Haben wir unsere Änderungen eigentlich getestet?

Möglichkeiten und Grenzen von Test-Gap Analyse

Dr. Elmar Jürgens

CQSE
Continuous Quality in Software Engineering

Über Mich

Forschung

- Clone Detection, Architekturanalyse
- Effektivität und Effizient von QS-Maßnahmen

Beratung

- Gründer
- Qualitäts-Bewertung & Qualitäts-Controlling

Gesellschaft für Informatik

- Zum Junior-Fellow ernannt
- Erfahruzngsaustausch Forschung <-> Praxis

Agenda

1. Optimierung Kosten/Nutzen von Testaktivitäten
2. Test-Gap-Analyse
3. Erfahrungen aus der Praxis

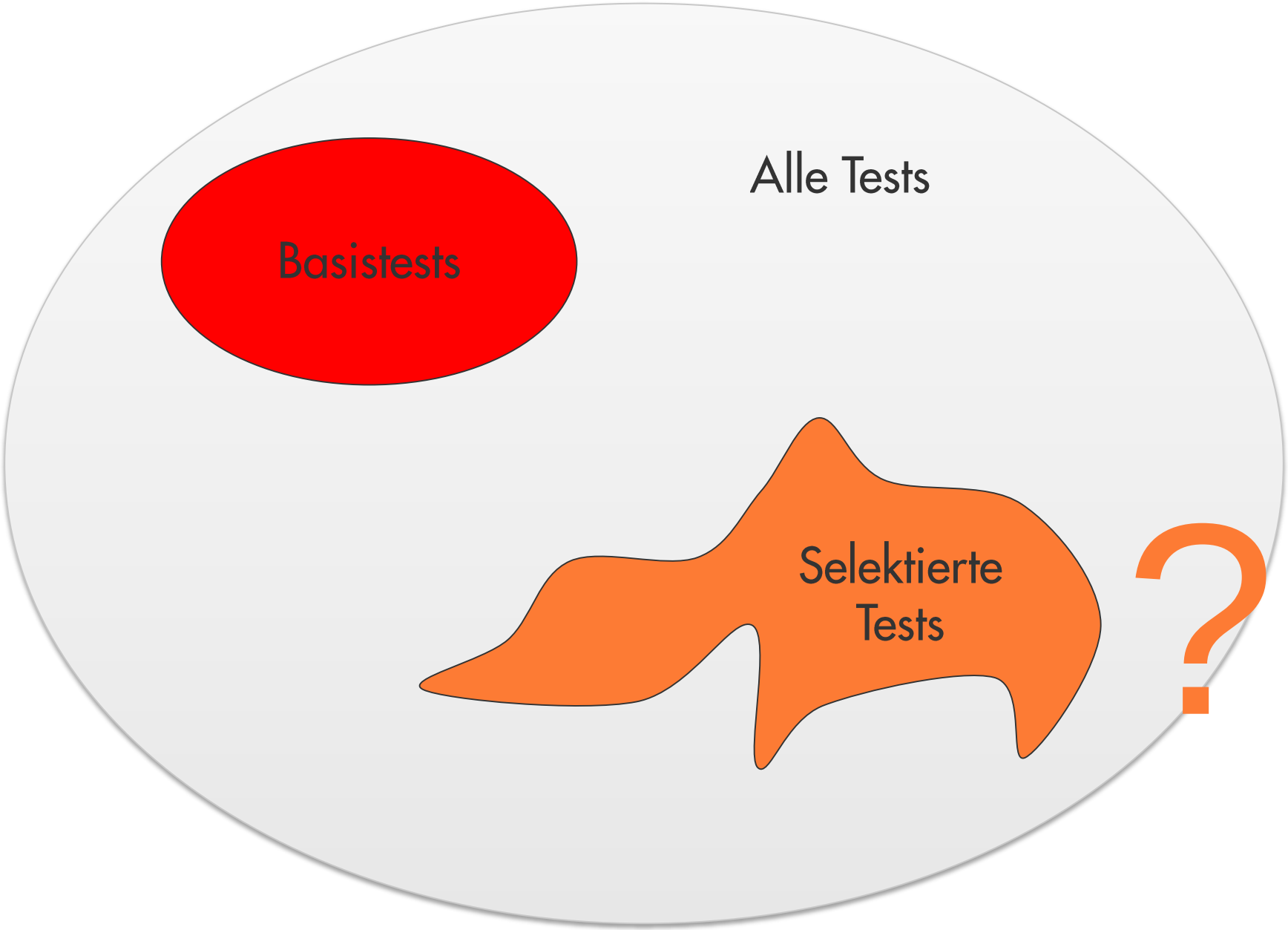
Fehlerfolgekosten

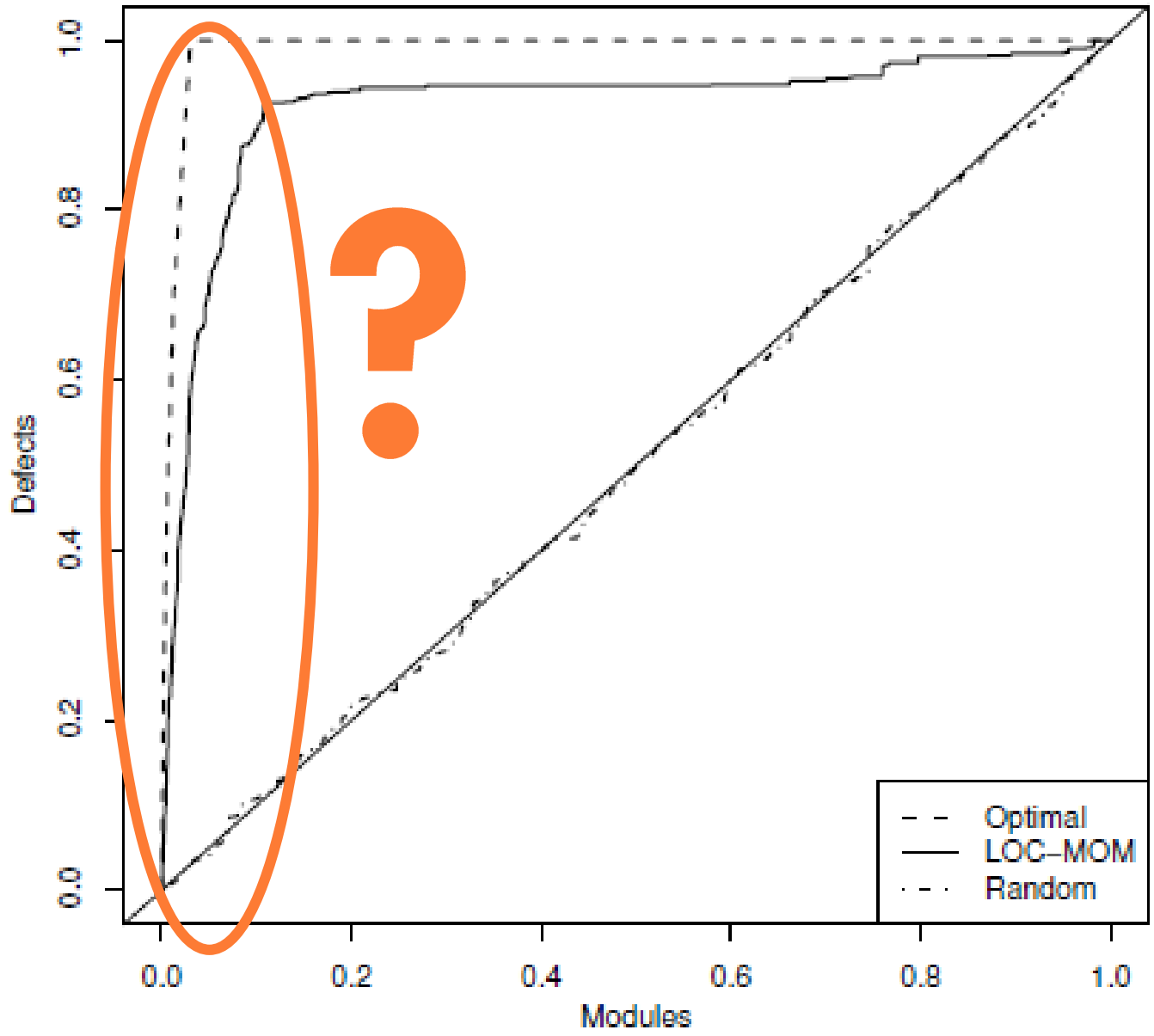
×

Fehlerwahrscheinlichkeit

>

Testkosten


Alle Tests
Basistests
Selektierte Tests
?



Mende, Koschke: Revisiting the Evaluation of Defect Prediction Models, Proceedings of the International Conference on Predictor Models in Software Engineering, 2009

Änderungen sind Fehlerprediktor

Nagappan, 2005

- Code Churn guter Prädiktor für Feldfehler
- Evaluiert auf *Windows Server 2003 (45 MLOC)*

Hassan, Holt 2005

- Most frequently/recently changed guter Fehlerprädiktor
- Eval: *NetBSD, FreeBSD, OpenBSD, Postgres, KDE, Koffice*

Eder, Hauptmann, Junker, Juergens, Vass, Prommer, 2013

- Fehlfehlerwahrscheinlichkeit 4x höher in geändertem Code
- Evaluiert auf *betr. Informationssystem @ Munich Re*

Bugzilla – Bug List

Home | New | Browse | Search | Search | [?] | Reports | Preferences | Administration | Help | Log out juergens@in.tum.de

Wed Aug 28 2013 11:45:48 CEST
quip?

Hide Search Description

Status: UNCONFIRMED, NEW, ASSIGNED, REOPENED **Product:** clone **Component:** clon

83 bugs found.

ID ▲	Summary
3382	Remove old filtering framework
4608	Improve progress monitoring for clone detection
3613	Make MetricOverview more flexible w.r.t. to database table names
3811	Incorrect offset reported by two-phased scanners
4610	Clone compare view does not open clone pair at correct position
1000	
1013	
1014	
872	
2397	
1824	
1945	
2199	
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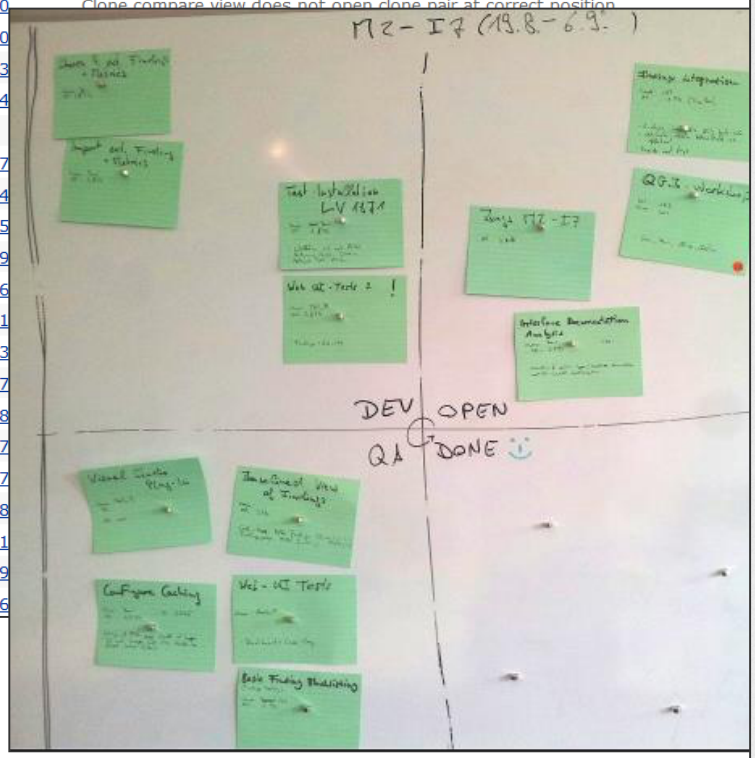
2439	
2476	



ConQAT

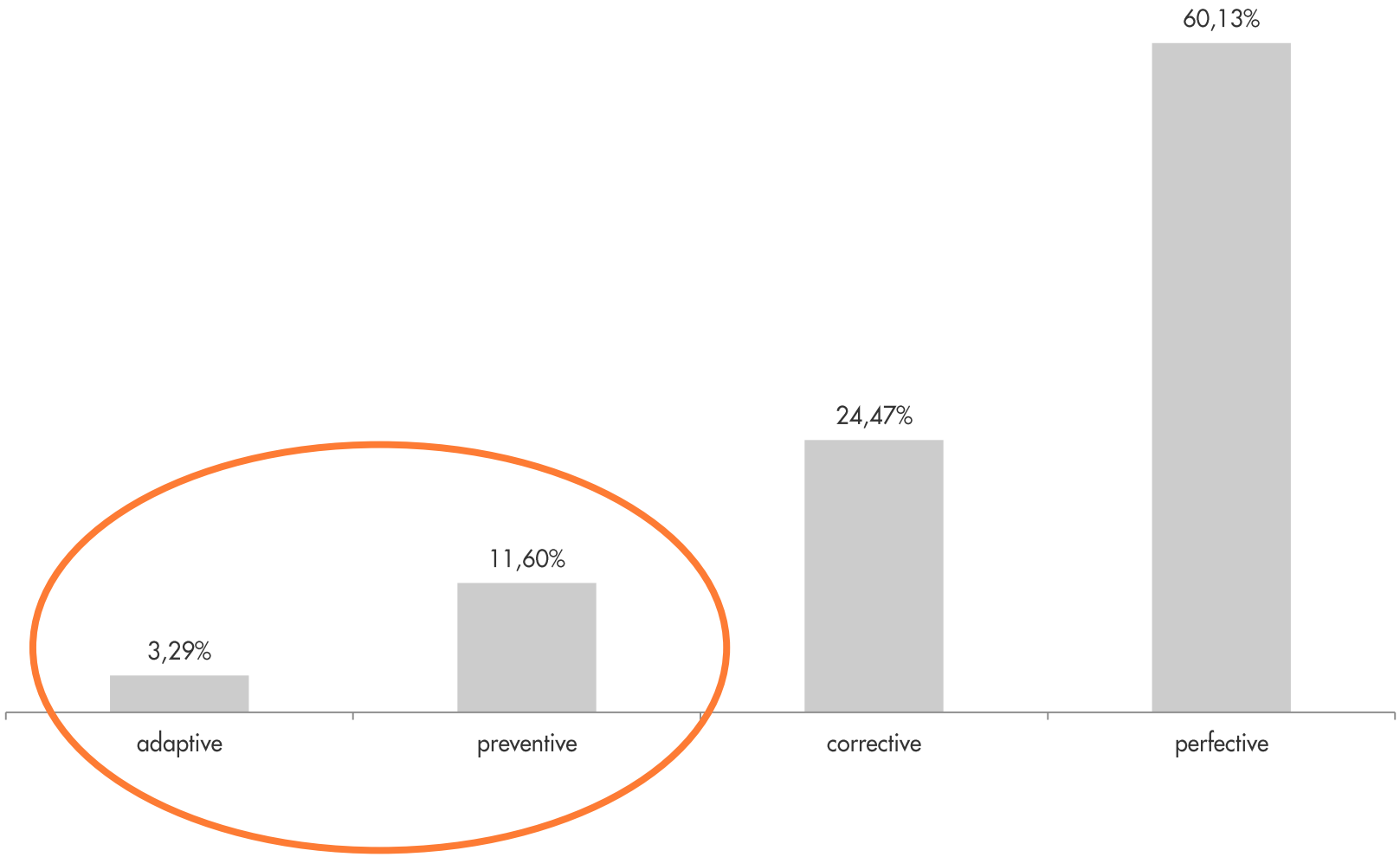
Übersicht | Aktivität | Roadmap | Tickets | Neues Ticket | Projektarchiv | Konfiguration

Tickets

Filter
Status: offen
Optionen
Anwenden | Zurücksetzen | Speichern

#	Tracker	Status	Priorität	Thema
5489	corrective	New	Normal	Cannot install ConQAT from update site on Kepler
5488	adaptive	New	Normal	Should be able to view "own" findings
5487	uncategorized	Assigned	Normal	Upload/Change of user image broken
5486	uncategorized	New	Normal	Allow for branded dists
5485	perfective	New	Normal	Enable hiding of individual findings in the IDE (e.g. after they are resolved)
5484	corrective	New	High	Visual Studio crashes after editing on findings
5483	uncategorized	Yellow	Normal	Cleanup com.teamscale.ide.prefs
5482	uncategorized	New	Normal	Filter structural clones
5481	adaptive	New	Normal	Integrate Sharepoint Analysis in MR Dashboard
5480	uncategorized	New	Normal	Teamscale connection preference page not working in Eclipse 4.3 on Mac
5479	preventive	Red	Normal	Benchmarking and selection of storage systems
5478	uncategorized	Yellow	Normal	Usability: "Open in Web Browser" should use the browser from preferences
5477	corrective	New	Normal	Fix refresh problem when setting a dashboard as default
5475	perfective	Assigned	Normal	Create UI test for "show history" in code perspective
5474	adaptive	Assigned	Normal	Enable mapping of baseline to head resources when packages are split
5473	perfective	Red	Urgent	Connection problems using svn+ssh
5472	perfective	Accepted	Normal	Display baselines in charts (as small vertical lines)
5471	perfective	Accepted	Normal	Support selection of explicit baseline for filtering
5470	perfective	Accepted	Normal	Service documentation shall also provide more detailed documentation on q
5469	perfective	Accepted	Normal	Adding/removing metrics to chart widget changes colors of other metrics
5468	perfective	Accepted	Normal	Simple metric widget shall support explicit baseline for delta value calculatio
5467	corrective	Accepted	High	The delta not found in the store!
5466	corrective	Accepted	Normal	Problems when tracking TODOs which have changed line breaks

