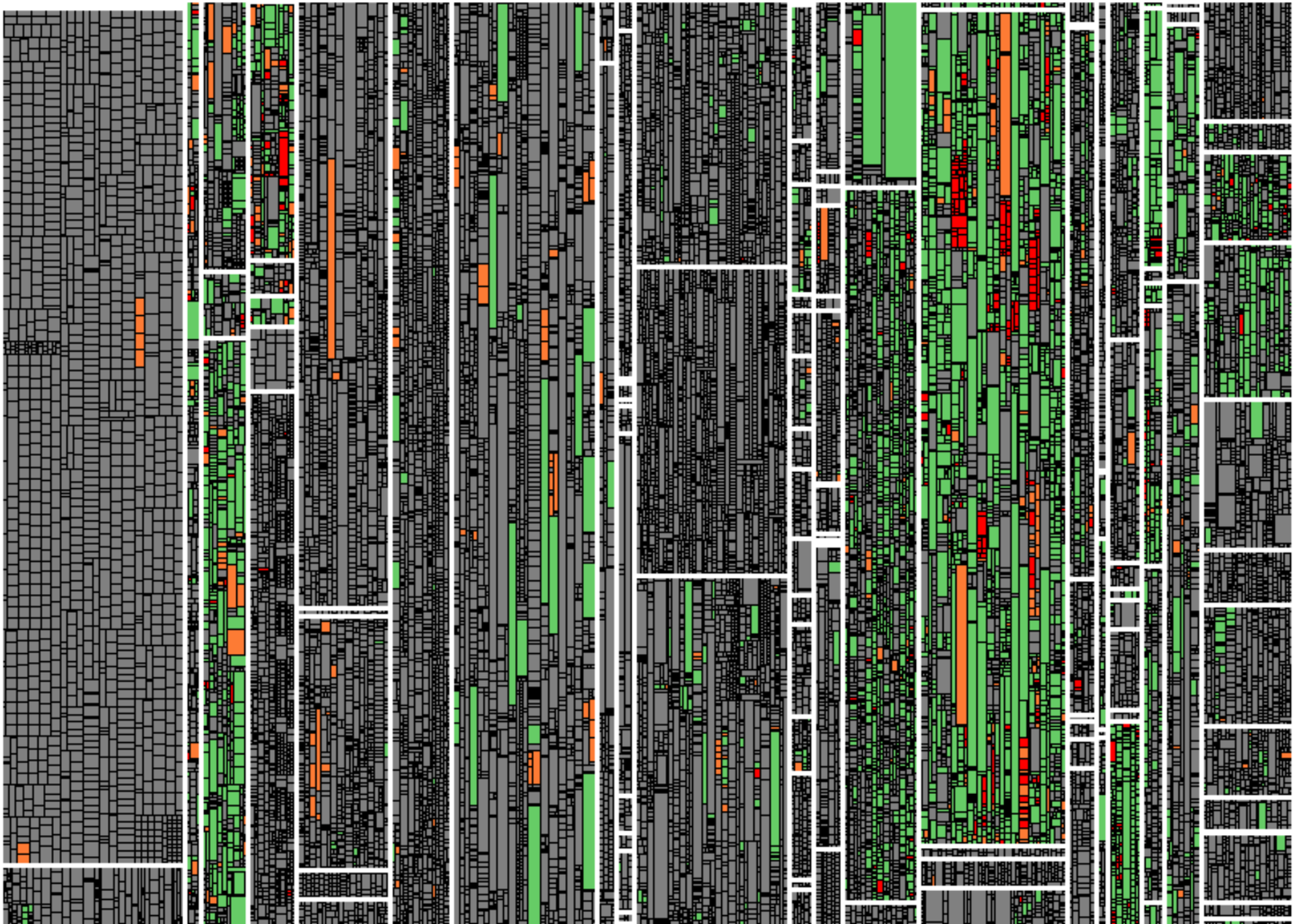
**Bug Test
during Hotfix**

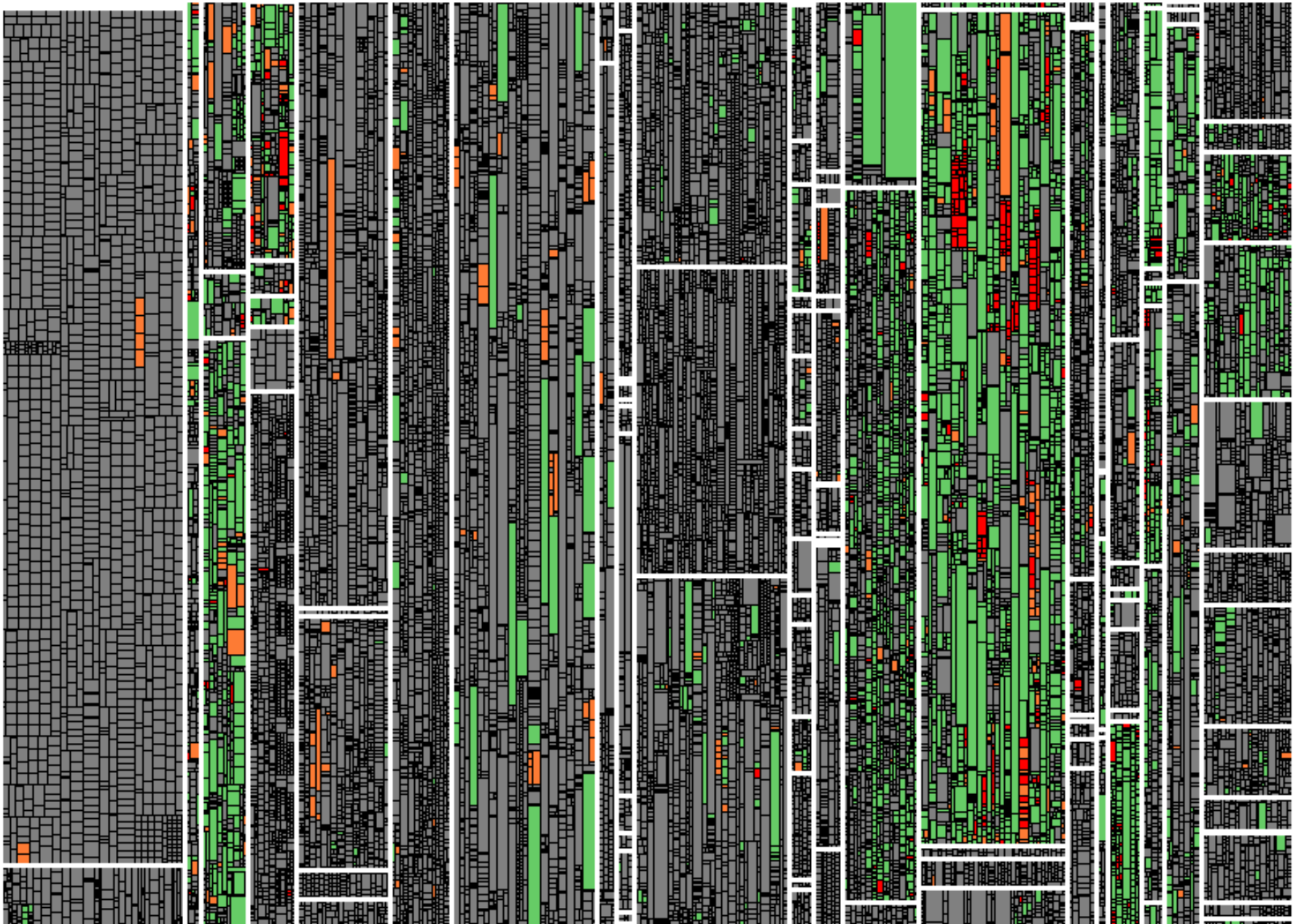


