Test tools using AI

What can you test with it _right now_?

TestNet work group
'Testen met AI'
('Testing with AI')

**Hannie van Kooten
and Marek Lof**

Index

Third wave

1980 waterfall and manual testing, large tools, XP, RAD

2000 open source frameworks, sharing knowledge, agile, XP, Scrum, Kanban, speed!

2010 larger scale, faster!, crowdtesting , user feedback, cloud, apps, DevOps, Continuous testing, CI/CD-integration

2020 Autonomous testing with Machine Learning and AI

Source:ThirdWave Testtalk Joe Colantonio

Test tools with ai *this moment*

Wat do they do?

Do we have to believe what they say?

Is it real or exaggerated?

Do they provide us with insights in how ai is used?

And not to forget: are they handy and useful?

A small insight in what we have seen..

Ai will solve problems we have with Selenium or Appium

a=b? Tests break if the element identifier has been changed

ele ment Tests fail if when an element missing, a step is missing and the tests stop.

dek king Missing tests, coverage

Coding of tests is too time-consuming.

Reaction on this video: Is it fine, if I say 'bullcrap'?

Others complement

Making quality software is slow and expensive

People use more software and we expect more from functionality, features and quality

Time to market is getting shorter

Visual differences are not easy to detect by tools and give too many mistakes
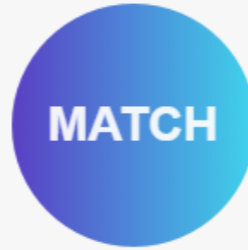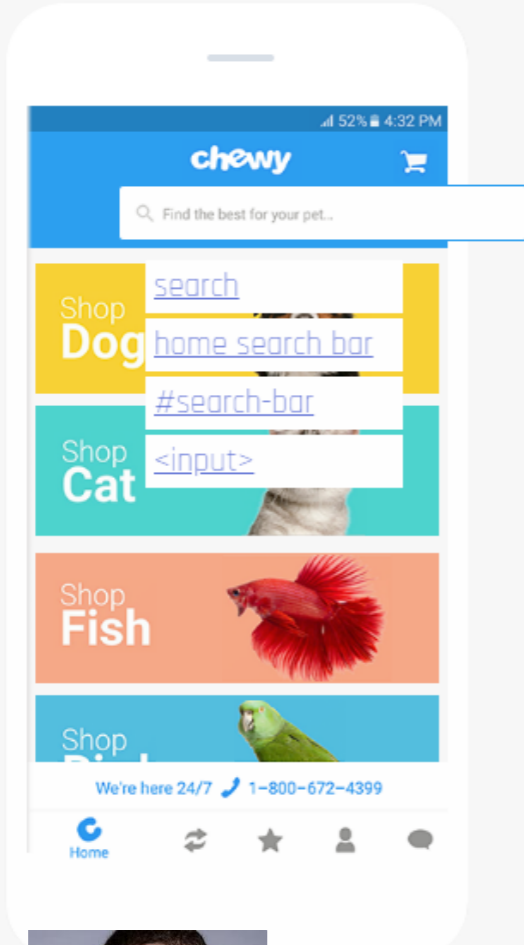
We test too little, too much or the wrong things

CI/CD pipeline is clogged, tests consume too much time

Differences with identifiers and layout
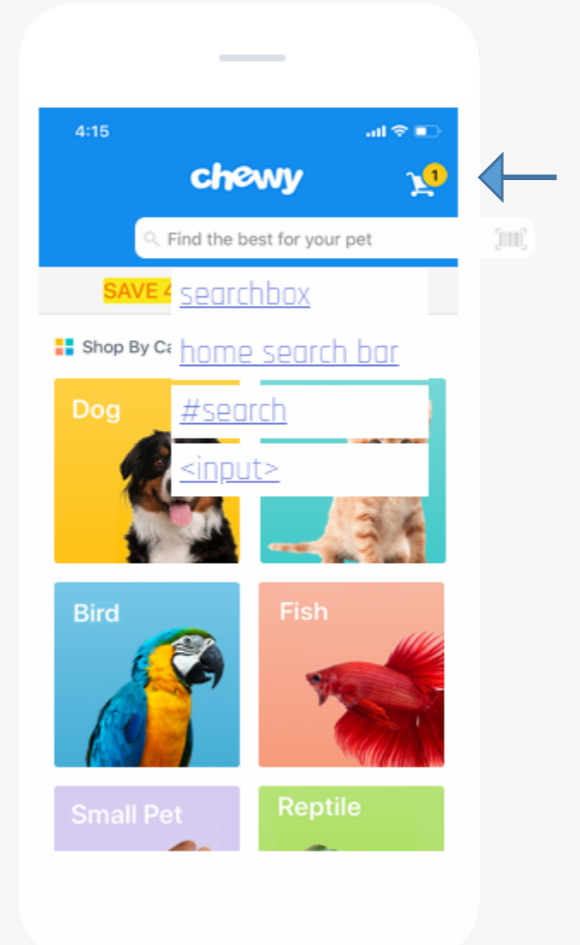

Baseline

Nieuwe run

MATCH

AI just like a real person, **IDENTIFIES** the screens and elements in your app

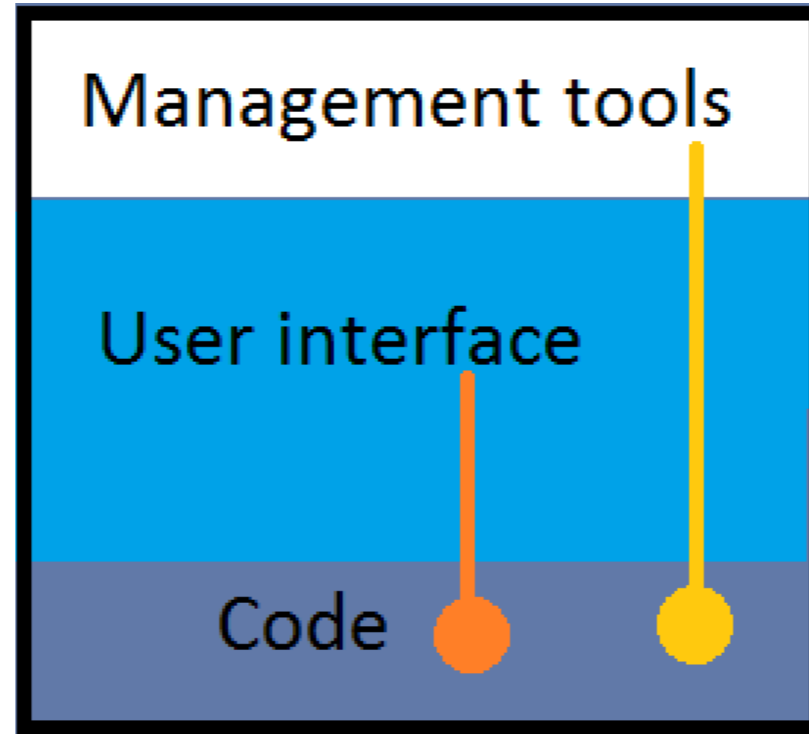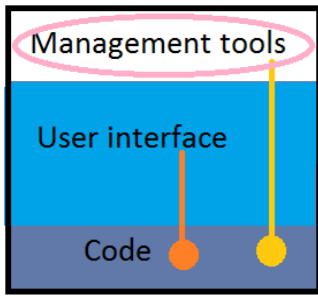**AI EXECUTES** user scenarios—test on-demand whenever you're ready

AI RECOGNIZES elements, so that even if things change, your test don't break.

Different tools and their roots

Eran Sher in TestTalk

Problem: coverage by tests

What happened if you are running all your regression tests, all the tests are passing, but actually you don't know what they are covering.