CRs in ConQAT



Auf Basis von ca. 2000 CRs aus dem ConQAT Bugzilla

Bugzilla – Bug List

Home | New | Browse | Search | Search [?] | Reports | Preferences | Administration | Help | Log out juergens@in.tum.de

Wed Aug 28 2013 11:45:48 CEST
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Status: UNCONFIRMED, NEW, ASSIGNED, REOPENED **Product:** clone **Component:** clon

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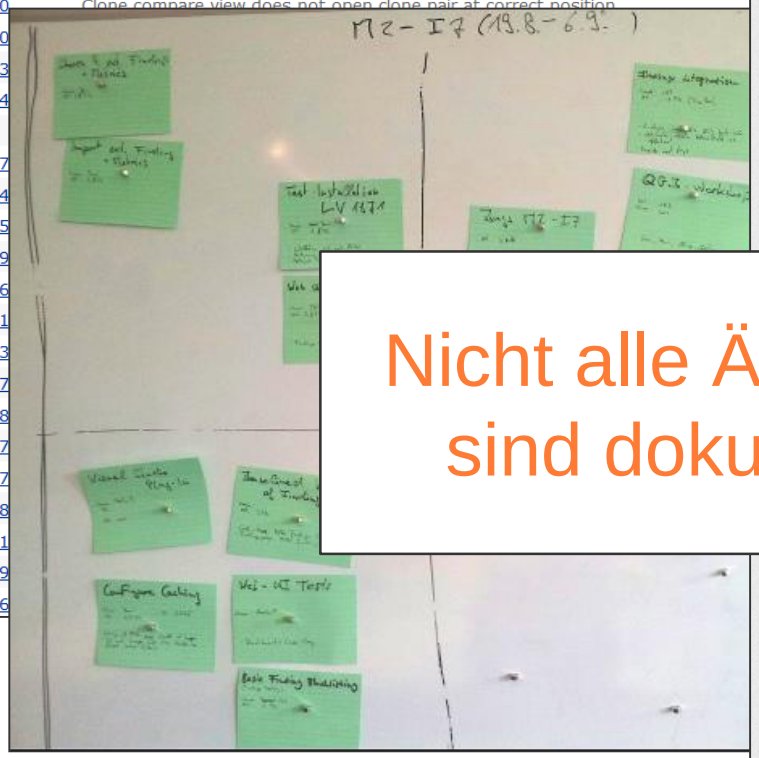

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Nicht alle Änderungen sind dokumentiert!

Wieviele Änderungen sind ungetestet?

Studie: C# System @ Munich Re

Release A: 5 Iterationen (2 Monate)

- 15% Methoden neu/geändert, 8% ungetestet

Release B: 10 Iterationen (4 Monate)

- 15% Methoden neu/geändert, 9% ungetestet

Feldfehlerwahrscheinlichkeit 5x höher für unget. Änderungen

Eder, Jürgens, … *Did We Test Our Changes? Assessment btw. Tests & Development in Practice*, AST@ICSE 2013

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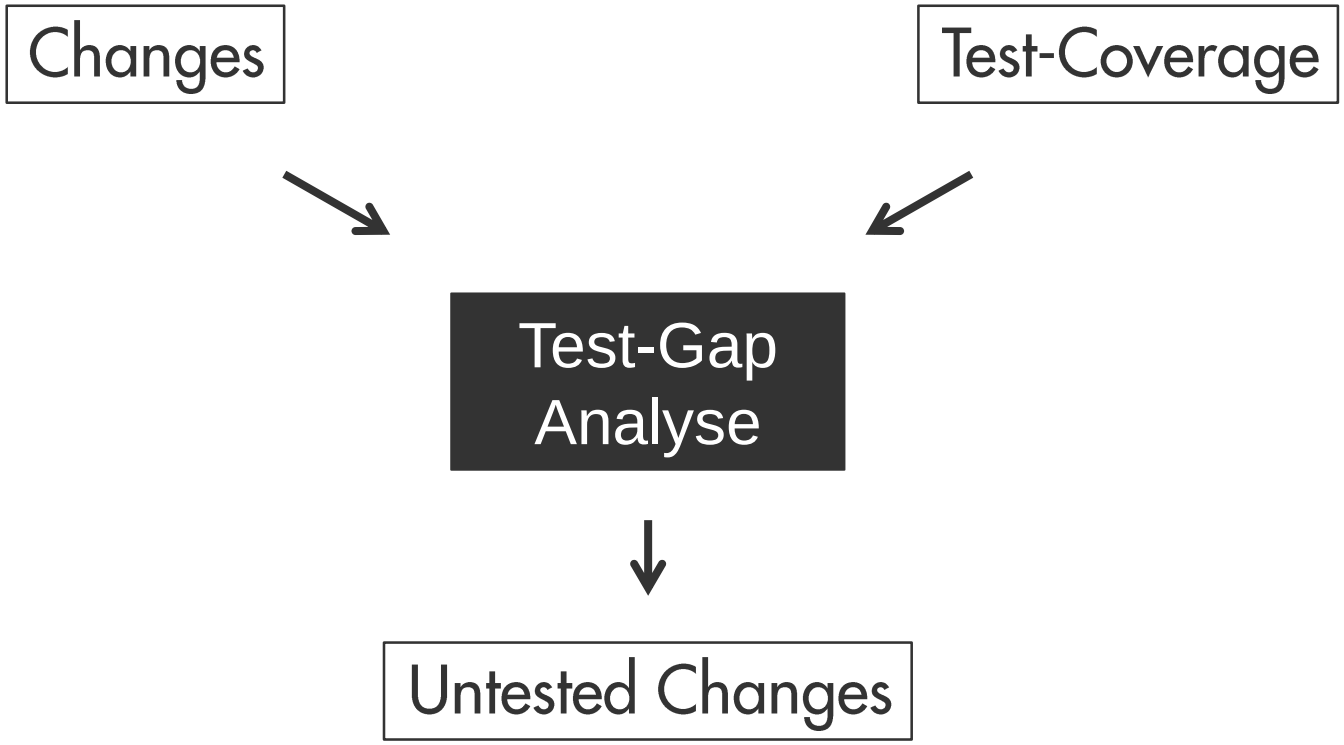
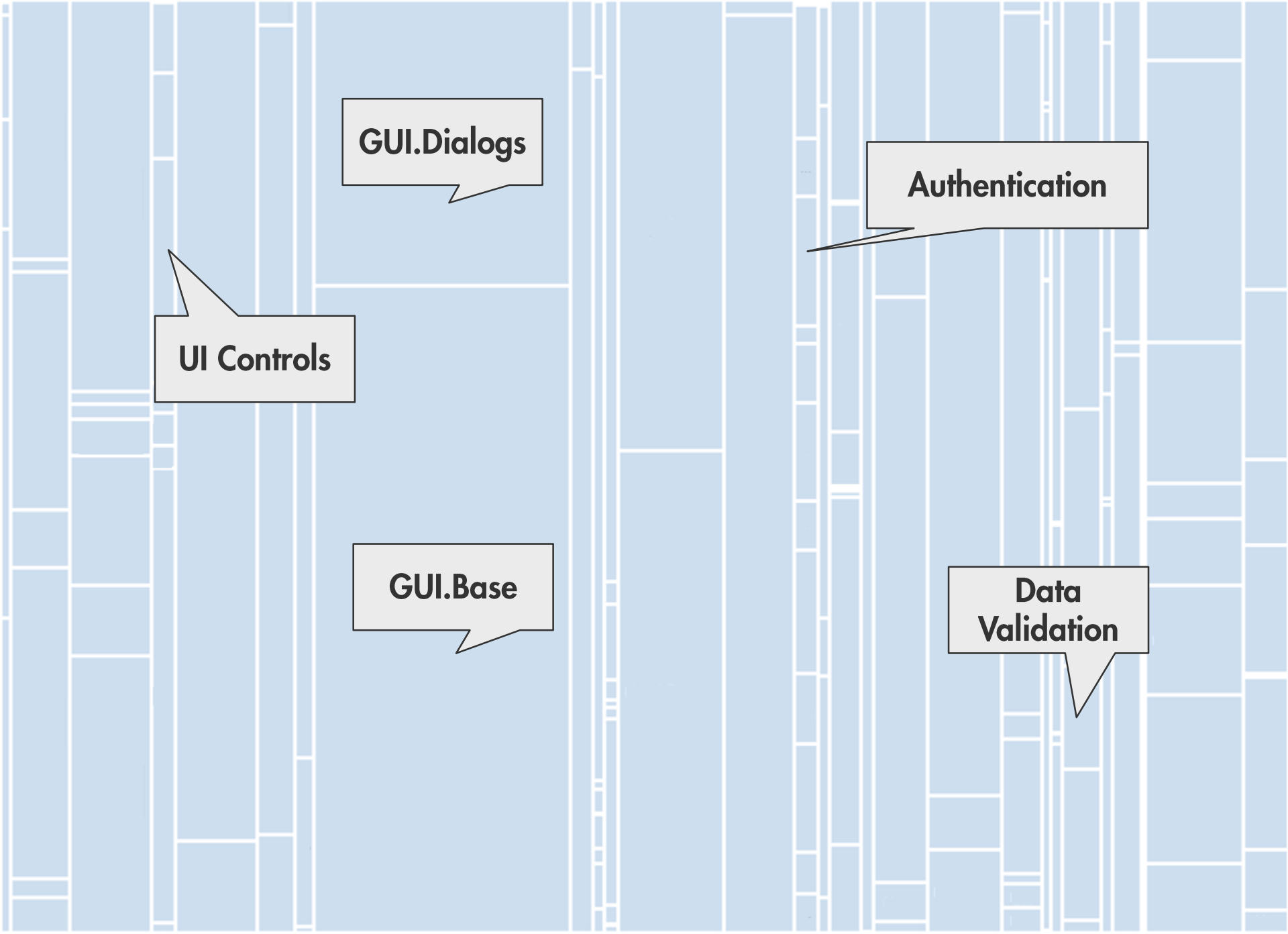
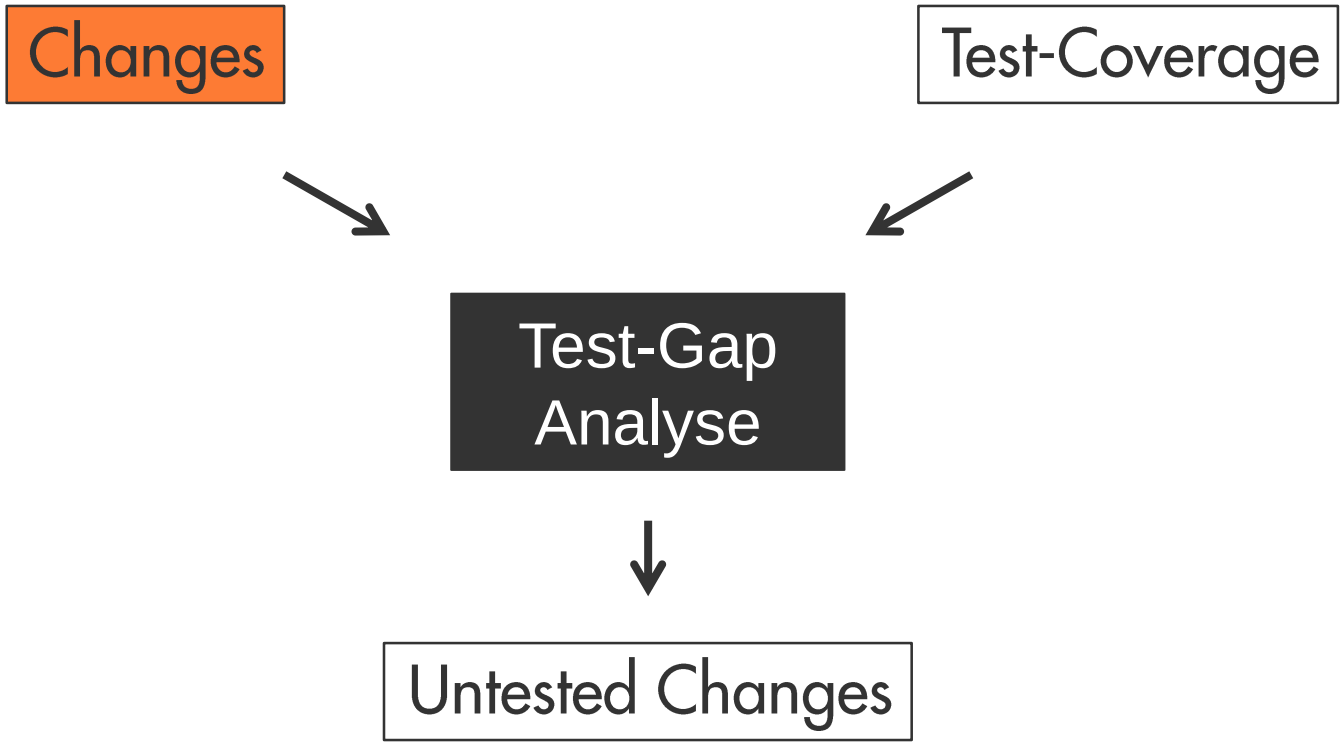
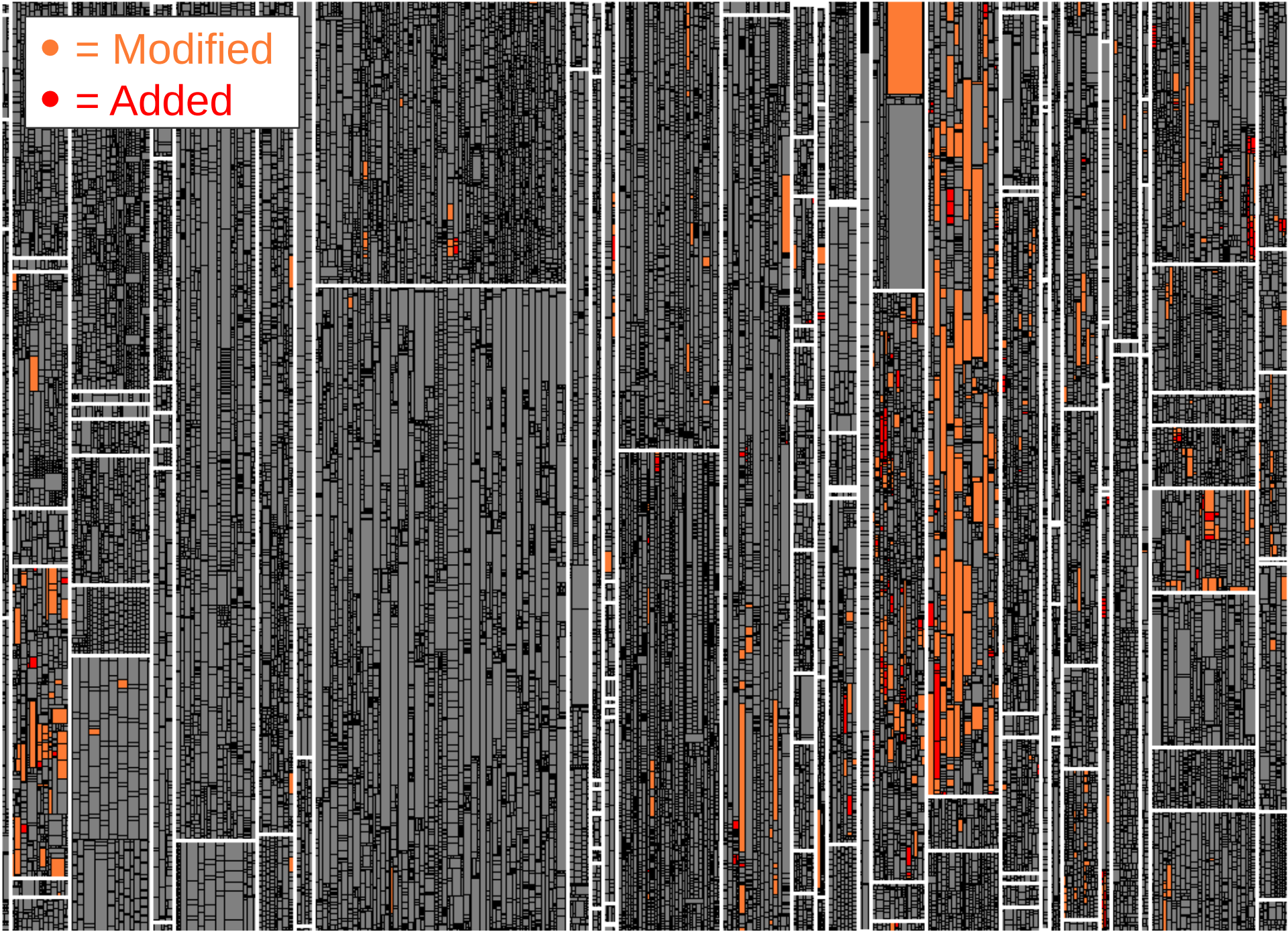
3. Erfahrungen aus der Praxis