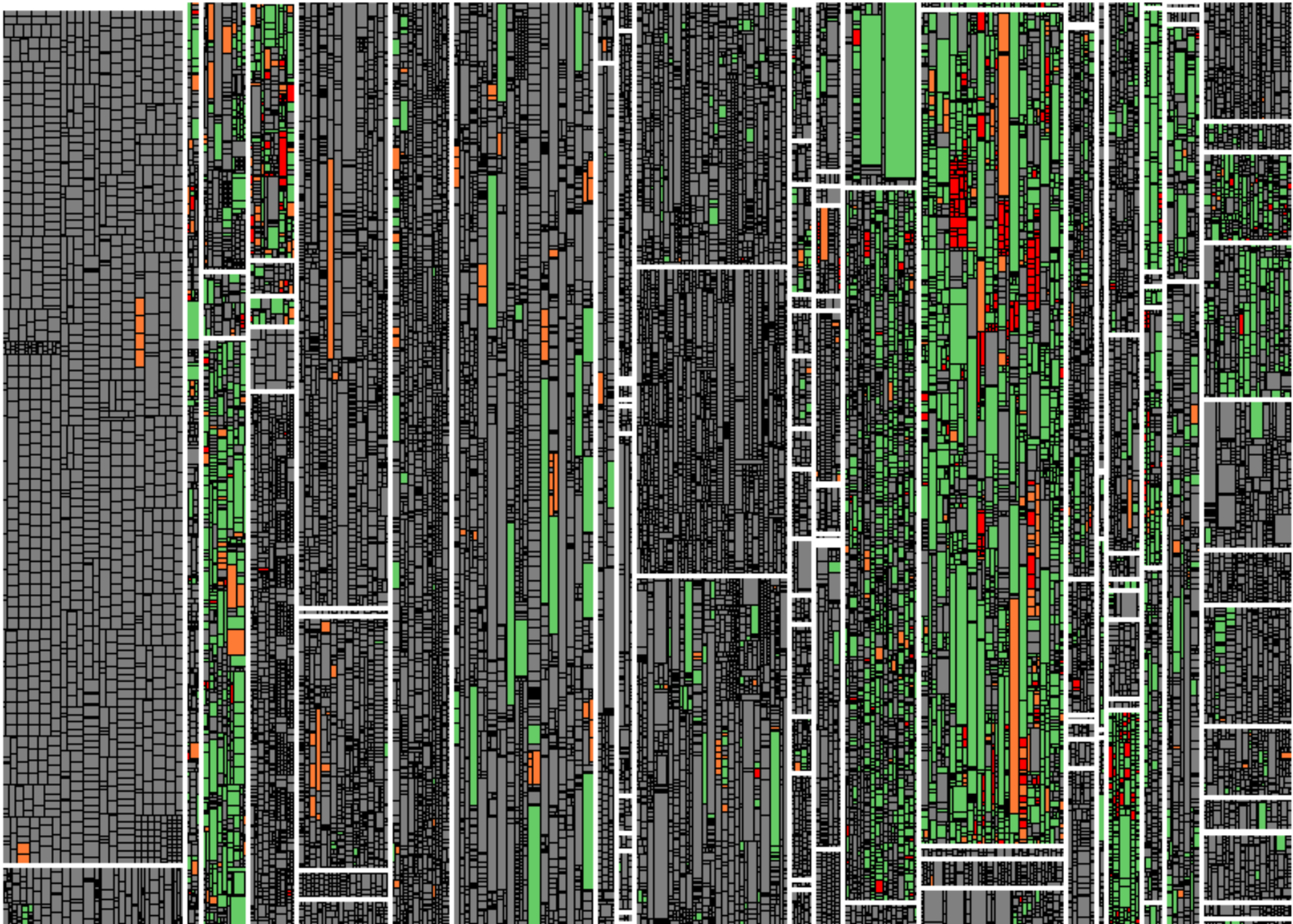


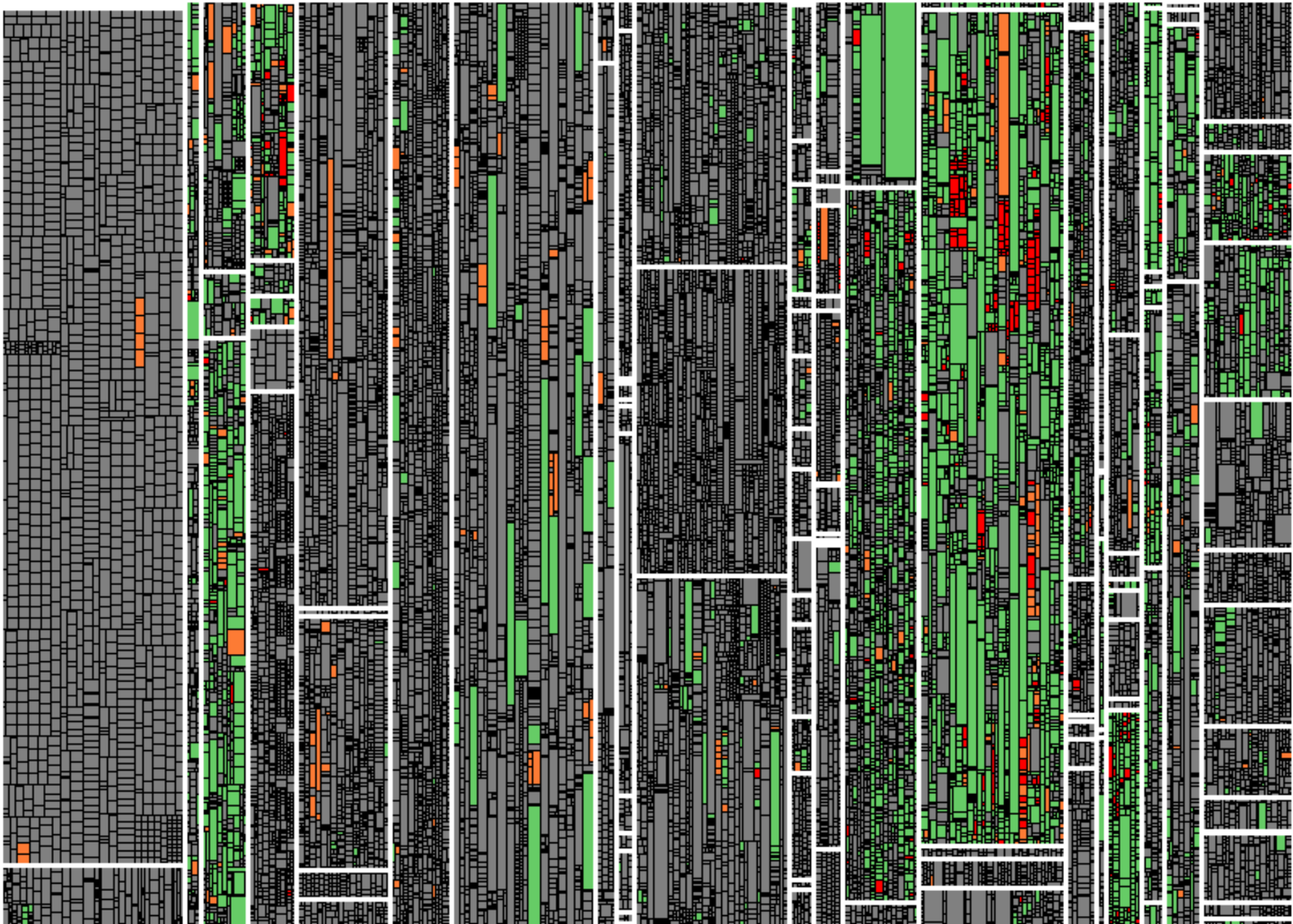


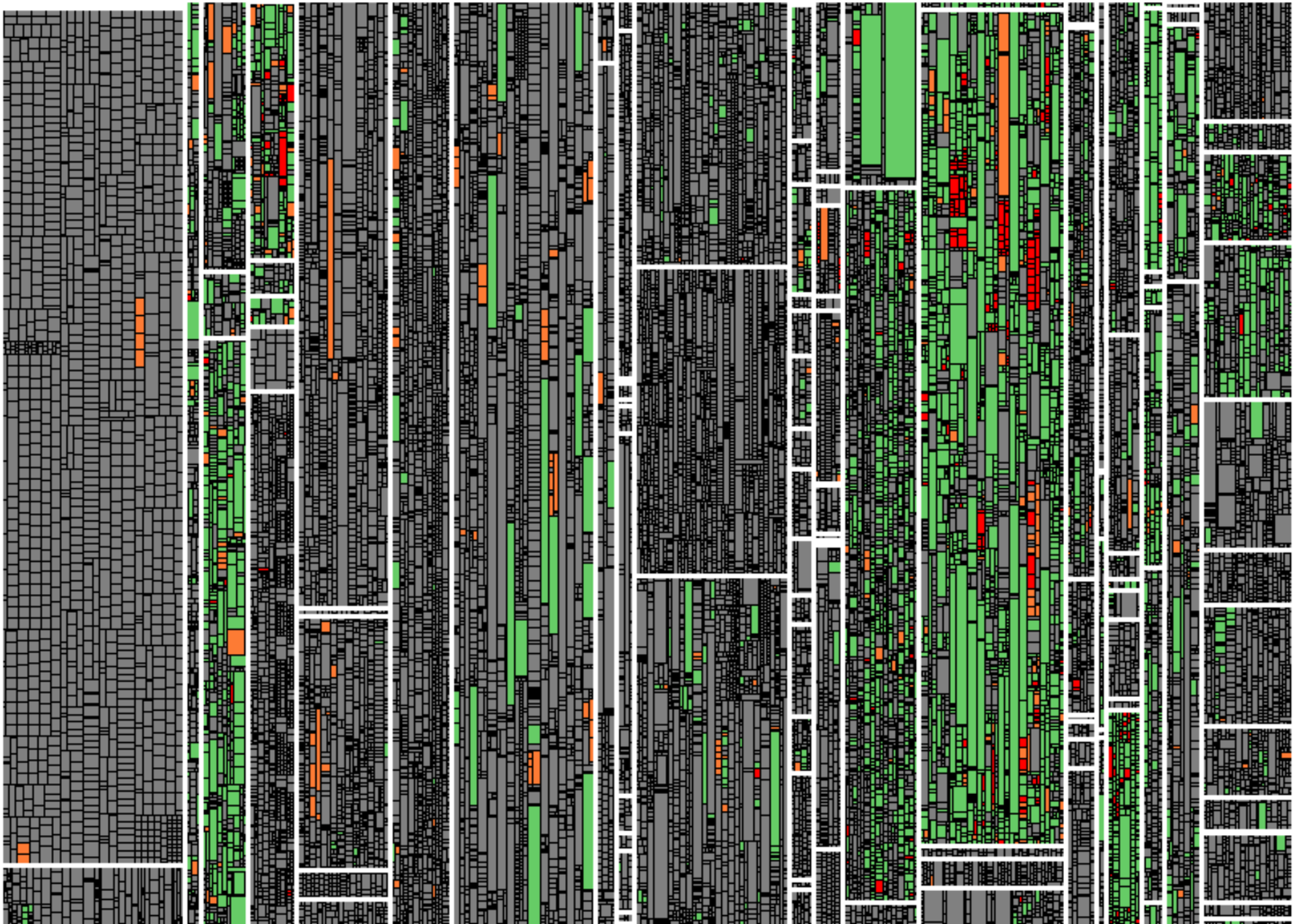
Release Test