You need to make sure that the content of the build is tested.
It's hard because with continuous integration, you're getting lots of builds.
You're getting incremental code changes. In many cases, the feature is not even ready as a whole.
You're getting part of the feature until it's ready with ready with one of the last builds.

Continuous testmanagement

SEALIGHTS FOR **SOFTWARE DEVELOPMENT**

Quality Trend Intelligence
Understand the Quality of the Deliverables Over Time >

Test Gap Analytics
Discover Your Gaps and Plan Your Team's Next Steps. >

Release Quality Analytics
Use Smart Analytics to Determine Release Readiness >

Block Untested Code Changes
Solve Critical Issues Before They Impact Your Users >

SEALIGHTS FOR **QUALITY ASSURANCE**

Automated Test Prioritization
Identify Redundant and Ineffective Tests >

Exploratory Test Code Coverage
Improve Team Efficiency and Speed >

Functional Test Code Coverage
Enable Visibility and Quick Feedback Loops >

Quality Trend Intelligence
Approve or Fail Builds Based on Real-Time Insight >

Buzzwords

Sealights

A summary…

Data from all types of tests is collected and analyzed on code coverage.

In dashboards the analyzed results are shown. In the overviews you can click through to details. From overviews to details.

Trends are made visible, quality improvements can be implemented. Duplicate testing can be prevented.

This way you will know where the gaps are.
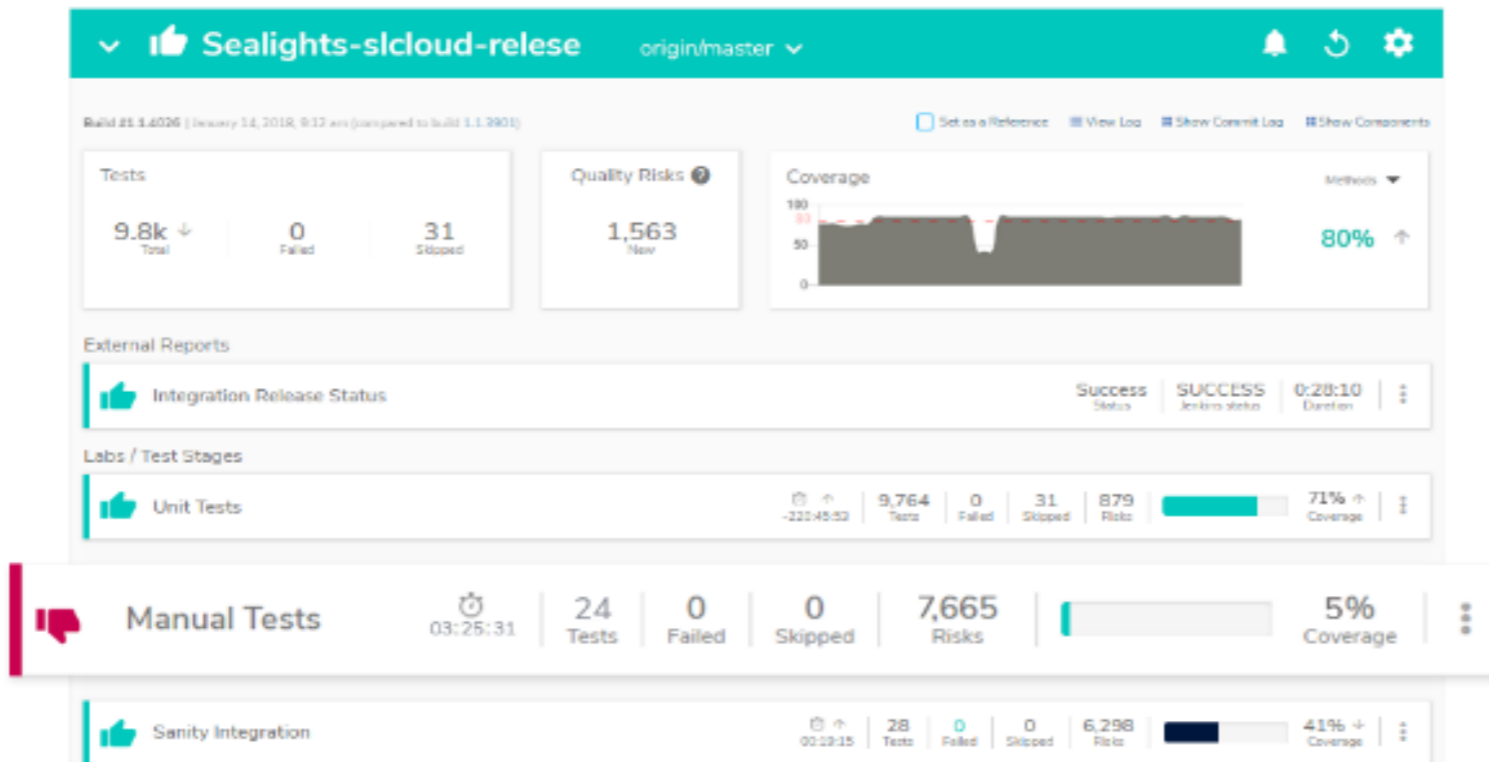
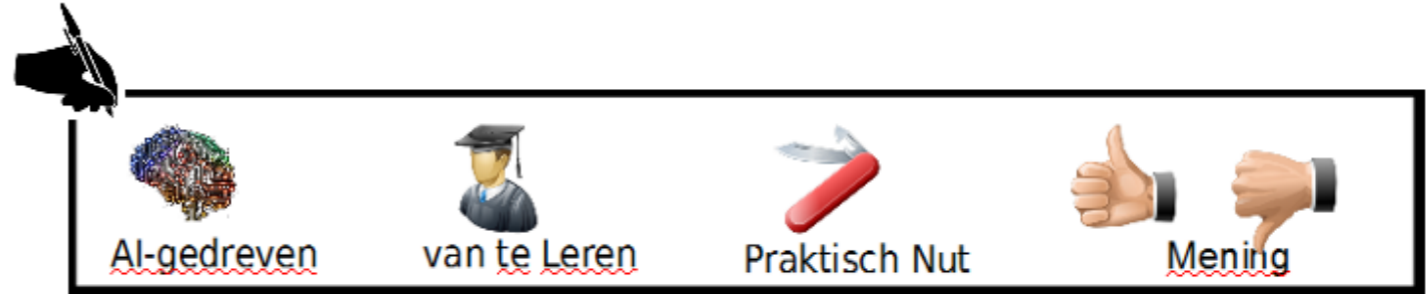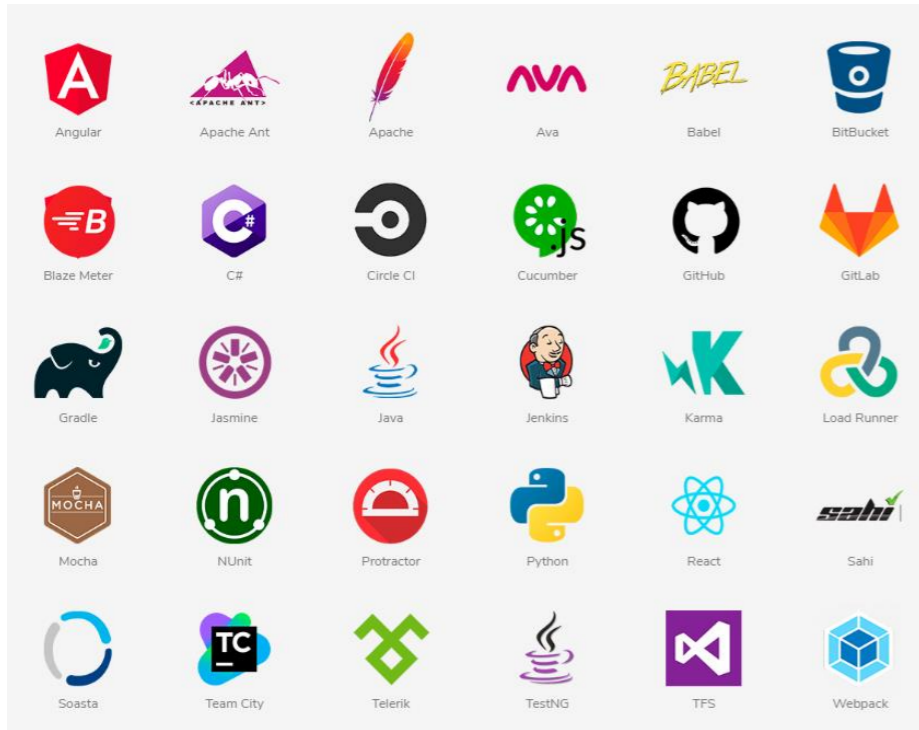Commit check on untested code.