Anatomie Test-Gap Analyse




GUI.Dialogs
Authentication
UI Controls
GUI.Base
Data
Validation


Changes
Test-Coverage
Test-Gap Analyse
Untested Changes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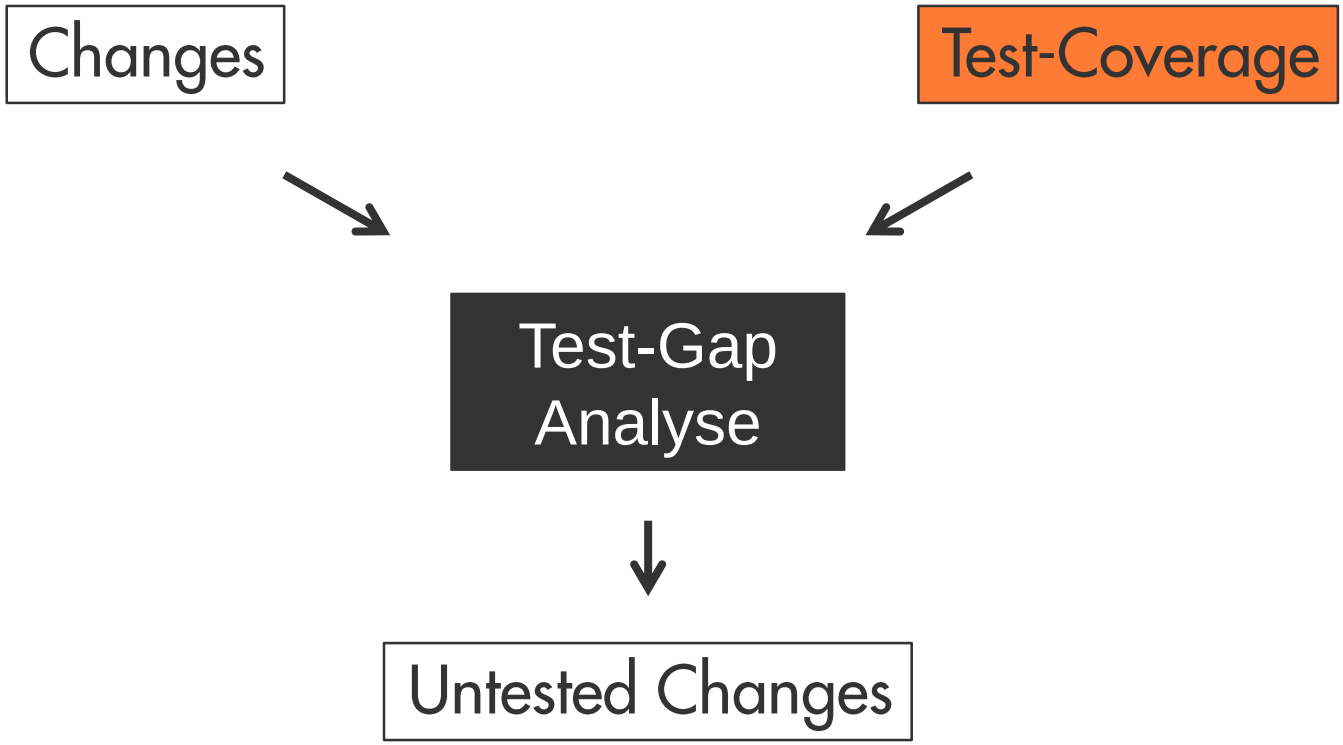
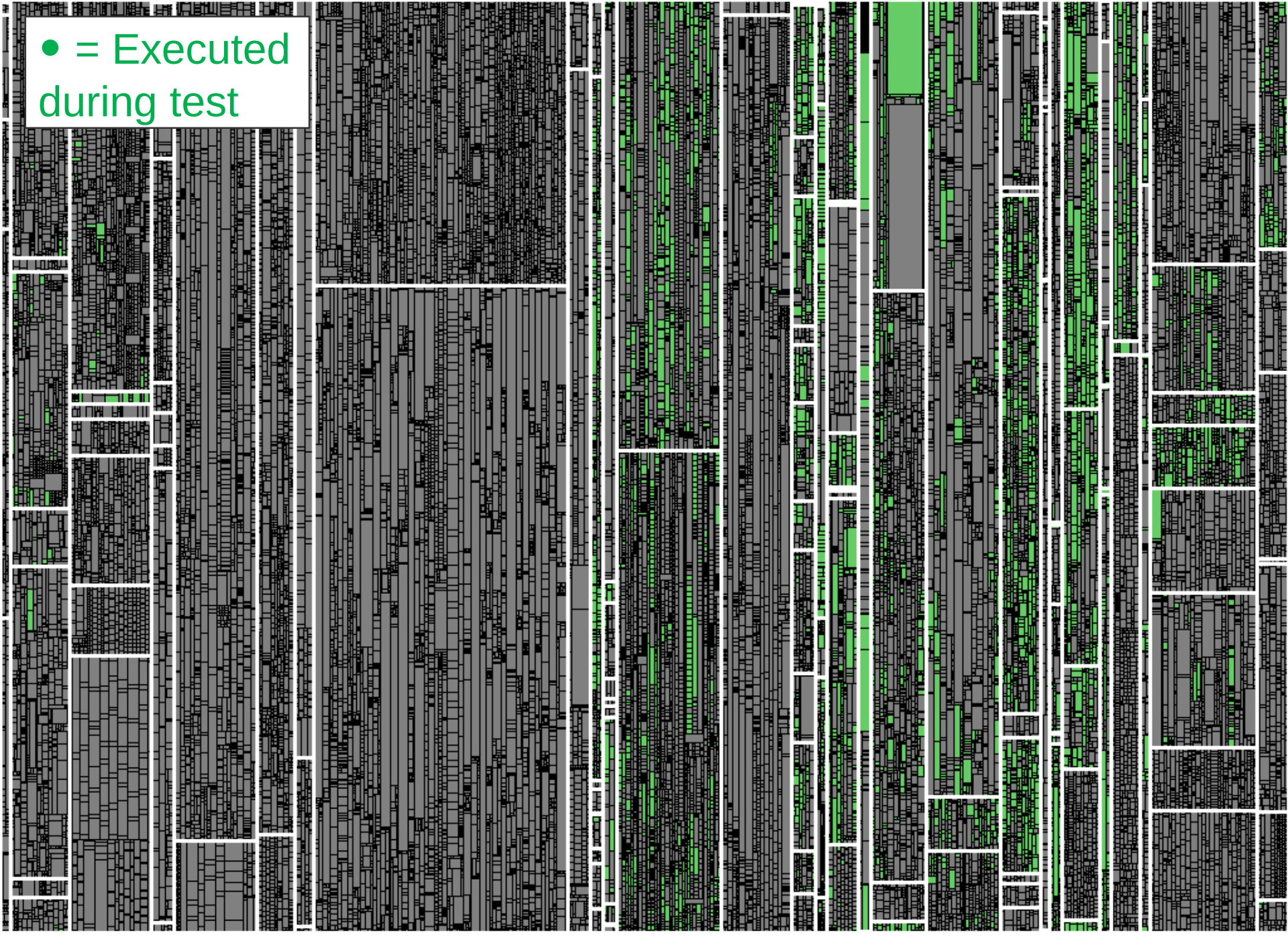
= Added