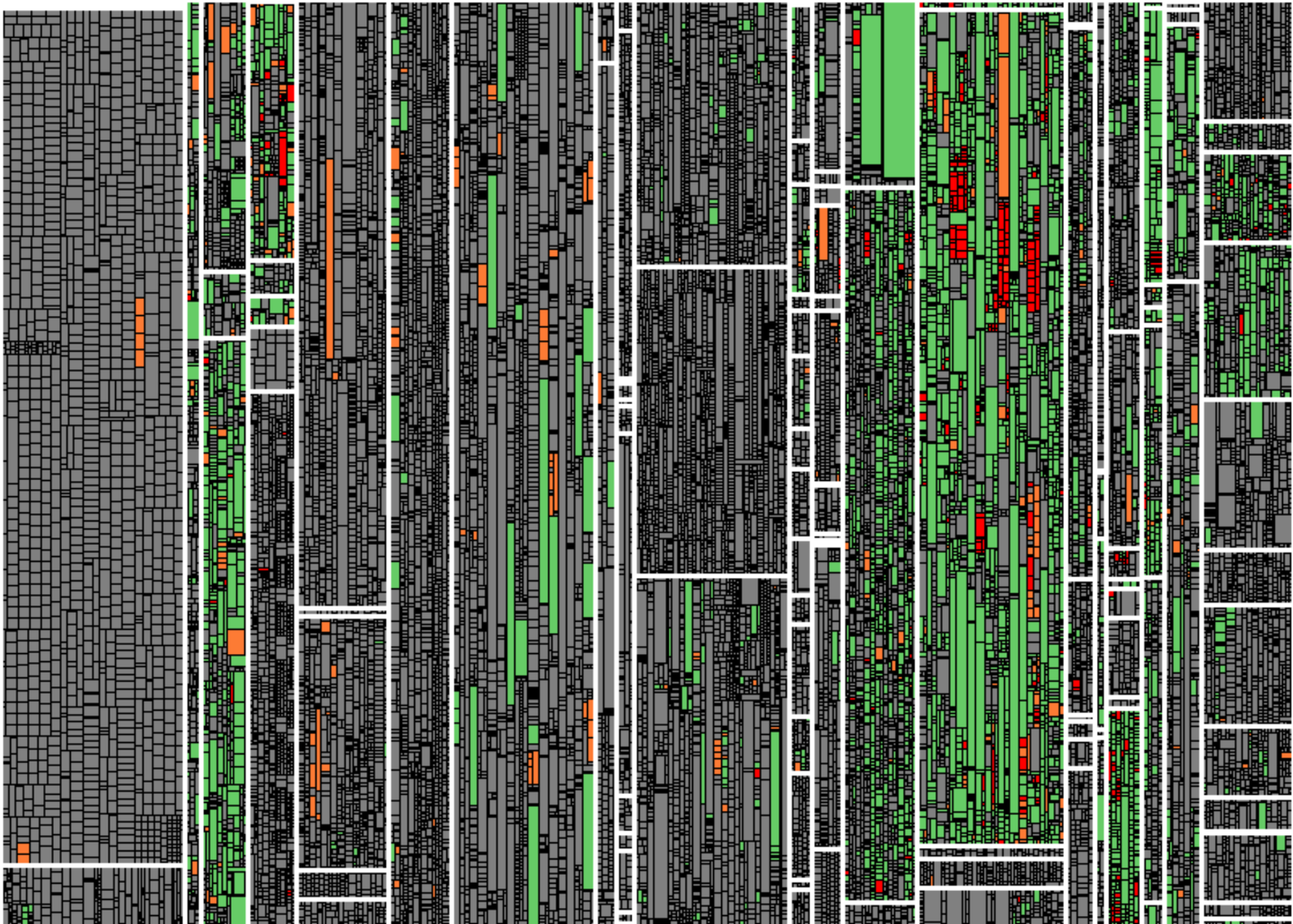


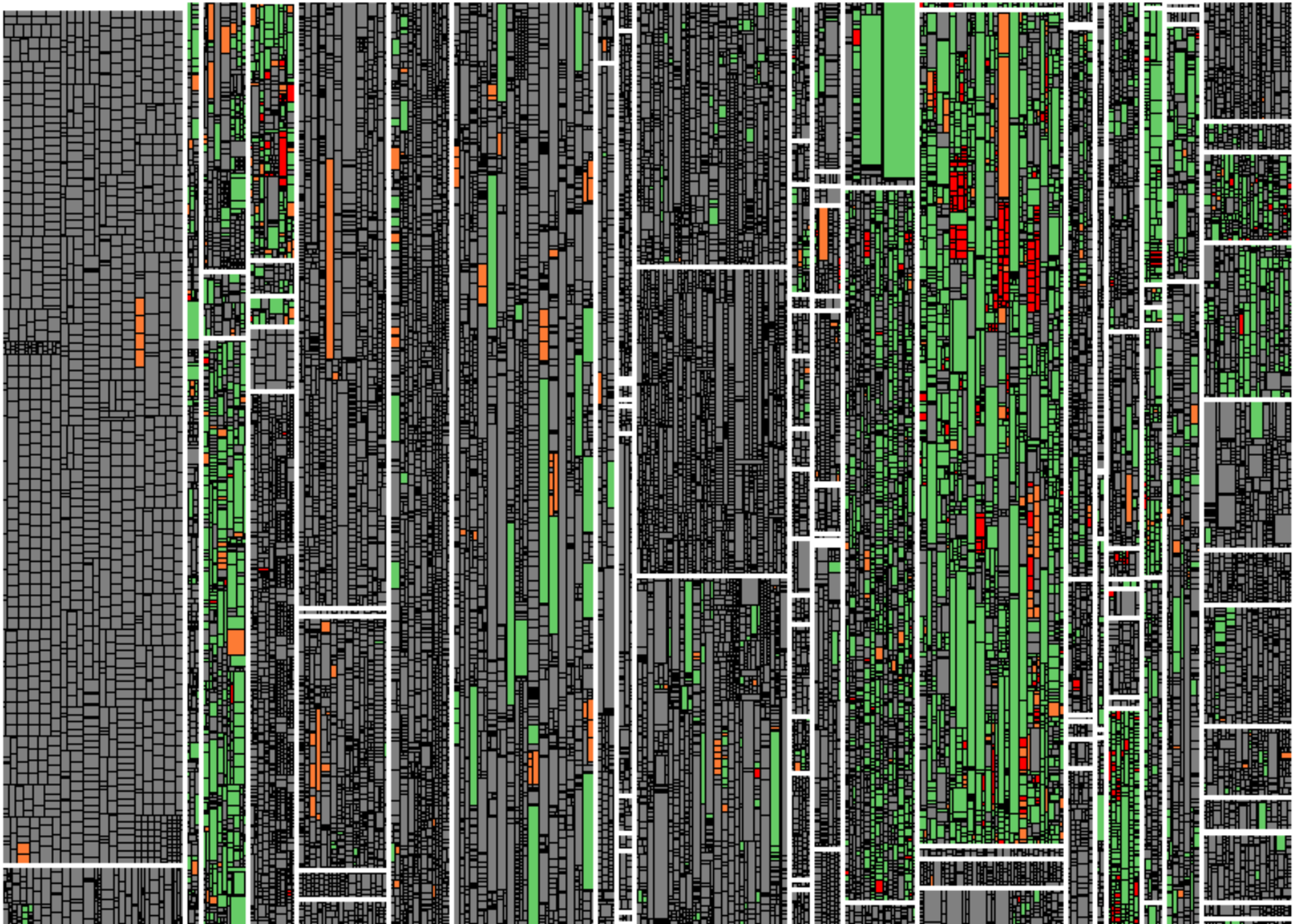


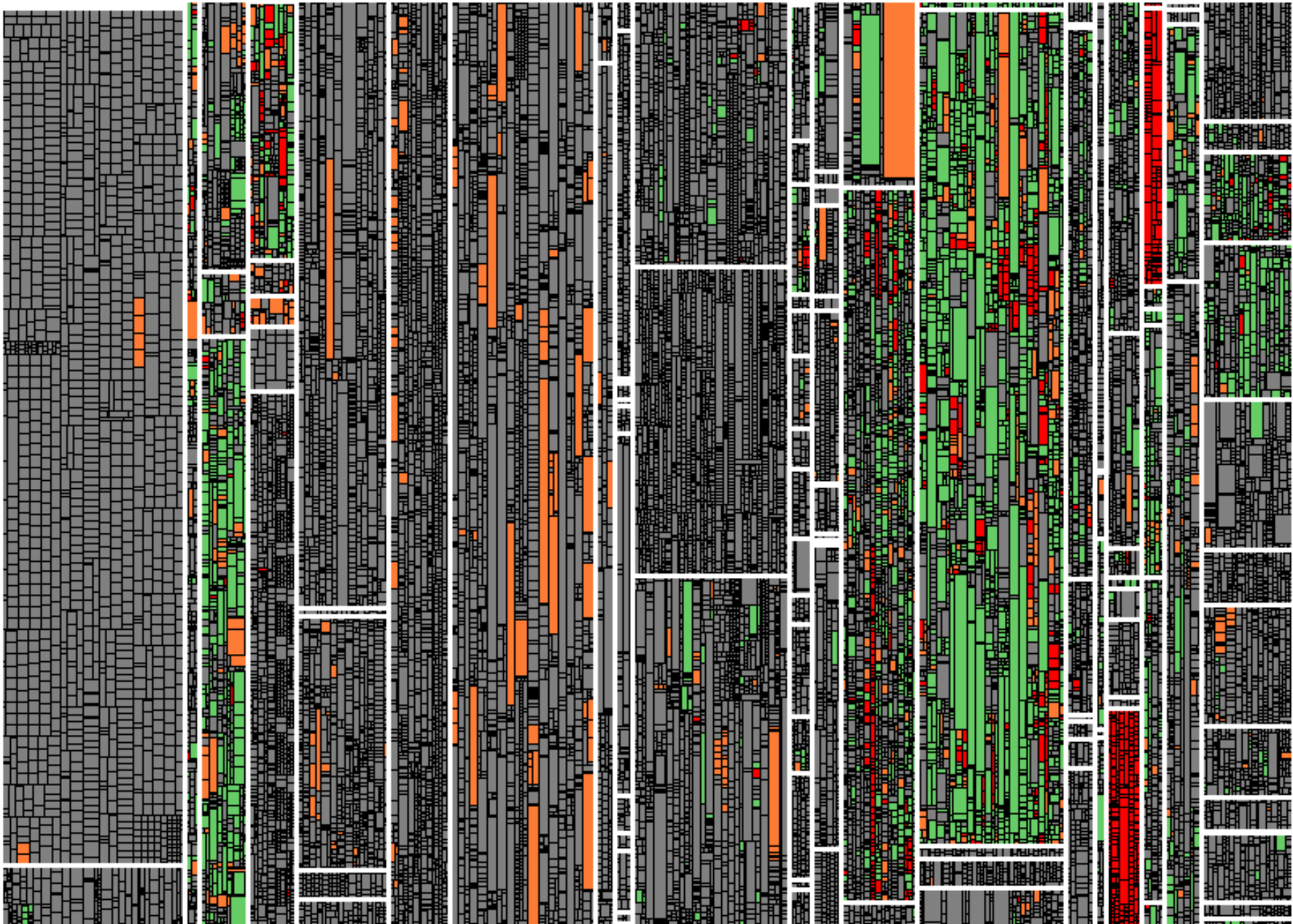


