

 EuroSTAR 2026

OSLO

15-18 June

Which Tests Can We Safely Skip This Test Run? Which Next Run? Always?

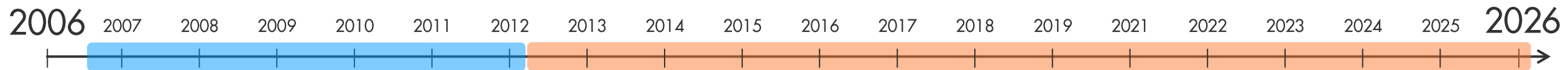
Elmar Jürgens

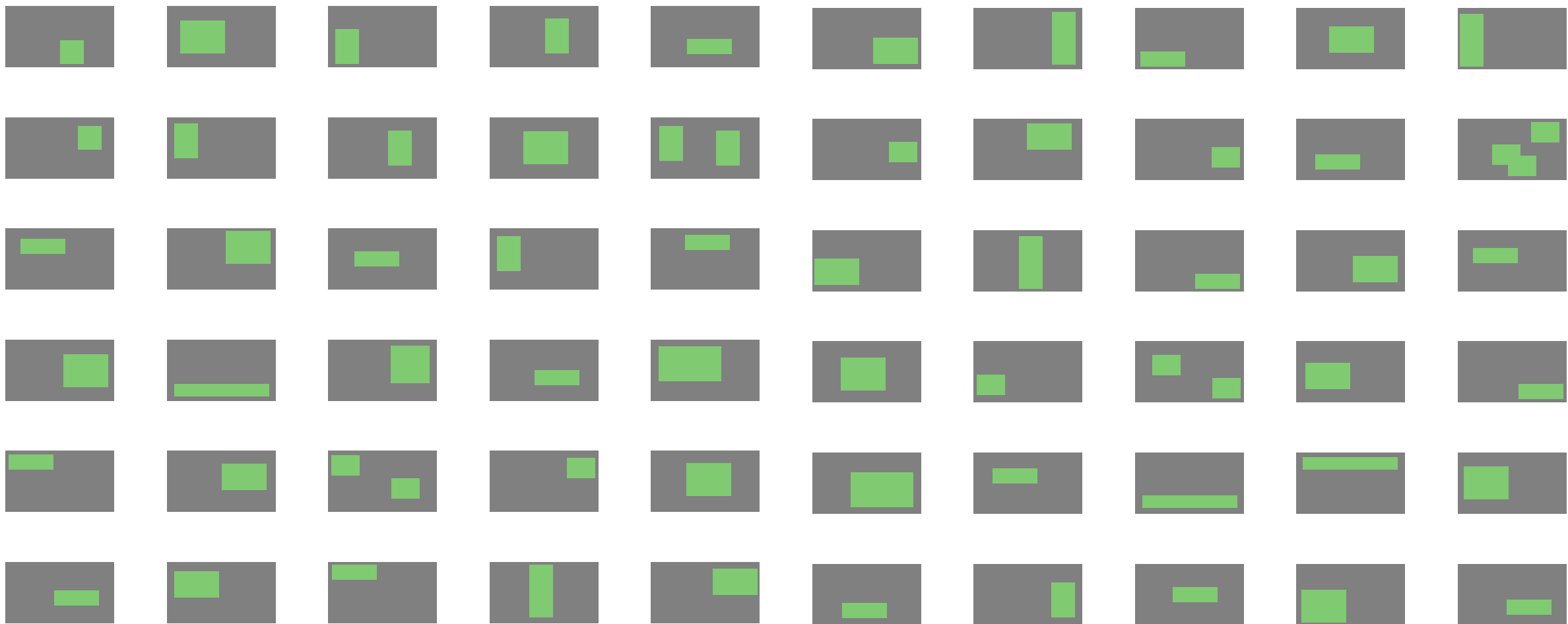
CQSE Germany

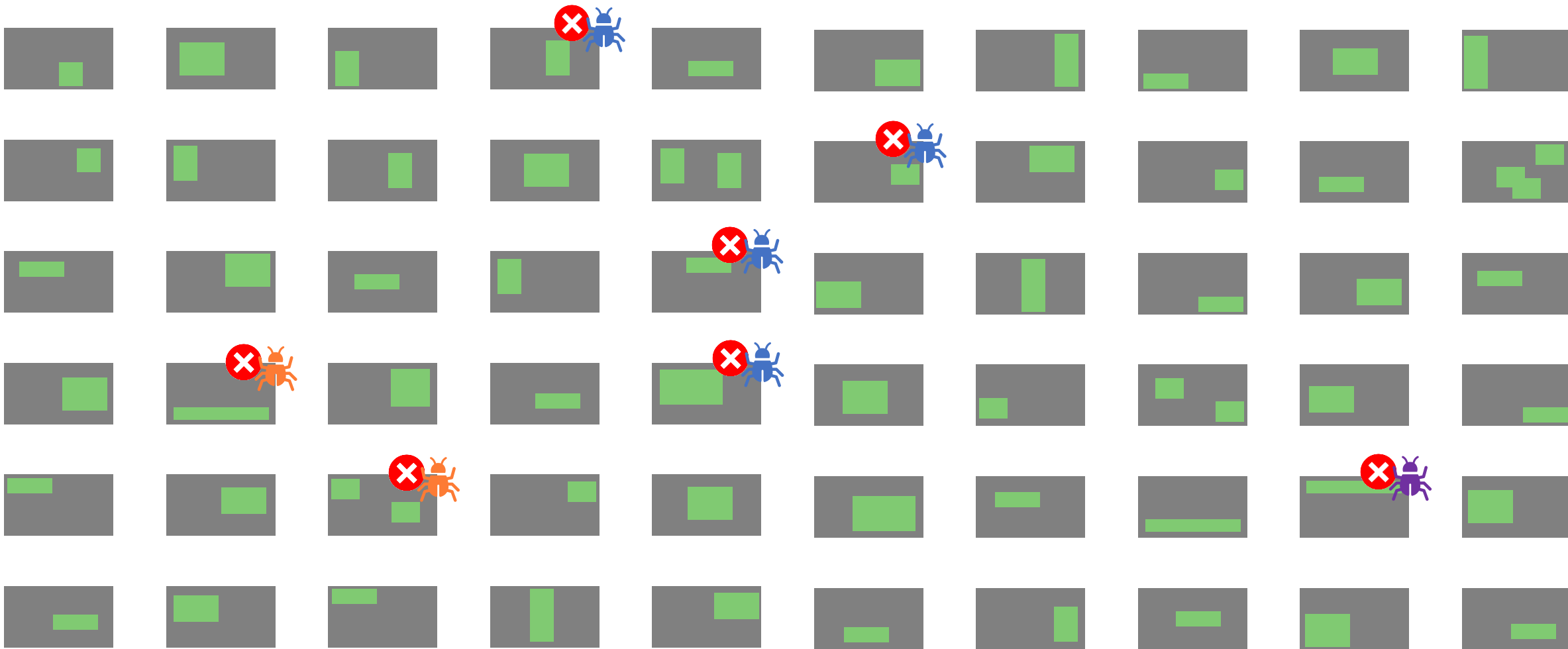


TRACK TALK

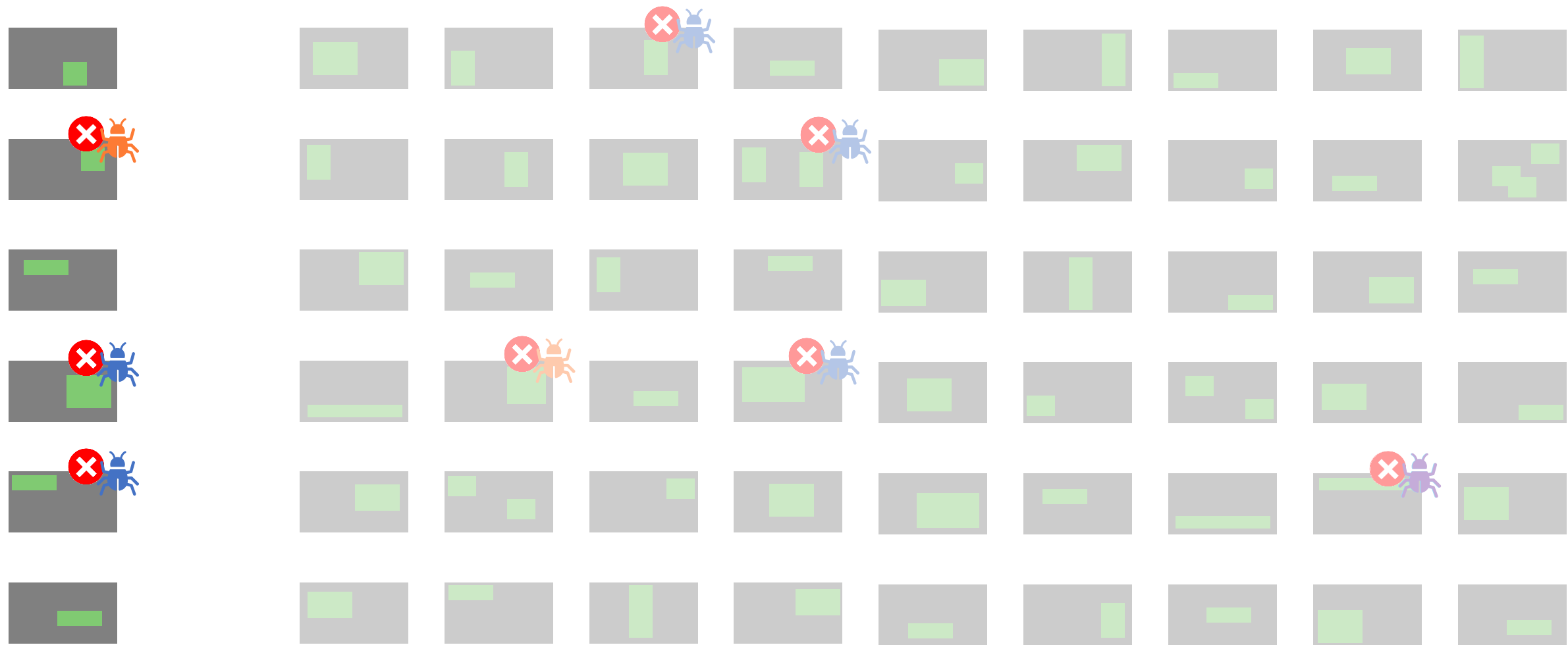




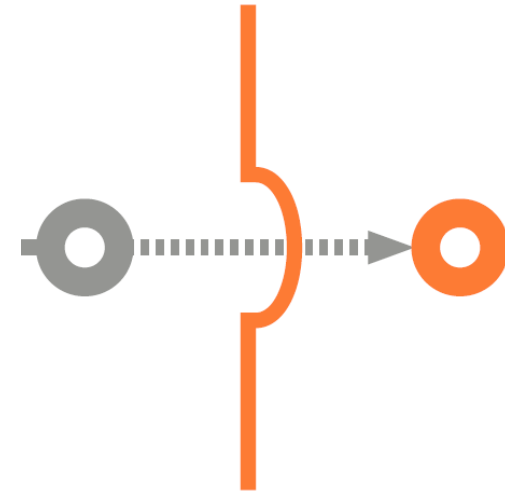




Test Suggestions

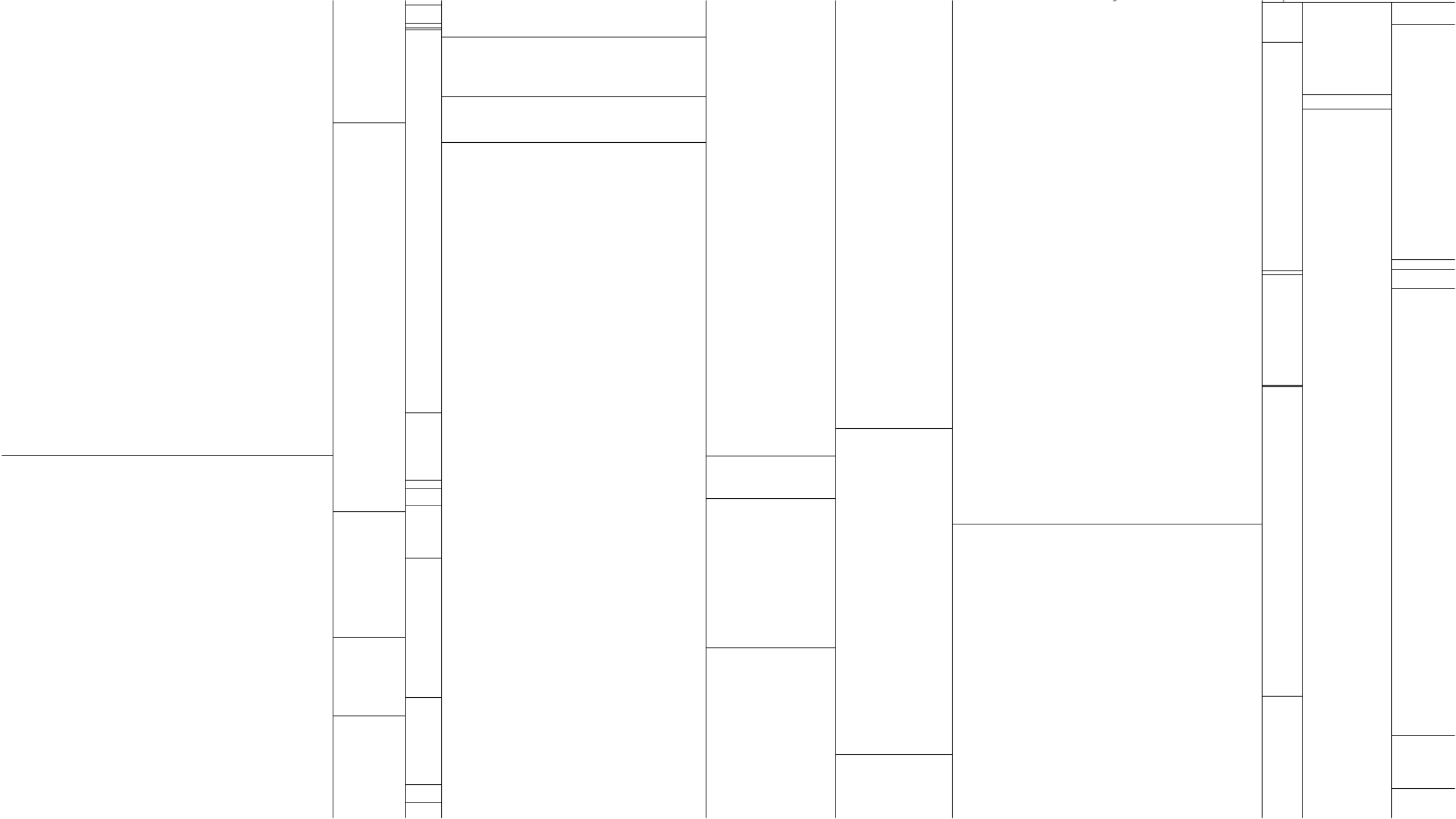


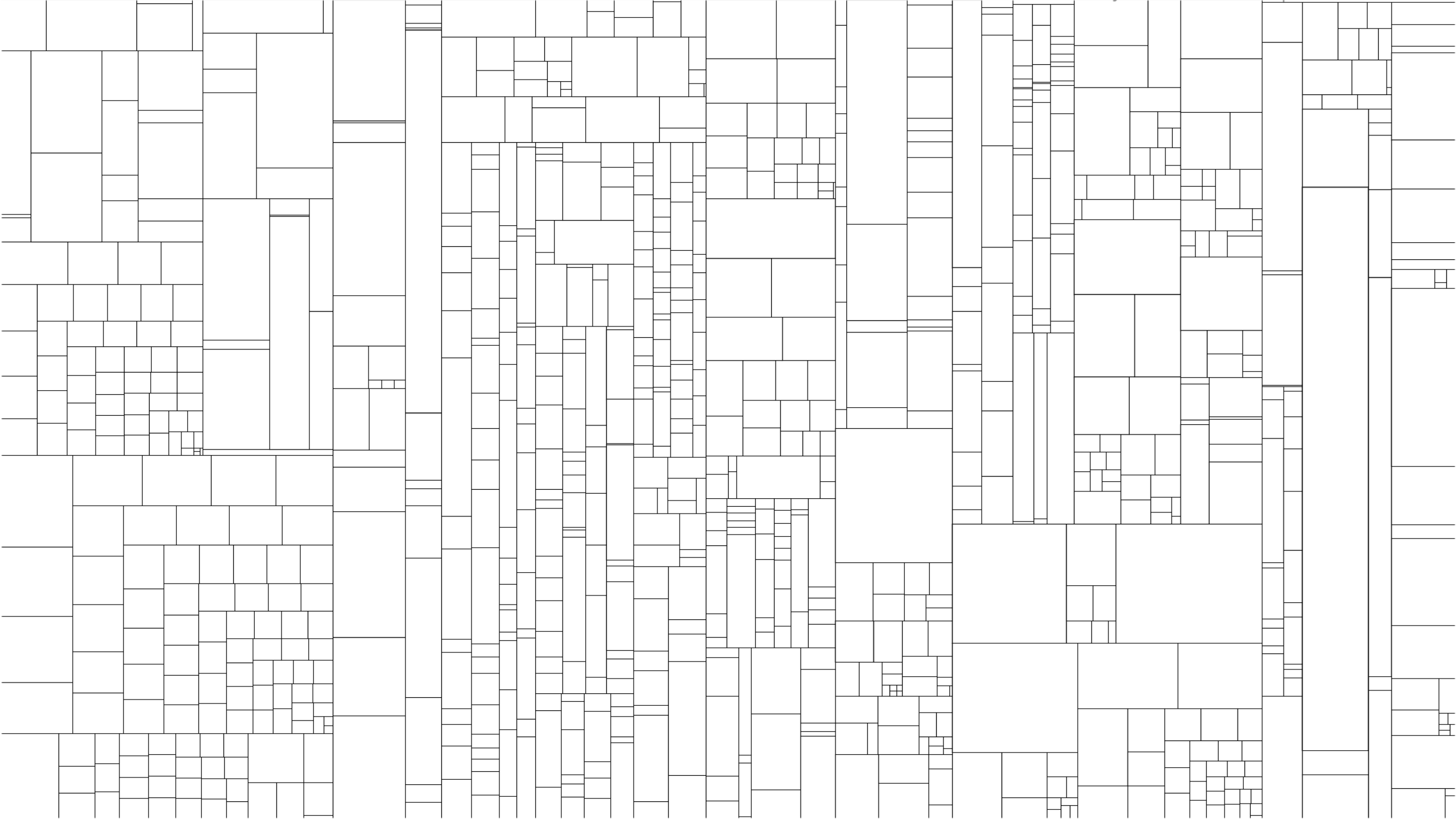
Test Suggestions for **Quality Gates**

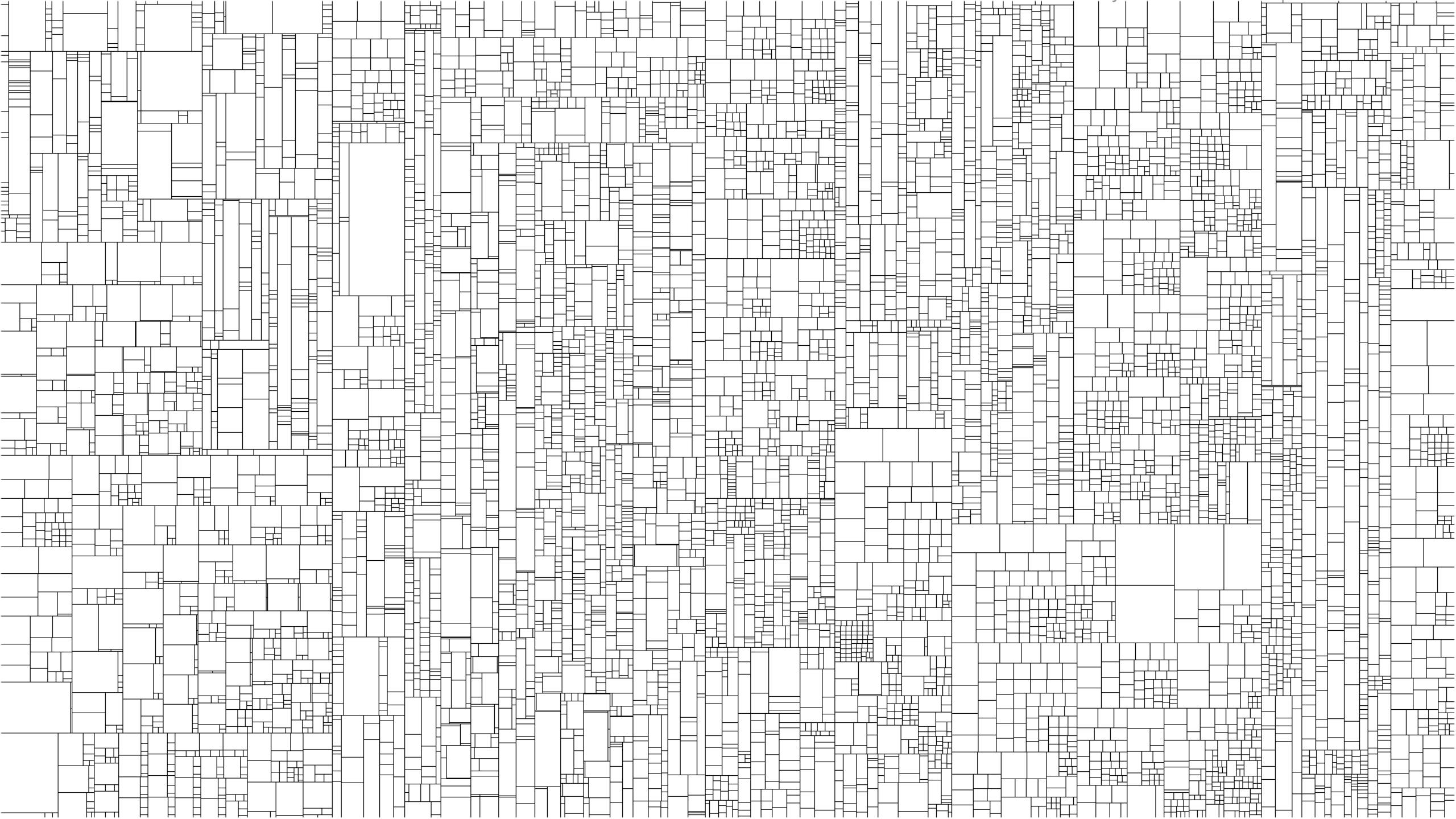




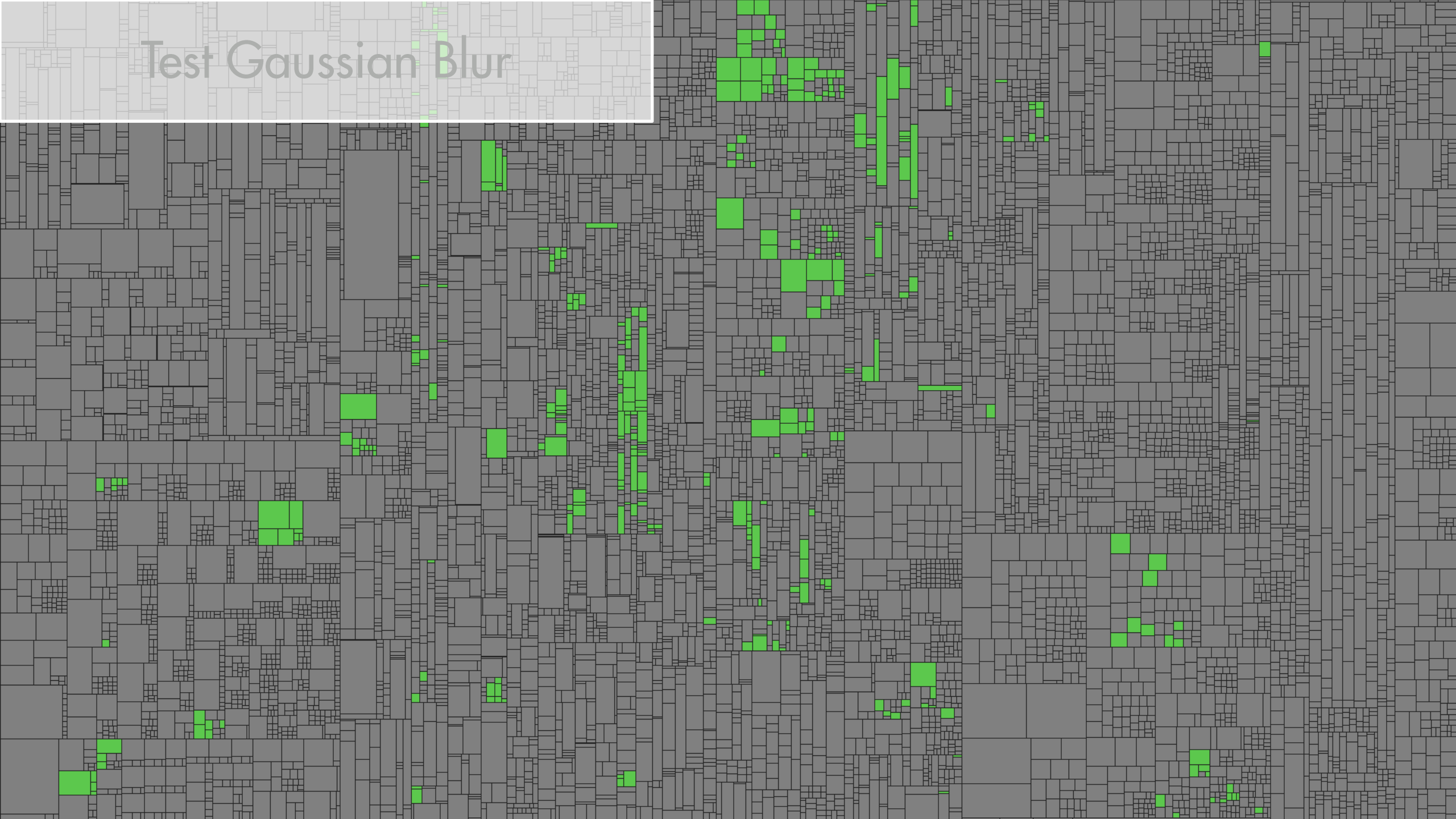
```
114
115    private static void createAndShowGUI(String[] args) {
116        assert calledOnEDT() : threadInfo();
117
118        Messages.setMsgHandler(new GUIMessageHandler());
119
120        // GlobalKeyboardWatch.showEventsSlowerThan(100, TimeUnit.MILLISECONDS);
121
122        Theme theme = Themes.DEFAULT;
123        // if a LaF was set from the command line, then don't override it
124        if (System.getProperty("swing.defaultlaf") == null) {
125            theme = AppPreferences.loadTheme();
126            Themes.install(theme, false, true);
127        }
128
129        int uiFontSize = AppPreferences.loadUIFontSize();
130        String uiFontType = AppPreferences.loadUIFontType();
131
132        Font defaultFont = UIManager.getFont("defaultFont");
133        if (defaultFont != null) { // if null, we don't know how to set the font
134            if (uiFontSize != 0 || !uiFontType.isEmpty()) {
135                Font newFont;
136                if (!uiFontType.isEmpty()) {
137                    newFont = new Font(uiFontType, Font.PLAIN, uiFontSize);
138                } else {