SeaLights
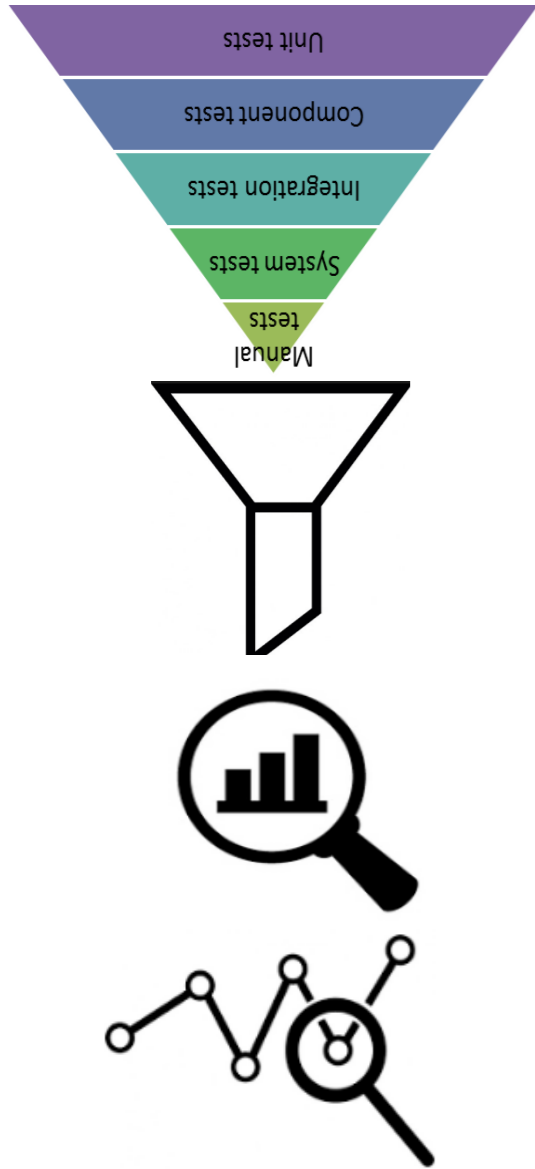
Exploratory test code coverage

Provide insight into which code areas are tested with manual and exploratory tests to improve team efficiency and speed.

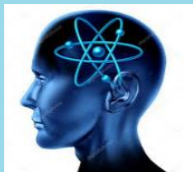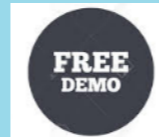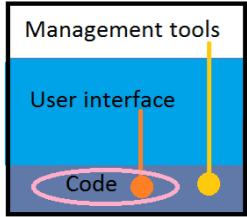Reduce overlap with other test types to reduce test time

Details

Angular	Apache Ant	Apache	Ava	Babel	BitBucket
Blaze Meter	C#	Circle CI	Cucumber	GitHub	GitLab
Gradle	Jasmine	Java	Jenkins	Karma	Load Runner
Mocha	NUnit	Protractor	Python	React	Sahi
Soasta	Team City	Telerik	TestNG	TFS	Webpack

AI-gedreven   van te Leren   Praktisch Nut   Mening

White paper | Quality: The Missing Metric For Software Development Managers

White paper | Top 4 Machine Learning Algorithms for Testing

White paper | How to Use Analytics to Eliminate the Risk of Your Teams Technic...

Israël   ai-bi?   Ci integr.   internet   rapport   ?

Sealights

Improve code quality

Spin off from Oxford

- Uses code and code history for

- Code coverage tests

- Automatically generates unit tests where they are missing

  after a sweep through the code

What does Diffblue Deeptest do with source code?

Code → Parse code → Derive meaning → AI → Generate Code → Unit tests

Queries →
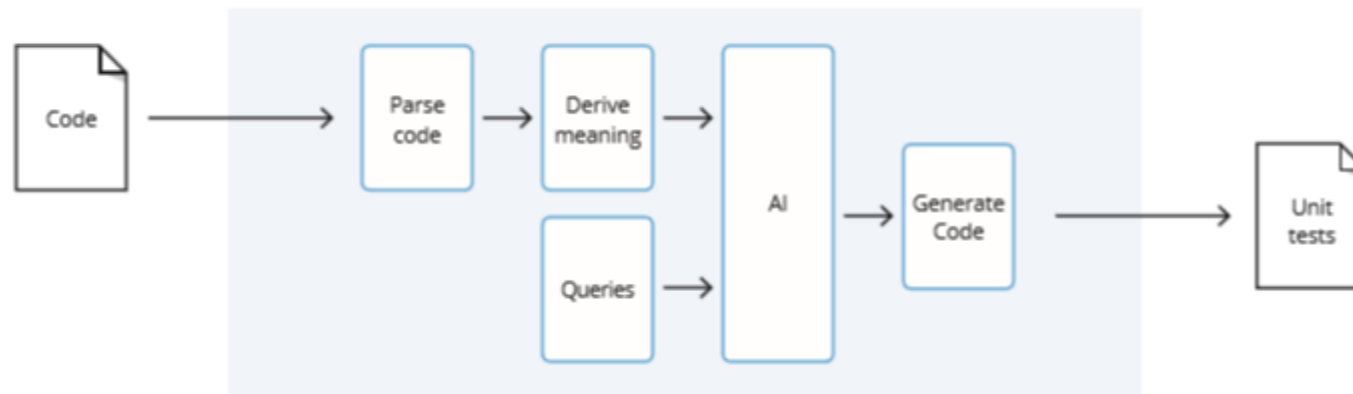
The above diagram shows the steps a piece of source code flows through when being

Where in software development?