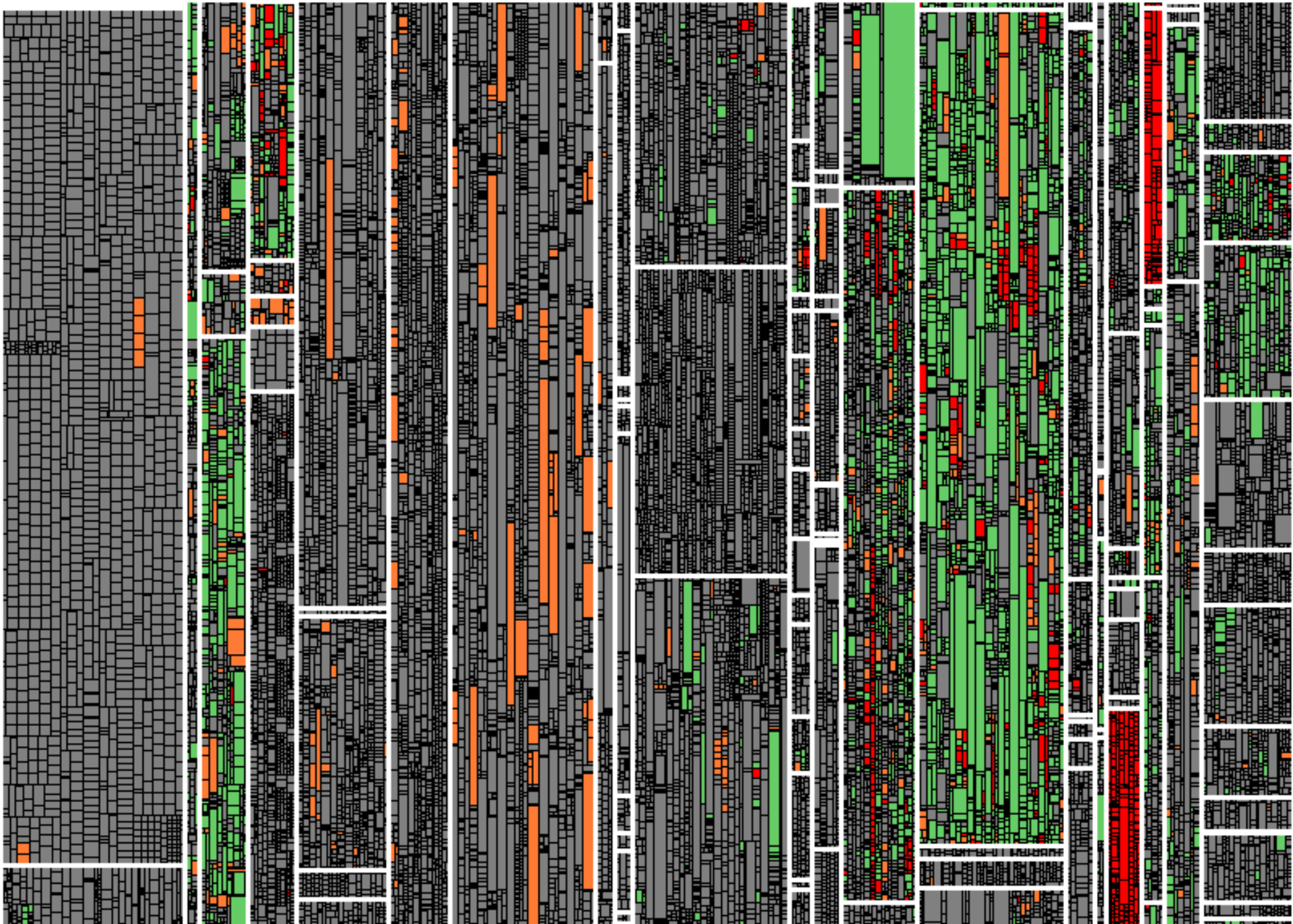


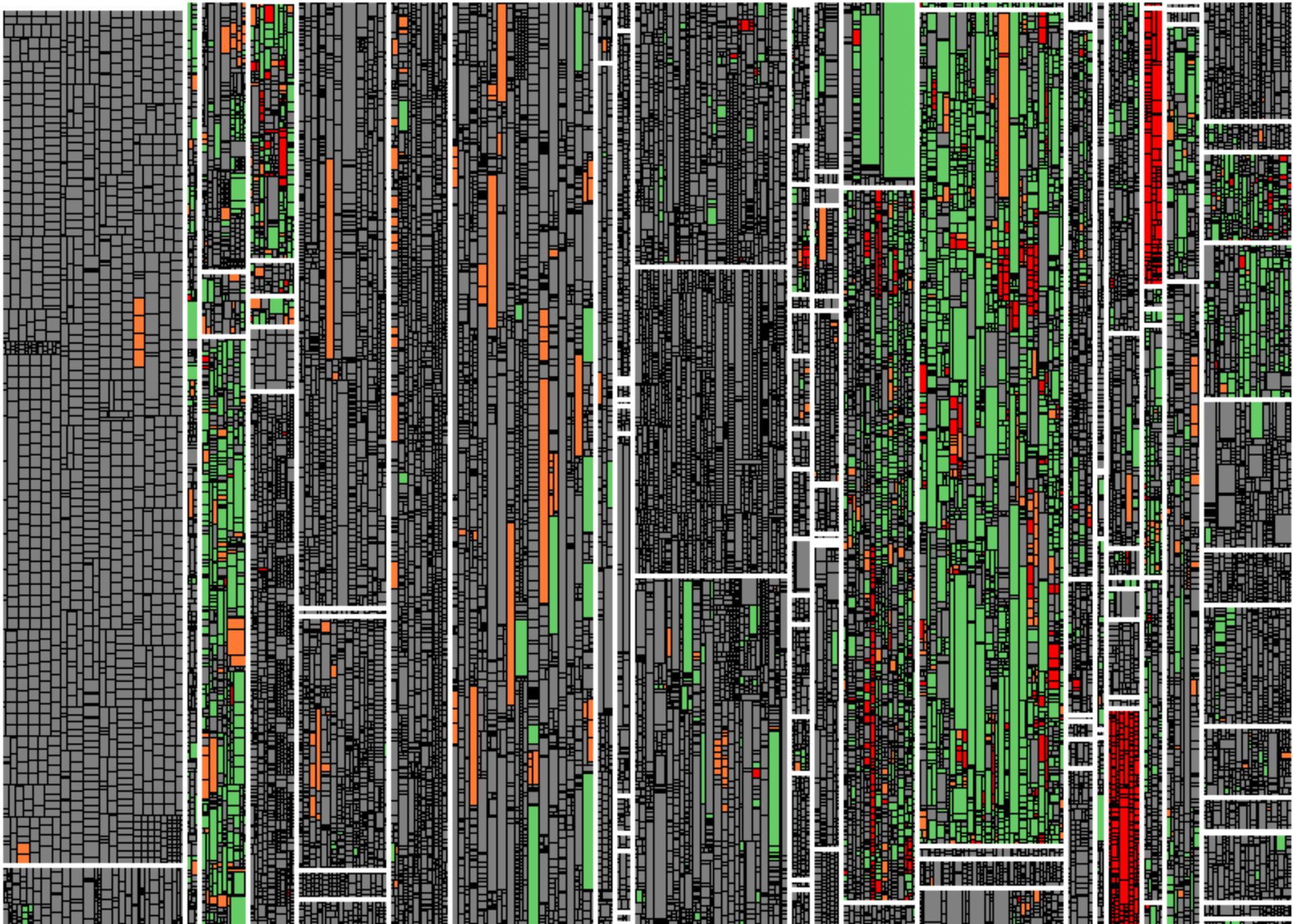


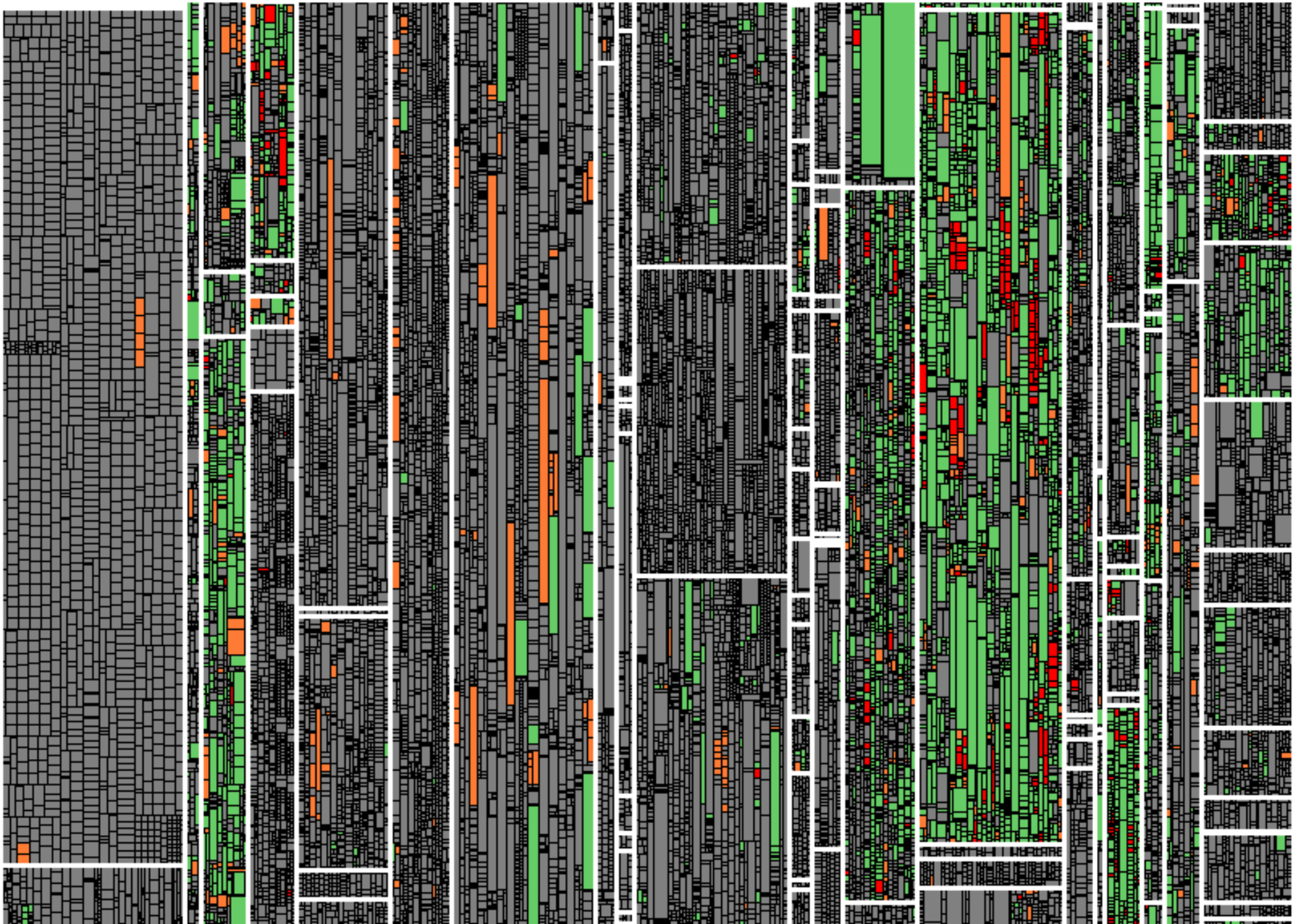