139                    newFont = defaultFont.deriveFont((float) uiFontSize);
140                }
141
142                FontUIResource fontUIResource = new FontUIResource(newFont);
143                UIManager.put("defaultFont", fontUIResource);
144
145                if (theme.isNimbus()) {
146                    UIManager.getLookAndFeel().getDefaults().put("defaultFont", fontUIResource);
147                }
148            }
149        }
150
151        var pw = PixelitorWindow.get();
152        Dialogs.setMainWindowInitialized(true);
153
154        // Just to make 100% sure that at the end of GUI
155        // initialization the focus is not grabbed by
156        // a textfield and the keyboard shortcuts work properly
157        FgBgColors.getGUI().requestFocus();
158
159        TipsOfTheDay.showTips(pw, false);
160
161        MouseZoomMethod.load();
162        PanMethod.load();
163
164        // The IO-intensive preloading of fonts is scheduled
165        // to run after all the files have been opened,
166        // and on the same IO thread
167        openCLFilesAsync(args)
168            .exceptionally(throwable -> null) // recover
169            .thenAcceptAsync(v -> afterStartTestActions(), onEDT)
170            .thenRunAsync(Utils::preloadFontNames, onIOThread)
171            .exceptionally(Messages::showExceptionOnEDT);
172    }
173
```



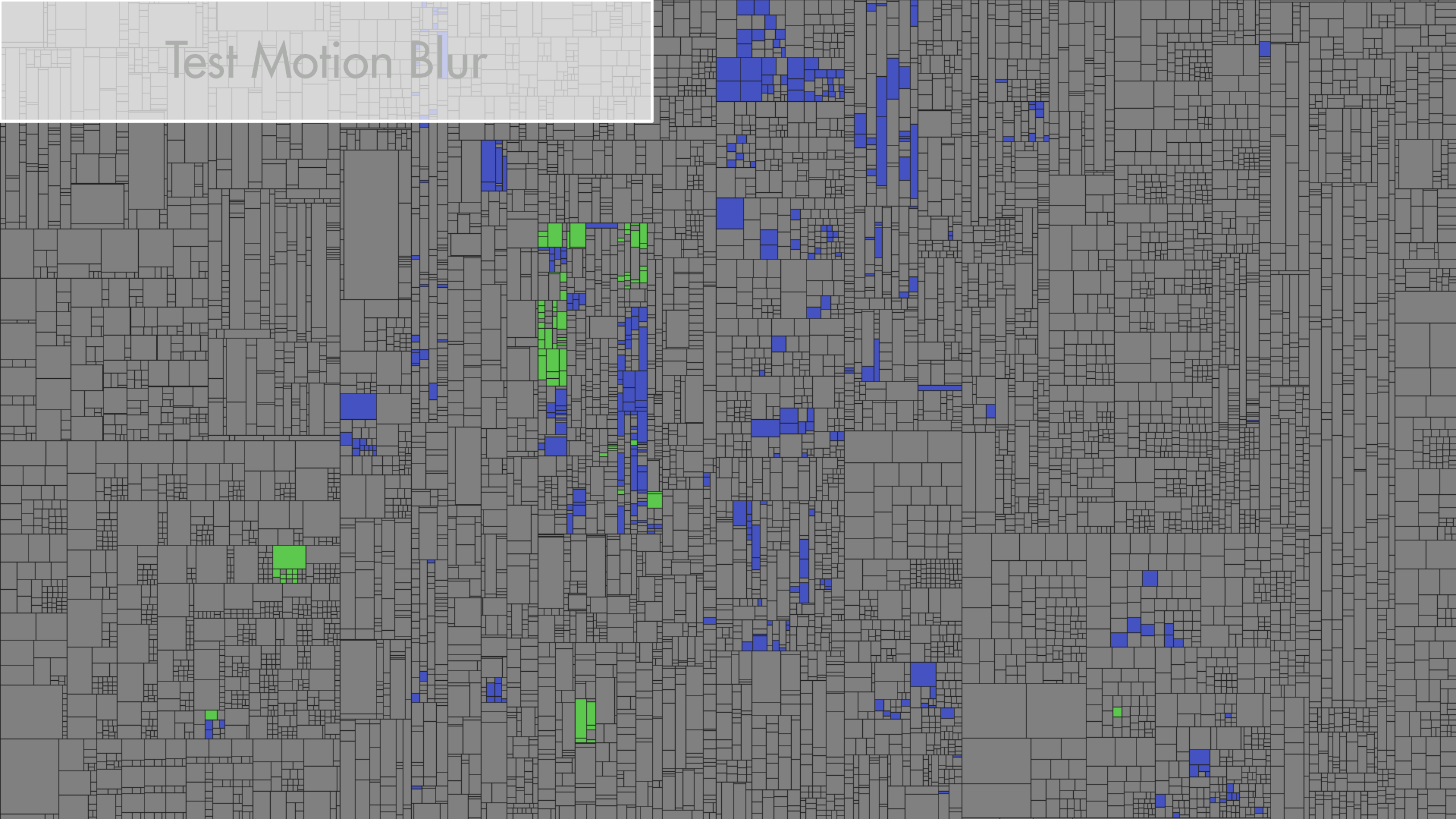




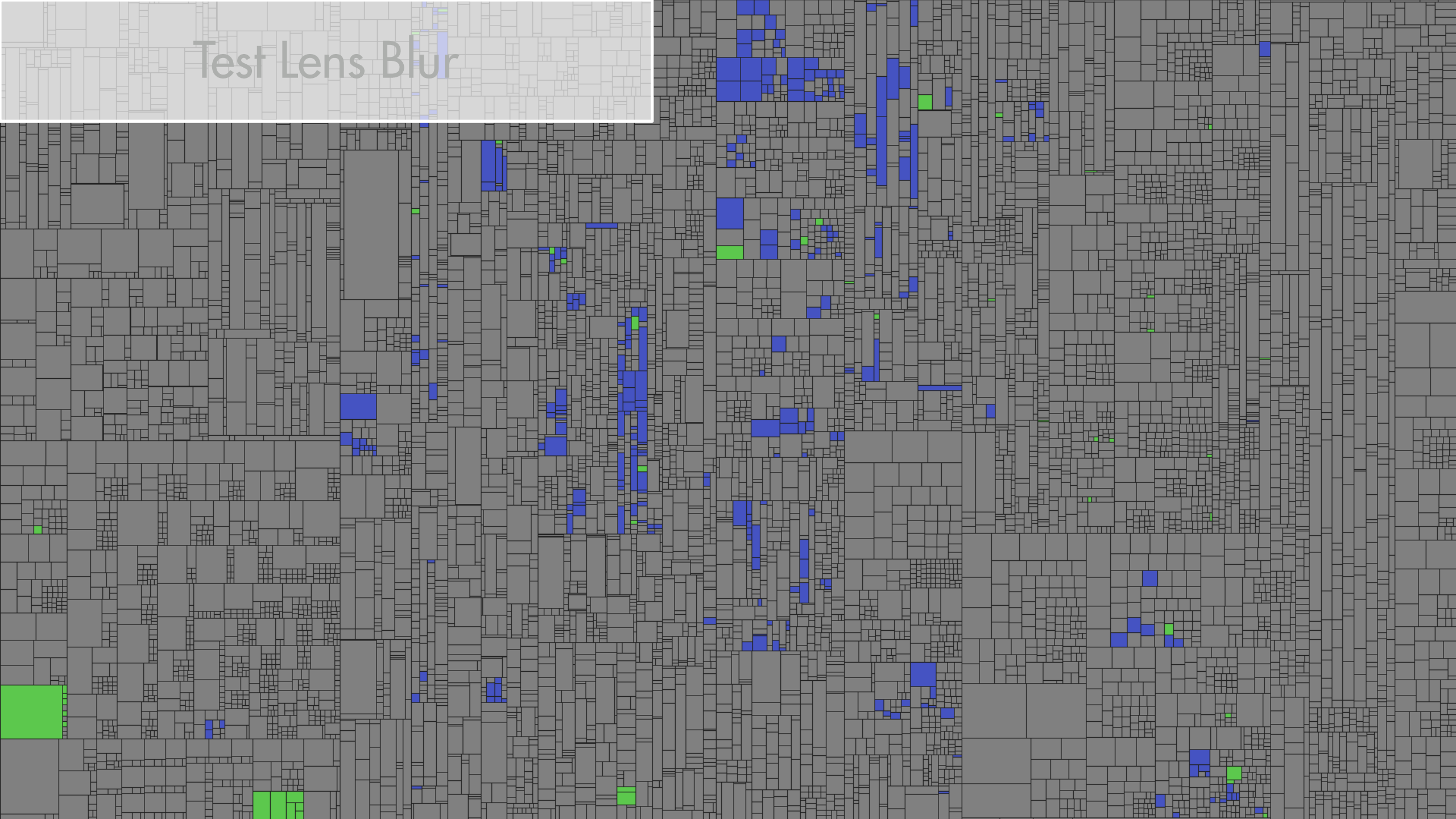
Test Gaussian Blur



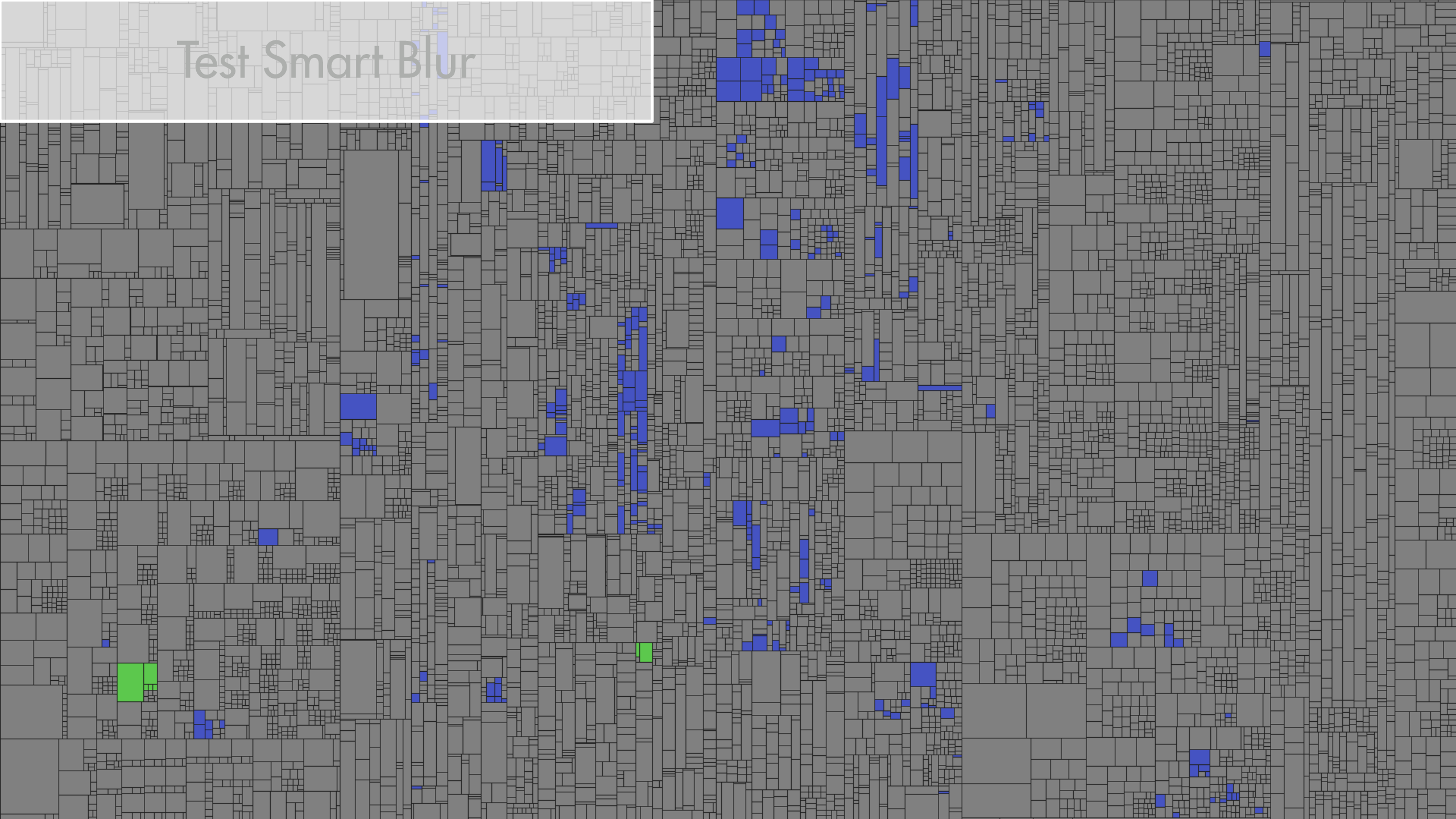
Test Motion Blur

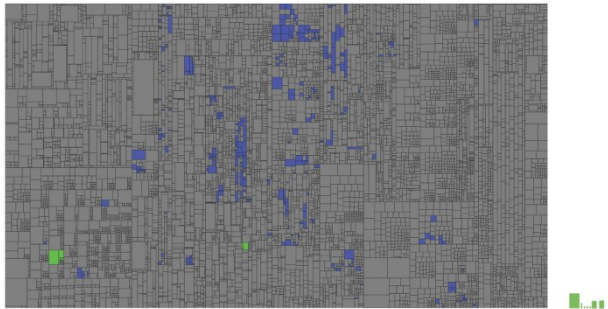
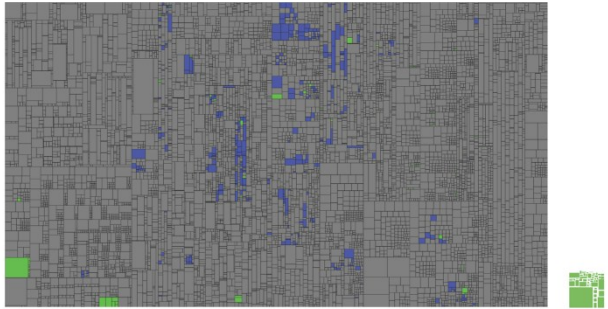
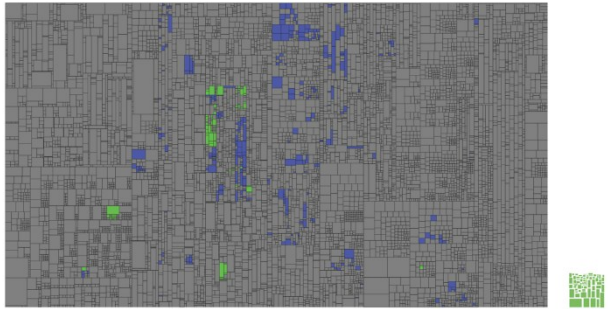
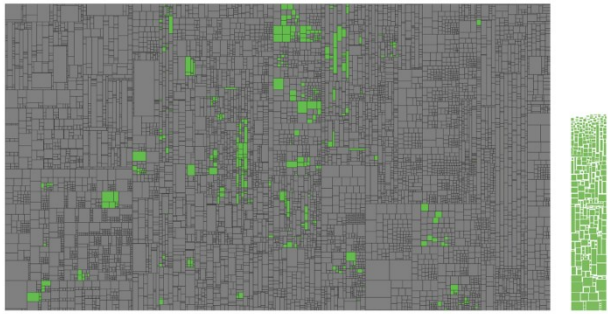