Changes
Test-Coverage
Test-Gap Analyse
Untested Changes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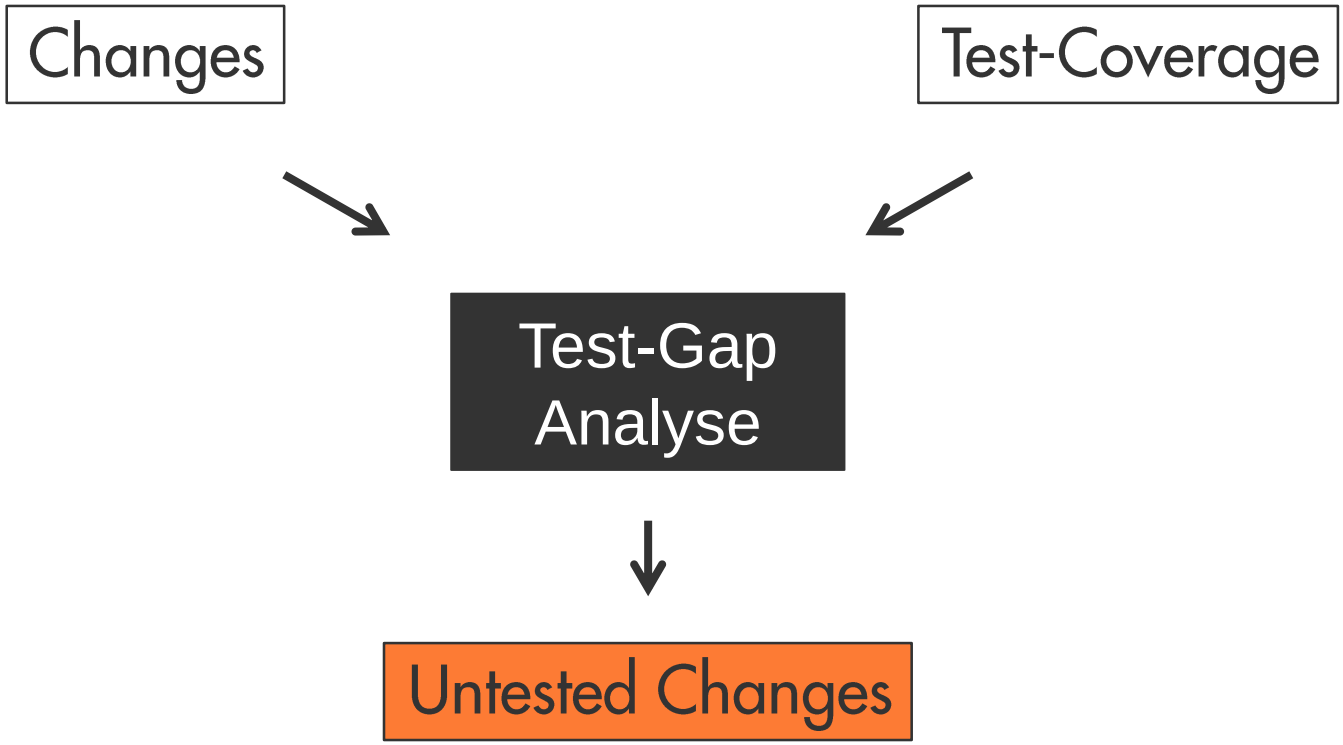
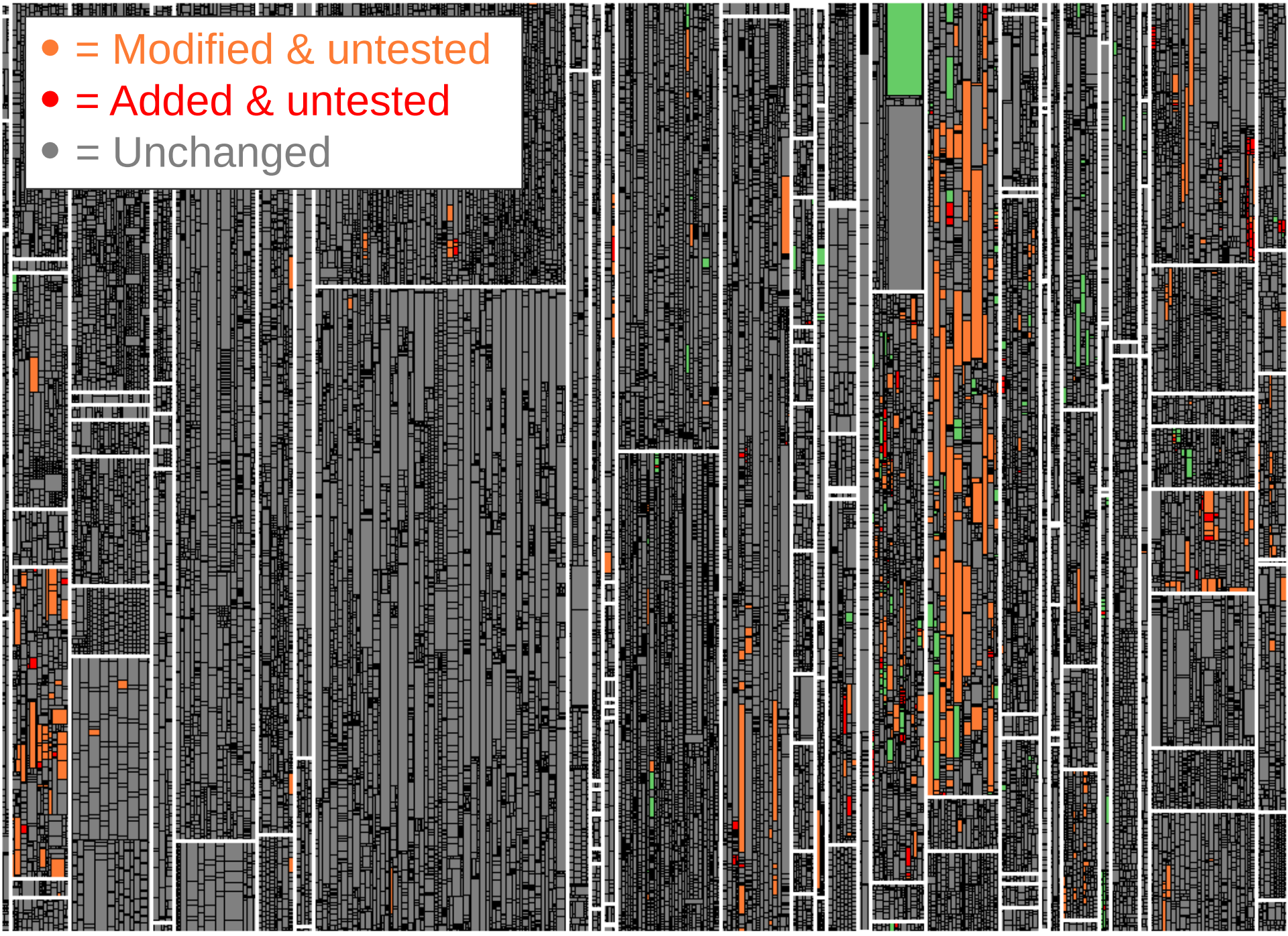
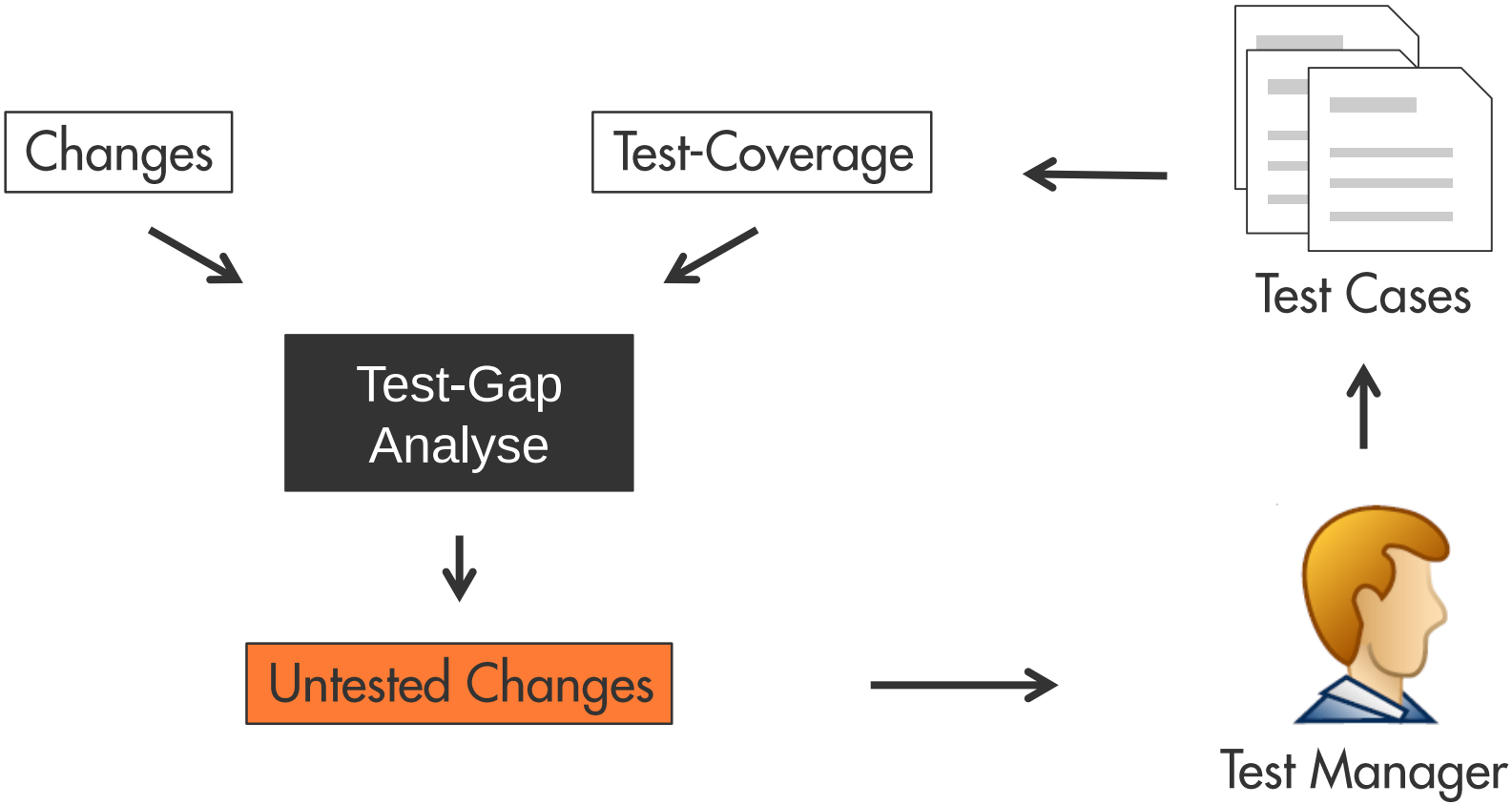
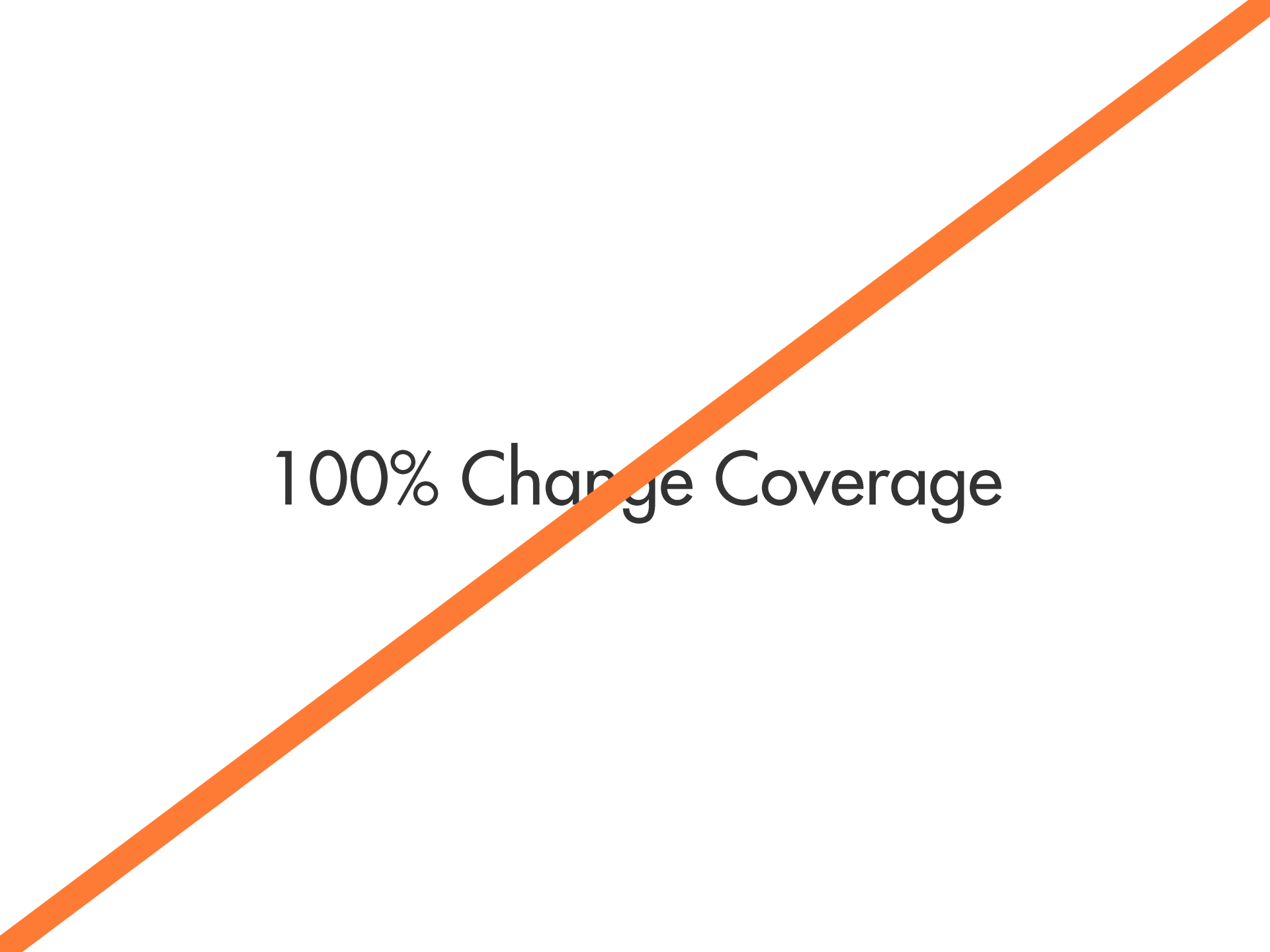
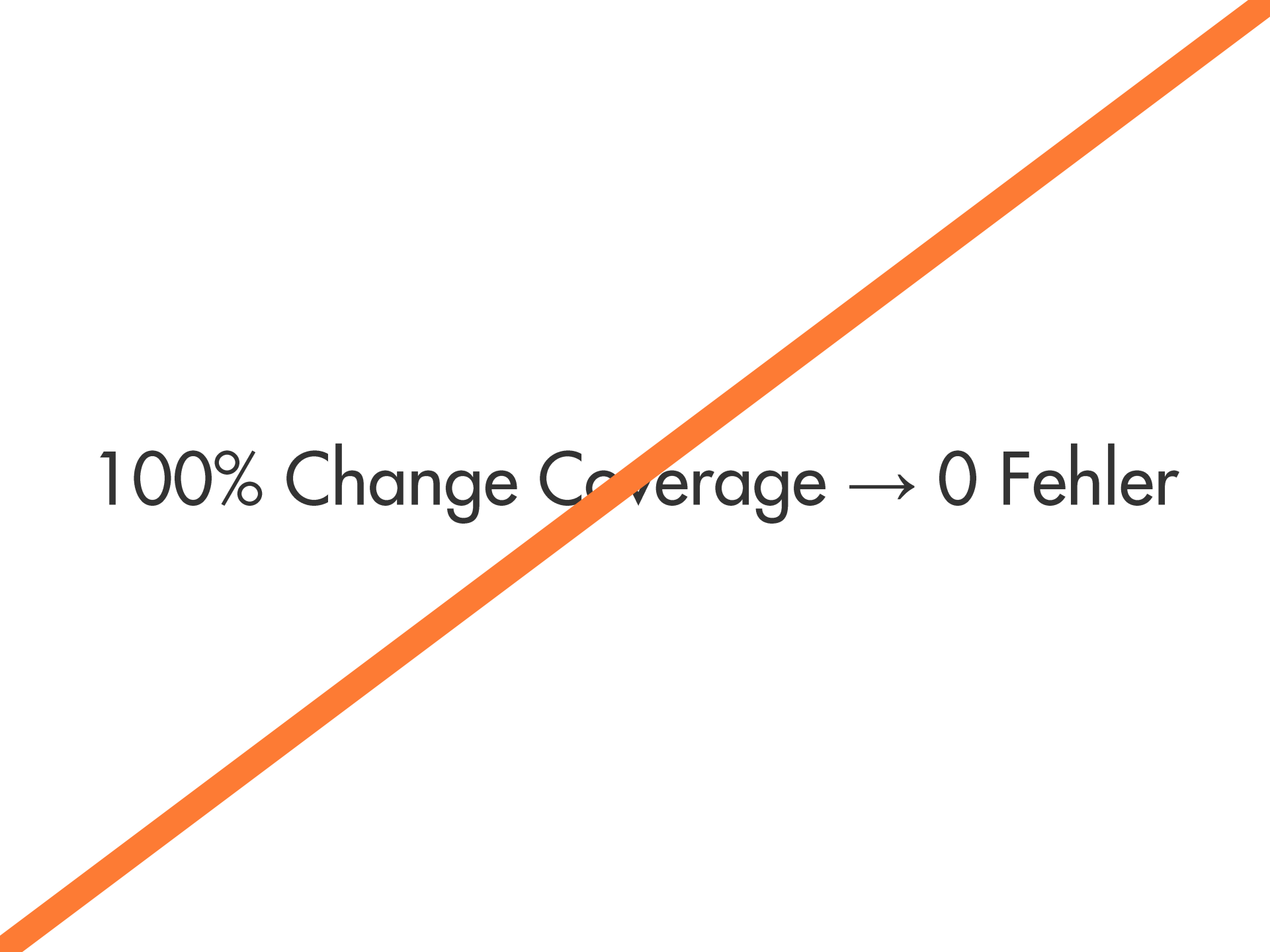