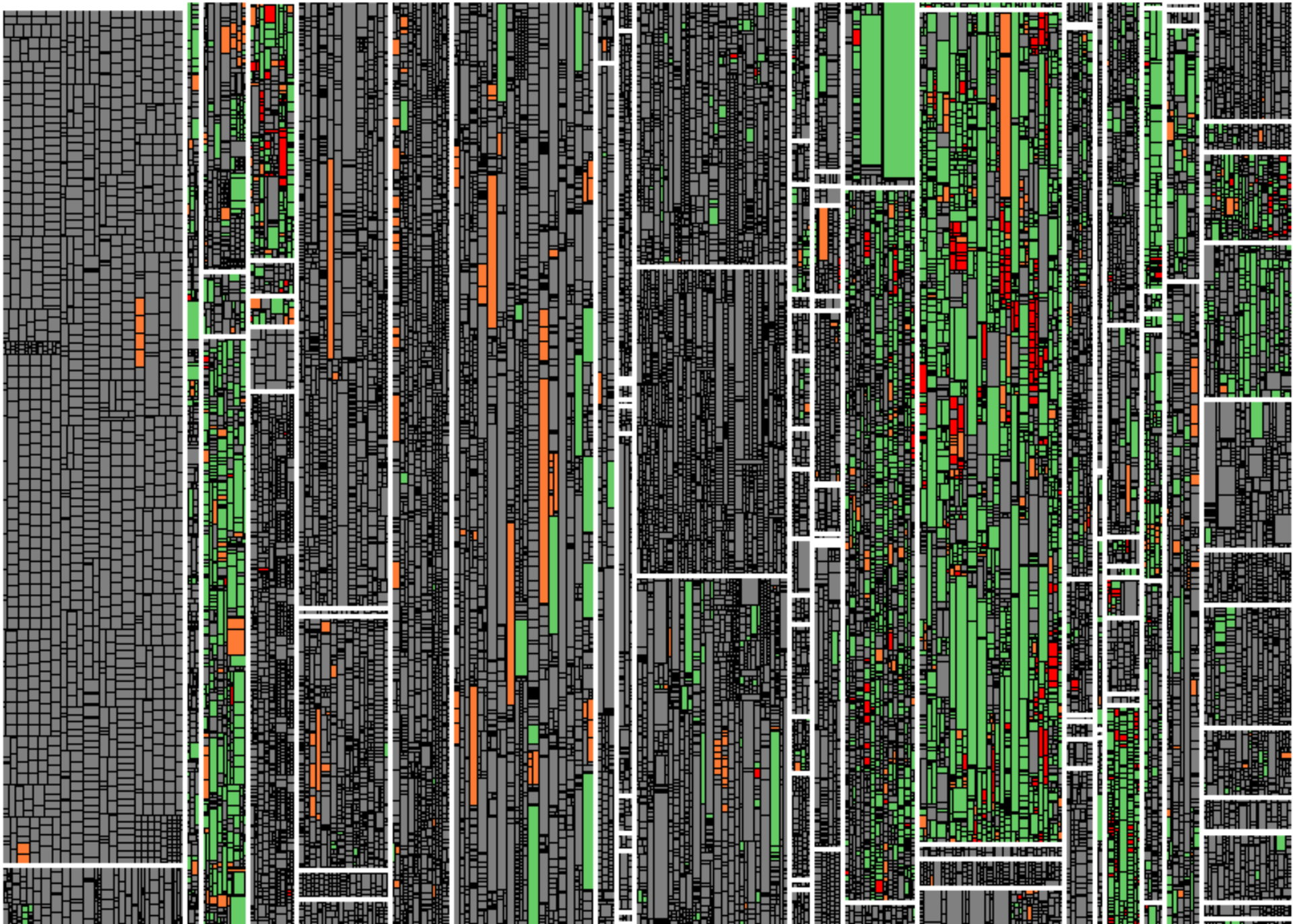


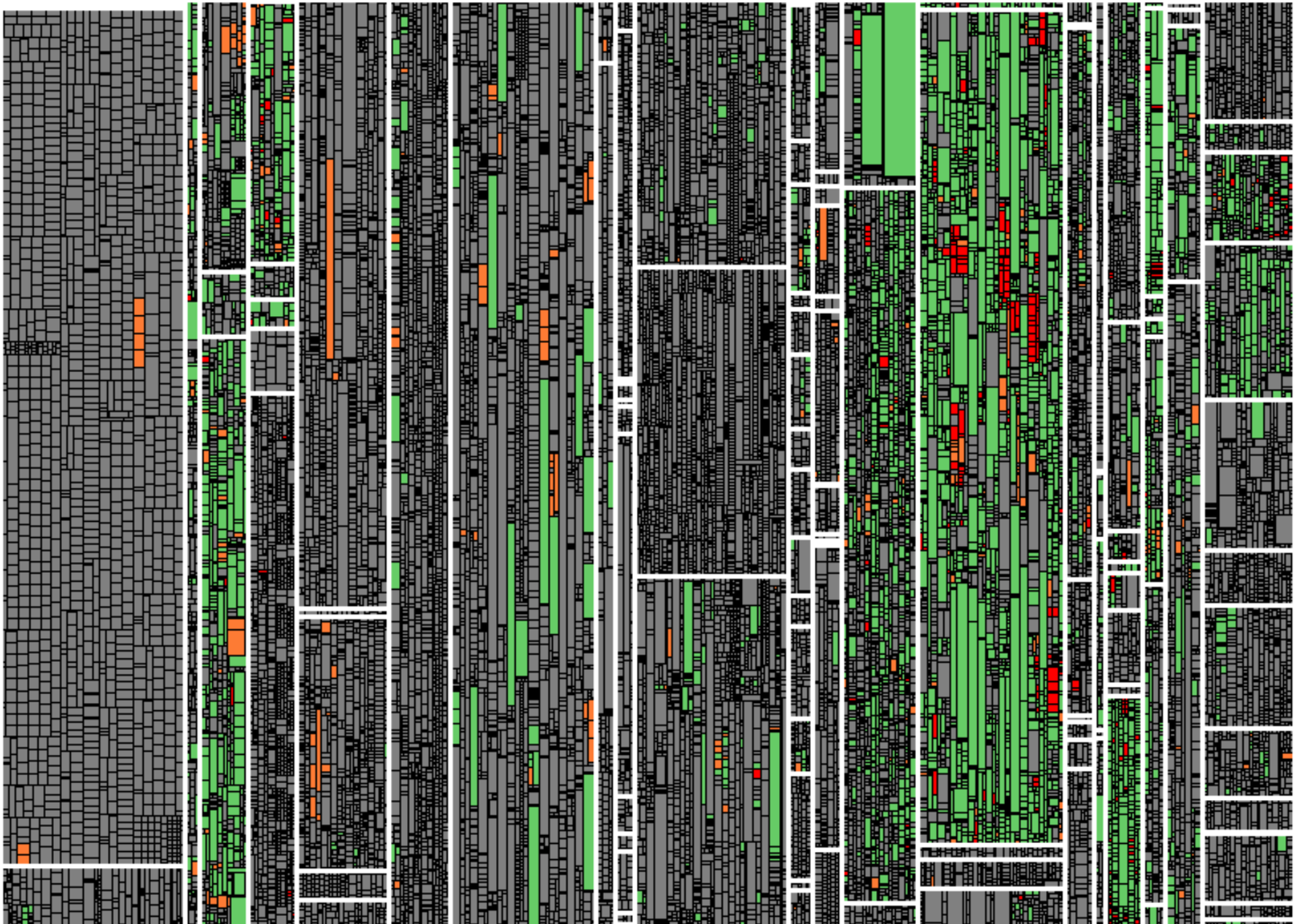


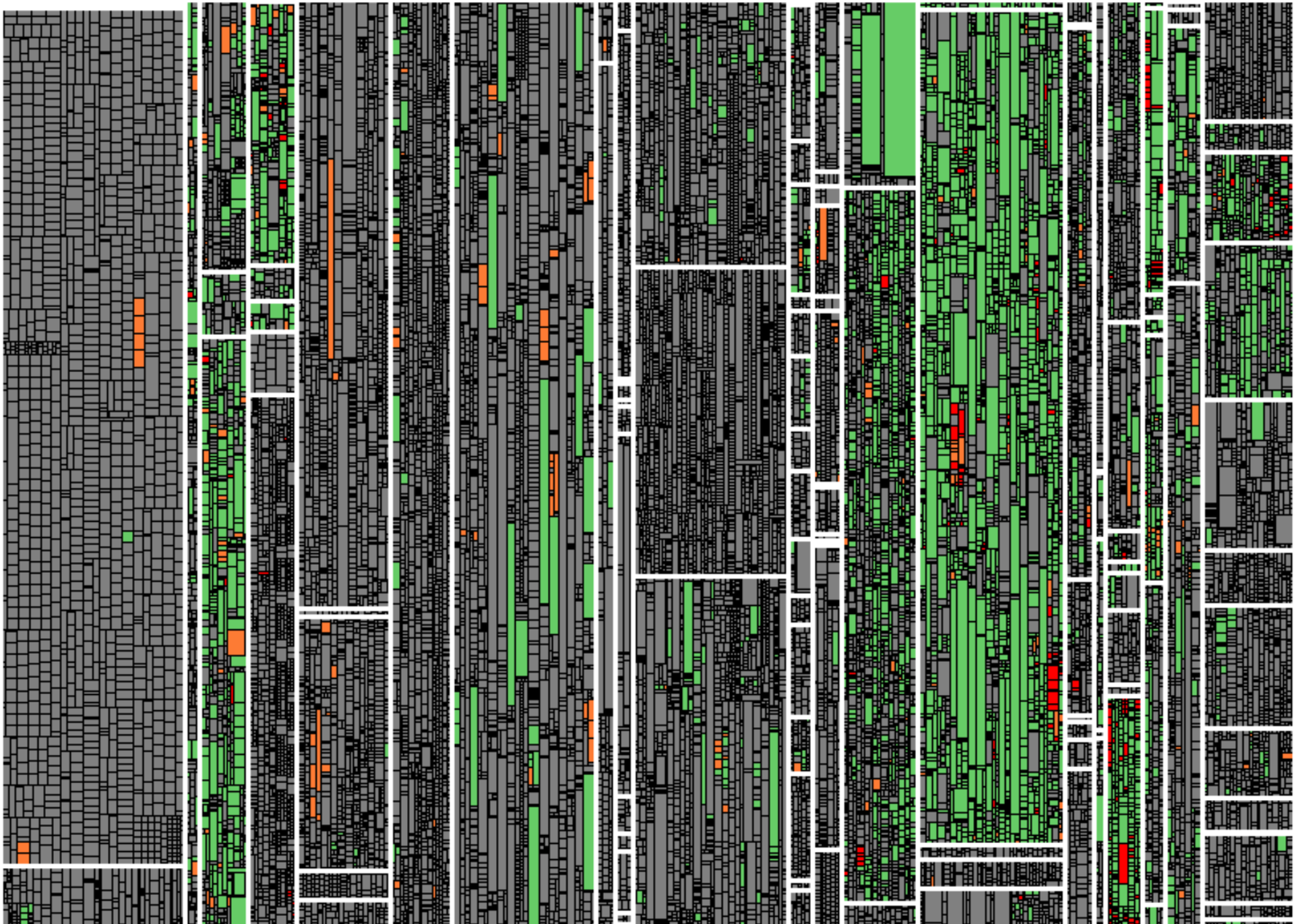