Test Lens Blur

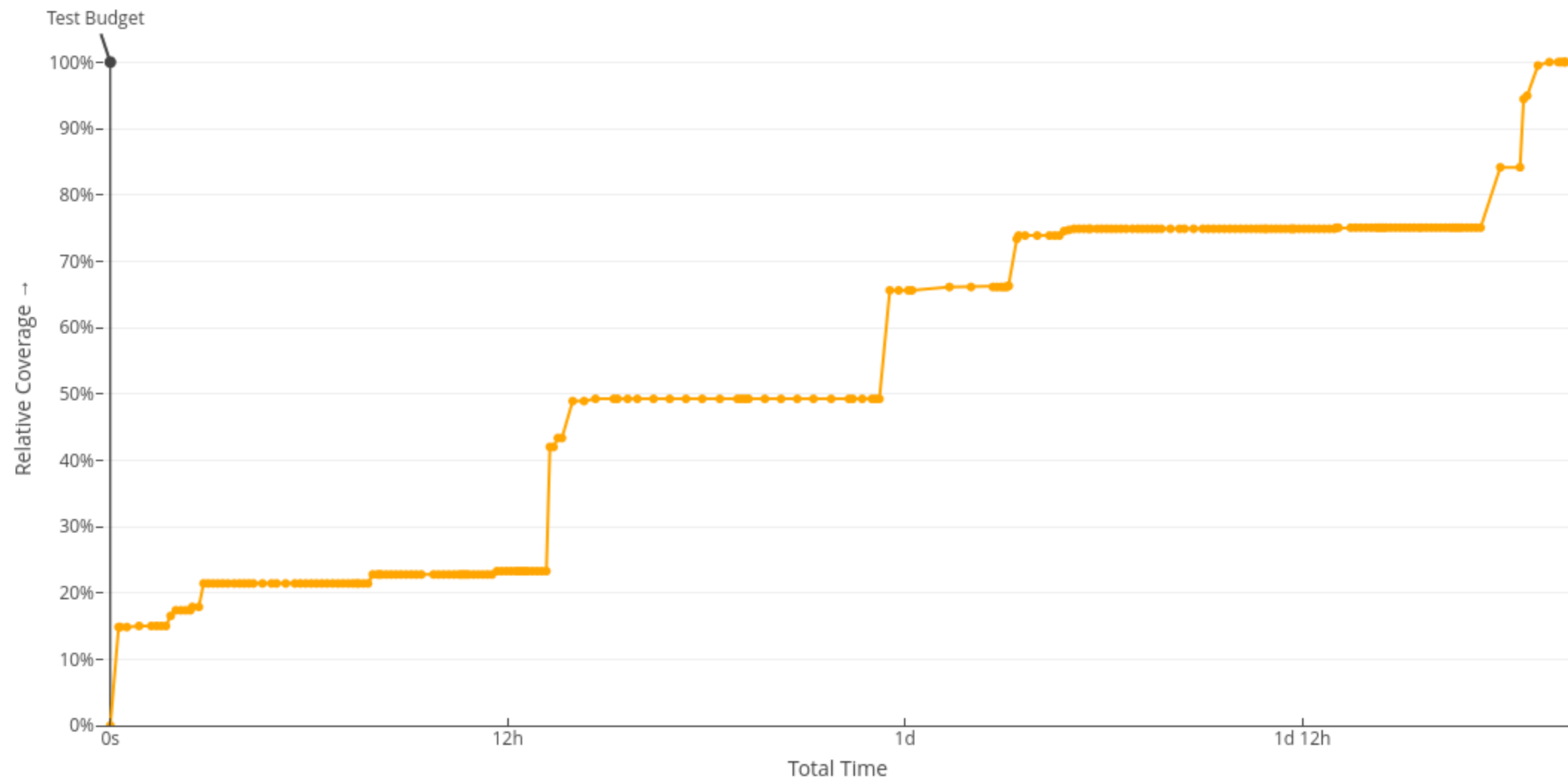


Test Smart Blur





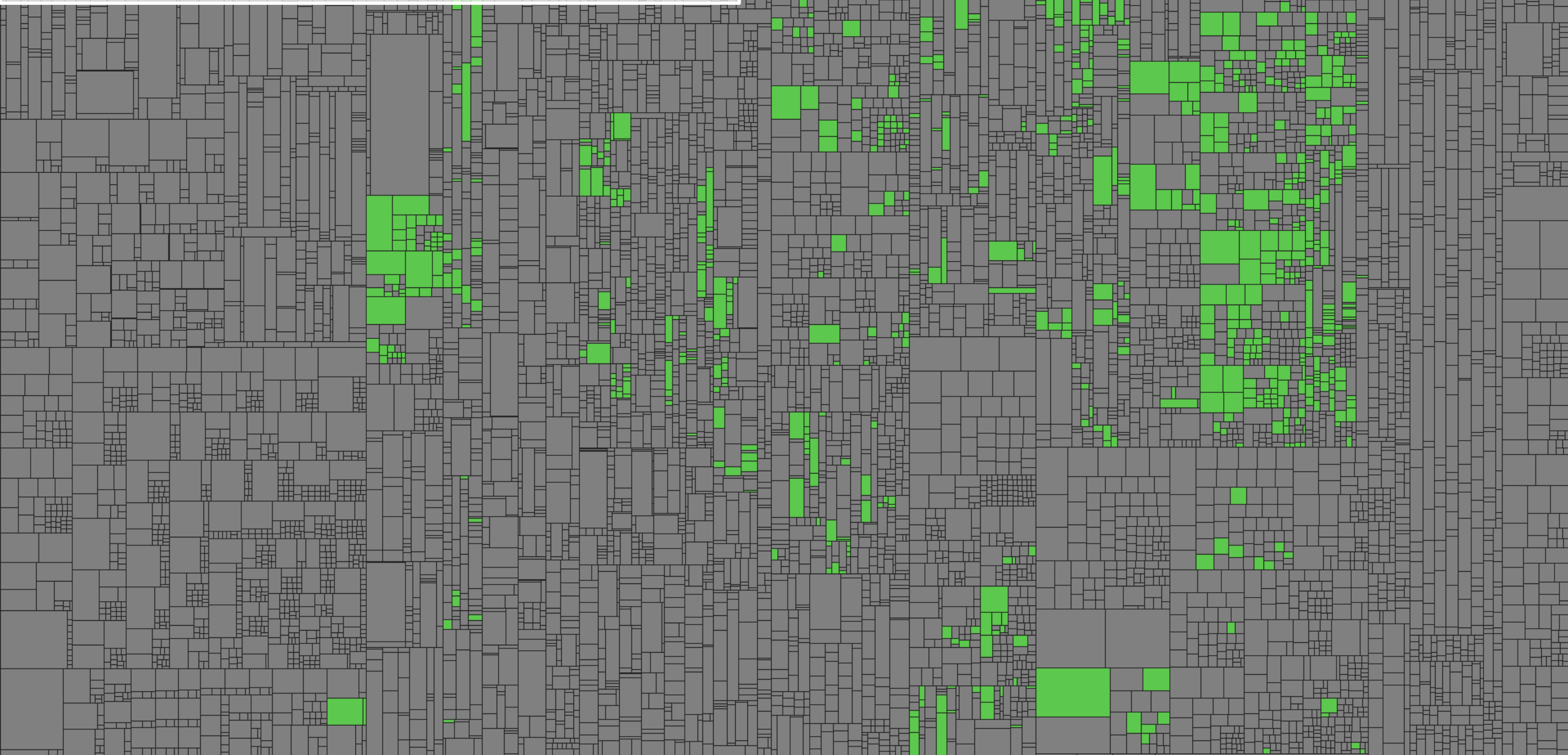
Coverage over Time ?



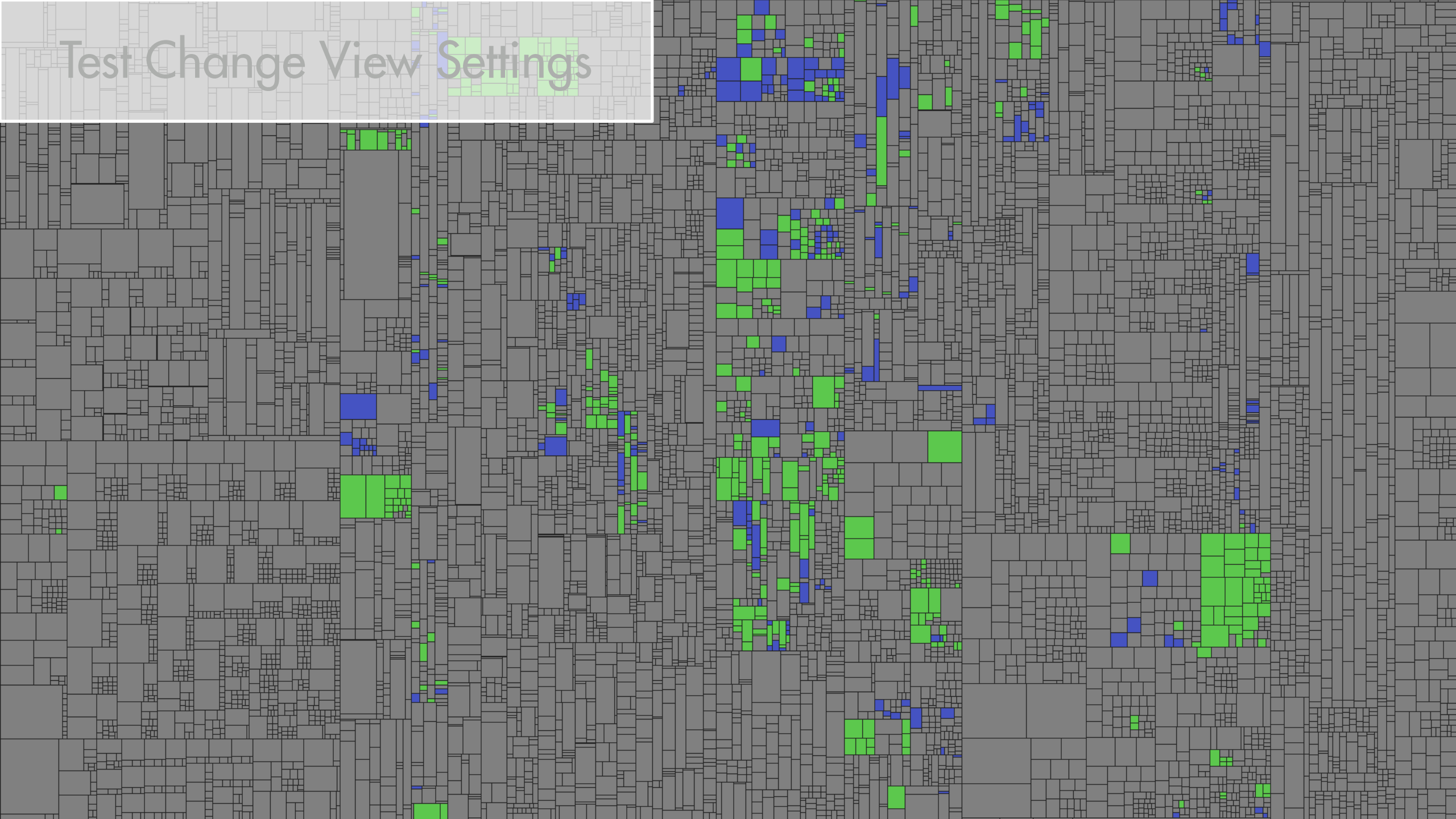
Results for Test Query & Budget Restriction

Relative Coverage: 0%, Selected Tests: 0 out of 236 (0%)

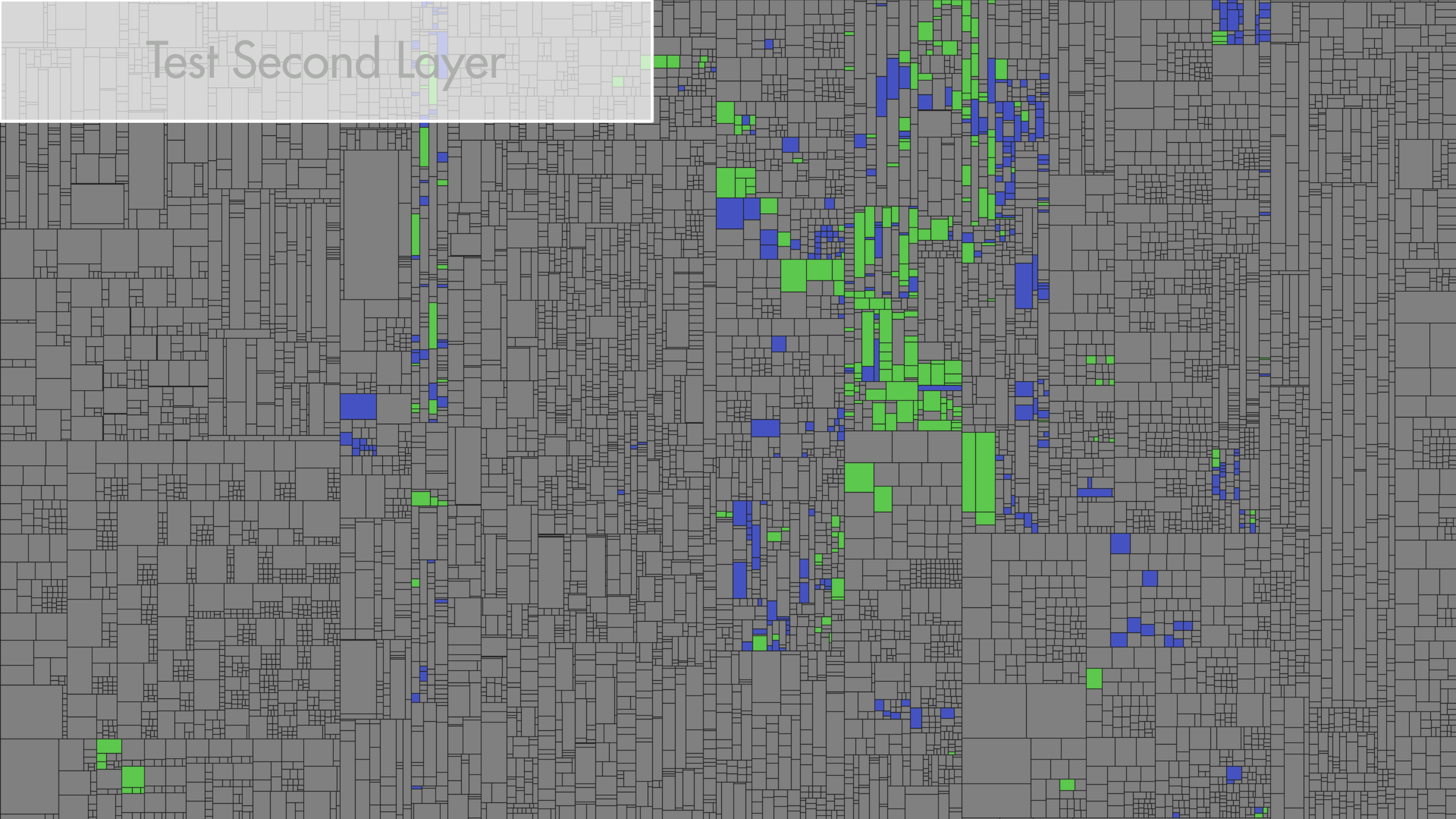
Test Create and Modify Selection



Test Change View Settings

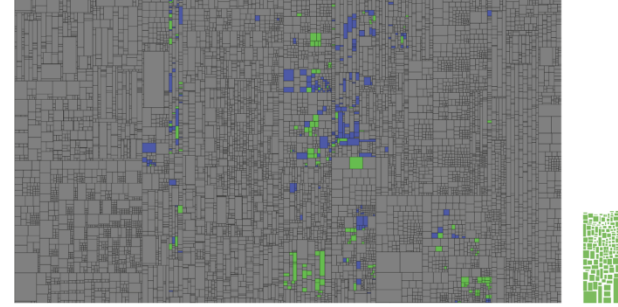
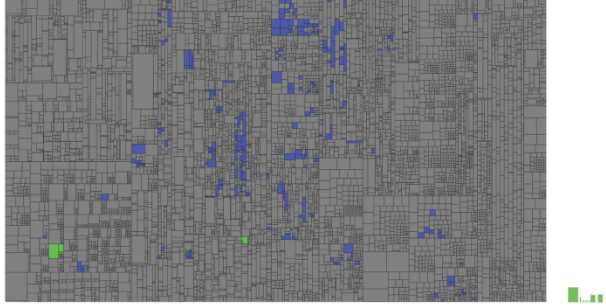
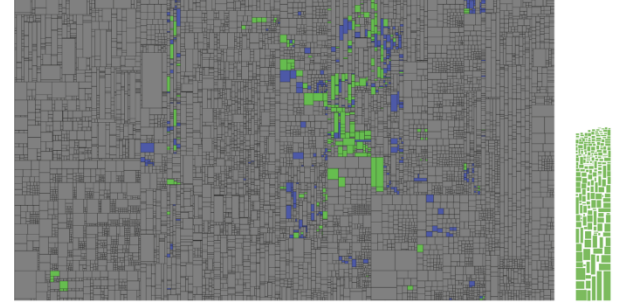
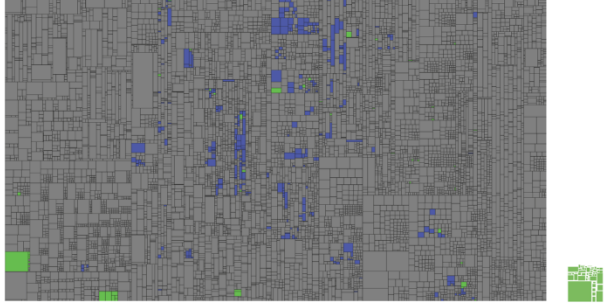
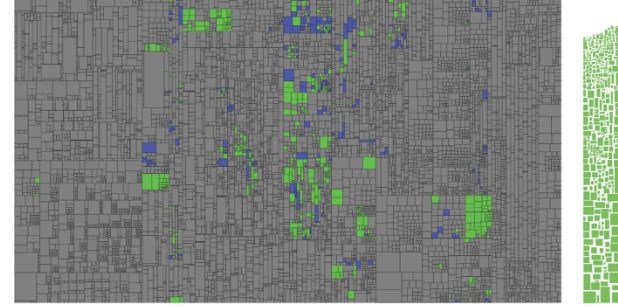
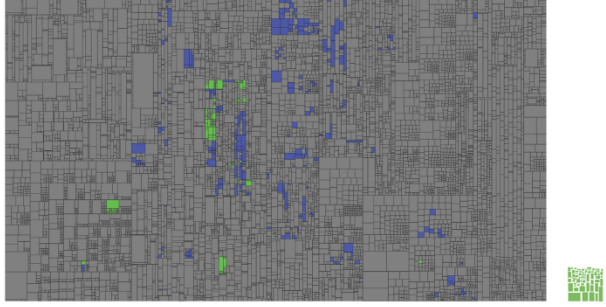
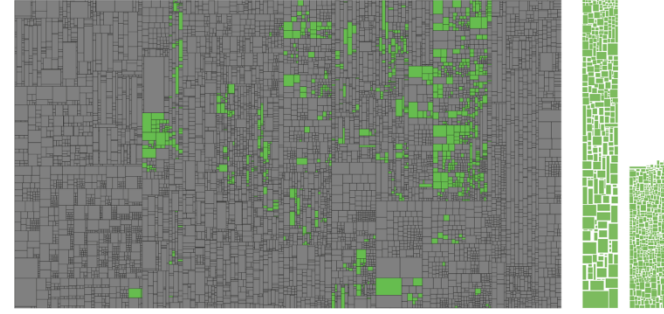
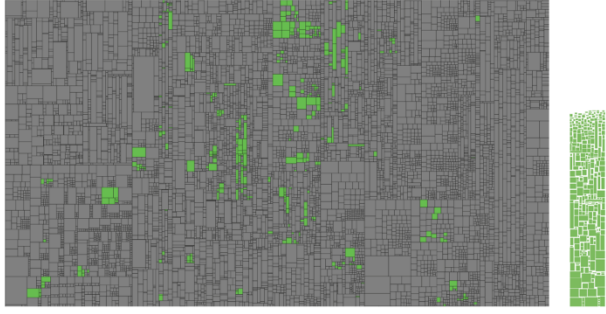