Manage	Code		CI/CD	Jenkins	Travis CI

Manage

Plan
- JIRA
- Wrike

Manage tests
- Tosca
- qTest
- Cucumber

Track
- JIRA
- Wrike

Code

Write code
- Eclipse
- IntelliJ

Coding Assistants
- Codota
- Kite

Automatically write tests
- **Diffblue Deeptest**

Testing frameworks
- JUnit
- Selenium
- Cucumber

Code review
- Crucible

Code review
- Git

CI/CD — Jenkins, Travis CI

Build
- Maven
- Gradle

Deploy
- UrbanCode Deploy
- Serena
- Plutora

Execute tests
- LoadRunner
- Selenium
- Cucumber

Static analysis
- Coverity
- SonarSource

Monitor
- Nagios
- Retrace

diffblue AI for code

Details

Probabilitstic Fault Localisation (paper)

Lots of scientific articles
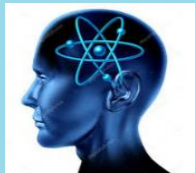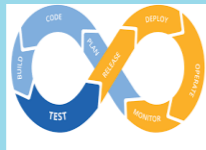
UK Ai! Ci? github rapport Github?
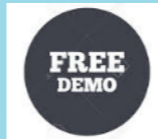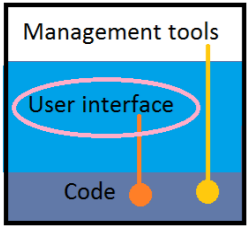
Visual validation of changes

Management tools
User interface
Code

Ai powered visual testing and monitoring

Buzzwords
Buzzwords

Add on on existing test suites

Supports lots of (test)frameworks

WEB

Selenium Java
Selenium Javascript
Selenium C#
Selenium PHP
Selenium Python
Selenium Ruby
React Storybook (beta)
Angular Storybook (beta)
Vue Storybook (beta)
WebdriverIO
Watir
Capybara
Protractor
UFT/QTP
LeanFT C#
LeanFT Javascript
Coded UI

MOBILE

Appium native C#
Appium native Java
Appium native Javascript
Appium native PHP
Appium native Python
Appium native Ruby
Appium web C#
Appium web Java
Appium web Javascript
Appium web PHP
Appium web Python
Appium web Ruby
XCUI (Objective-C)
XCUI (Swift)
Espresso
Calabash iOS
Calabash Android

SCREENSHOTS

CLI
C#
Java
Javascript
PHP
Python
Ruby
XCTest (Objective-C)
XCTest (swift)

OTHER

Windows UFT
Windows Coded UI
Windows Apps
PDF Forms
REST API

applitools

Wat kan applitools?

Visual testing can generate a lot of errors and is not easy.

Applitools use ai to prevent this and to learn which changes are meaningful and which not.