Changes
Test-Coverage
Test-Gap Analyse
Untested Changes


= Modified & untested
= Added & untested
= Unchanged

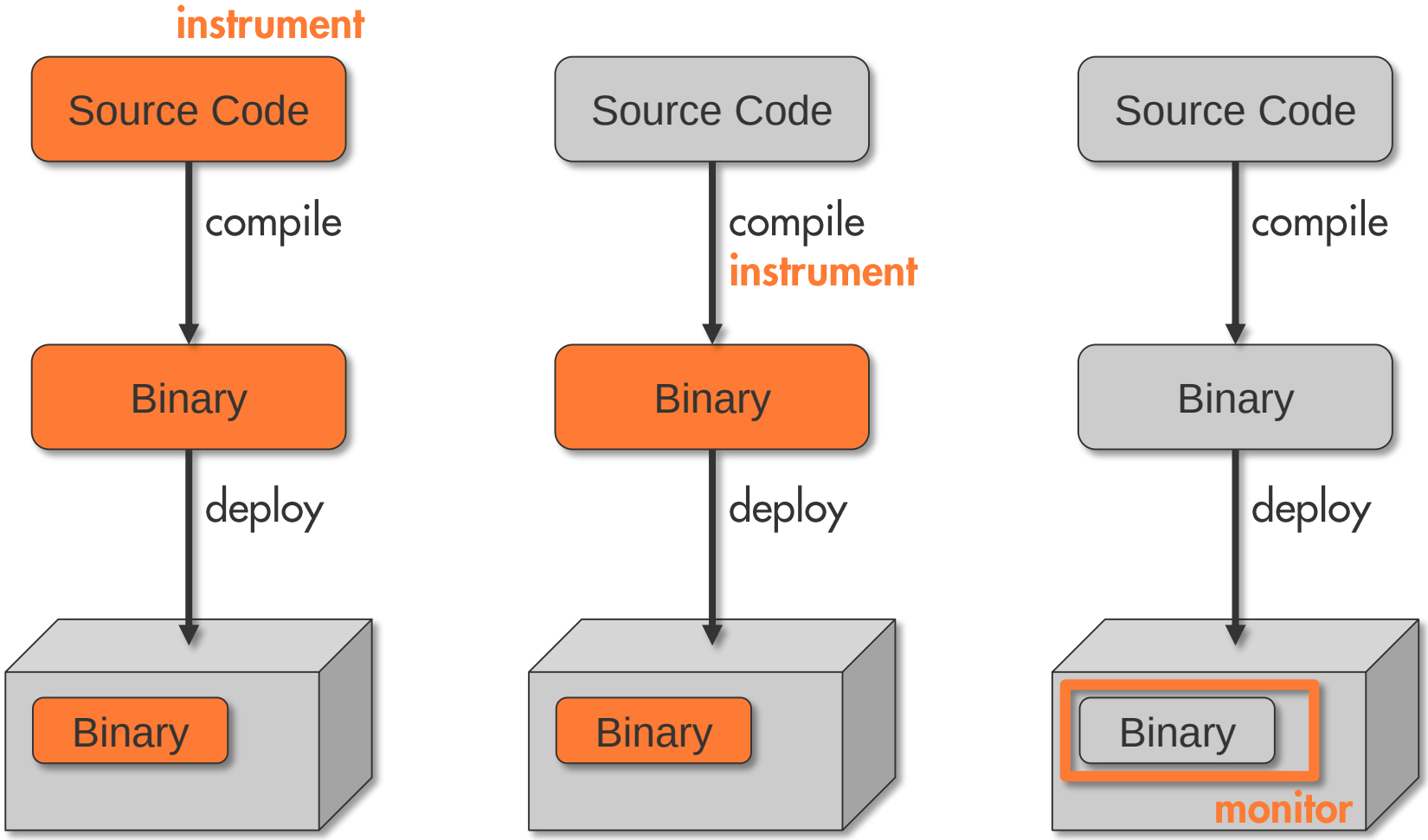
Einsatz im Testprozess



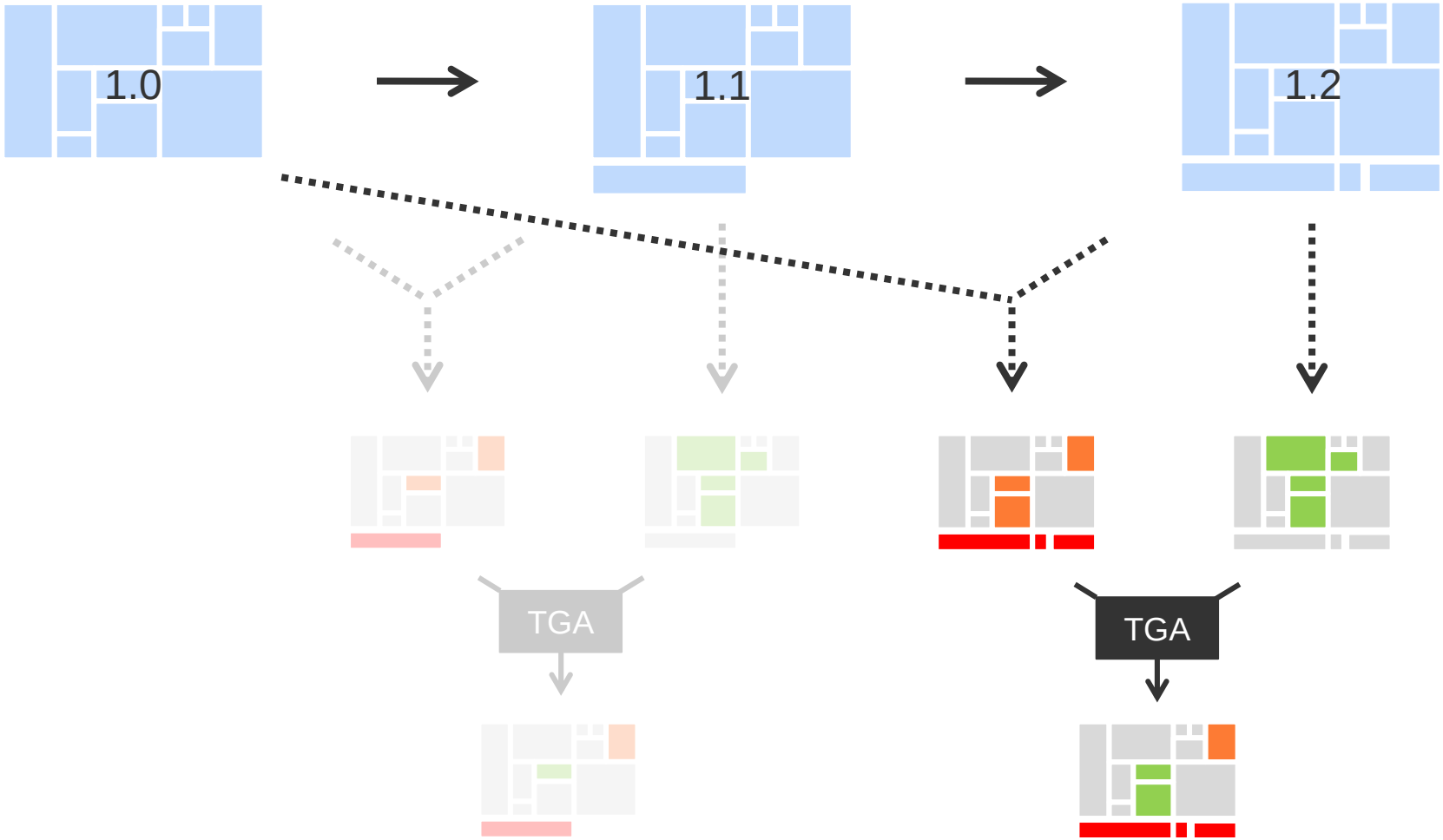

100% Change Coverage


100% Change Coverage → 0 Fehler

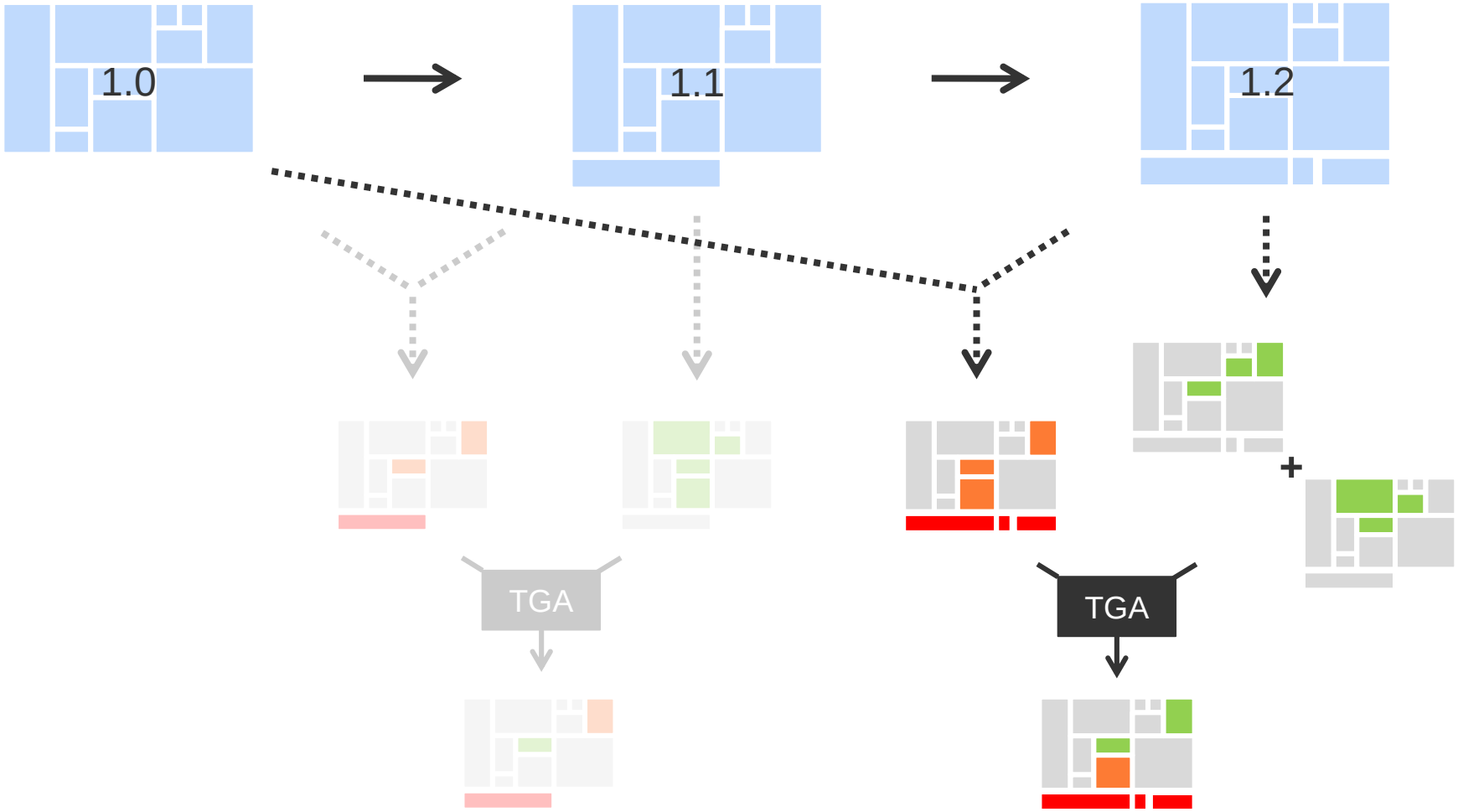
Ansätze zur Instrumentierung



Automatisierte Tests



Manuelle Tests

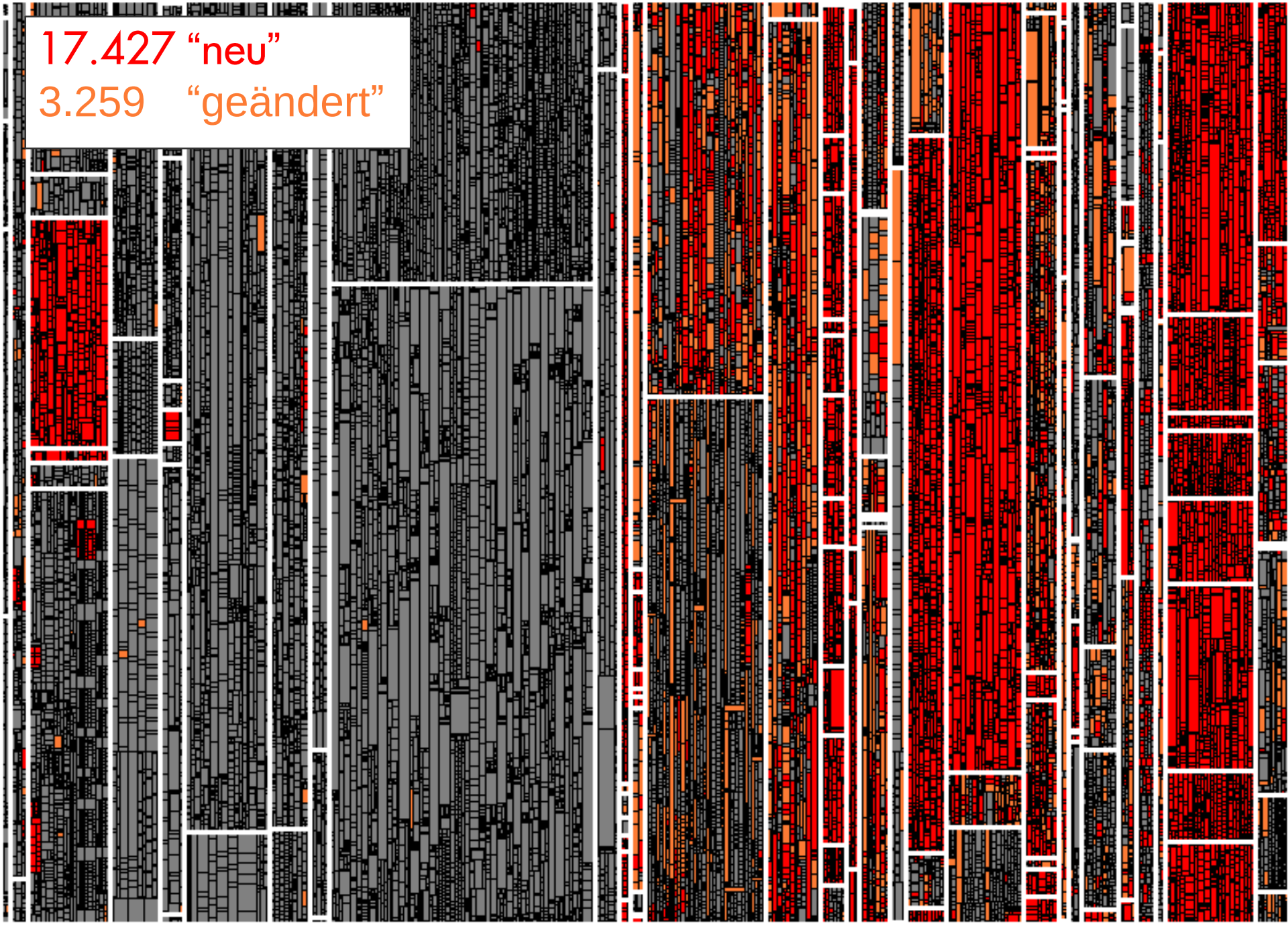


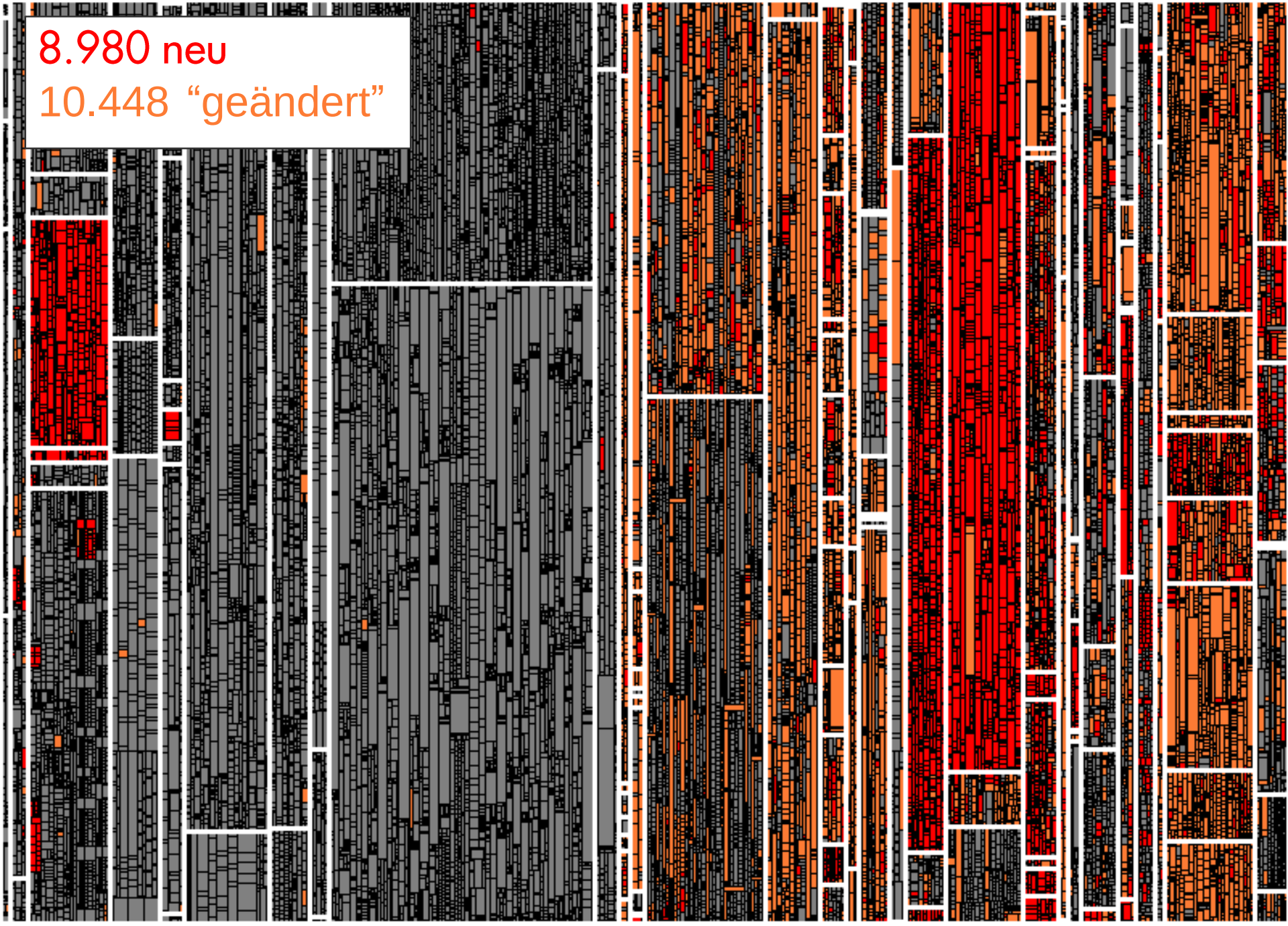
NamespaceRenames.java 8737

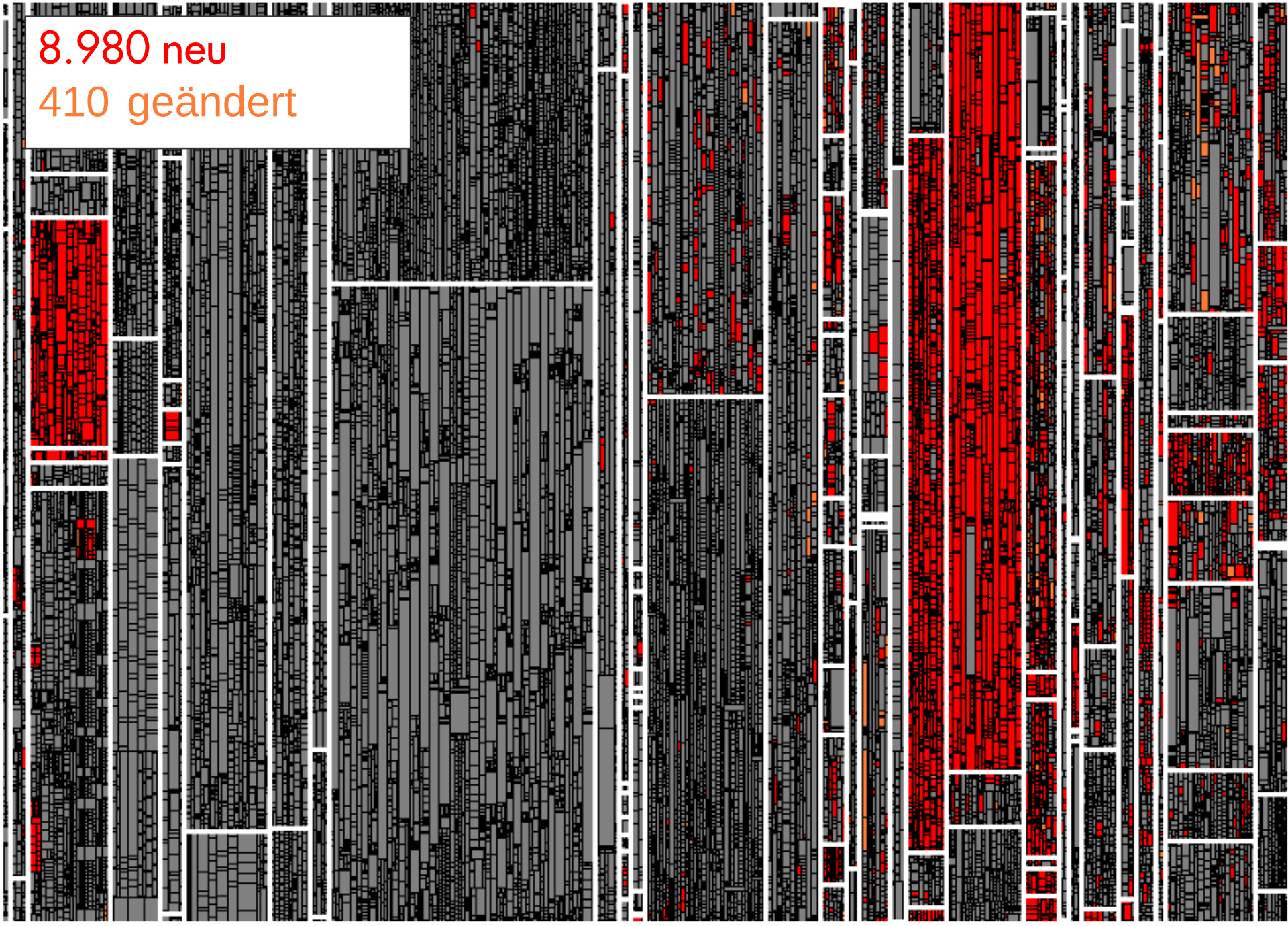
```
/* package */class NamespaceRenames {

    /** Maps from old name fragment to new name fragment */
    public Set<ImmutablePair<String, String>> namespaceRenames = new HashSet<

    /**
     * Computes a rename rule from an old and a new namespace name based on a
     * type name correspondence. <code>
     * For name1 = a.oldnamespace.b.c.D and name2 = a.newnamespace.b.c.D, res
     * </code>
     * */
    public static ImmutablePair<String, String> computeRenameRule(
            String fqTypeName1, String fqTypeName2, String separator) {

        if (fqTypeName1.equals(fqTypeName2)) {
            return null;
        }

        String commonSuffix = StringUtils.longestCommonSuffix(fqTypeName1,
                fqTypeName2);
        if (StringUtils.isEmpty(commonSuffix)) {
            return null;
        }

        int separatorPosition = commonSuffix.indexOf(separator);
        if (separatorPosition != -1) {
            commonSuffix = commonSuffix.substring(separatorPosition);
        }

        String from = StringUtils.stripSuffix(commonSuffix, fqTypeName1);
        String to = StringUtils.stripSuffix(commonSuffix, fqTypeName2);

        return new ImmutablePair<String, String>(from, to);
    }
```