Test Second Layer

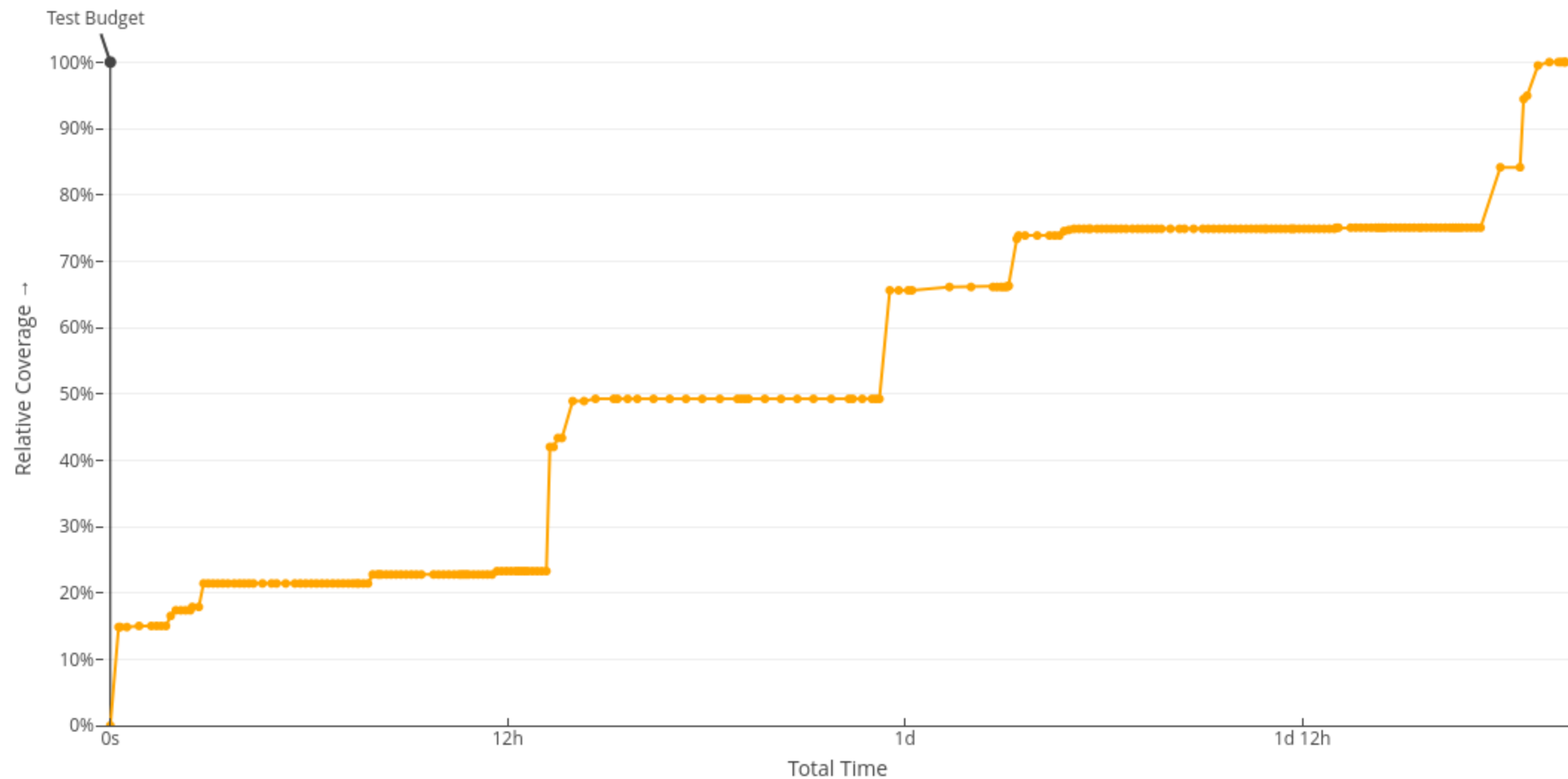


Test Save Image





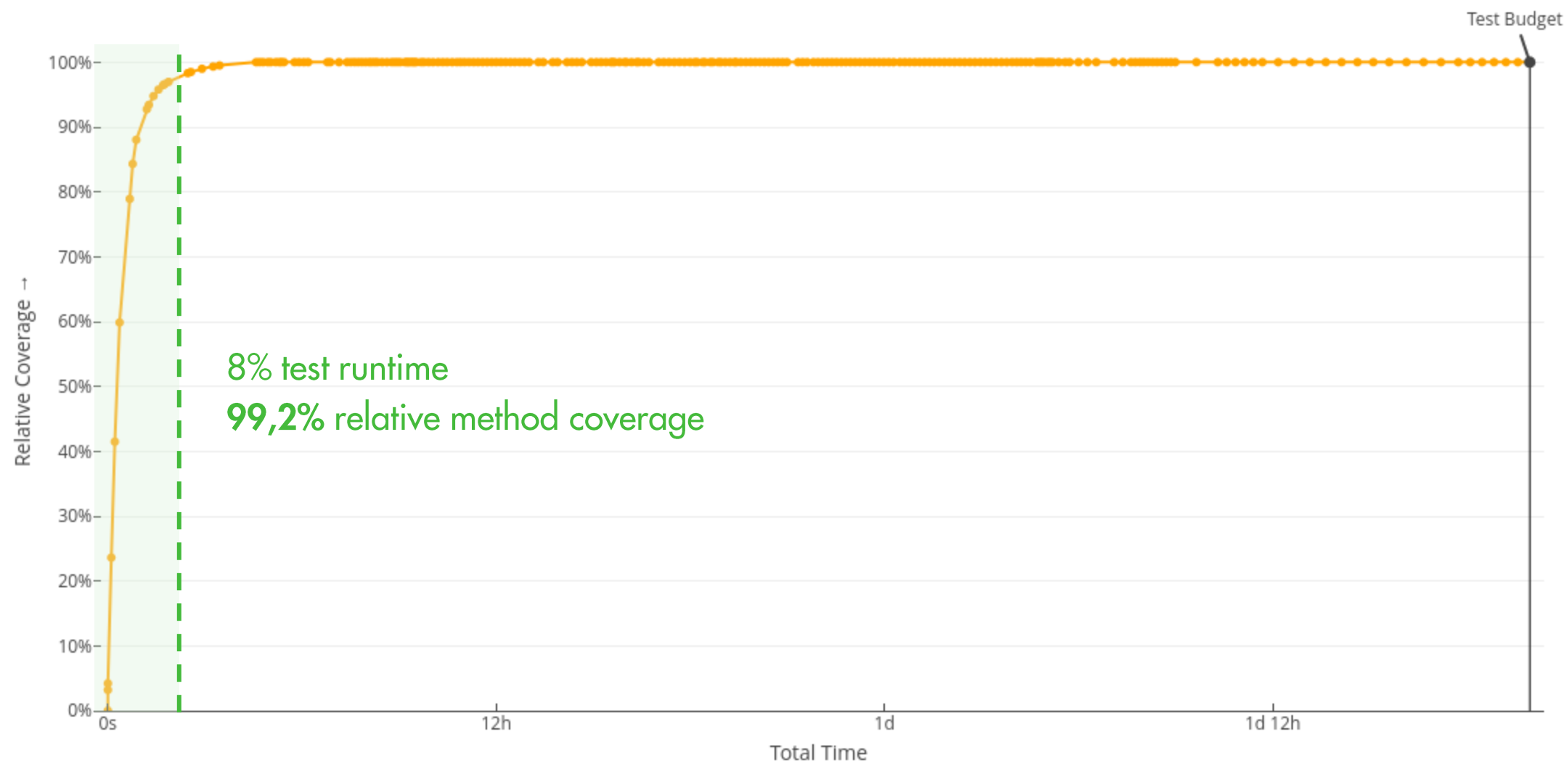
Coverage over Time ?



Results for Test Query & Budget Restriction

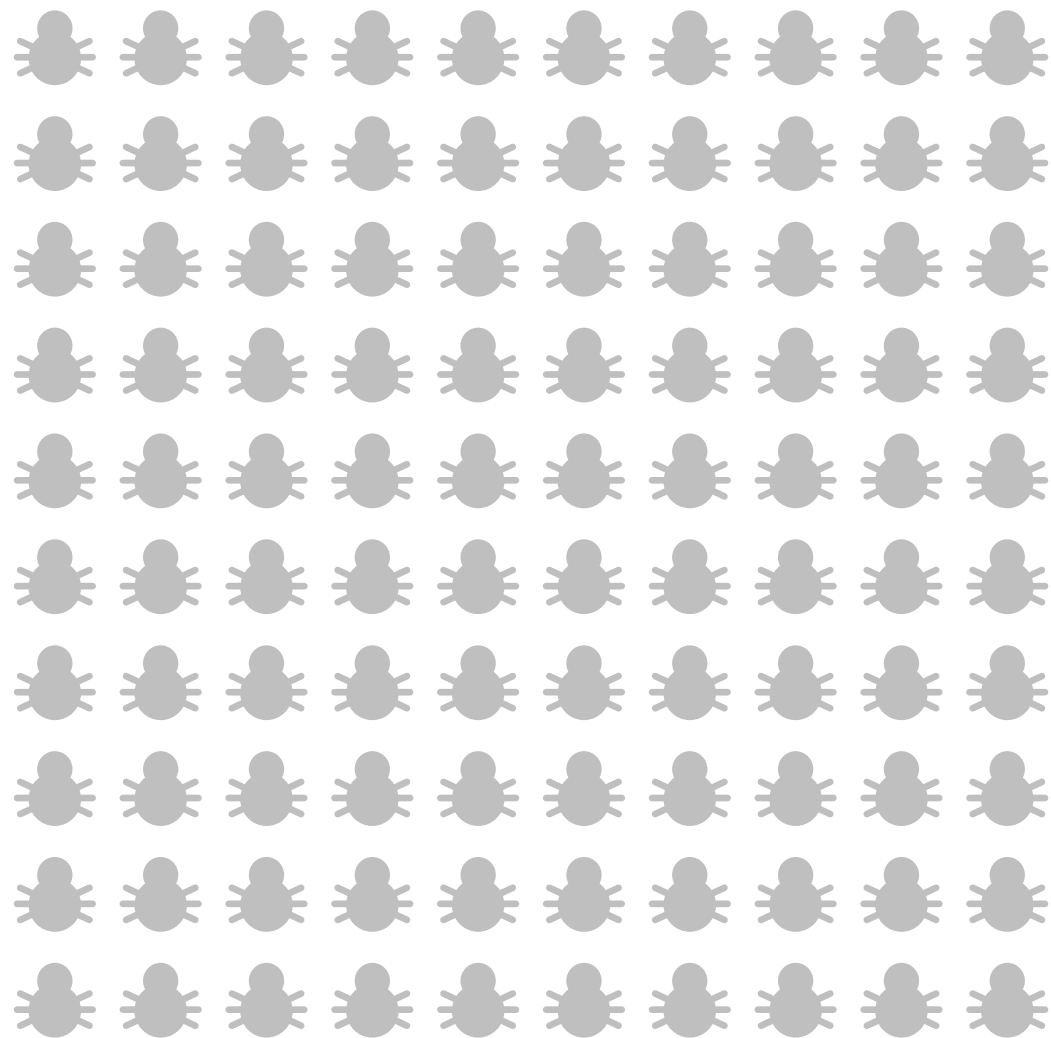
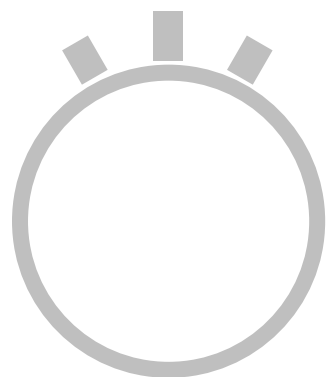
Relative Coverage: 0%, Selected Tests: 0 out of 236 (0%)

Coverage over Time ?

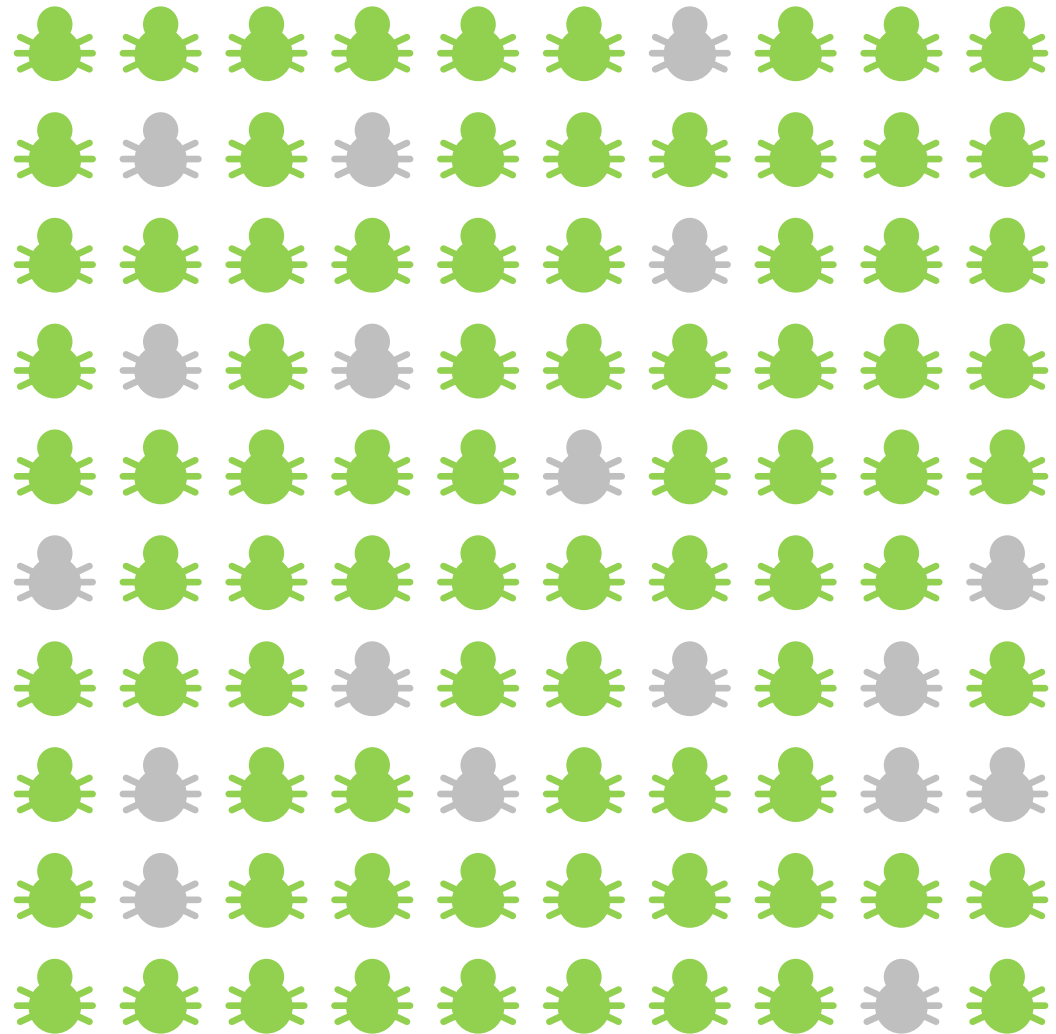


Results for Test Query & Budget Restriction

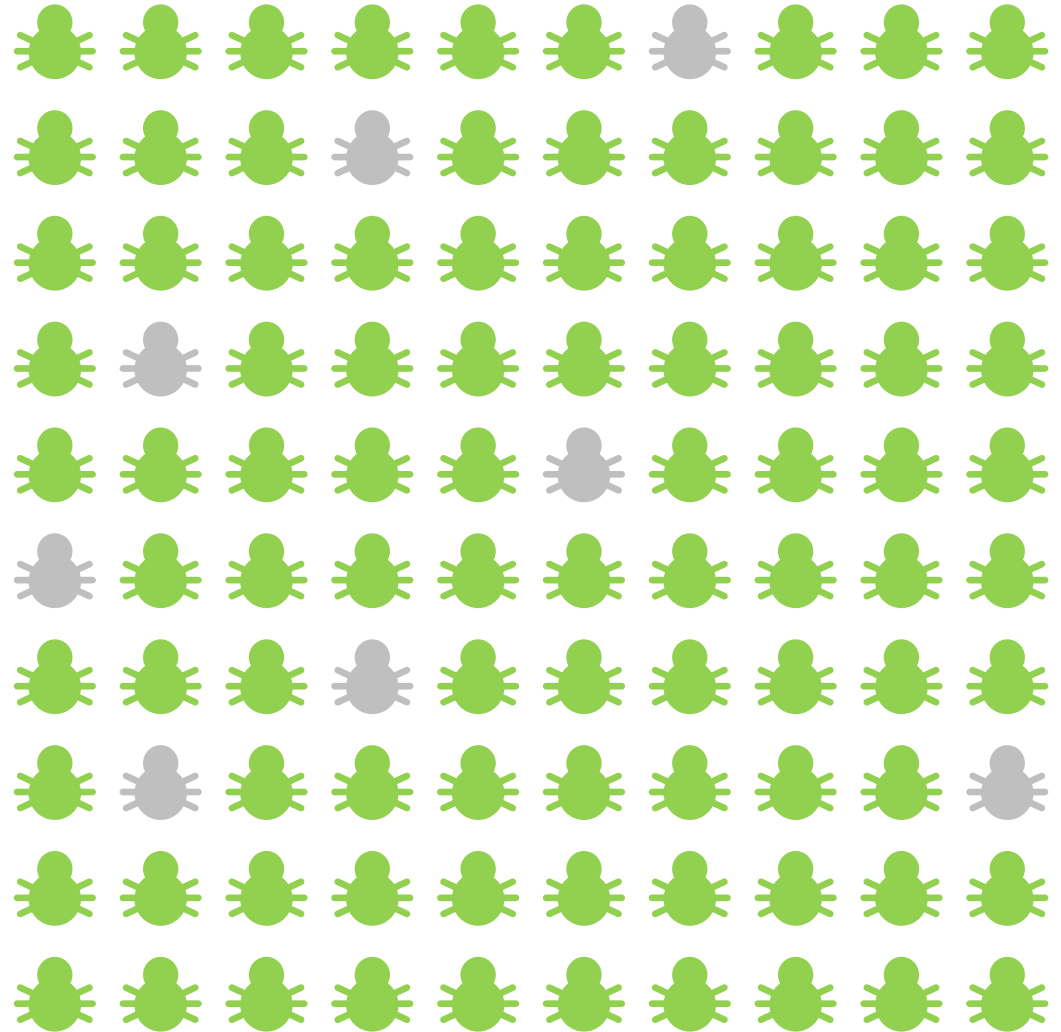
Relative Coverage: 100%, Selected Tests: 236 out of 236 (100%)