Baseline
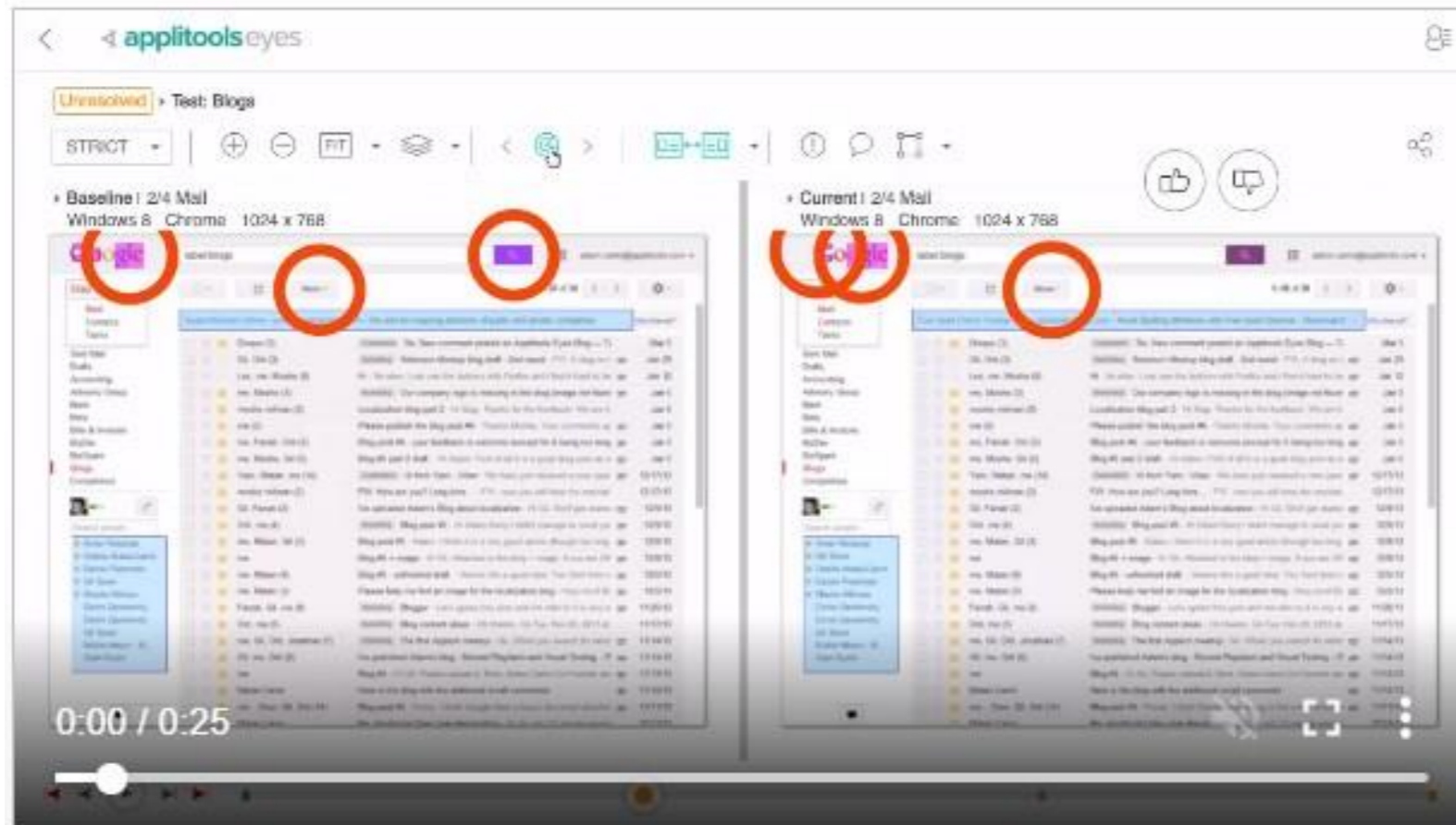
New run

Visual differences, bugs and baseline
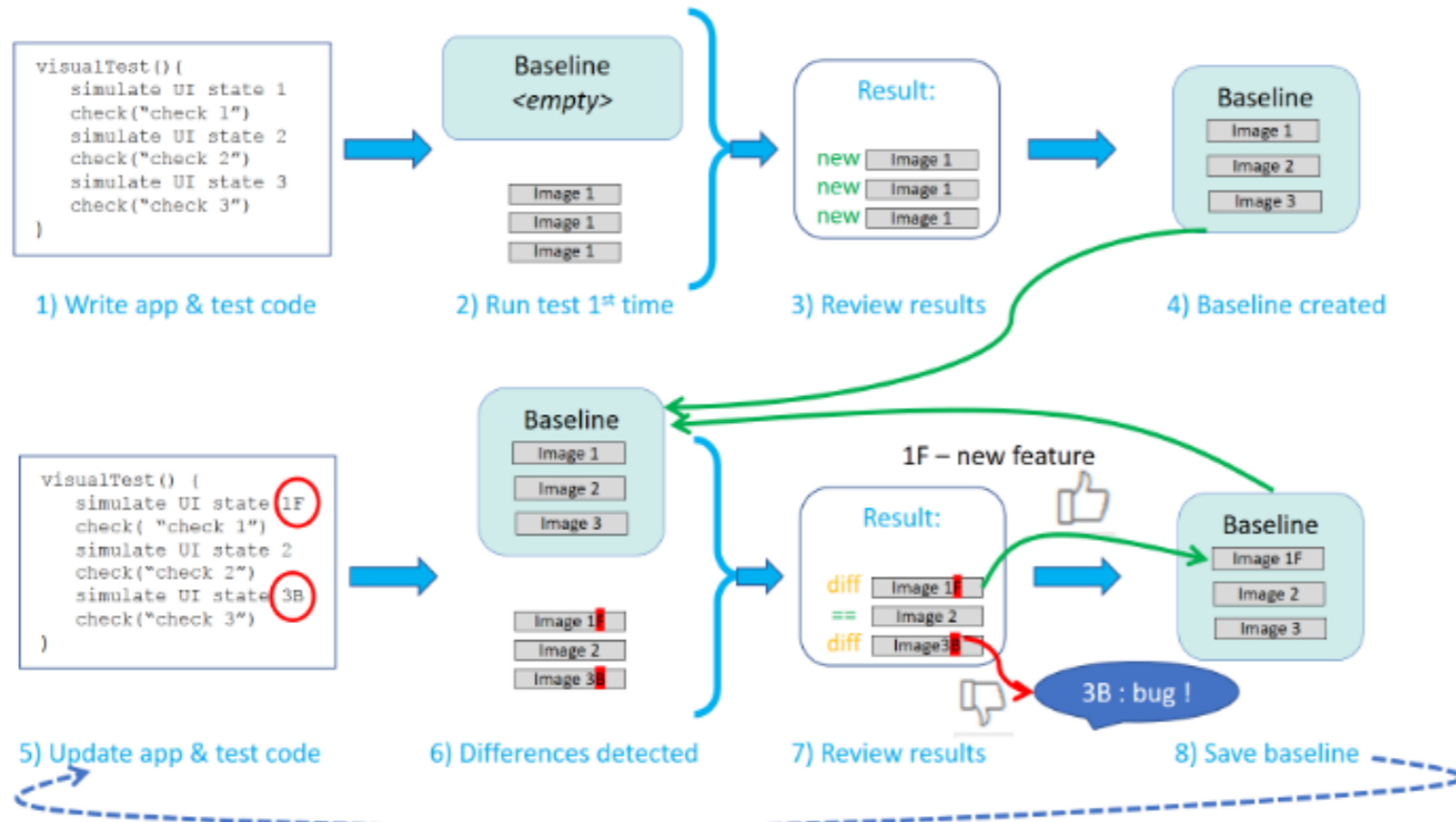
Real test cases

Management tools
User interface
Code
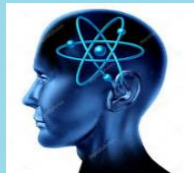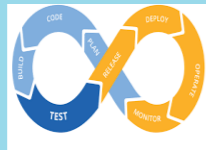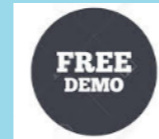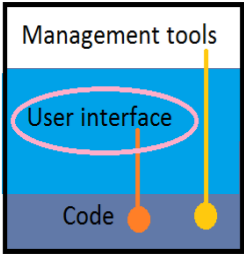
ultra high test engineer productivity-lightning fast test creation

appvance IQ

Appvance ai explanation

Short recap

A scan of the application can be done in a few minutes

After we have specified a few entry fields machine learning will continue to get the application ready ..

Test scripts are generated on activities of real users (production)

The result is hundreds or thousands of scripts

These scripts can be used for functional and performance testing.
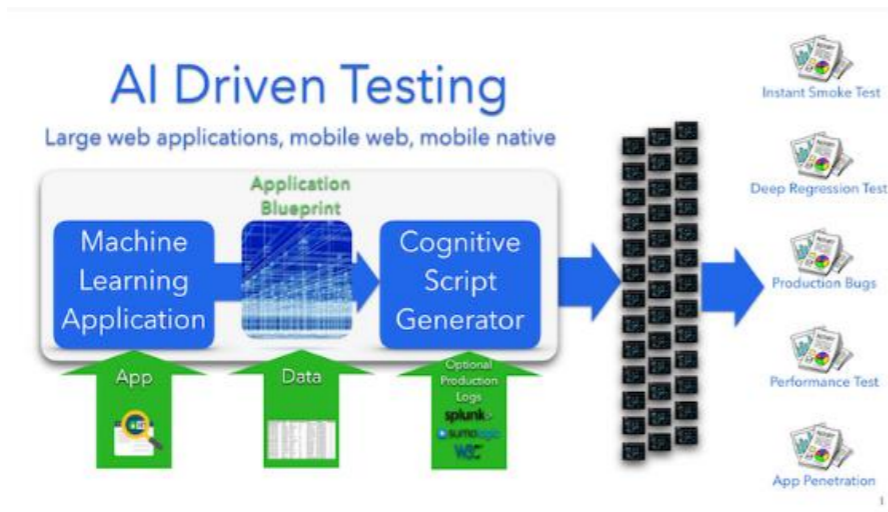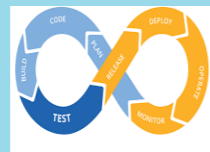
Side step: Testcases from production

Details

Customers mentioned on website: large companies

Software can be used with
Oracle forms
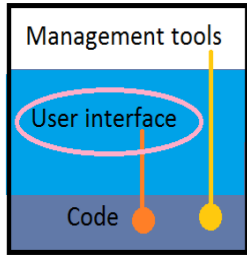Oracle webform server
AngularJS
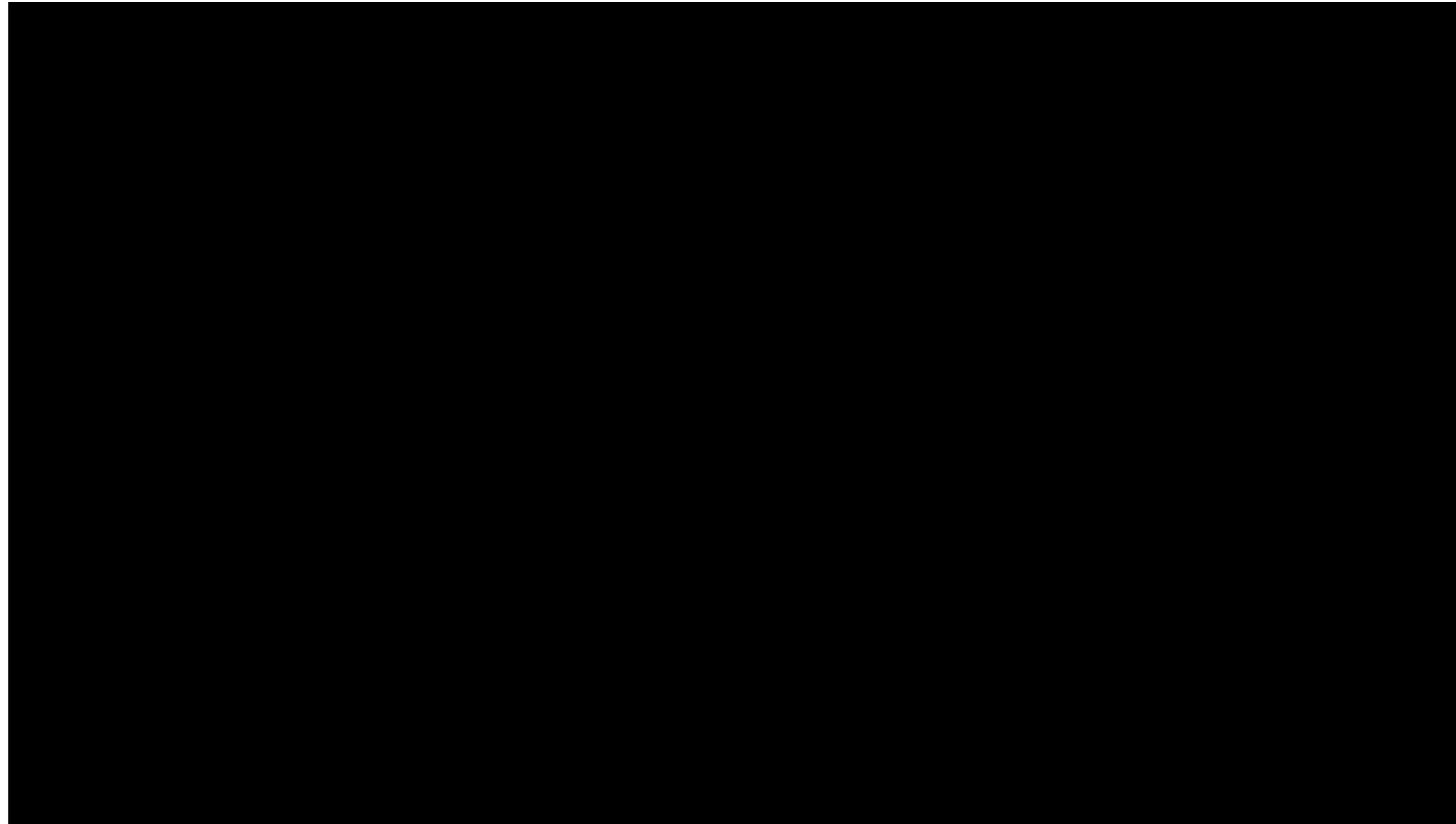HTML5