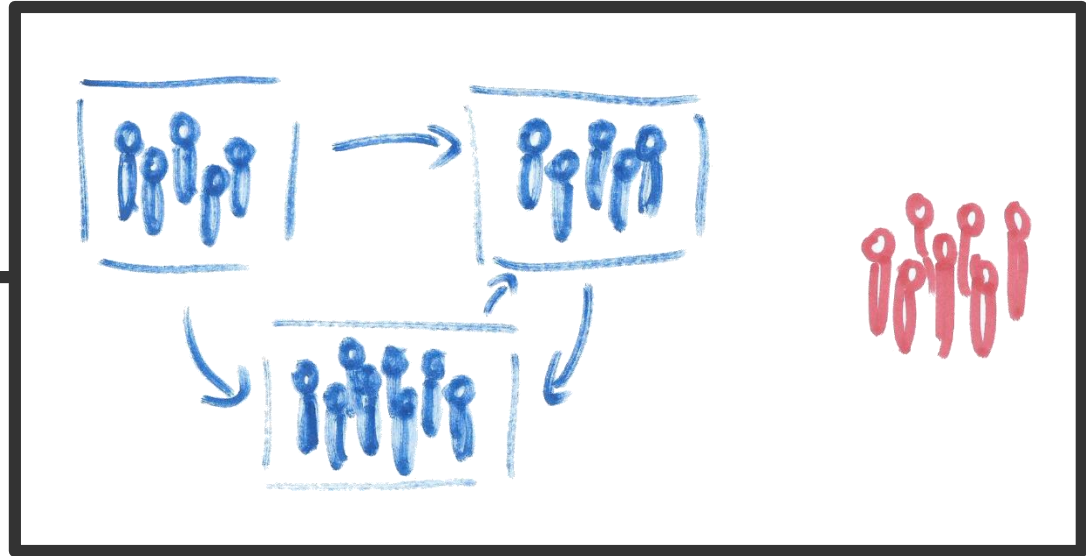
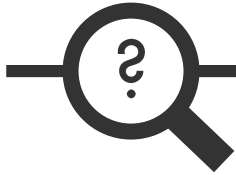
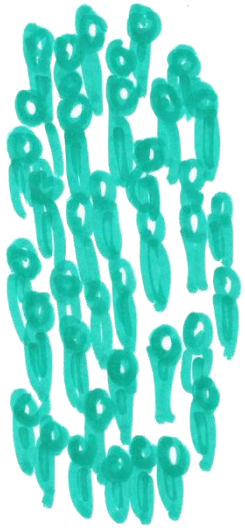