Pareto Optimization



Pareto Optimization



Industry Example

Before: nightly „Re-run all“

Feedback late next day



With only 5% test
time budget, we find
**70% of failing
commits**



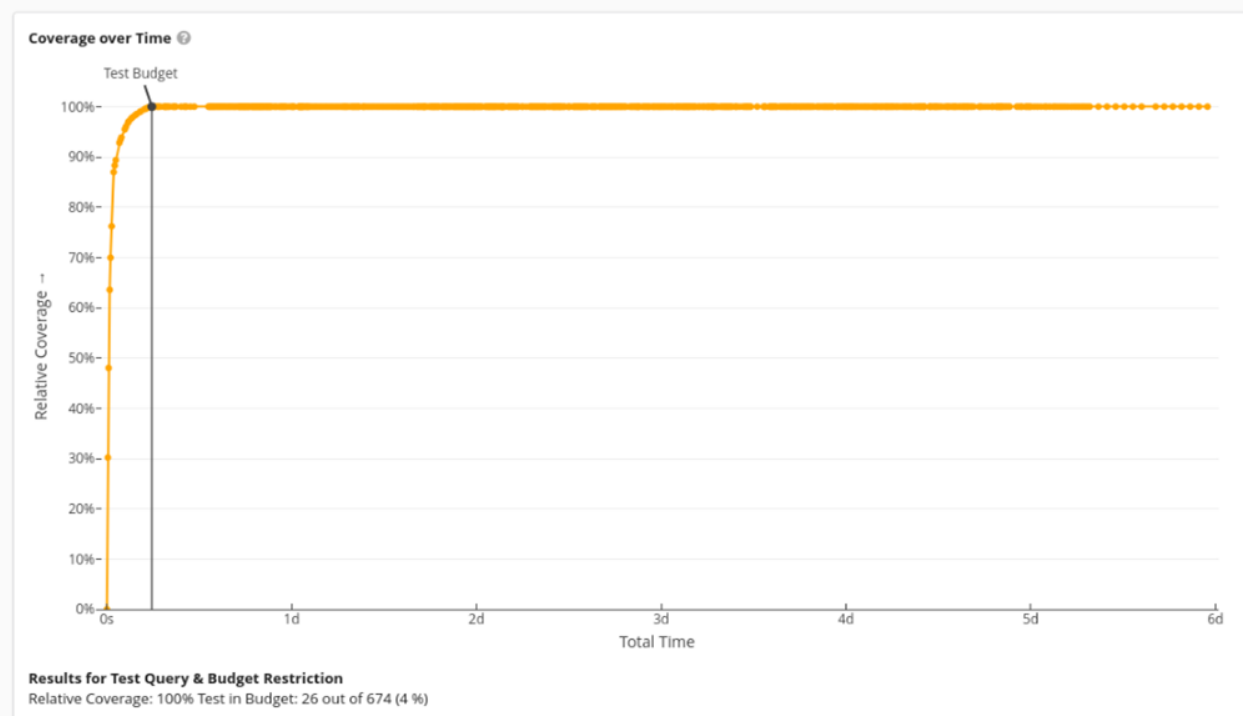
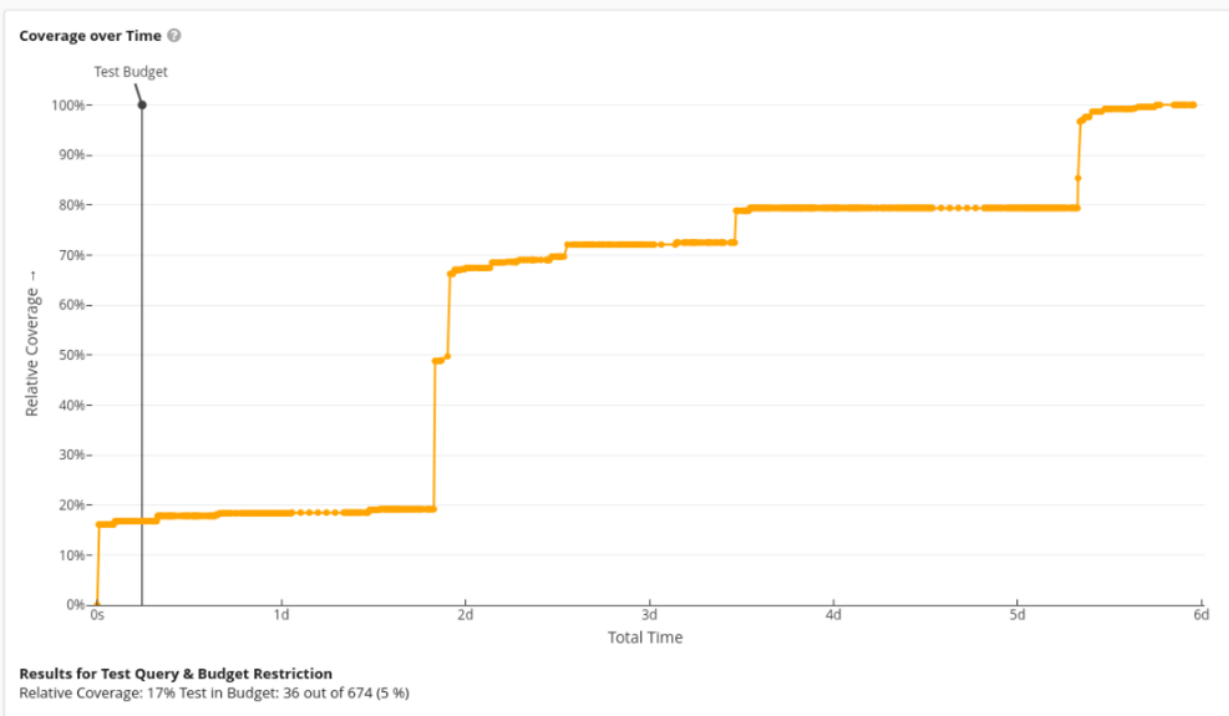
During the day 1 h test budget or „pareto test list“



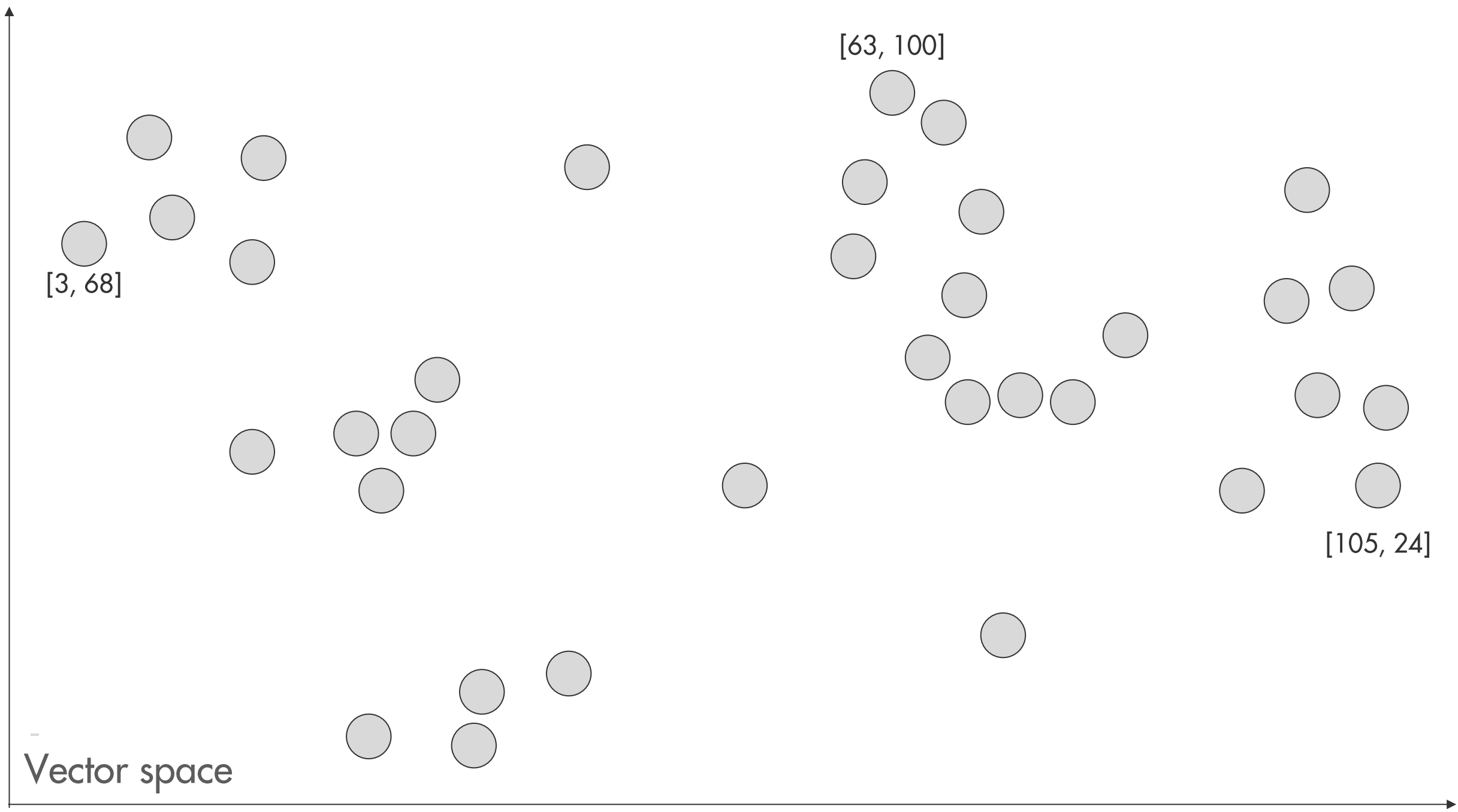
Nightly: „Re-run all“

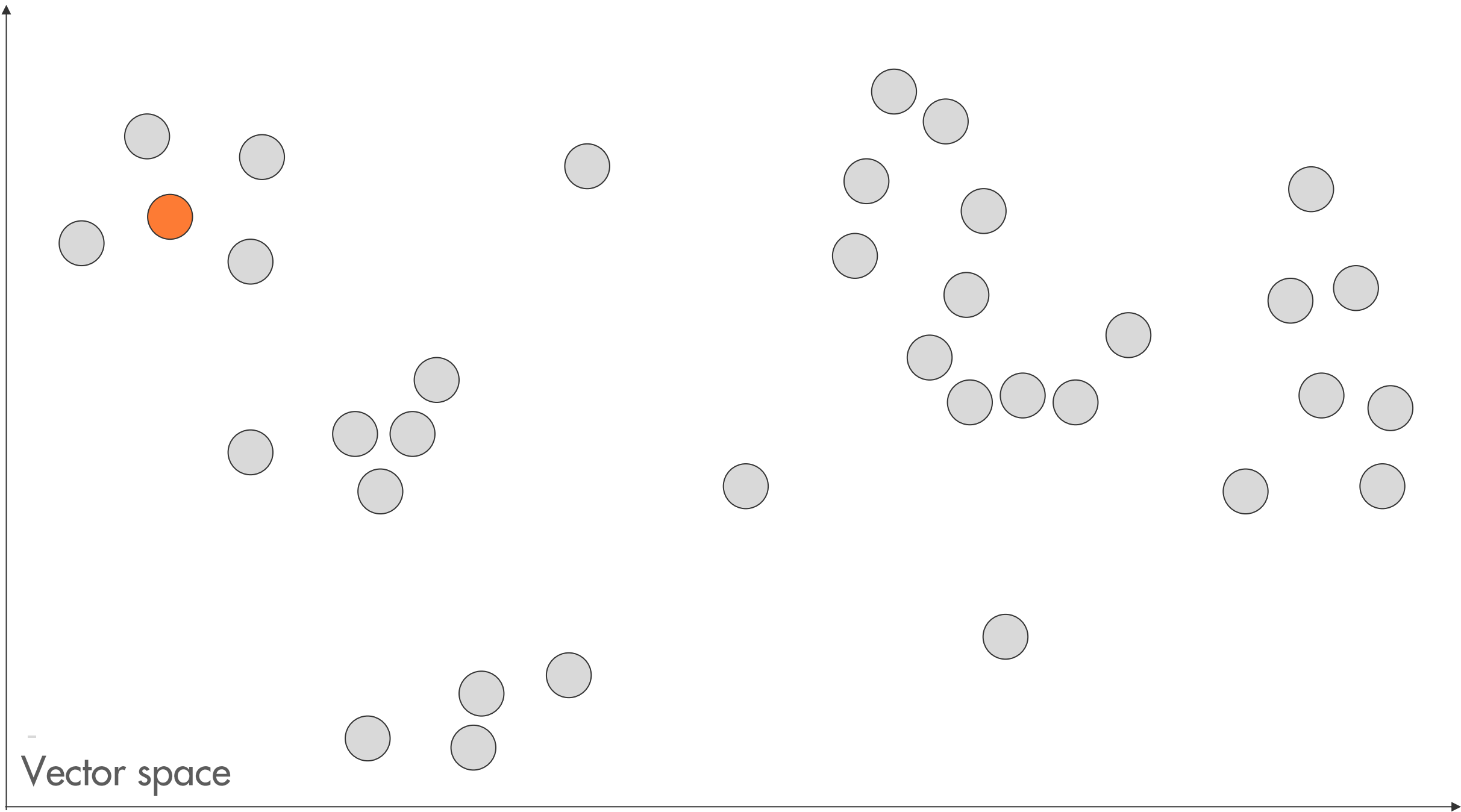


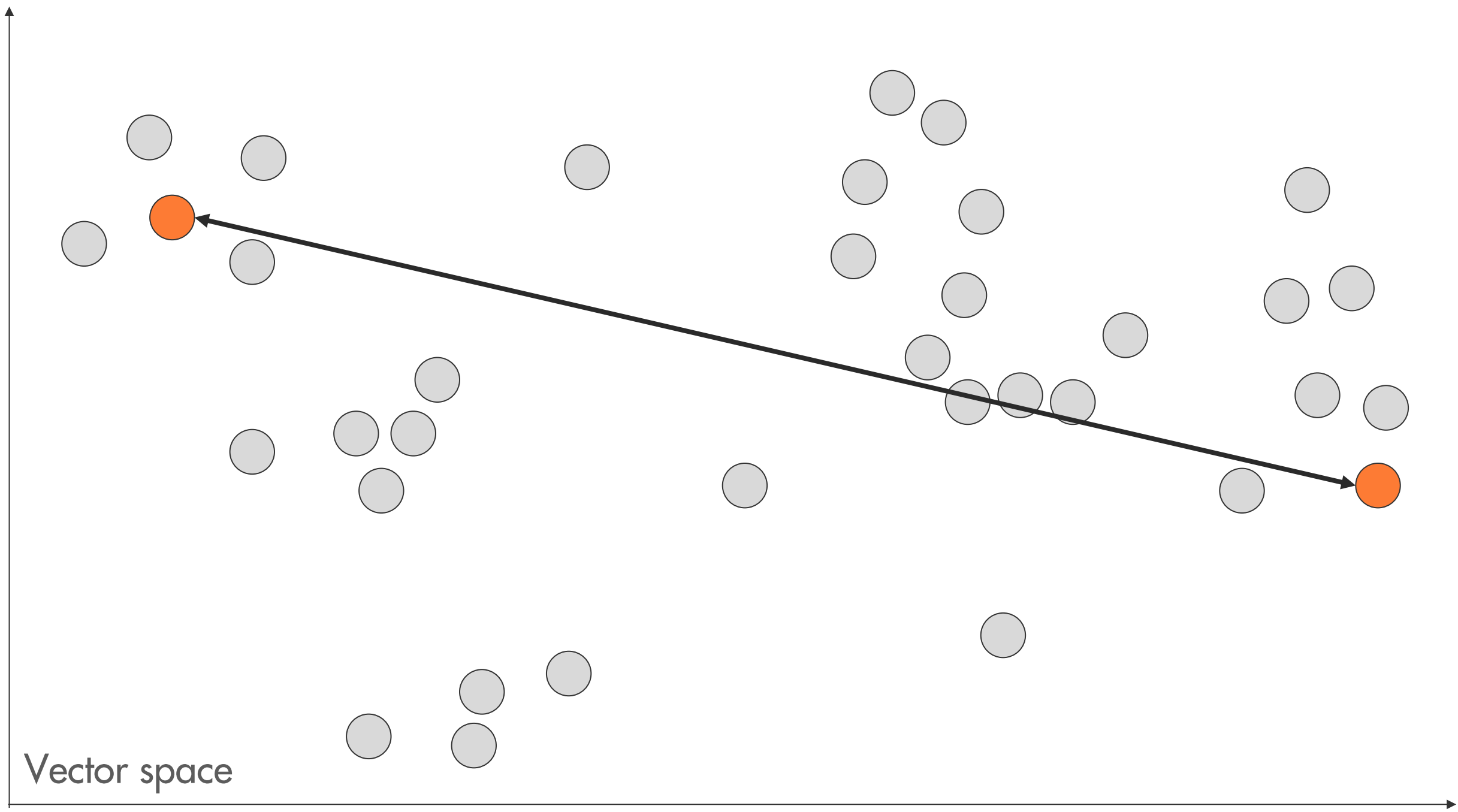
How about
without Test Coverage?