USA
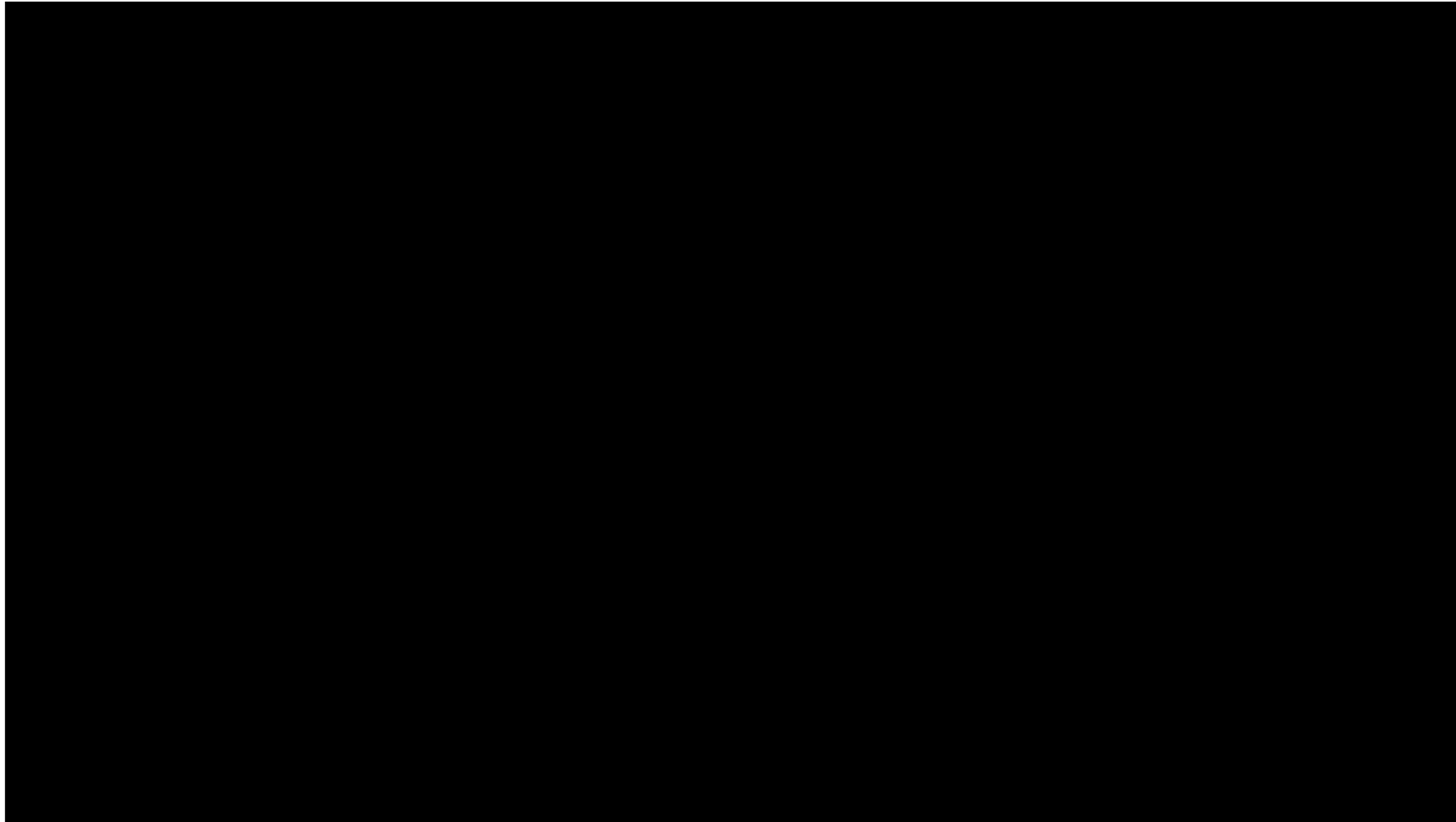Costa Rica
India

internet   yes   ?

Generate cases & self healing tests

Management tools

User interface

Code

Buzzwords

autonomous testing-no scripting-zero maintenance-execute thousands tests in minutes-ai diagnoses-visual testing

functionize

Functionize and ai

Recap

Collect data: online users + testers

Data → tool (adaptive event analysis system) → creates models

Models are pushed to the Elastic Cloud environment

Tests are run on all platforms

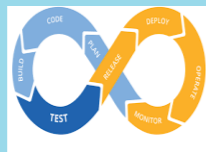Can analyze static and dynamic content with ML
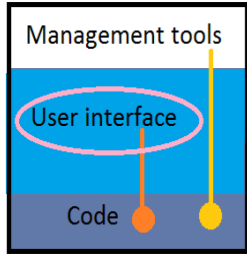
San Francisco   ai   Ci   internet   rapport   ?