NamespaceRenames.java 8727

```
/* package */class NamespaceRenames {

    /** Maps from old name fragment to new name fragment */
    public Set<ImmutablePair<String, String>> namespaceRenames = new Has

    // TODO (LH) Doc vs. method name : 'Compute' vs. 'find'
    /**
     * Computes a rename rule from an old and a new namespace name based
     * type name correspondence. <code>
     * For name1 = a.oldnamespace.b.c.D and name2 = a.newnamespace.b.c.D
     * </code>
     * */
    // TODO (LH) PLease reflect in identifier names that they refert to
    // names
    public static ImmutablePair<String, String> findRenameRule(String na
            String name2, String separator) {

        if (name1.equals(name2)) {
            return null;
        }

        // TODO (LH) Looks like StringUtils is missing a 'longestCommons
        String commonSuffix = reverse(StringUtils.longestCommonPrefix(
                reverse(name1), reverse(name2)));
        if (StringUtils.isEmpty(commonSuffix)) {
            return null;
        }

        int separatorPosition = commonSuffix.indexOf(separator);
        if (separatorPosition != -1) {
            commonSuffix = commonSuffix.substring(separatorPosition);
        }

        // TODO (LH) Please reflect in identifier names that these are
        // namespaces
        String from = StringUtils.stripSuffix(commonSuffix, name1);
        String to = StringUtils.stripSuffix(commonSuffix, name2);

        return new ImmutablePair<String, String>(from, to);
    }
```


17.427 “neu”
3.259 “geändert”


8.980 neu
10.448 “geändert”


8.980 neu
410 geändert

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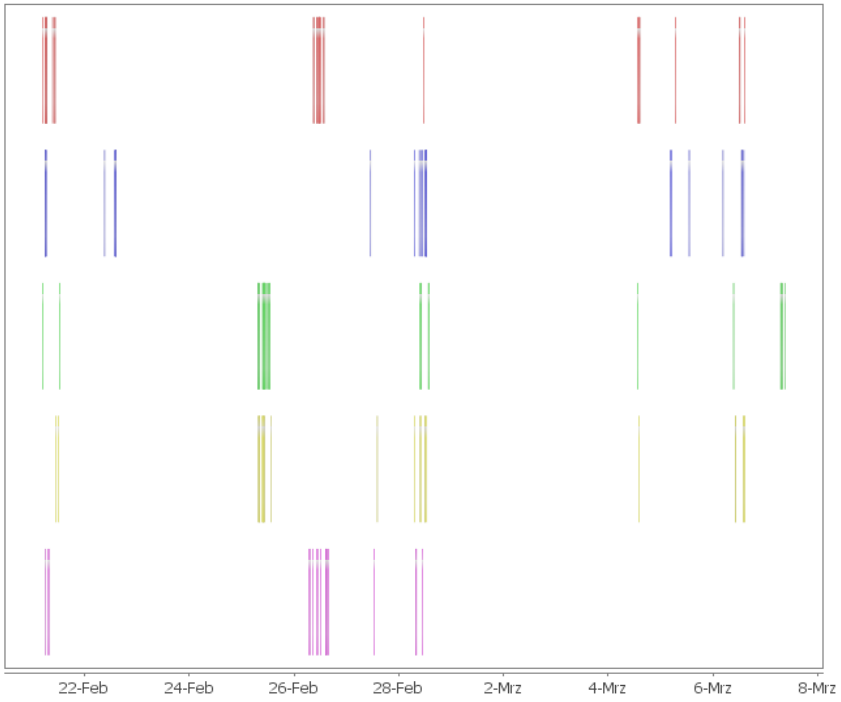
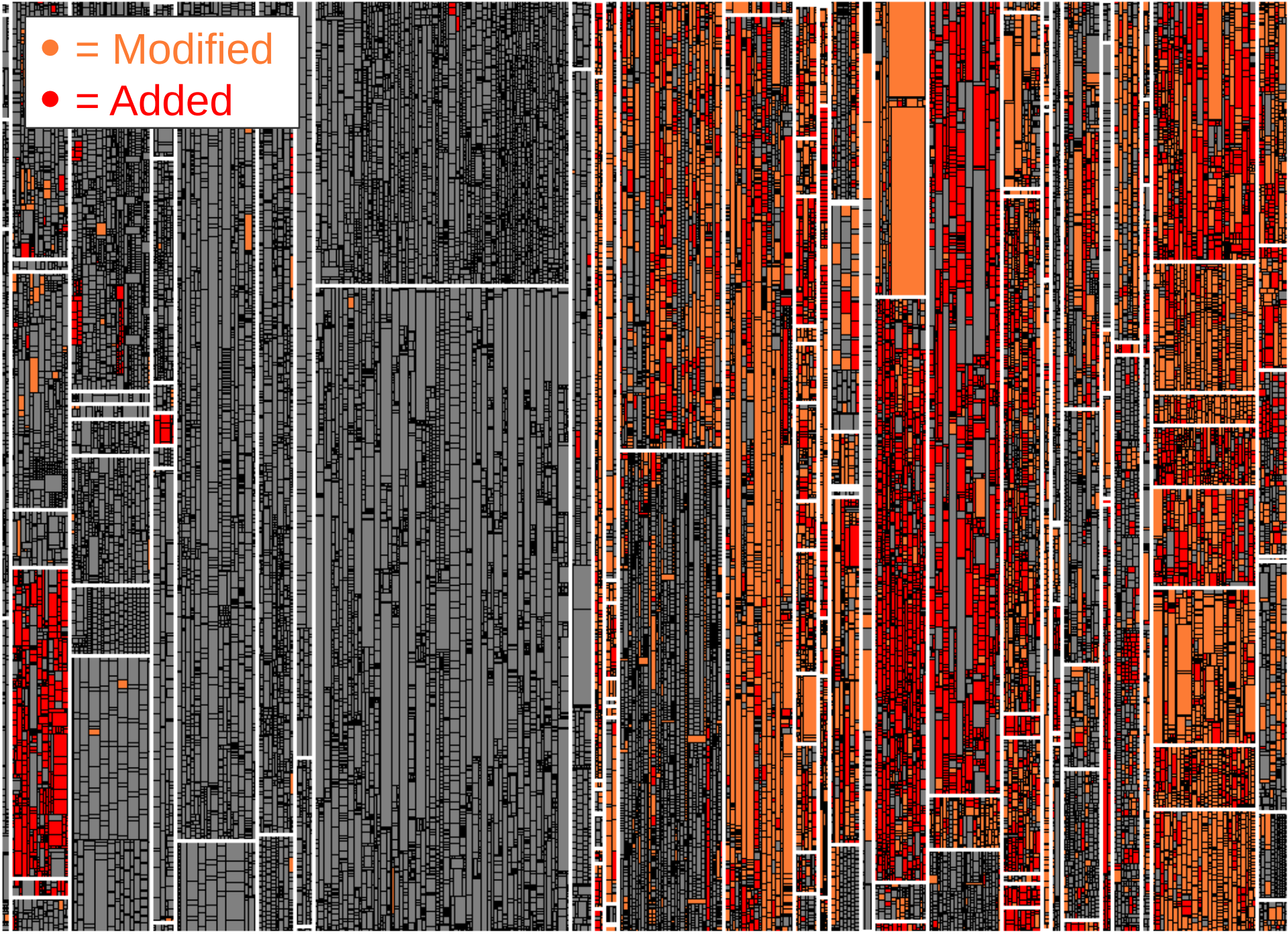
3. Erfahrungen aus der Praxis

Einsatz bei Test-Factory

- 5 Tester in Indien
- Zeitraum 2 Wochen
- 143 Test-Sessions
- 6 Versionen des Systems

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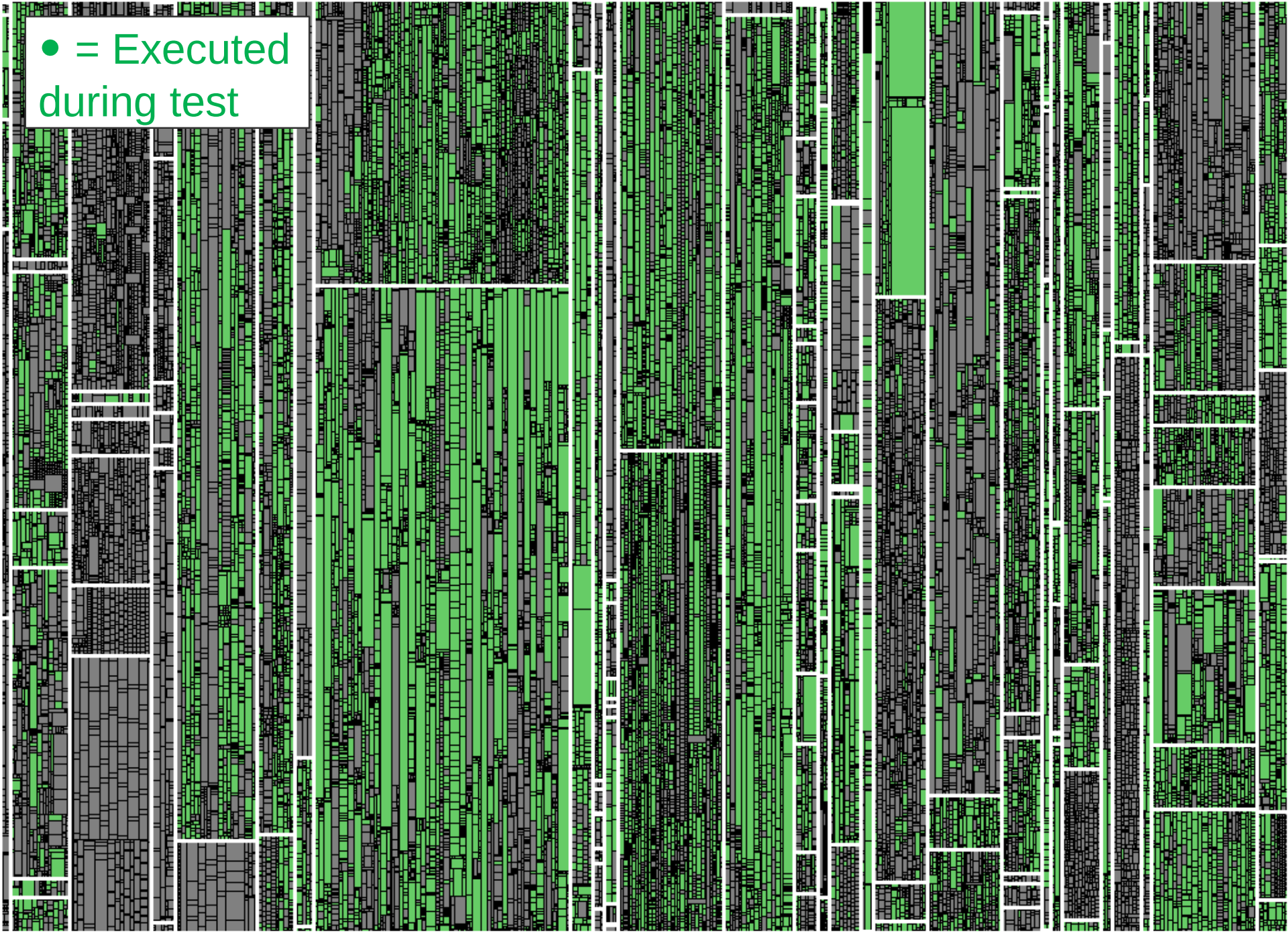
• = Added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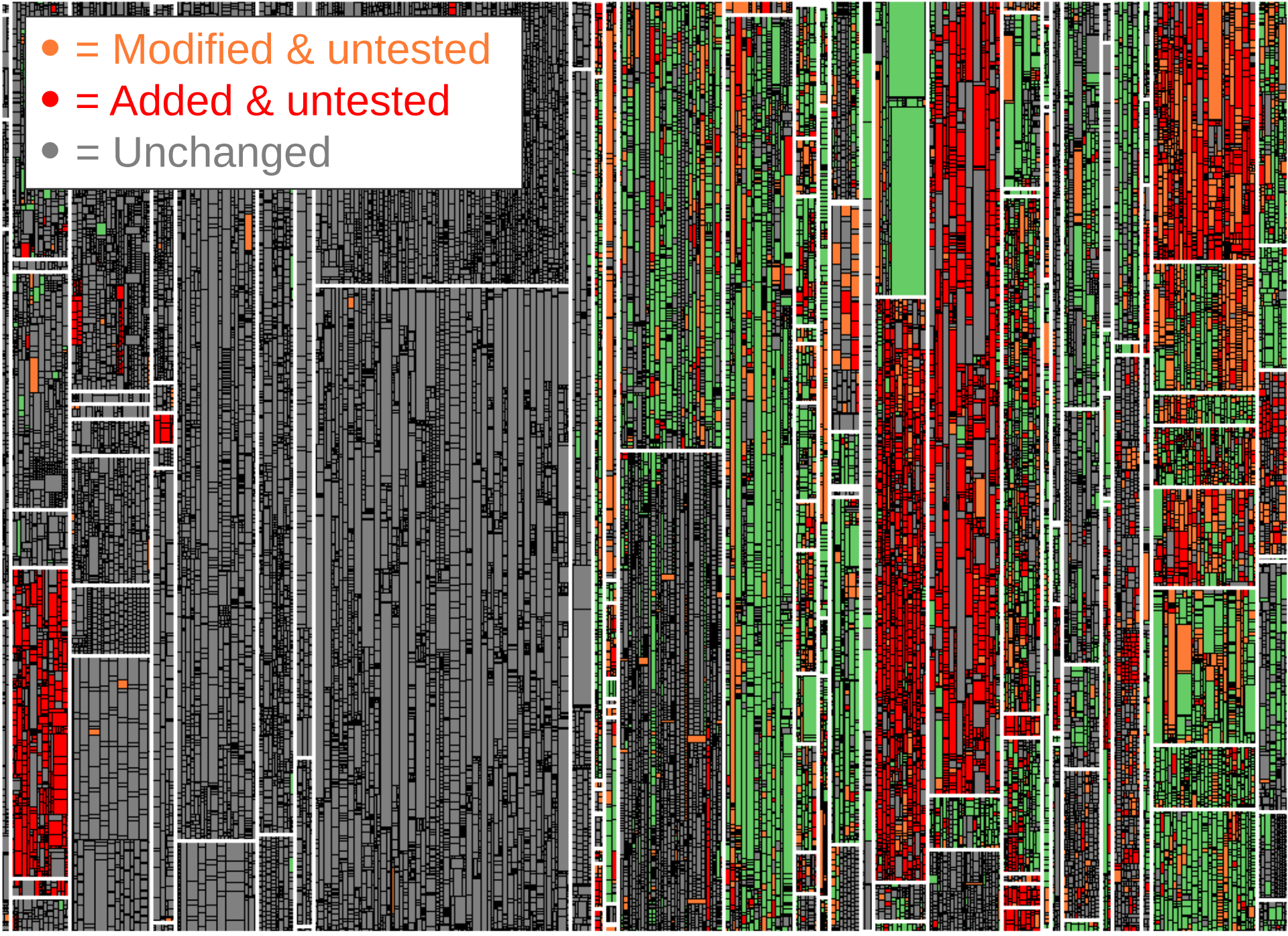
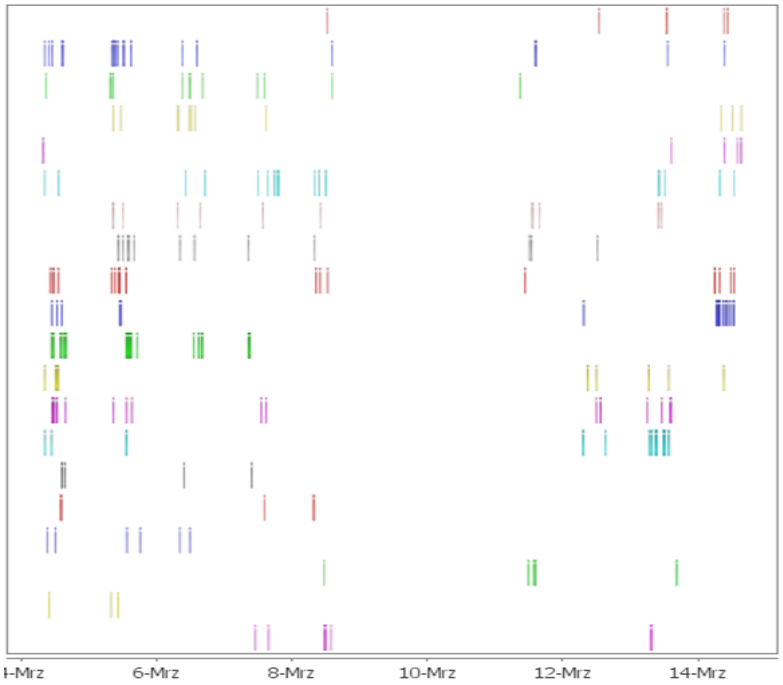
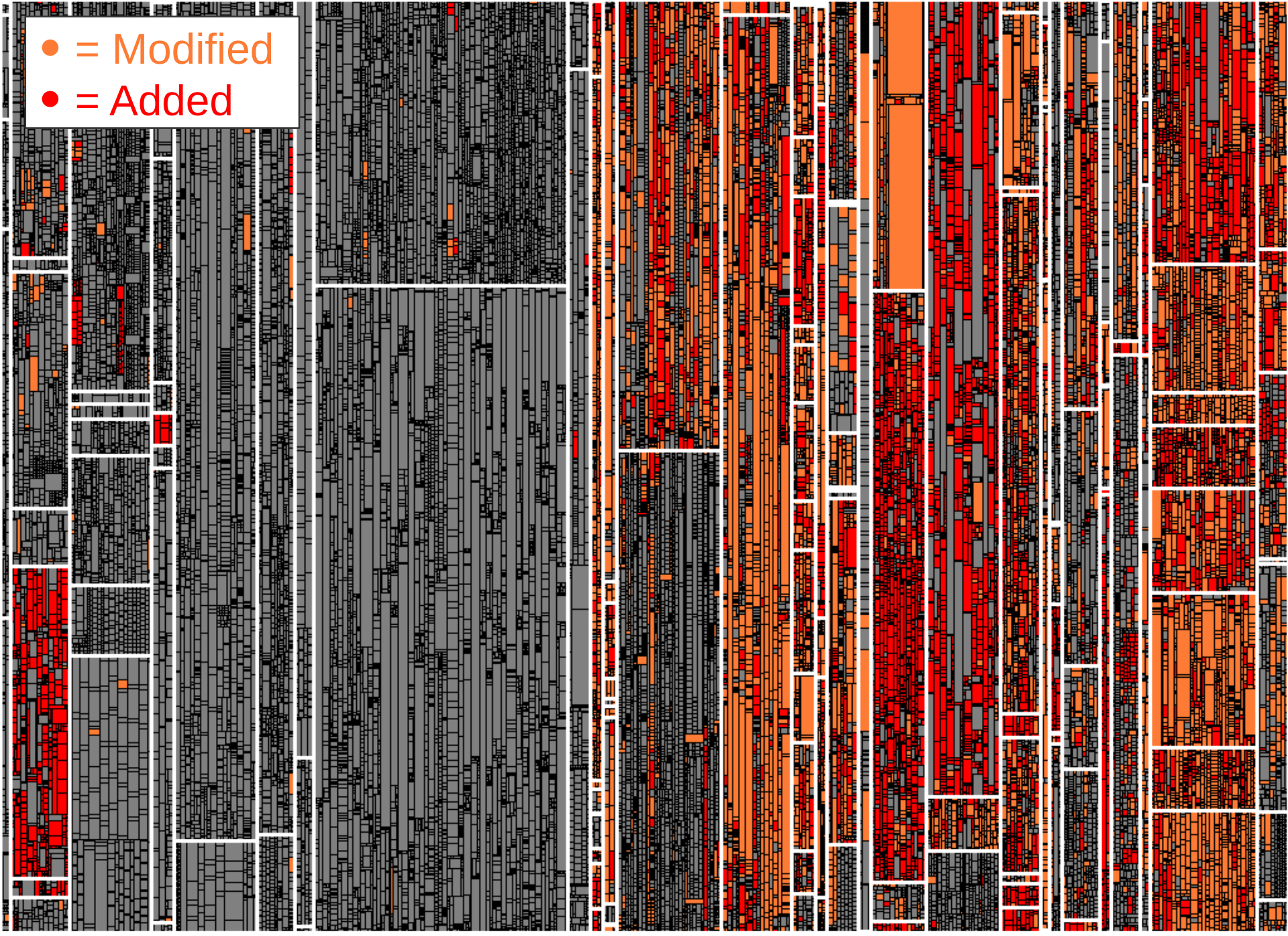