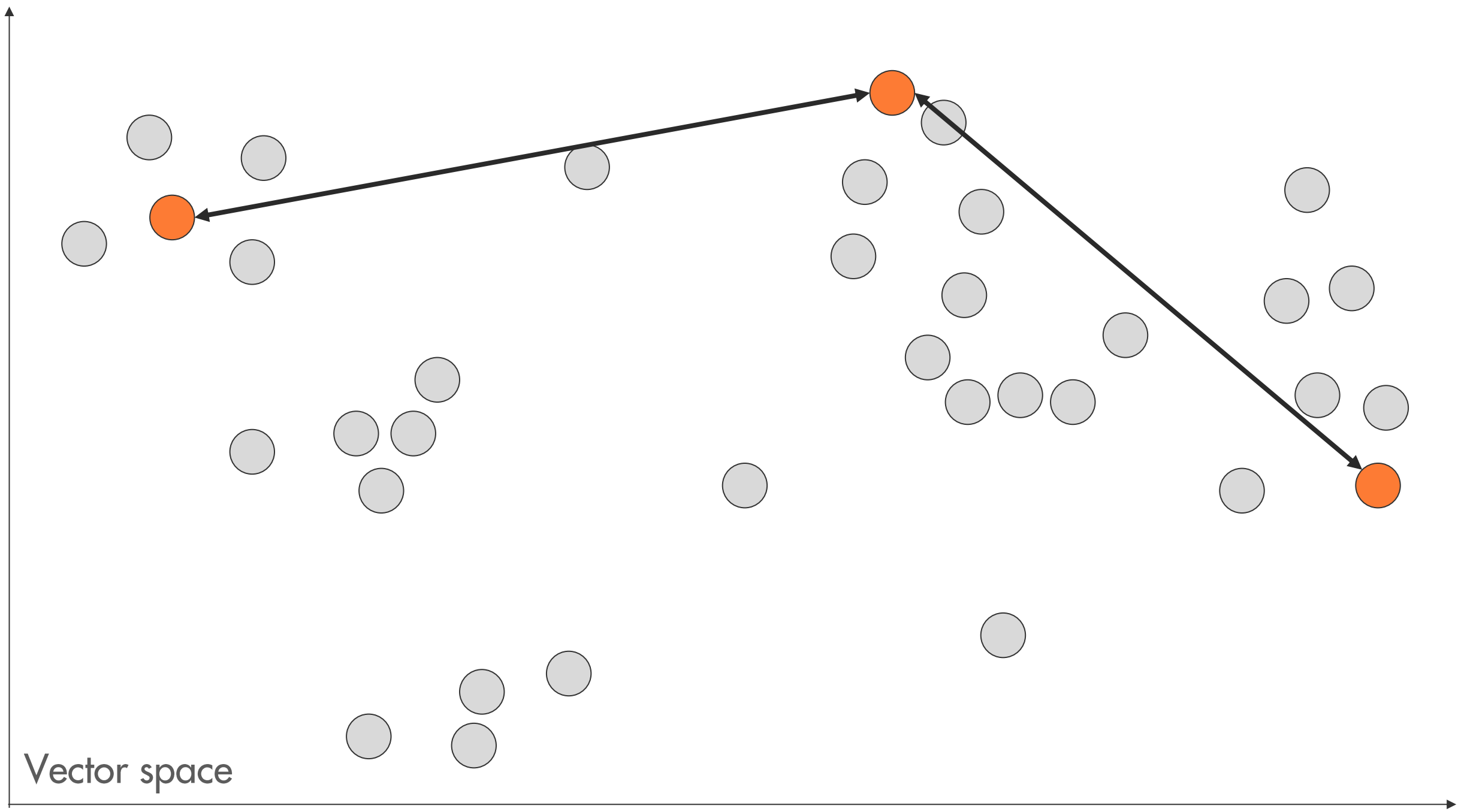
Idea: Tests with **dissimilar content**

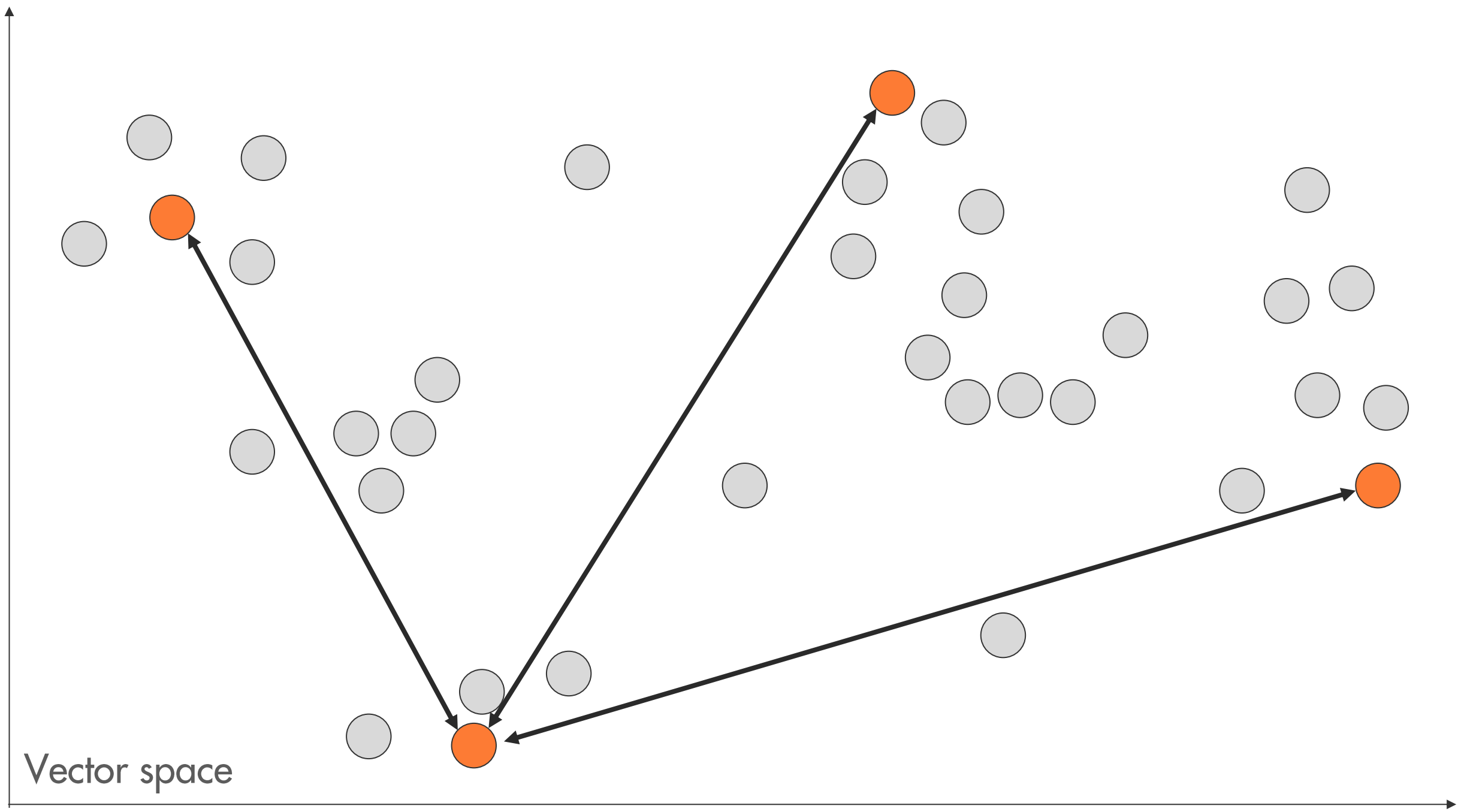






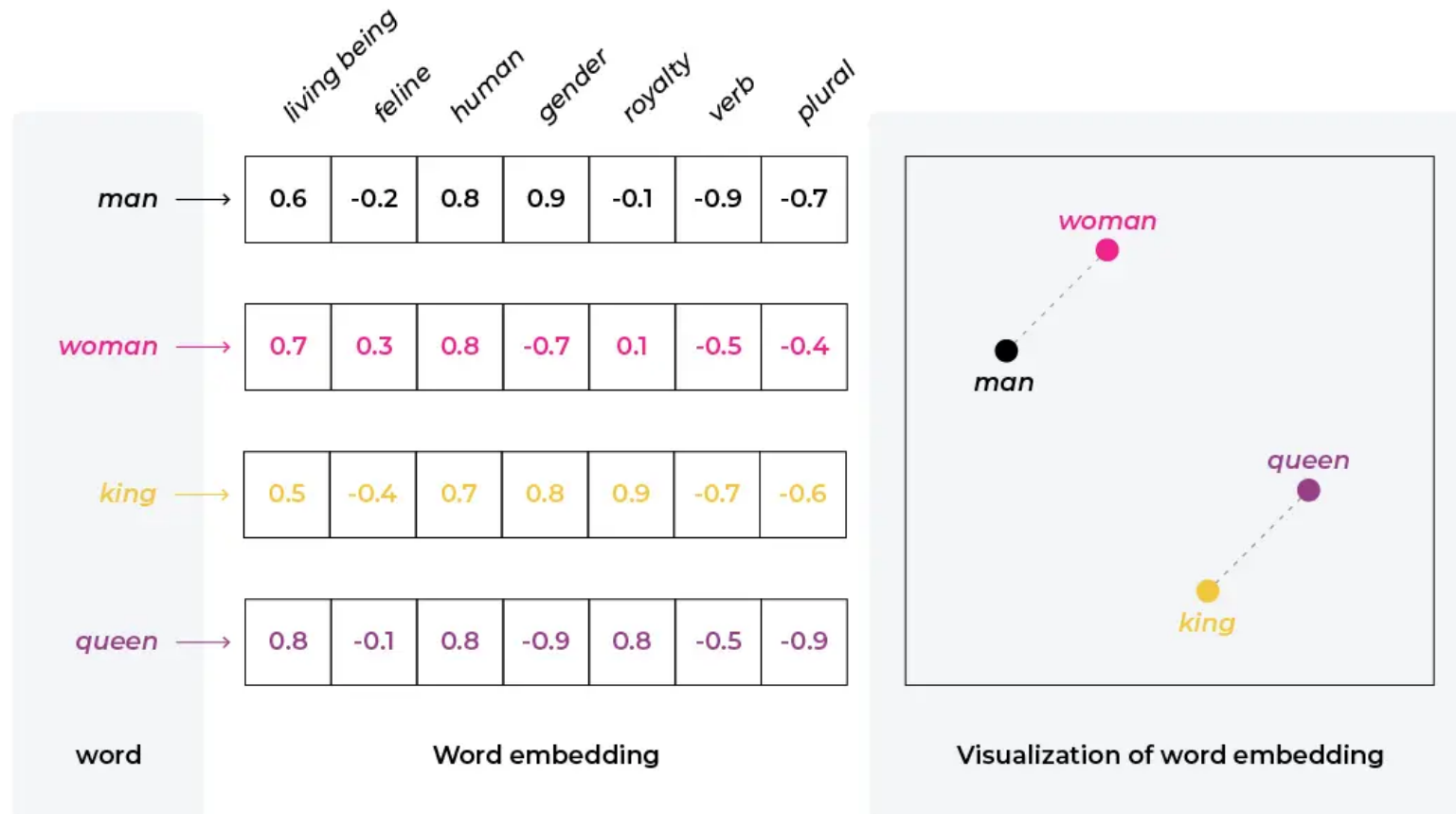
Vector space



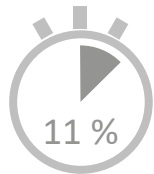
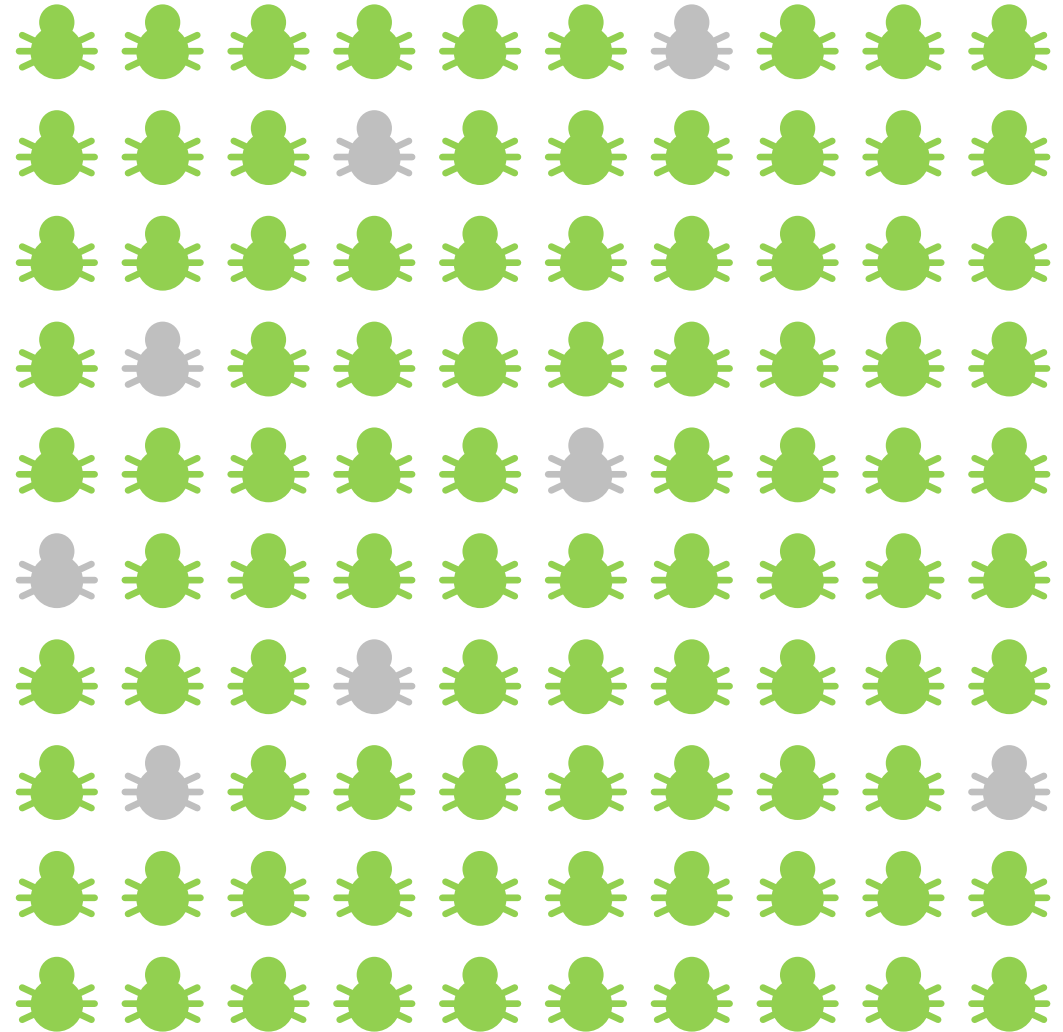
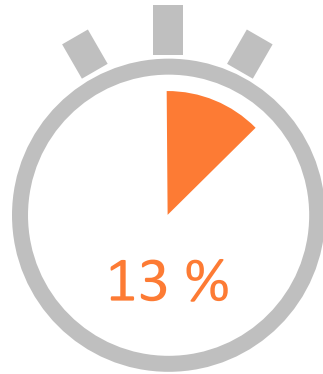


Vector space

Large Language Models (AI)

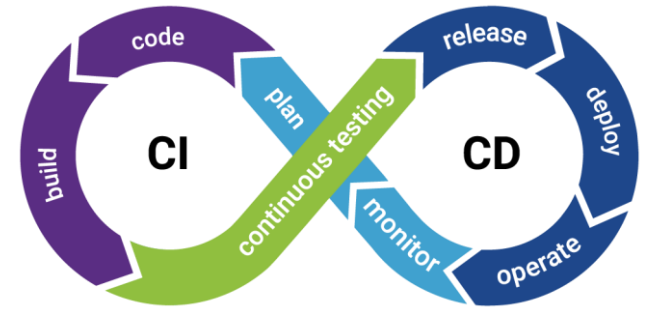


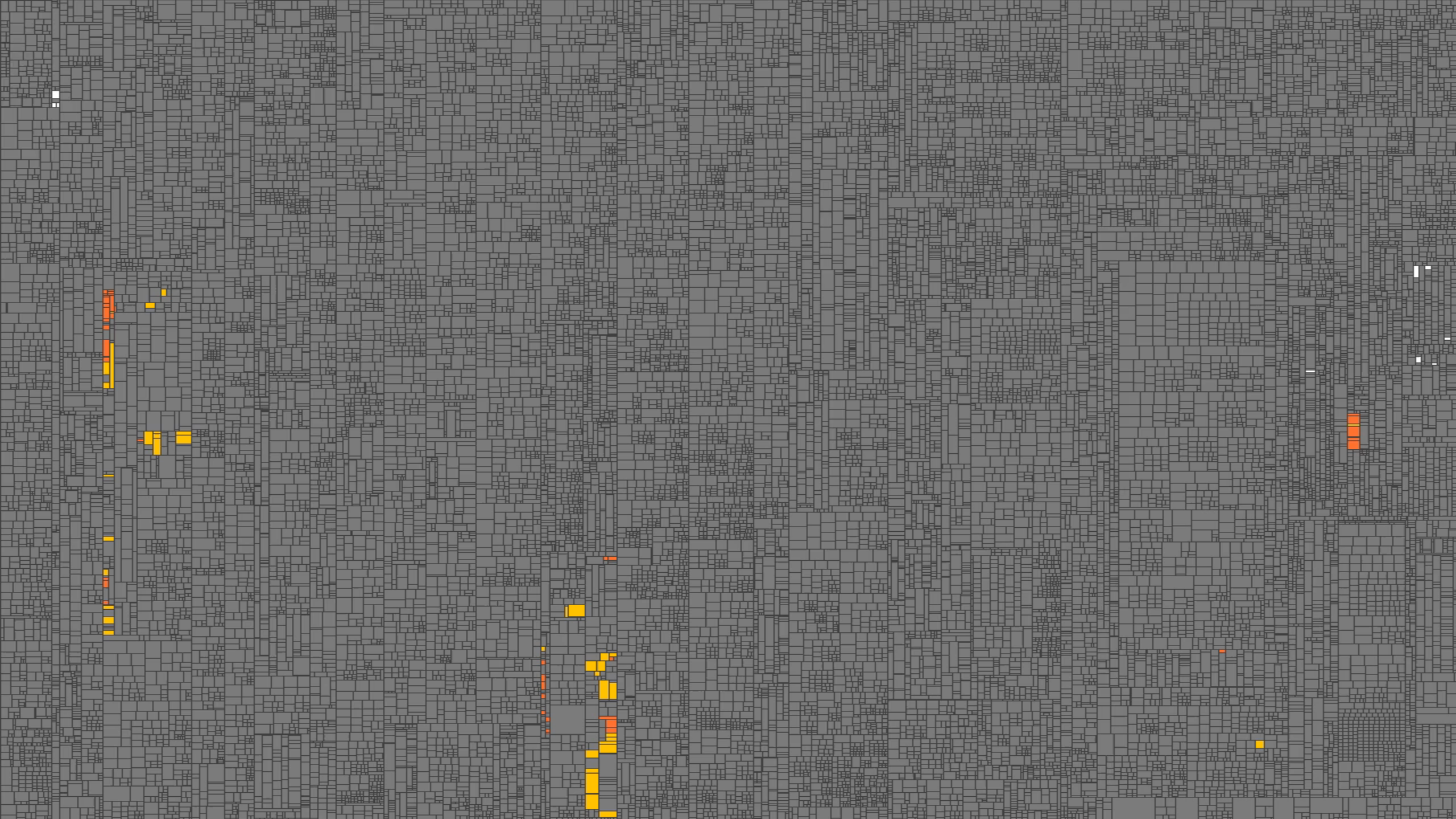
AI Test Clustering



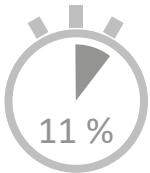
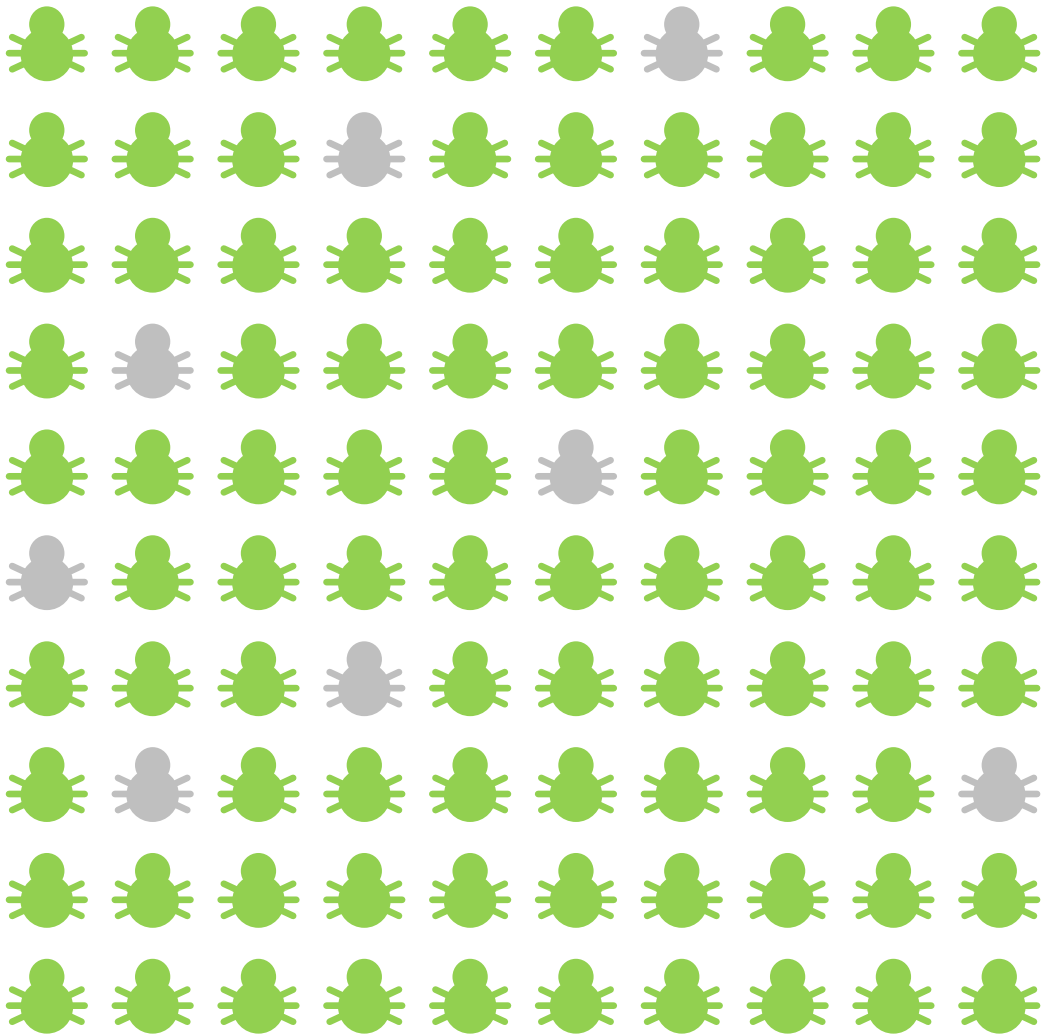
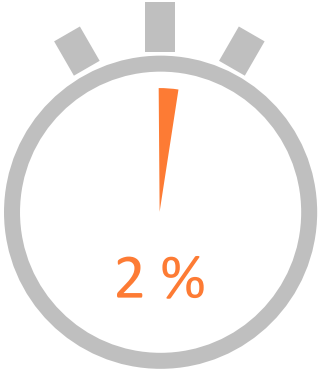
Pareto
Optimization

Test Suggestions for Continuous Integration





Test Impact Analysis



Pareto
Optimization



AI Test
Clustering

Industry Example



Before

Test runtimes of 3-12h through large parameter combination space.