functionize

Generate testcases & predict quality

Productivity gap

UX gap

Increase Coverage through Automated Exploratory Testing

AI tests what users can do

„Eggplant AI automation. It auto-generates test cases to massively increase testing productivity, speed, and coverage.
It uses artificial intelligence and **deep learning** to literally hunt defects — **predicting** where quality issues are most likely to pop up, and correlating data to quickly identify and resolve them.“
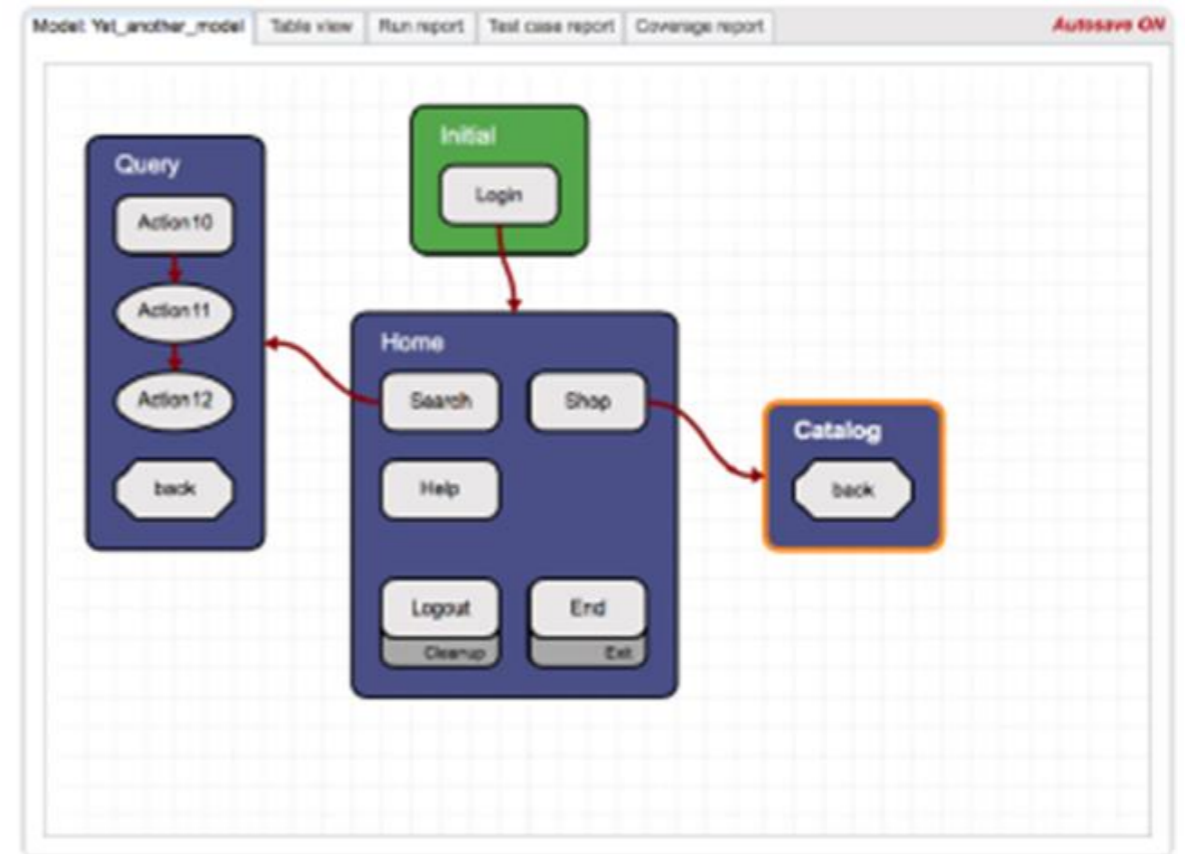
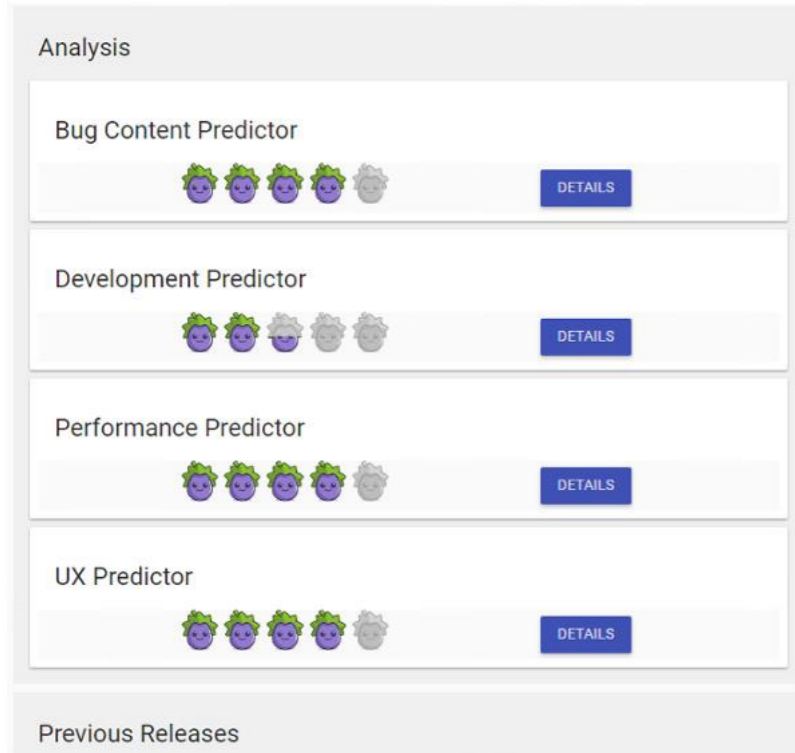eggplant

Functional tests and model

Functional test suite of eggplant is needed for ai module

Ai tool used to create a blueprint/map

of your with pages, widgets,

Actions, datatypes and states.

The ai can be influenced by the user:

Give a scenario a higher weighting

Predictive

Bug Content Predictor anticipates the expected, relative number of undiscovered defects based on the development and test assets. It uses an internal metric of undiscovered defects per thousand lines of code to assess all aspects of the build process, including the quality of the requirements that define the feature being checked in.

Test Coverage Predictor uses coverage data from regression and exploratory tests to provide an assessment of the level of coverage on the current product.

Test suite functional- performance-netwerk-cloud automation-management tool ..
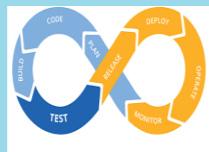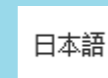
Londen   ai   Ci   internet   rapport   ?
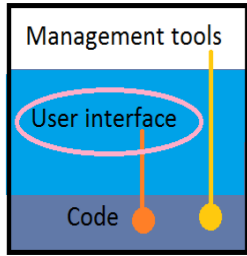USA

Record & playback as a base for ai testing

Demo MABL

Make a plan

Let's make a basic plan that tests your journey **BurenStad PRD** every 4 hours.

✓ ✓ ✓ **4** 5

What do you want to call this plan?

BurenStad PRD 4hrs Recurrent ✓

* This plan will run now and every 4 hours.
Later, you can add additional journeys to this plan.

Save plan

Congratulations!

You've completed all the steps.

To help you get started **I created 2 journeys for you.**

Visit home page

This journey checks the homepage loads and logs in if credentials are available

Visit all linked pages within the app

This journey crawls the app and loads each page. It will...

- take a screenshot of each page and notify you of unexpected changes
- check all links and report on any that are broken
- report javascript errors

Next up is the dashboard where you can see the latest status for each test.

Next

Deep Dive met MABL

Dive films

Buren Stad.nl - Alles over de stad Buren in de Betuwe.webm

Buren Stad.nl - Alles over de stad Buren in de Betuwe - mabl trainer.webm

🝔 mabl

Help   Default ▾   Insights **8**   mareklof@gmail.com 👤 ▾

Check all pages for broken links and errors > BurenStad PRD > 2018-08-29 11:07:05