= Modified & untested
= Added & untested
= Unchanged

Einsatz bei explorativem Test

- 23 Tester
  - Requirement Engineers
  - Fachbereich
  - Endanwender
- Zeitraum 2 Wochen
- 307 Test-Sessions
- 8 Versionen des Systems

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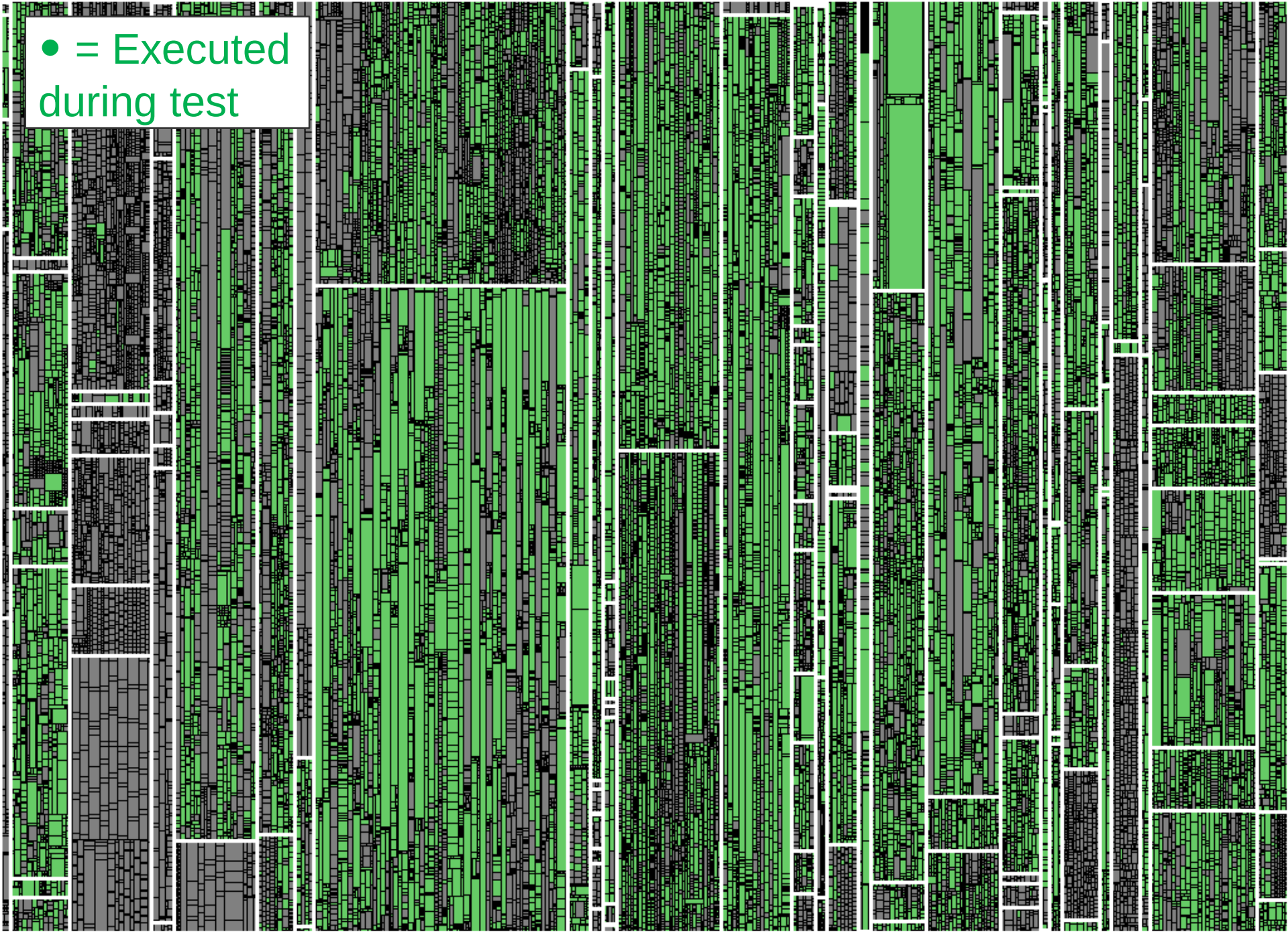
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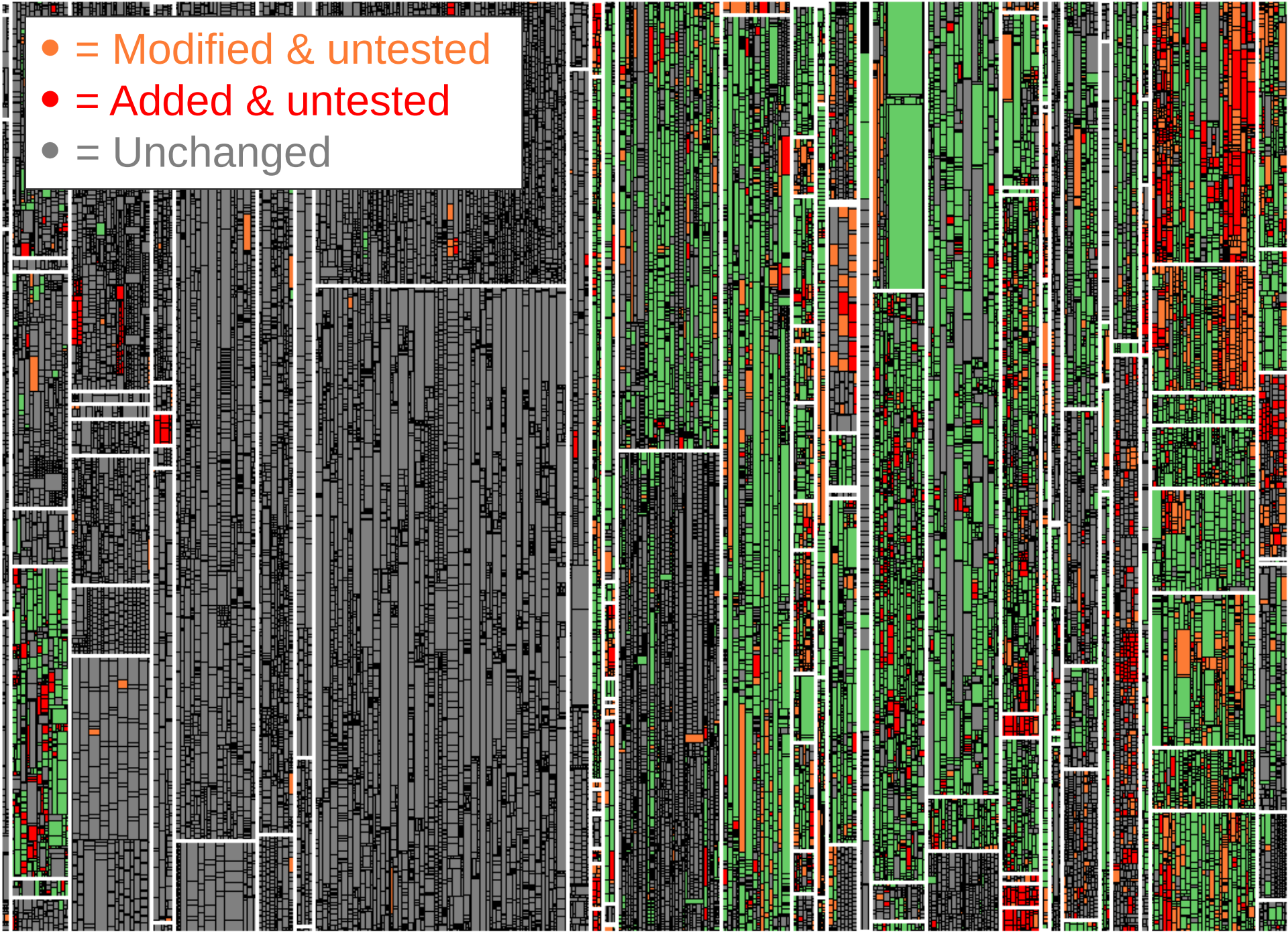
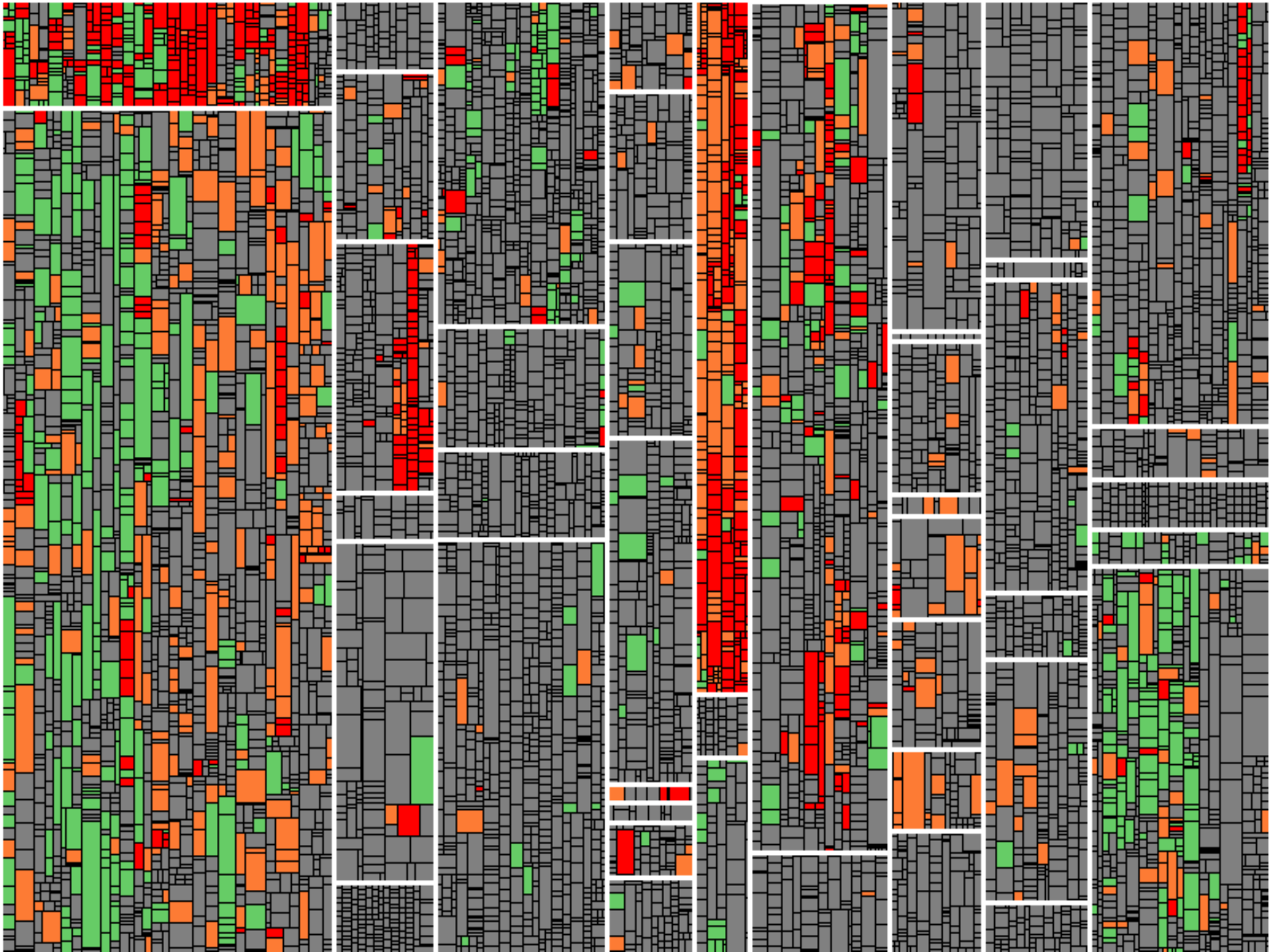
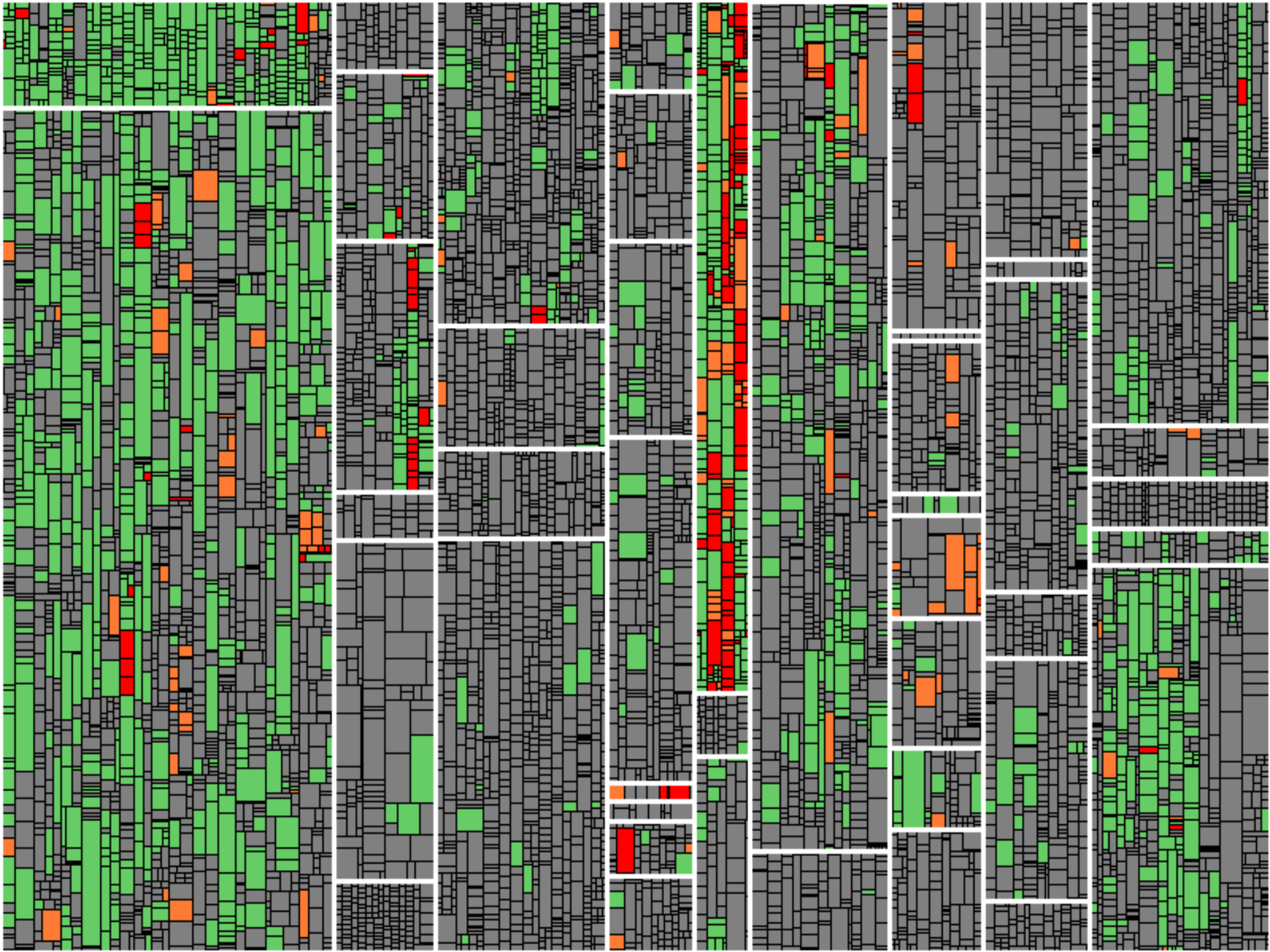
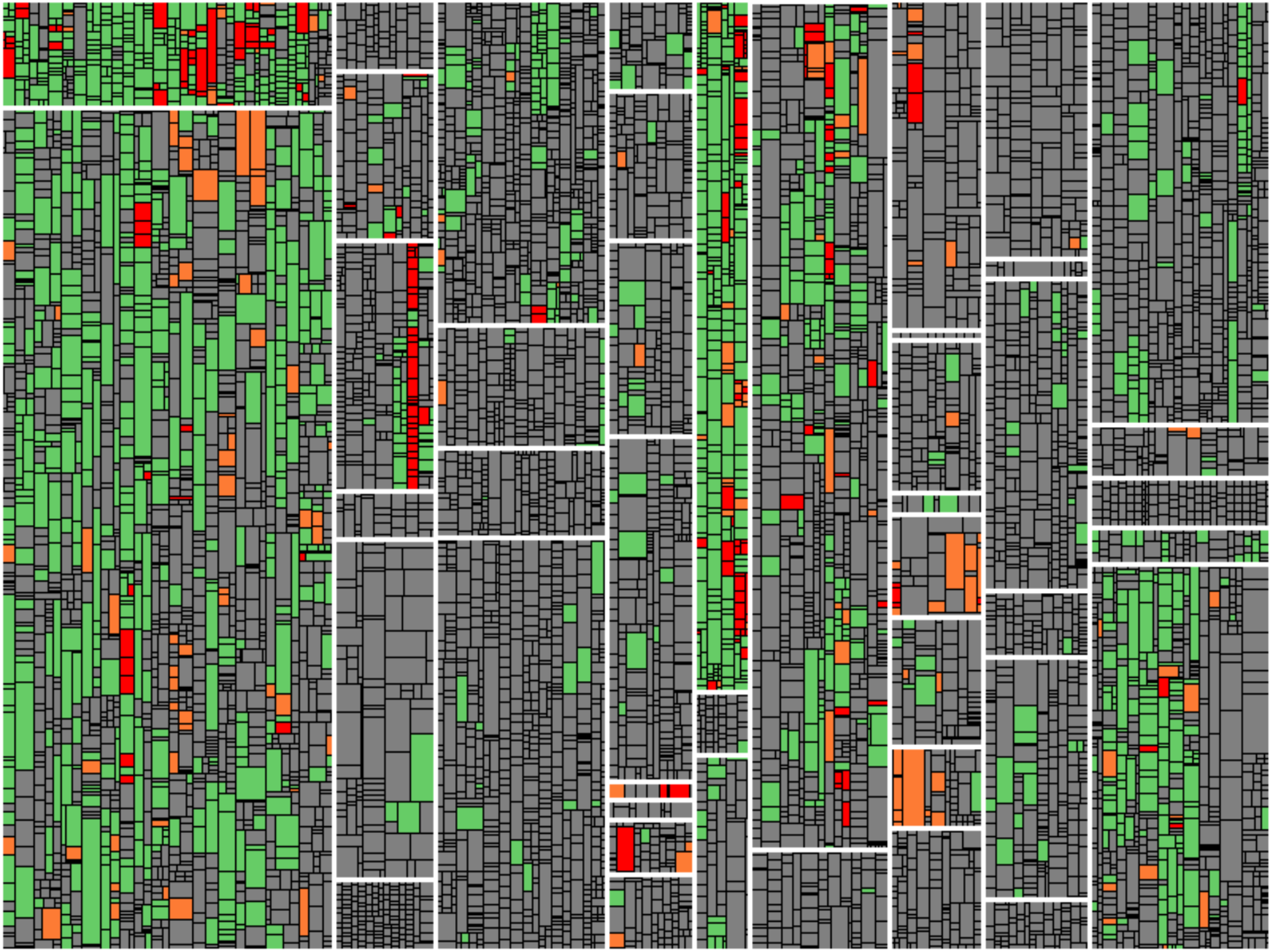
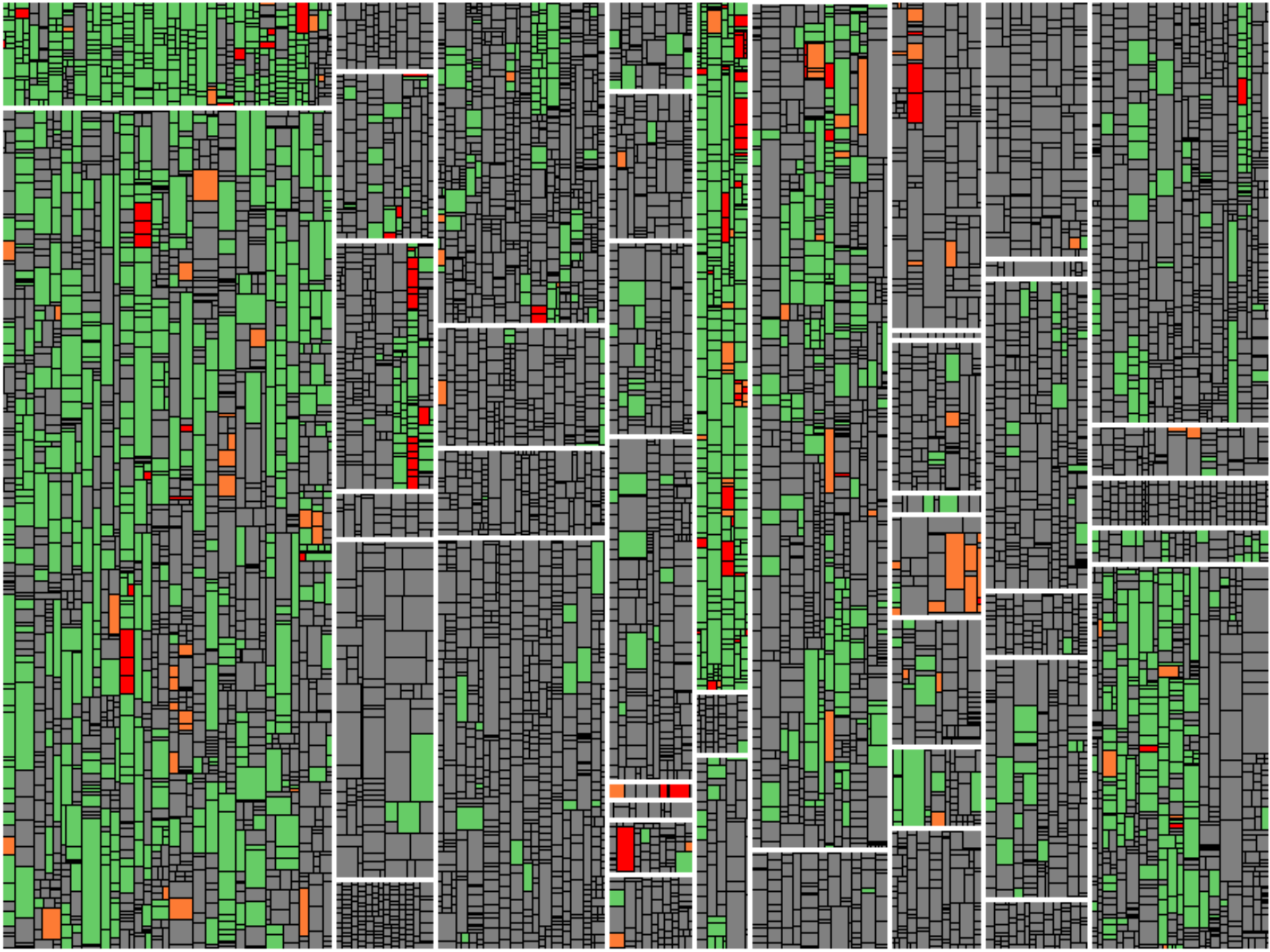