Goal

Test feedback from the CI in less than 10 minutes.

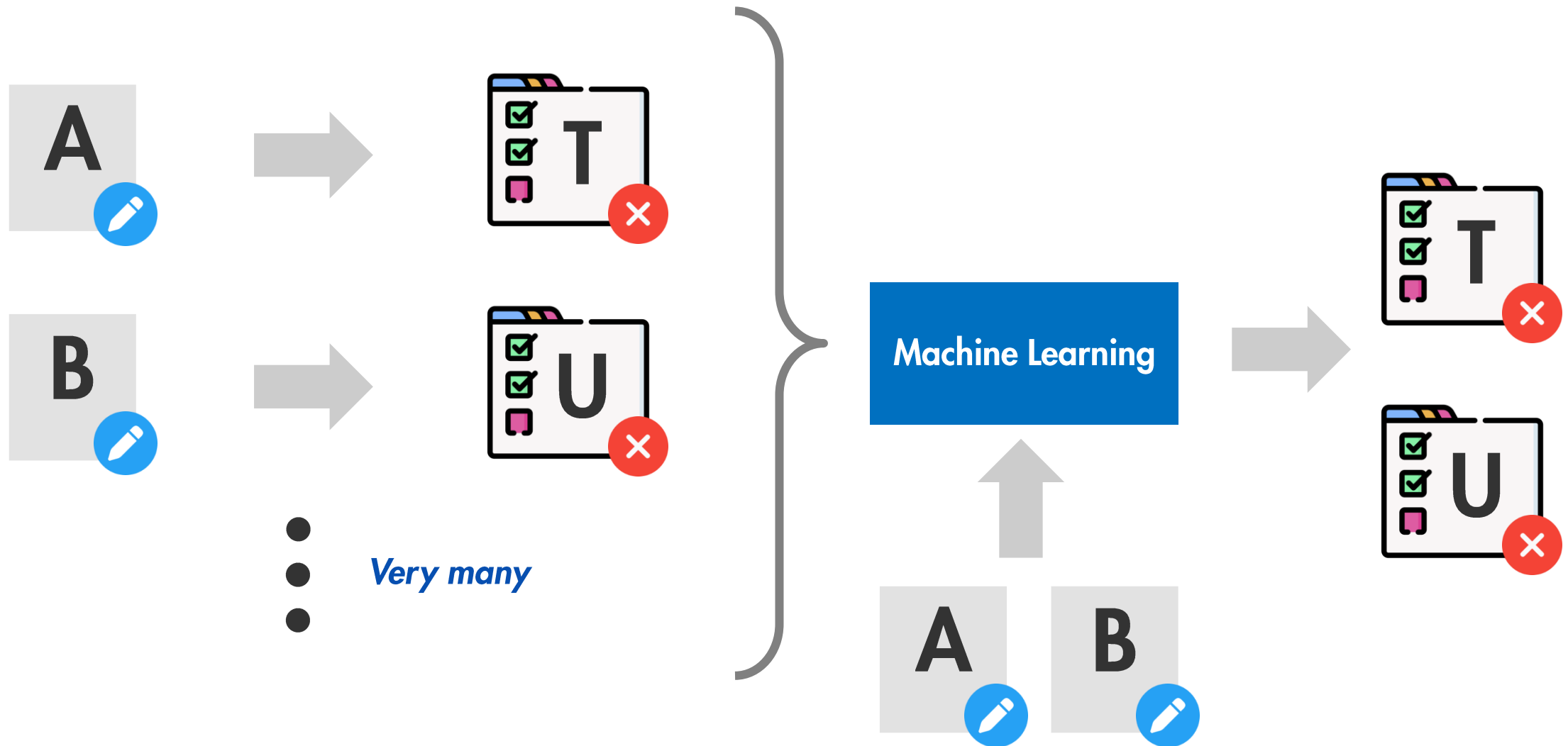


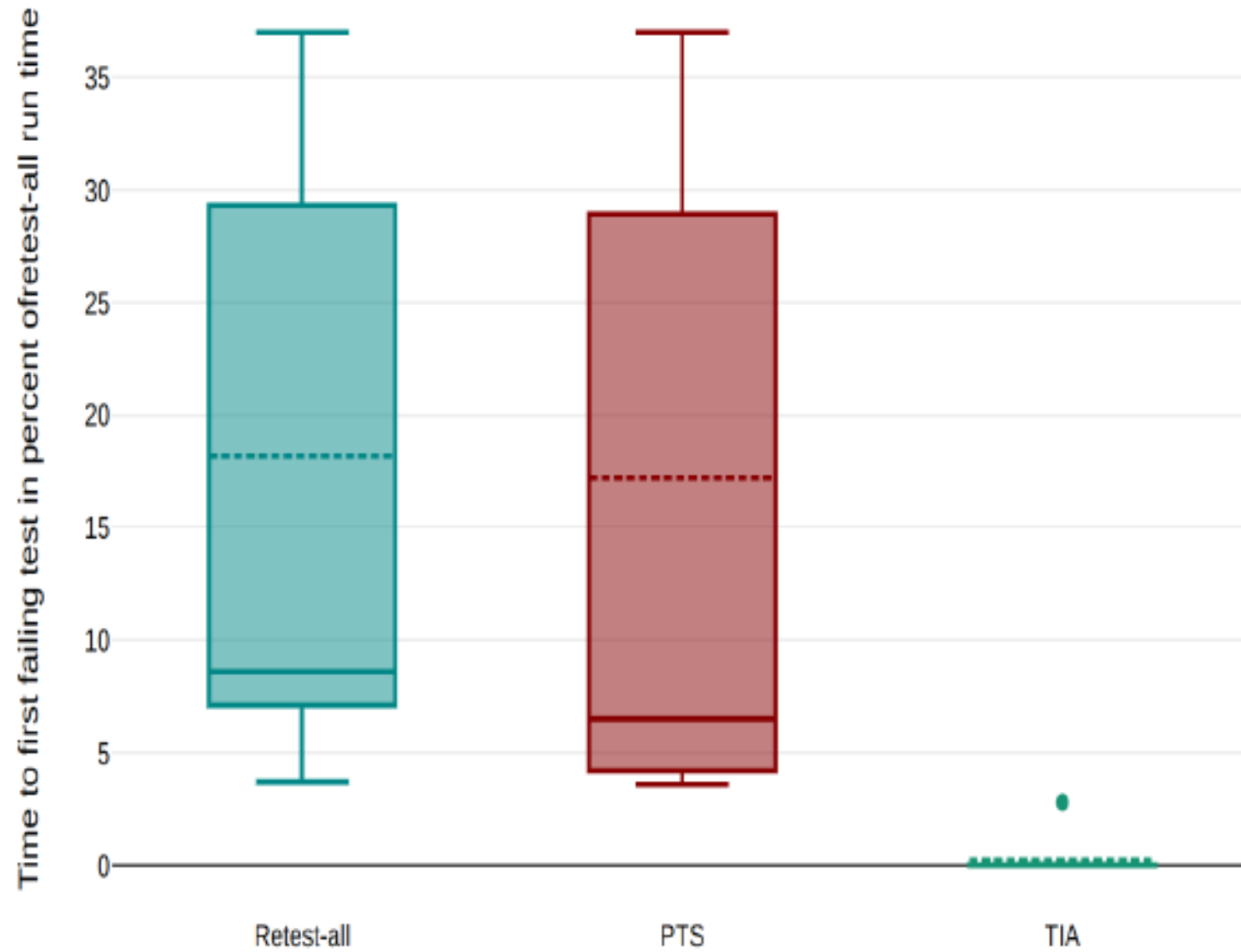
With TIA

Since the introduction of test impact analysis years ago, test feedback always arrives within 10 minutes, although the number of tests increased 57% since.

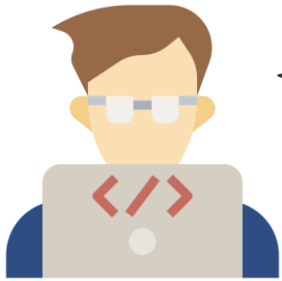
How about
without Test Coverage?

Predictive Test Selection



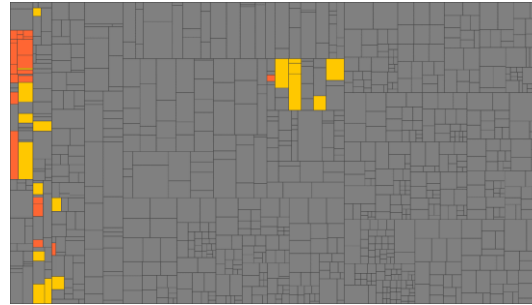


Continuous Integration



We changed **Login, Accounting
und Search.**

(User Story, Pull Request, Release, ...)



Google

test cases for login



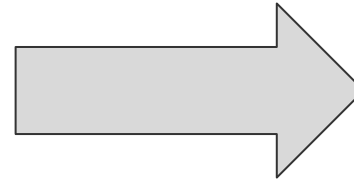
Google

test cases for accounting



Google

test cases for search



Tests the affected functionality

```
125 - try (LoggingUtils.LoggingResources ignored = initializeFallbackLogging(options, delayedLogger)) {
126 -     delayedLogger.errorAndStdErr(
127 -         e.getMessage() + " The application should start up normally, but NO coverage will be collected!",
128 -         e);
129 -     attemptLogAndThrow(delayedLogger);
130 + try (LoggingUtils.LoggingResources ignored = initializeFallbackLogging(options)) {
131 +     String message = e.getMessage() + " The application should start up normally, but NO coverage will be collected!";
132 +     logAndPrintError(e, message);
133 +     throw e;
134 + }
135
136
137
138
139 - initializeLogging(
140 -     Logger logger =
141 -     delayedLogger.l
142 + initializeLoggin
143 + HttpUtils.setSh
144 + return agentOpt
145
146
147
148
149 - private static void att
150 - // We perform ac
151 - // ensure the c
```

Code-changes

Search query

"Search and login and list and user and ..."

Similarity Scoring



Tests to execute

Manual test



Test Steps

automated



Test Code

Dokument database

Geänderter Code

```
43
42     LOG.debug("Debit Transaction from Account: Account Updated.");
41
40 }
39
38 /*
37  * Transfer amount between two accounts
36  *
35  * Accounts should be full objects. With that said, the objects are fetched to make sure.
34  *
33  * AccountTransaction can be a partial object but must contain the transaction amount.
32  */
31 public void transfer(Account fromAccount, Account toAccount, AccountTransaction accountTransaction) {
30
29     LOG.debug("Transfer Between Accounts:");
28
27     // From Transaction
26     fromAccount = this.getAccountById(fromAccount.getId());
25     AccountTransaction fromAt = new AccountTransaction();
24     fromAt.setAmount(accountTransaction.getAmount());
23     fromAt.setTransactionDate(accountTransaction.getTransactionDate());
22     fromAt.setDescription("Transfer to Account (" + toAccount.getAccountNumber() + ")");
21     fromAt.setTransactionType(transactionTypeRepository.findByCode(Constants.ACCT_TRAN_TYPE_XFER_CODE));
20     debitTransaction(fromAccount, fromAt);
19
18     // To Transaction
17     toAccount = this.getAccountById(toAccount.getId());
16     AccountTransaction toAt = new AccountTransaction();
15     toAt.setAmount(accountTransaction.getAmount());
14     toAt.setTransactionDate(accountTransaction.getTransactionDate());
13     toAt.setDescription("Transfer from Account (" + fromAccount.getAccountNumber() + ")");
12     toAt.setTransactionType(transactionTypeRepository.findByCode(Constants.ACCT_TRAN_TYPE_XFER_CODE));
11     creditTransaction(toAccount, toAt);
10
9     LOG.debug("Transfer Between Accounts: Accounts Updated.");
8 }
7
6 /*
5  * Get Account object by Id
4  */
3 public Account getAccountById(Long id) {
2     Optional<Account> act = accountRepository.findById(id);
```

Digibank

Geänderter Code

Code Test

```

43     LOG.debug("Debit Transaction from Account: Account Updated.");
42 }
41
40 }
39
38 /*
37  * Transfer amount between two accounts
36  *
35  * Accounts should be full objects. With that said, the objects are f
34  *
33  * AccountTransaction can be a partial object but must contain the tr
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31 public void transfer(Account fromAccount, Account toAccount, AccountT
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29     LOG.debug("Transfer Between Accounts:");
28
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26     fromAccount = this.getAccountById(fromAccount.getId());
25     AccountTransaction fromAt = new AccountTransaction();
24     fromAt.setAmount(accountTransaction.getAmount());
23     fromAt.setTransactionDate(accountTransaction.getTransactionDate());
22     fromAt.setDescription("Transfer to Account (" + toAccount.getAccoun
21     fromAt.setTransactionType(transactionTypeRepository.findByCode(Cons
20     debitTransaction(fromAccount, fromAt);
19
18     // To Transaction
17     toAccount = this.getAccountById(toAccount.getId());
16     AccountTransaction toAt = new AccountTransaction();
15     toAt.setAmount(accountTransaction.getAmount());
14     toAt.setTransactionDate(accountTransaction.getTransactionDate());
13     toAt.setDescription("Transfer from Account (" + fromAccount.getAcco
12     toAt.setTransactionType(transactionTypeRepository.findByCode(Consta
11     creditTransaction(toAccount, toAt);
10
9     LOG.debug("Transfer Between Accounts: Accounts Updated.");
8 }
7
6 /*
5  * Get Account object by Id
4  */
3 public Account getAccountById(Long id) {
2     Optional<Account> act = accountRepository.findById(id);

```

```

20 public class AccountServiceTest extends IntegrationTest {
19
18     @Test
17     public void transferBetweenSameAccountShouldNotBePossible() {
16         Account account = new Account("savings", AccountType.SAVING
15         AccountService service = new AccountService();
14         AccountTransaction transaction =
13         | MockAccountTransaction.createForAmount(100);
12         service.transfer(account, account, transaction);
11
10         assertThat(this.getErrors()).contains(
9         | new Error("Transfer between same account is not possible.
8
7         Account databaseAccount = this.findAccountById(account.getId()
6         AccountTransactionList transactionList = this.getTransaction
5         assertThat(transactionList).isEmpty()
4     }
3
2 }
1
21

```

Geänderter Code

Cucumber Test

```
43 LOG.debug("Debit Transaction from Account: Account Updated.");
42 }
41
40 }
39
38 /*
37  * Transfer amount between two accounts
36  *
35  * Accounts should be full objects. With that said, the objects are f
34  *
33  * AccountTransaction can be a partial object but must contain the tr
32  */
31 public void transfer(Account fromAccount, Account toAccount, AccountT
30
29 LOG.debug("Transfer Between Accounts:");
28
27 // From Transaction
26 fromAccount = this.getAccountById(fromAccount.getId());
25 AccountTransaction fromAt = new AccountTransaction();
24 fromAt.setAmount(accountTransaction.getAmount());
23 fromAt.setTransactionDate(accountTransaction.getTransactionDate());
22 fromAt.setDescription("Transfer to Account (" + toAccount.getAccount
21 fromAt.setTransactionType(transactionTypeRepository.findByCode(Cons
20 debitTransaction(fromAccount, fromAt);
19
18 // To Transaction
17 toAccount = this.getAccountById(toAccount.getId());
16 AccountTransaction toAt = new AccountTransaction();
15 toAt.setAmount(accountTransaction.getAmount());
14 toAt.setTransactionDate(accountTransaction.getTransactionDate());
13 toAt.setDescription("Transfer from Account (" + fromAccount.getAccount
12 toAt.setTransactionType(transactionTypeRepository.findByCode(Consta
11 creditTransaction(toAccount, toAt);
10
9 LOG.debug("Transfer Between Accounts: Accounts Updated.");
8 }
7
6
5 /*
4  * Get Account object by Id
3  */
2 public Account getAccountById(Long id) {
1 Optional<Account> act = accountRepository.findById(id);
```

```
22 @ui @account @savings
21 Feature: Transfer Money (UI)
20 As a DigitalBank user
19 I want to transfer money between accounts
18 So I can change how much is in each account
17
16
15 @negative
14 Scenario: Transfer between the same account is not possible
13 Given Carleen is logged into the application with Carleen6231@gmail.com
12 And they attempt to open a new 'Savings Account'
11 When Carleen enters 'Tangerine Savings' into the Account Name field
10 And they select 'Individual' from the Ownership radio button
9 And they select 'Money Market' from the Account Type radio button
8 And they enter '2500' into the Money Market Initial Deposit field
7 And they click the Submit button
6 And they attempt to transfer money
5 When Carleen selects account number '1' as the from account
4 And they select account number '1' as the to account
3 And they enter '11' into the amount field
2 And they submit the form
1 Then Carleen verifies the transfer failed
23
```

Geänderter Code

Robot Test

```
43 LOG.debug("Debit Transaction from Account: Account Updated.");
42 }
41
40 }
39
38 /*
37  * Transfer amount between two accounts
36  *
35  * Accounts should be full objects. With that said, the objects are full
34  *
33  * AccountTransaction can be a partial object but must contain the transaction
32  */
31 public void transfer(Account fromAccount, Account toAccount, AccountTransaction
30
29 LOG.debug("Transfer Between Accounts:");
28
27 // From Transaction
26 fromAccount = this.getAccountById(fromAccount.getId());
25 AccountTransaction fromAt = new AccountTransaction();
24 fromAt.setAmount(accountTransaction.getAmount());
23 fromAt.setTransactionDate(accountTransaction.getTransactionDate());
22 fromAt.setDescription("Transfer to Account (" + toAccount.getAccountName() + ")");
21 fromAt.setTransactionType(transactionTypeRepository.findByCode(Constants.CREDIT_TRANSACTION_CODE));
20 debitTransaction(fromAccount, fromAt);
19
18 // To Transaction
17 toAccount = this.getAccountById(toAccount.getId());
16 AccountTransaction toAt = new AccountTransaction();
15 toAt.setAmount(accountTransaction.getAmount());
14 toAt.setTransactionDate(accountTransaction.getTransactionDate());
13 toAt.setDescription("Transfer from Account (" + fromAccount.getAccountName() + ")");
12 toAt.setTransactionType(transactionTypeRepository.findByCode(Constants.DEBIT_TRANSACTION_CODE));
11 creditTransaction(toAccount, toAt);
10
9 LOG.debug("Transfer Between Accounts: Accounts Updated.");
8 }
7
6
5 /*
4  * Get Account object by Id
3  */
2 public Account getAccountById(Long id) {
1 Optional<Account> acct = accountRepository.findById(id);
```

```
17 *** Settings ***
16 Resource      ../keywords/digibank_keywords.robot
15
14 *** Test Cases ***
13 Transfer between the same account is not possible
12 Log in Carleen6231@gmail.com
11 Open new account Savings Account Individual Money Market
10 Open transfer page
9 Select from account number 1
8 Select to account number 1
7 Enter amount 11
6 Submit transfer form
5 Transfer failed message should be displayed
4
3
2
1
18
```