Features

X-Mas
Holidays

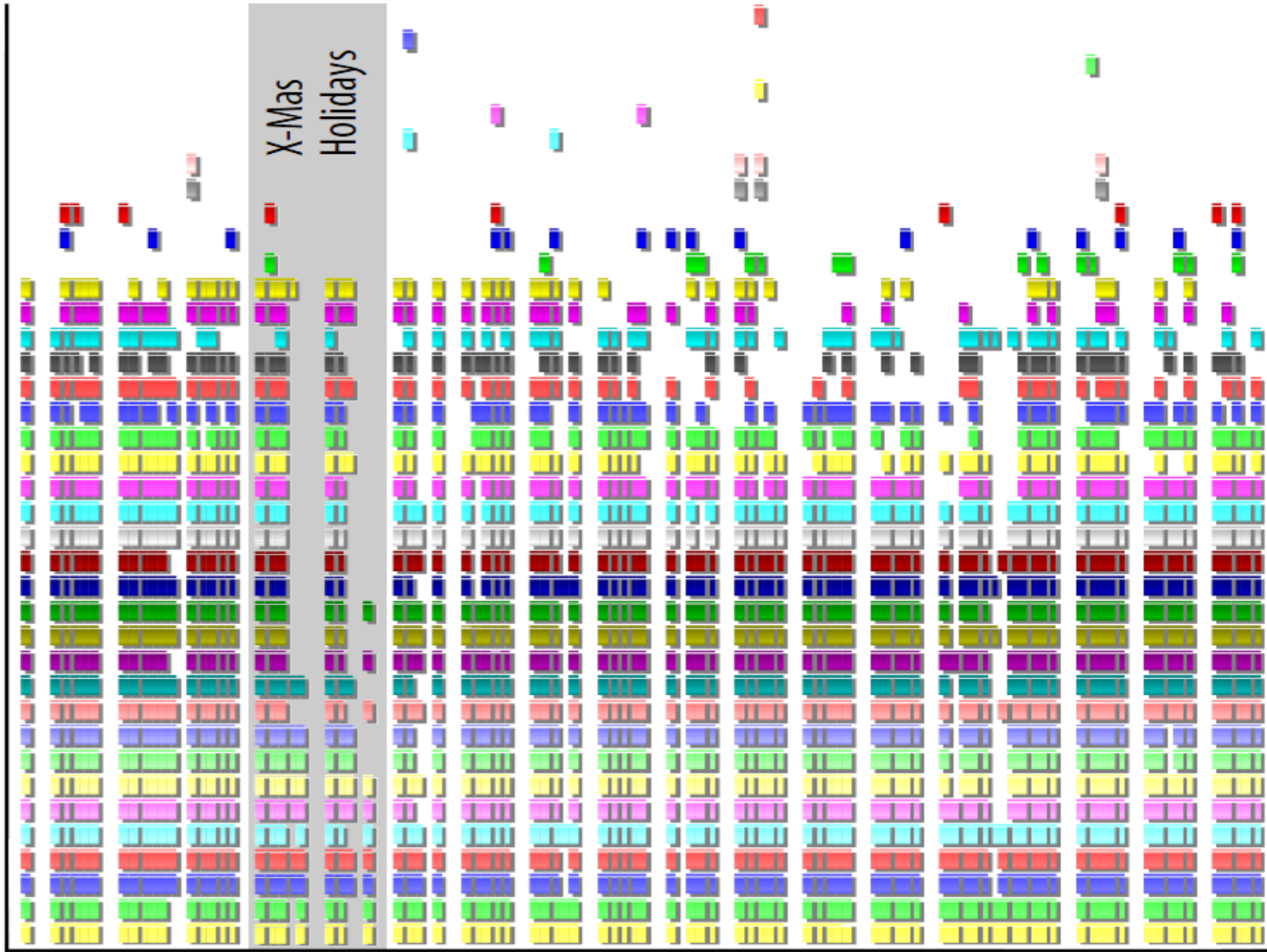
Nov

Dez

Jan

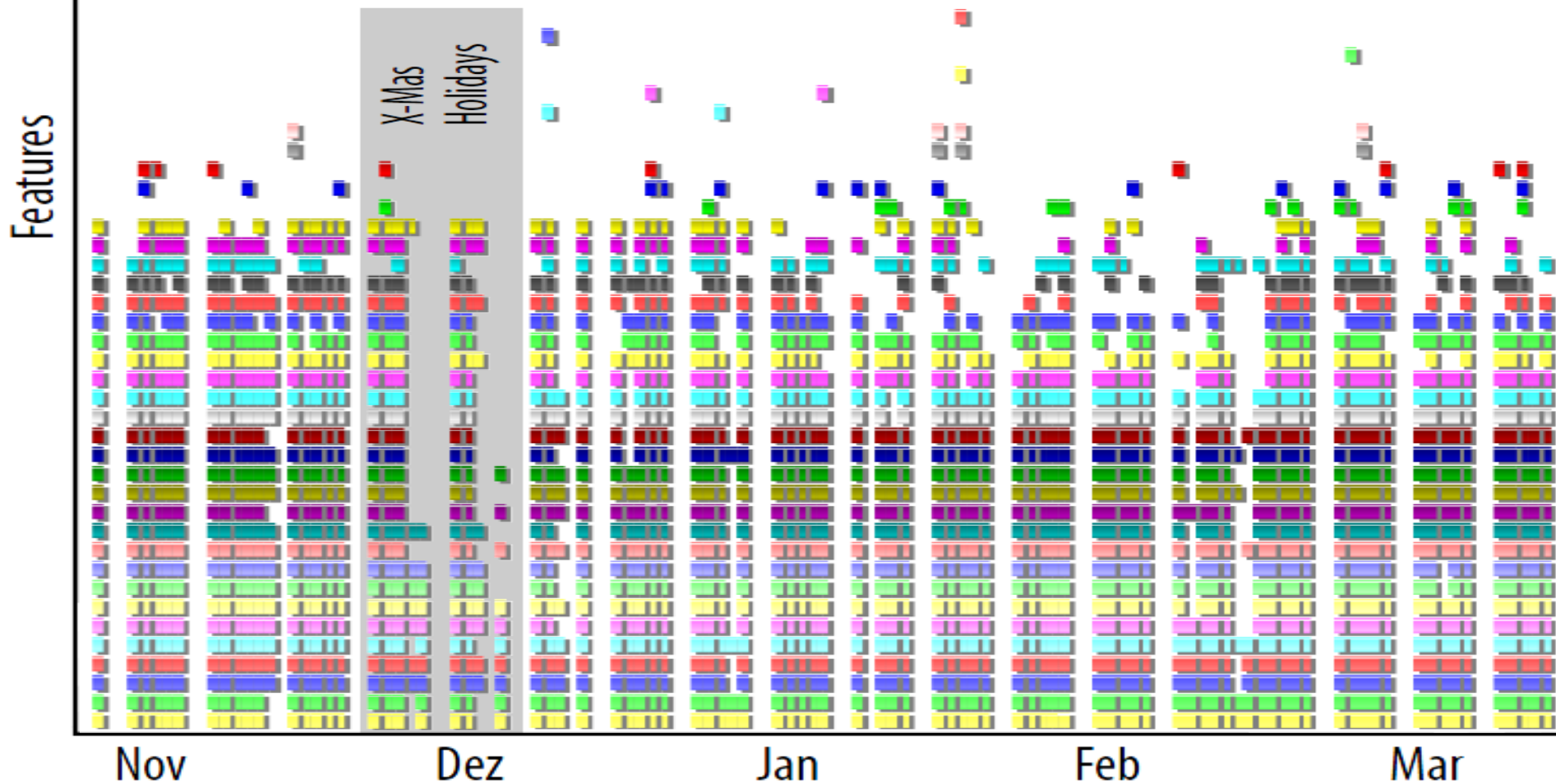
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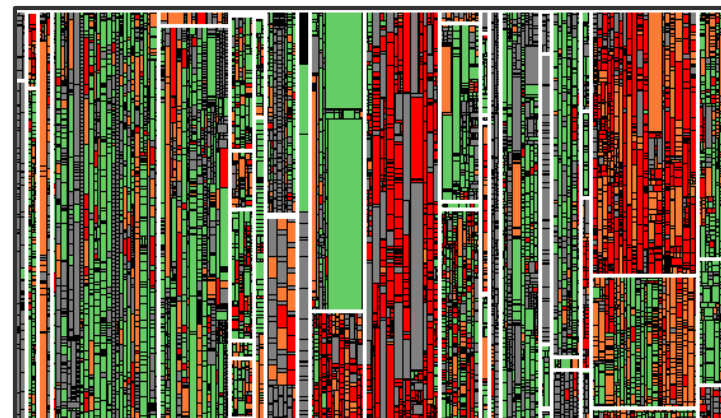
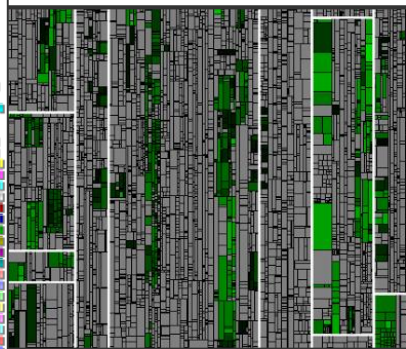
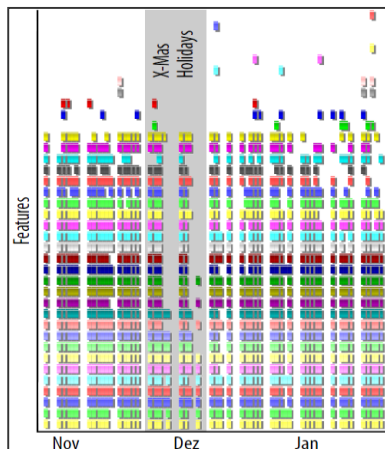
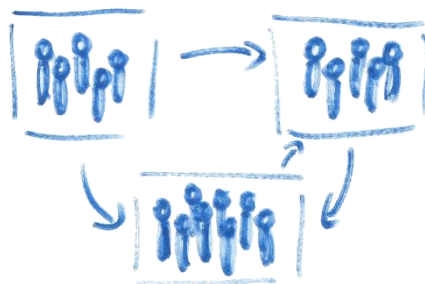
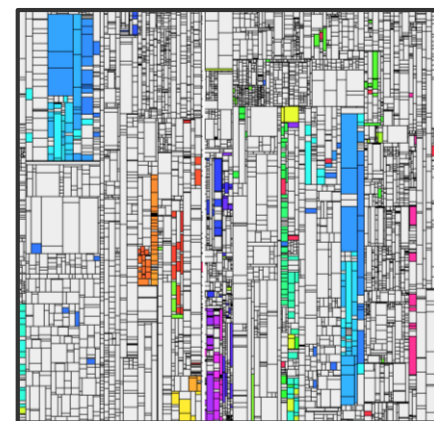
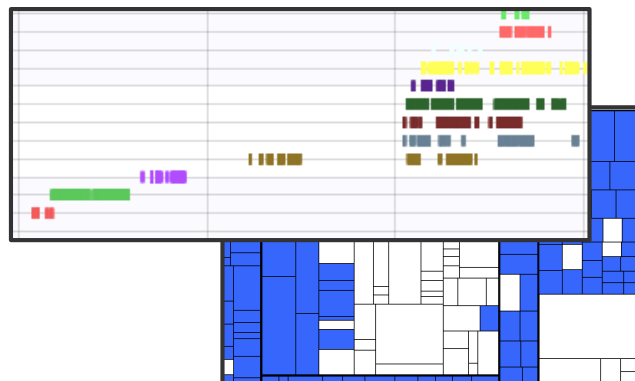
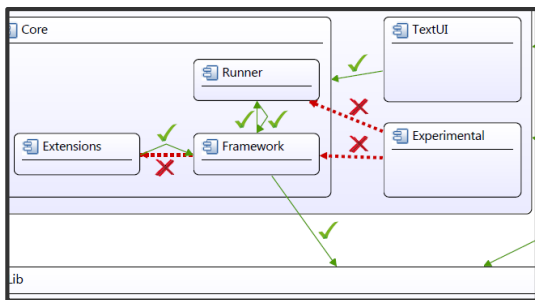
Mar



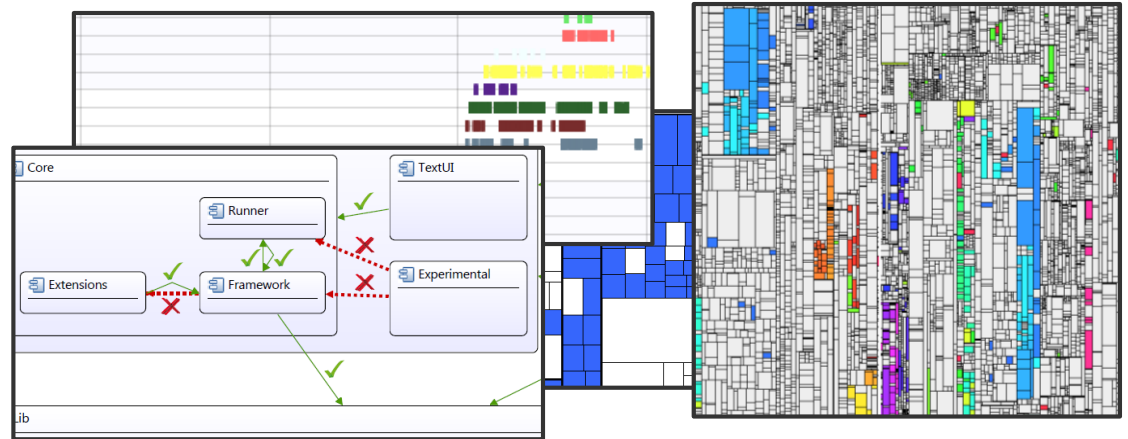
28% Features unused (15/53)