= Modified & untested
= Added & untested
= Unchanged

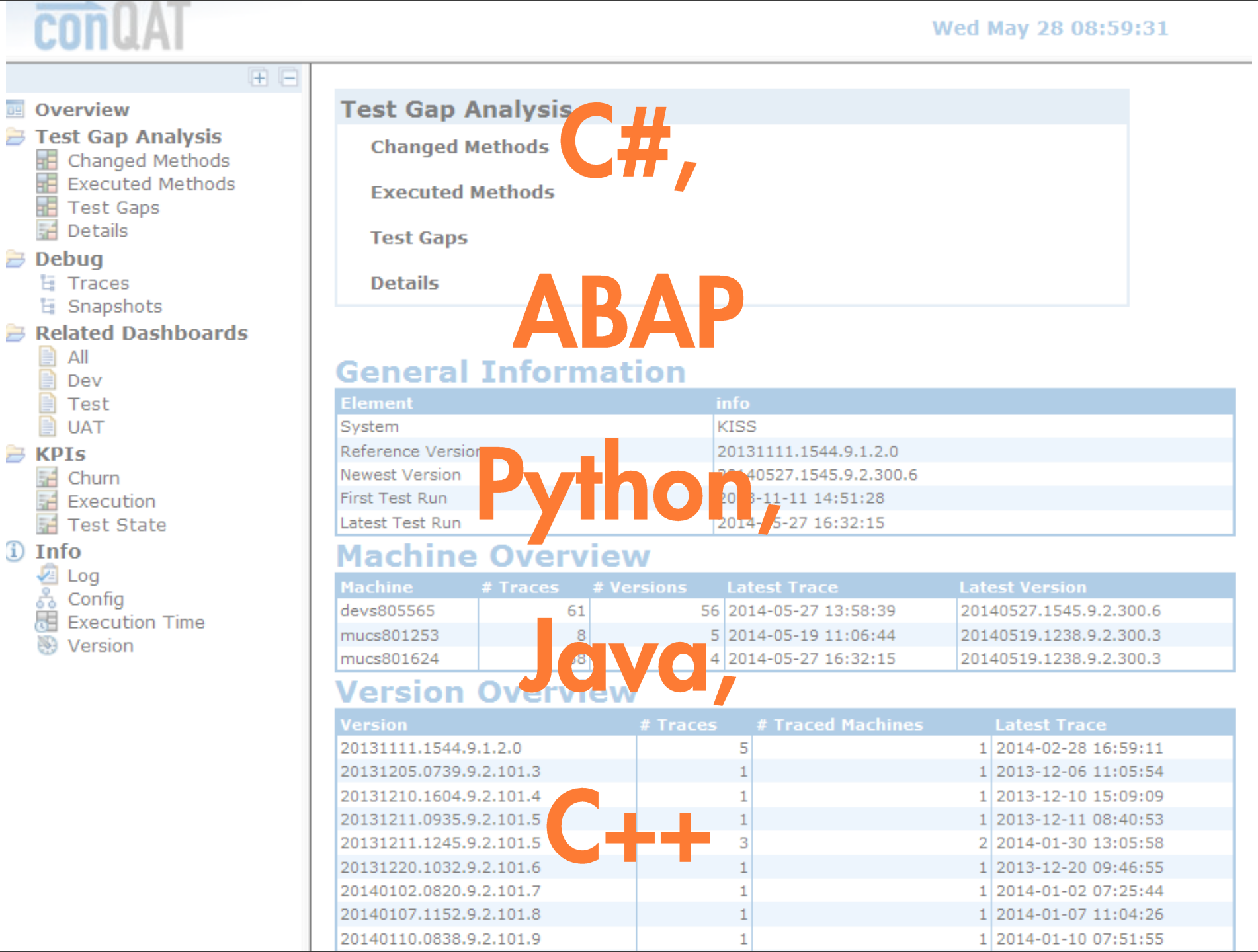
Verschiedene Umgebungen







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Overview
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KISS
Reference Version
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Newest Version
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First Test Run
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Latest Test Run
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Machine Overview
Machine
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Latest Trace
Latest Version
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Version
Traces
Traced Machines
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Fazit

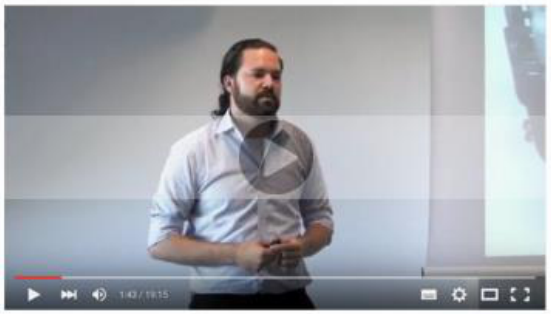
Änderungen am Code sind guter Fehlerprädiktor.

Test-Gap-Analyse macht Änderungen und Testaktivitäten transparenter und ermöglicht es ***ungewollt*** ungetestete Änderungen zu vermeiden.

Ich unterstütze gerne bei der Evaluierung / Einführung.

Wie sag ichs meinem Chef?

Mit Vorträgen über Softwarequalität sind wir regelmäßig auf Industriekonferenzen oder Kunden-internen Workshops vertreten.



Impulsvorträge

Gerne kommen wir auch zu Ihnen ins Haus, beispielsweise für interne Konferenzen oder Workshops. Unsere Themen reichen von Qualitätsanalysen über Qualitätscontrolling bis hin zu Testcontrolling oder der Einführung von Reviews. Oder aber Sie schlagen uns ein Thema Ihrer Wahl vor.

DAS ANGEBOT

- 60-90 MIN VORTRAG
- SOFTWAREQUALITÄT ALS THEMA
- BEI IHNEN IM HAUS
- € NUR UNSERE ANREISEKOSTEN
- TERMIN NACH VEREINBARUNG

IMPULSVORTRAG ANFRAGEN

Kontakt

Ich bin bis heute und morgen hier und freue mich auf Diskussionen!

Bei Interesse an einem Job in diesem Bereich bitte melden ☺

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