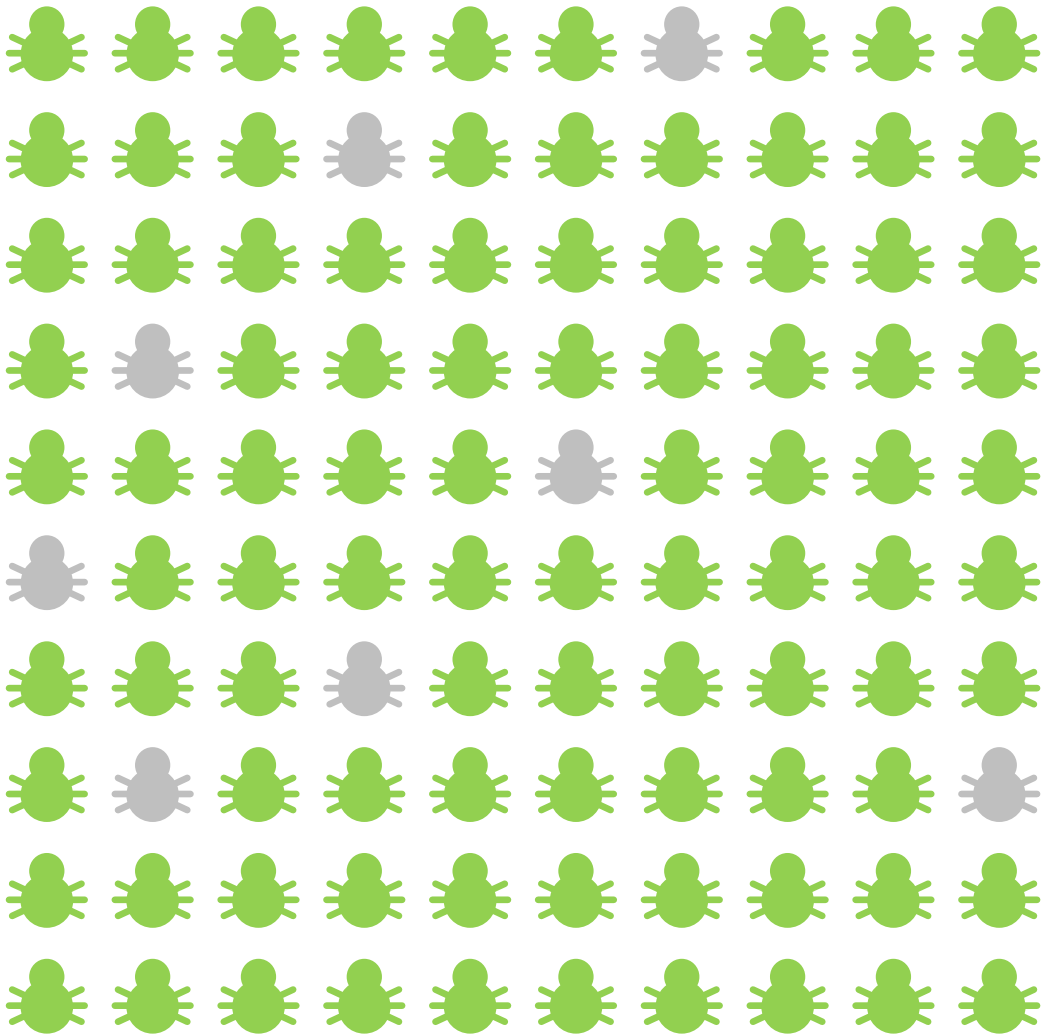
Geänderter Code

```
43
42     LOG.debug("Debit Transaction from Account: Account Updated.");
41
40 }
39
38
37 /*
36  * Transfer amount between two accounts
35  *
34  * Accounts should be full objects. With that said, the objects are full
33  *
32  * AccountTransaction can be a partial object but must contain the transaction
31  */
30 public void transfer(Account fromAccount, Account toAccount, AccountTransaction accountTransaction) {
29     LOG.debug("Transfer Between Accounts:");
28
27     // From Transaction
26     fromAccount = this.getAccountById(fromAccount.getId());
25     AccountTransaction fromAt = new AccountTransaction();
24     fromAt.setAmount(accountTransaction.getAmount());
23     fromAt.setTransactionDate(accountTransaction.getTransactionDate());
22     fromAt.setDescription("Transfer to Account (" + toAccount.getAccountName() + ")");
21     fromAt.setTransactionType(transactionTypeRepository.findByCode(Constants.CREDIT_TRANSACTION_TYPE).get());
20     debitTransaction(fromAccount, fromAt);
19
18     // To Transaction
17     toAccount = this.getAccountById(toAccount.getId());
16     AccountTransaction toAt = new AccountTransaction();
15     toAt.setAmount(accountTransaction.getAmount());
14     toAt.setTransactionDate(accountTransaction.getTransactionDate());
13     toAt.setDescription("Transfer from Account (" + fromAccount.getAccountName() + ")");
12     toAt.setTransactionType(transactionTypeRepository.findByCode(Constants.DEBIT_TRANSACTION_TYPE).get());
11     creditTransaction(toAccount, toAt);
10
9     LOG.debug("Transfer Between Accounts: Accounts Updated.");
8 }
7
6
5 /*
4  * Get Account object by Id
3  */
2 public Account getAccountById(Long id) {
1     Optional<Account> acct = accountRepository.findById(id);
```

Manueller Test

Action	Check
Log in as Carleen6231@gmail.com	
Open a new account: Type Savings Account, Individual In the Money Market Start deposit: 2500	Account was created as specified.
Open the transfer page.	
Select the account from step 2 as both from and to account.	
Enter amount: 11	
Submit the form	Transfer should fail with a message that transfers between the same account are prohibited

Similarity Scoring



Pareto
Optimization



AI Test
Clustering



Test-Impact-
Analyse

Quality Gate

We find 90% of the bugs in X% of the time

11%

Pareto-Analysis

13%

AI Test Clustering

Continuous Integration

2%

Test-Impact-Analysis

4%

Information Retrieval

Test Coverage

Test Content

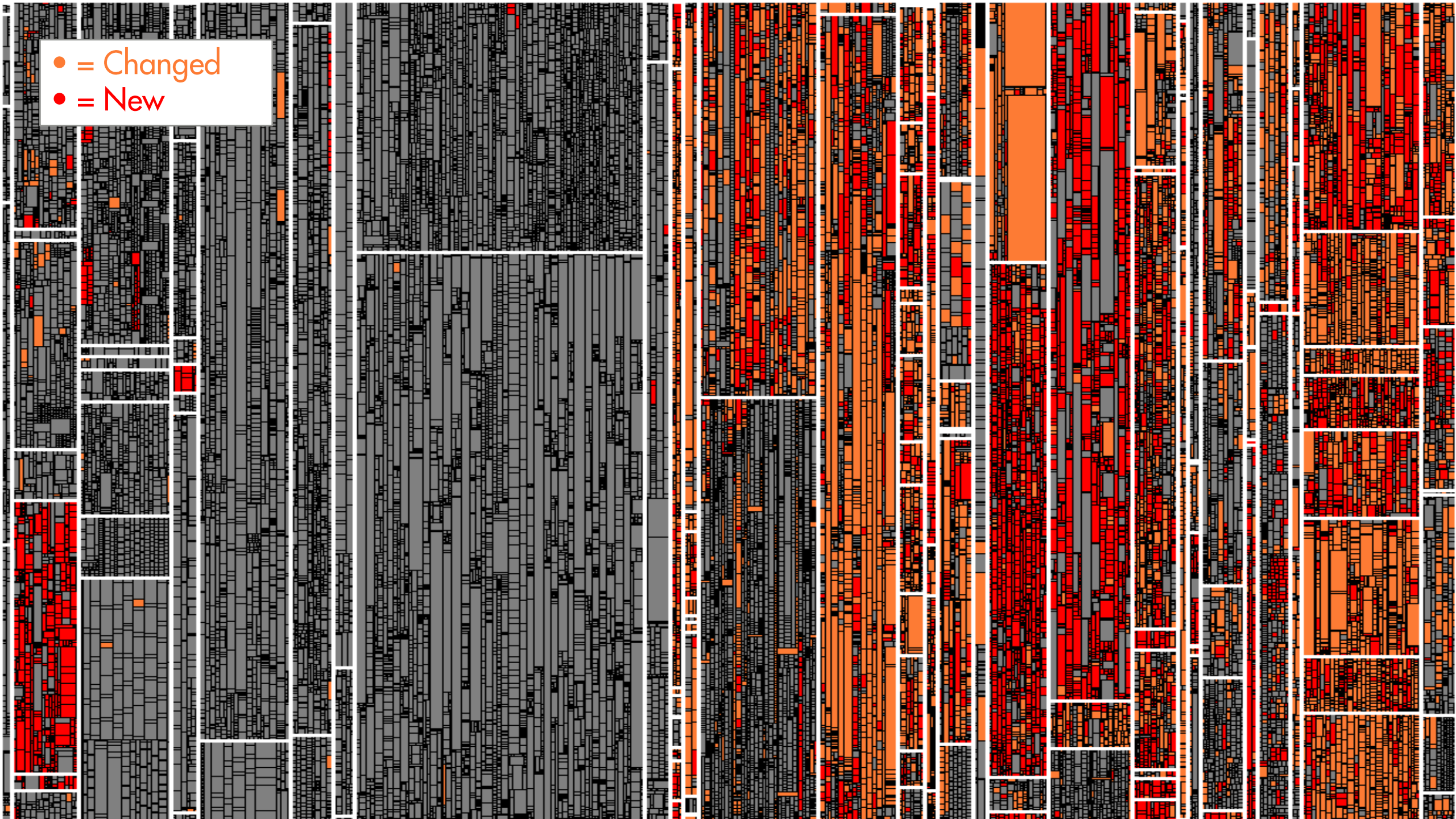
Precision & Effort



Start here!

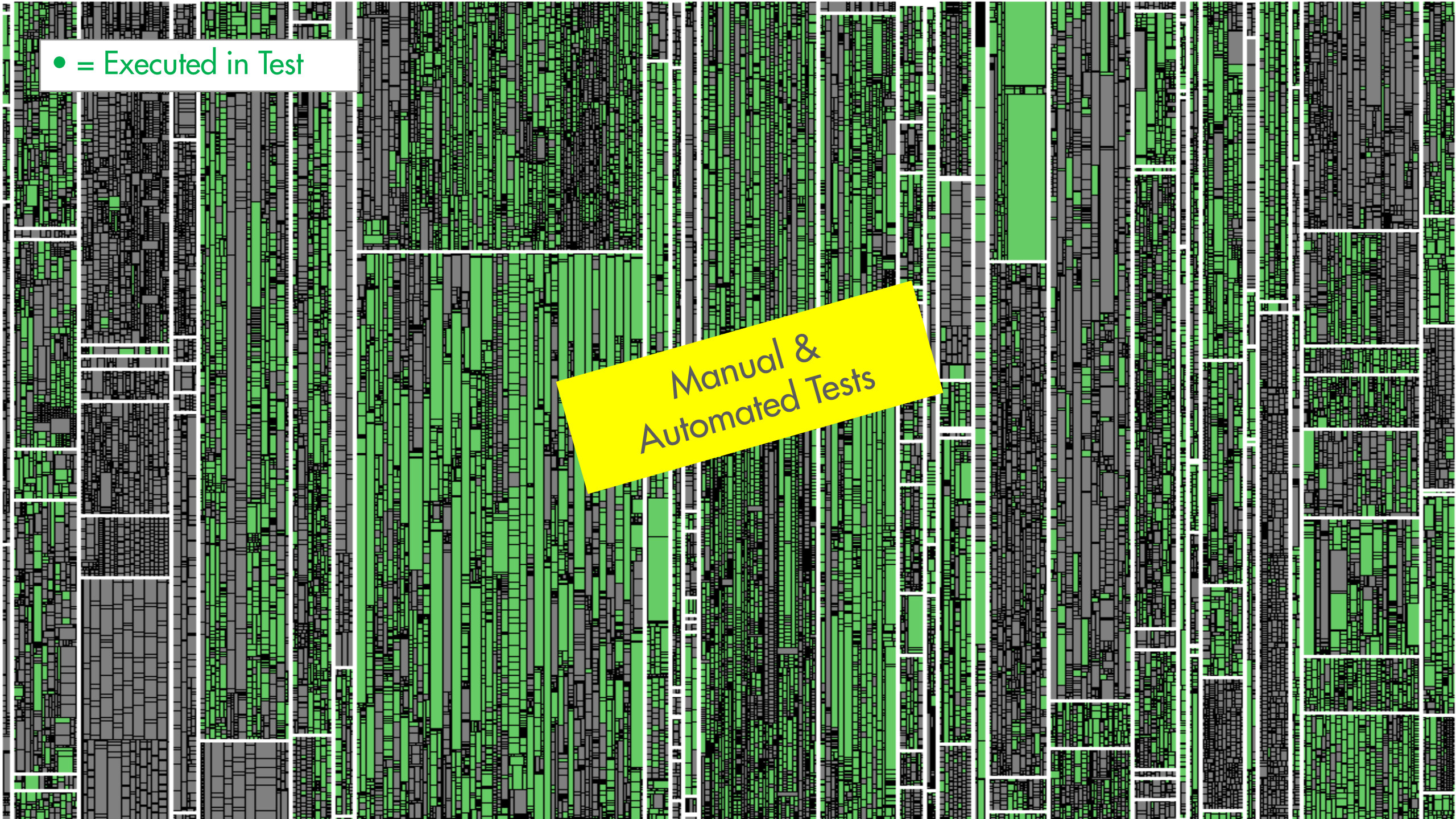
What if there are
no tests to select?

- = Changed
- = New

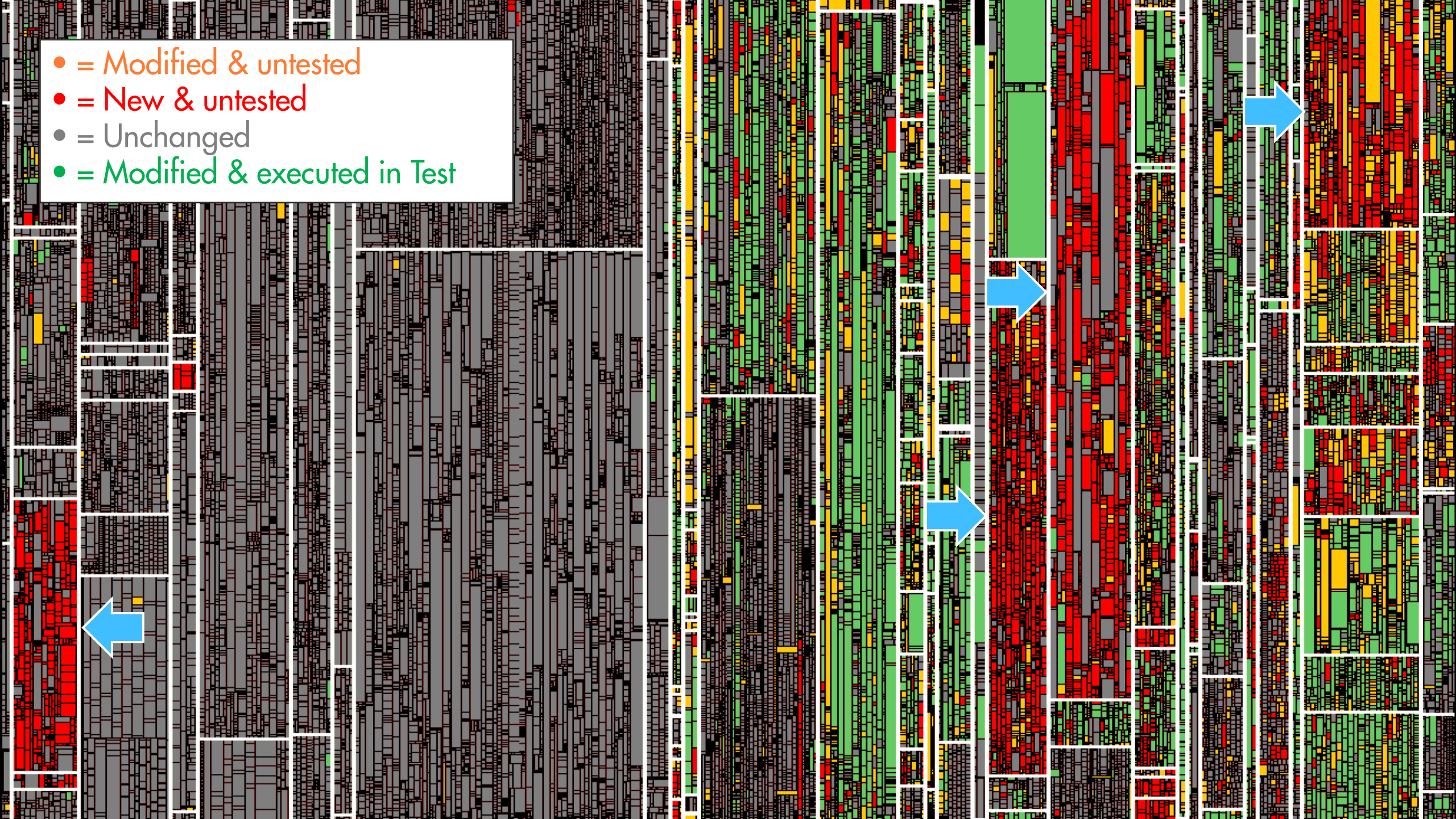


• = Executed in Test

Manual &
Automated Tests



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



Reduced Production Defects = 50%

Test Gap analysis reduced production defects in applications of MunichRe by ½

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

Issue # ▾	Subject	Test Gap		
🔗 TS-14421	Get rid of TestGapSynchronizer block	Done		0%
🔗 TS-14733	Remove Dataflow blocks	Done		22%

Done

Issue TS-14733 - Remove Dataflow blocks

Creator:

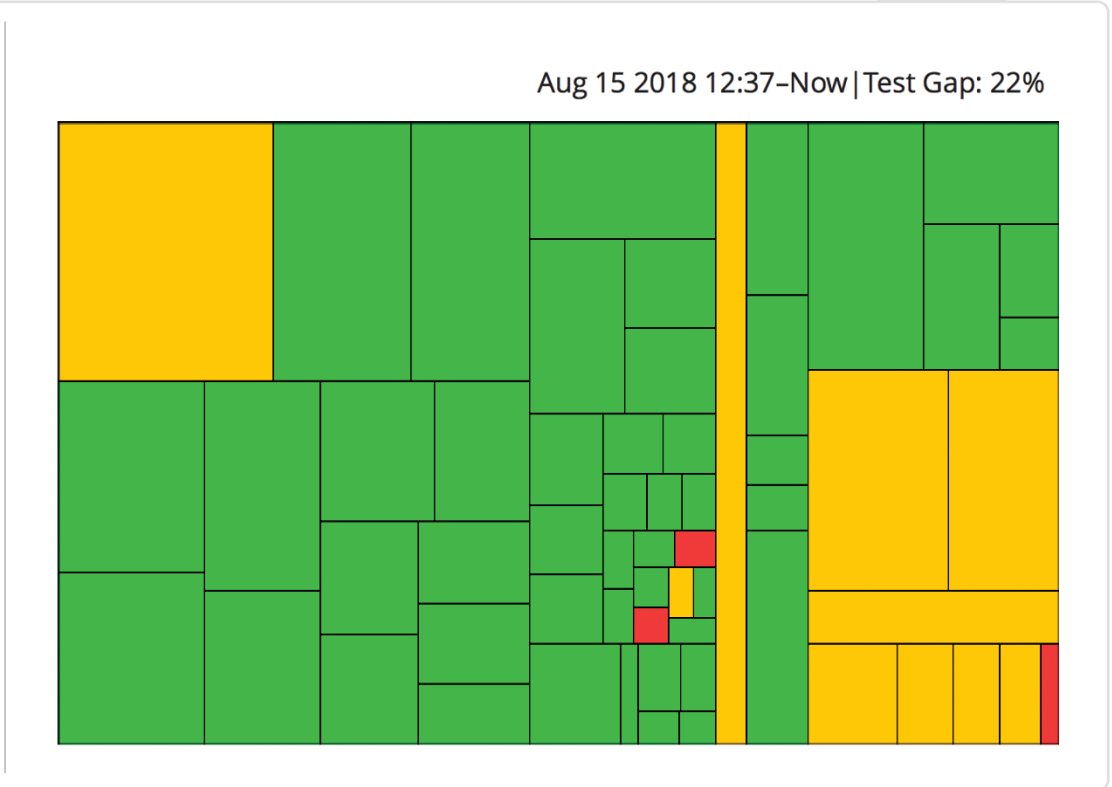
 (on Apr 06 2018 19:44)

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	https://git.cqse.eu/cqse/teamscale/3621	



Summary

Don't always run all tests (if it takes too long).

There are many test suggestion approaches that are fit for practice!

Talk to us. We are happy to discuss what works best in your context 😊

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Questions?

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