- 11 unexpectedly unused

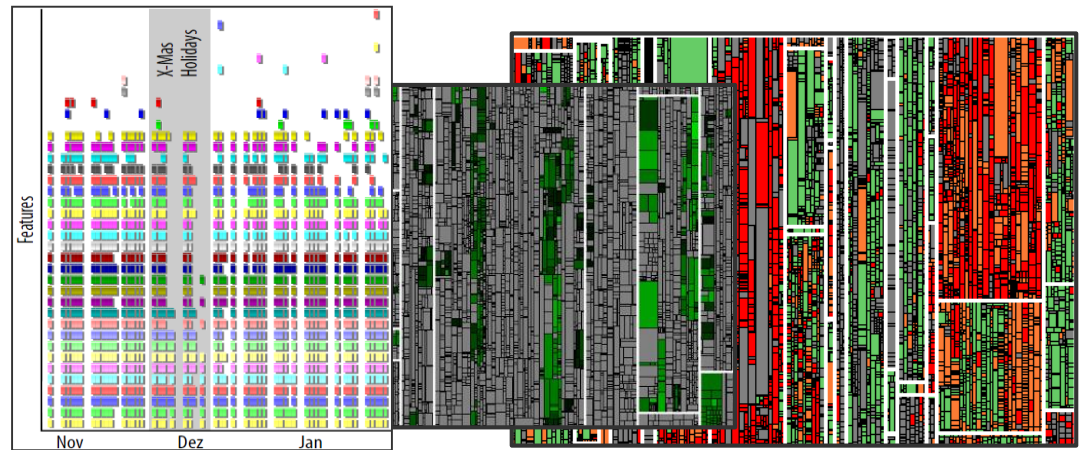




Static Analyses



Dynamic Analyses



Summary

Problems arise, if technical and organizational architecture do not fit together.

There are useful dynamic and static analyses available, that can discover symptoms of a mismatch to help fix them.

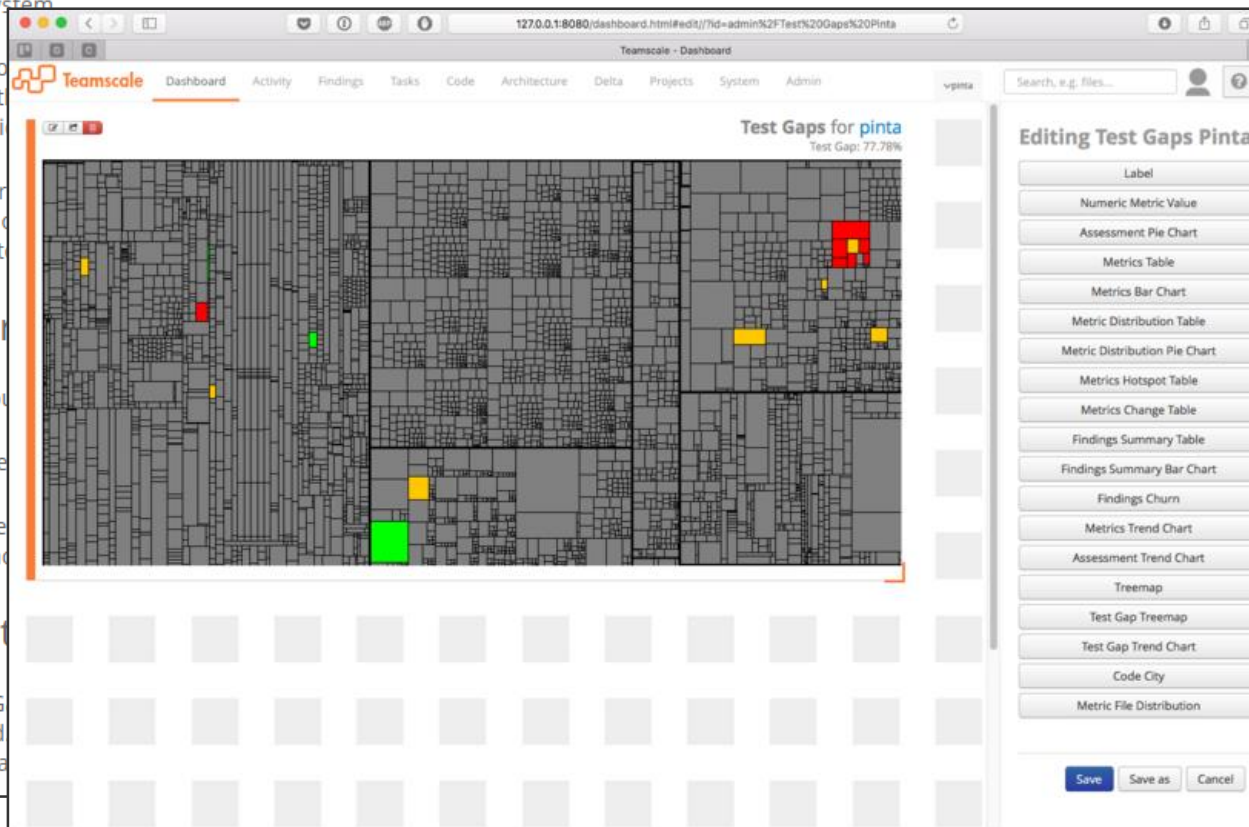
While highly automated, these analyses require experience for configuration and result interpretation. I'd like to share mine if you like.

<https://www.cqse.eu/en/blog>

Bridge your Test Gaps with Teamscale

Posted on 04/27/2016 by Dr. Dennis Pagano

Many companies employ sophisticated testing processes, but still bugs find their way into production. Often they hide among the subset of changes that were not tested. Actually, we found that untested changes are five times more error prone than the rest of the system.



ge regularly.

erage can be found here.

ges made on the way have been
want to show you how to find

Testing Changes in SAP BW Applications

Posted on 04/29/2015 by Dr. Andreas Göb

As my colleague Fabian explained a few weeks ago, a combination of change detection and execution logging can substantially increase transparency regarding which recent changes of a software system have actually been covered by the testing process. I will not repeat all the details of the Test Gap Analysis approach here, but instead just summarize the core idea: Untested new or changed (or changed but not tested) areas. Therefore it makes sense to use only those changed but untested areas.

Several times
In the main
from Python
containing
may provide
Analysis in

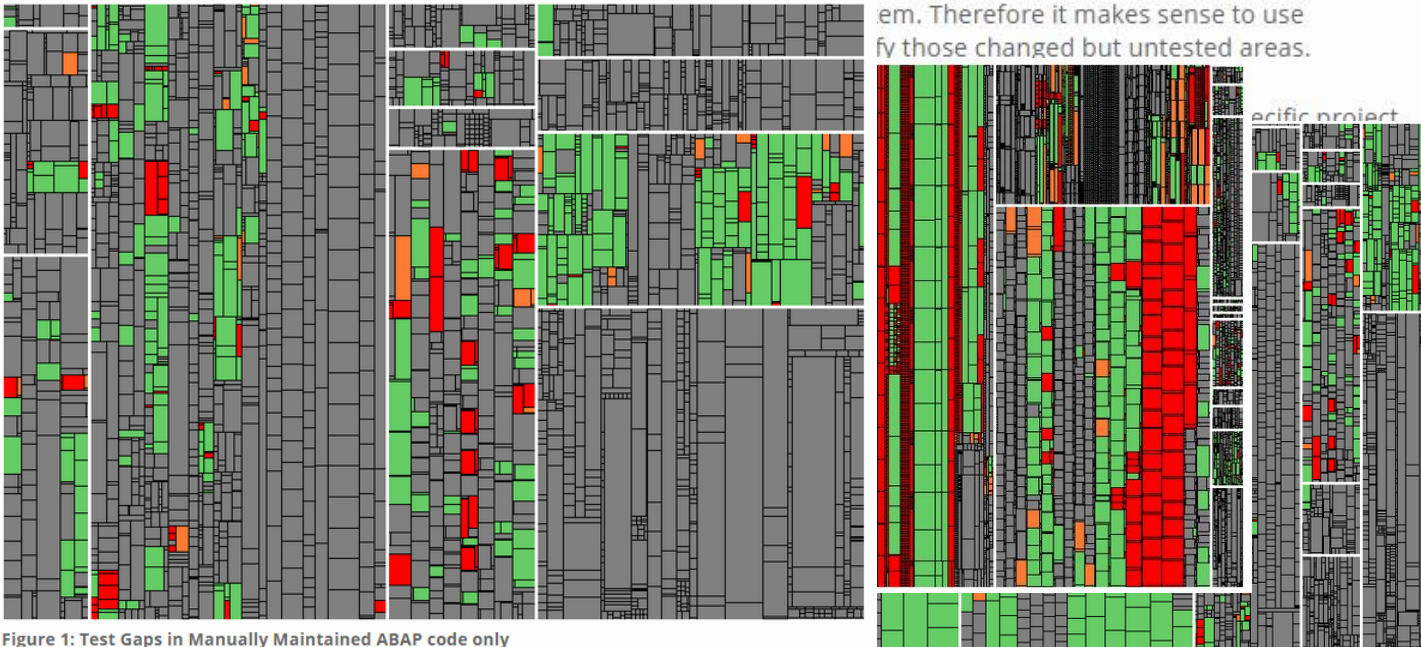


Figure 1: Test Gaps in Manually Maintained ABAP code only



Software Quality Blog

Practical Guide to Code Clones (Part 1)

Posted on 07/16/2014 by Dr. Benjamin Hummel

One well known principle in software engineering states *don't repeat yourself*, also known as the DRY principle. A very obvious violation of DRY is the application of copy/paste to create duplicates of large portions of source code within the same code base. These duplicate pieces of code, also known as *code clones*, have been subject to lots of research in the last two decades. In this two-part post I want to summarize those parts of the current knowledge that I find most relevant to the practitioner, especially the impact of clones on software development.



Practical Guide to Code Clones (Part 2)

Posted on 07/30/2014 by Dr. Benjamin Hummel

In the previous part we introduced the notion of code clones and discussed, whether and under which circumstances cloning in your code base can be a problem for development and maintenance. In this post, I will introduce ways and tools to deal with code clones in your code base. After reading this, you should be able to select and apply a detection tool to inspect the clones in your own code base.

goto;
conference



Please

**Remember to
rate session**

Thank you!



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www.cqse.eu/en/blog

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