BurenStad PRD 🝔

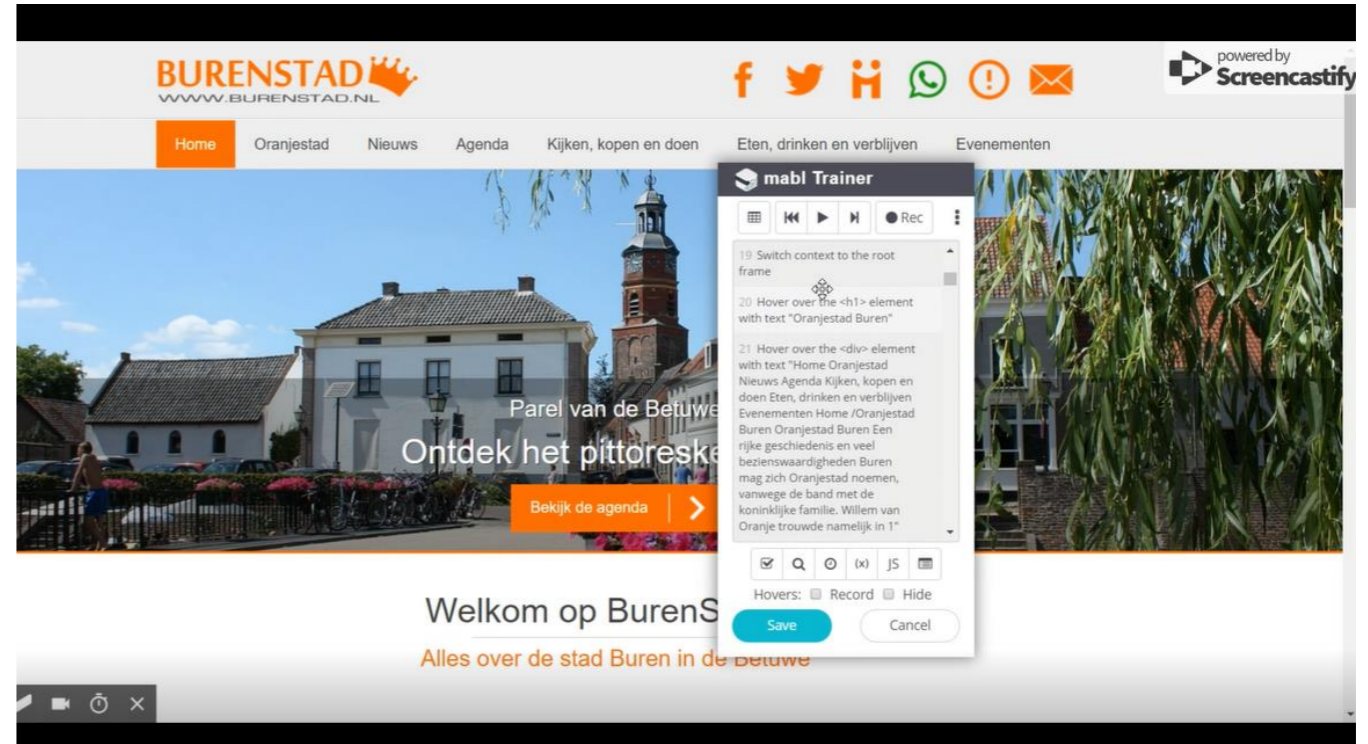✏ Edit in trainer   👾 New Jira issue

⚙ **Running**	**00:02:58**	🌐
Status	Runtime	Chrome

Links broken ⊟

I found 5 new broken links across 5 pages. There are 5 total broken links across 5 pages. I checked a total of 4897 links across 135 pages.

Collapse Logs   Auto-Scroll 🔵

Before Step   After Step   actions ▾

8-29 11:07:10,996 Starting journey run

Step 1: Set viewport size to width 1490

Step 2: Visit URL assigned to variable "app.url"

Step 3: Click on the <span> element with text "Oranjestad"

Step 4: Switch context to <iframe> element

Step 5: Switch context to the root frame

Step 6: Click on the <h3> element with text "Kasteel Buren"

Step 7: Click on the text field with ID "naam"

Step 8: Enter "6" in the text field with ID "naam"

Step 13: Enter "66666" in the text field with ID "email"

ℹ 2018-08-29 11:10:41,566 Looking for the field with ID "email" using an exact match waiting up to a few seconds.

ℹ 2018-08-29 11:10:43,312 Looking for the field with ID "email" or a close match while waiting up to 30 seconds for the page to load.

✓ 2018-08-29 11:10:51,899 Entered "66666" in the field with ID "email". 📷

⚙ Running

☰ Plans

A plan defines where and when mabl will test your app's functionality as described by one or more journeys.

⊕ New plan   ▼

☐	Plan	Created Date	Description	Triggered By	Environments	
☐	Check all pages for broken links and errors	Aug 29, 2018 9:43 AM	Load the base URL for the application, visit each of the linked pages, visit each of the links on those pages, a... so forth. Visit external pages but do not crawl the links	⚡ timer: 24 Hr 0 Min	▦ BurenStad PRD ◉ BurenStad PRD ⎘ https://www.burenstad.nl	On ⟳
☐	Verify home page load and login	Aug 29, 2018 9:43 AM	Attempt to log in (if applicable) and load the base URL for the specified application.	⚡ event: deployment ⚡ timer: 4 Hr 0 Min	▦ BurenStad PRD ◉ BurenStad PRD ⎘ https://www.burenstad.nl	On ▶
☐	BurenStad PRD 4hrs Recurrent	Aug 29, 2018 11:05 AM	None	⚡ timer: 4 Hr 0 Min ⚡ event: deployment	▦ BurenStad PRD ◉ BurenStad PRD ⎘ https://www.burenstad.nl	On ▶

Plans

☰ BurenStad PRD 4hrs Recurrent

✎ Edit   Notifications   ⎘   **Delete**

Enabled On Run ⟳

Each execution starts 1 journey runs

BROWSERS
🔴 (Chrome)

TRIGGERS
⚡ timer: 4 Hr 0 Min
⚡ event: deployment

APPLICATION
BurenStad PRD

ENVIRONMENTS
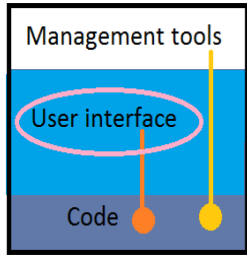BurenStad PRD   https://www.burenstad.nl

JOURNEYS
▶ BurenStad PRD

Updated 27 minutes ago

History

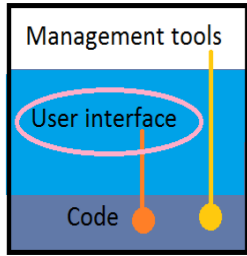| Status	Triggered By	Triggered ↑	Run Time	Actions	Journeys					
Running	Manual	Aug 29, 2018 11:31 AM	Running	⟳	🔴	BurenStad PRD 🔍	⚙ Running	00:00:23	⟳	View output
Passed	Schedule	Aug 29, 2018 11:06 AM	00:13:27		🔴	BurenStad PRD 🔍	✔ Passed	00:13:19		View output

Show more runs

Testim

Testim uses machine learning automation to speed-up the authoring, execution, and maintenance of automated tests.
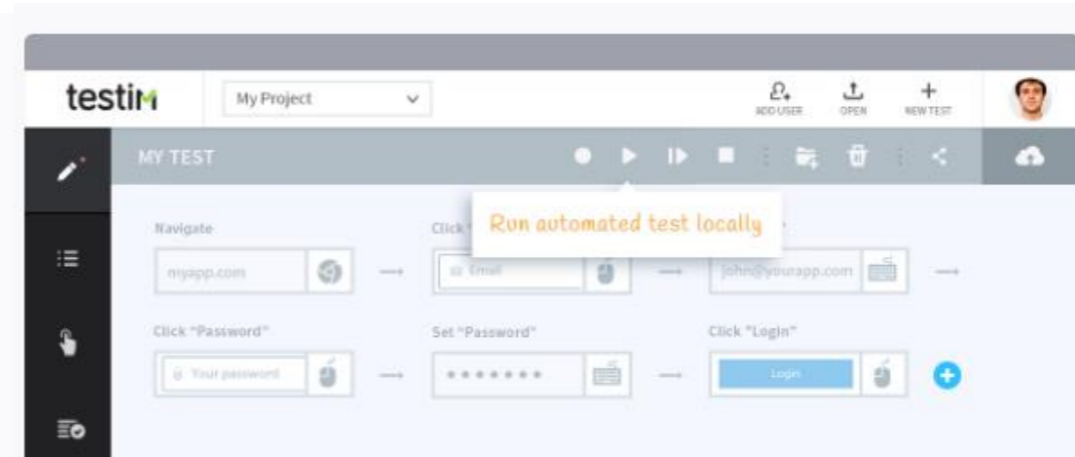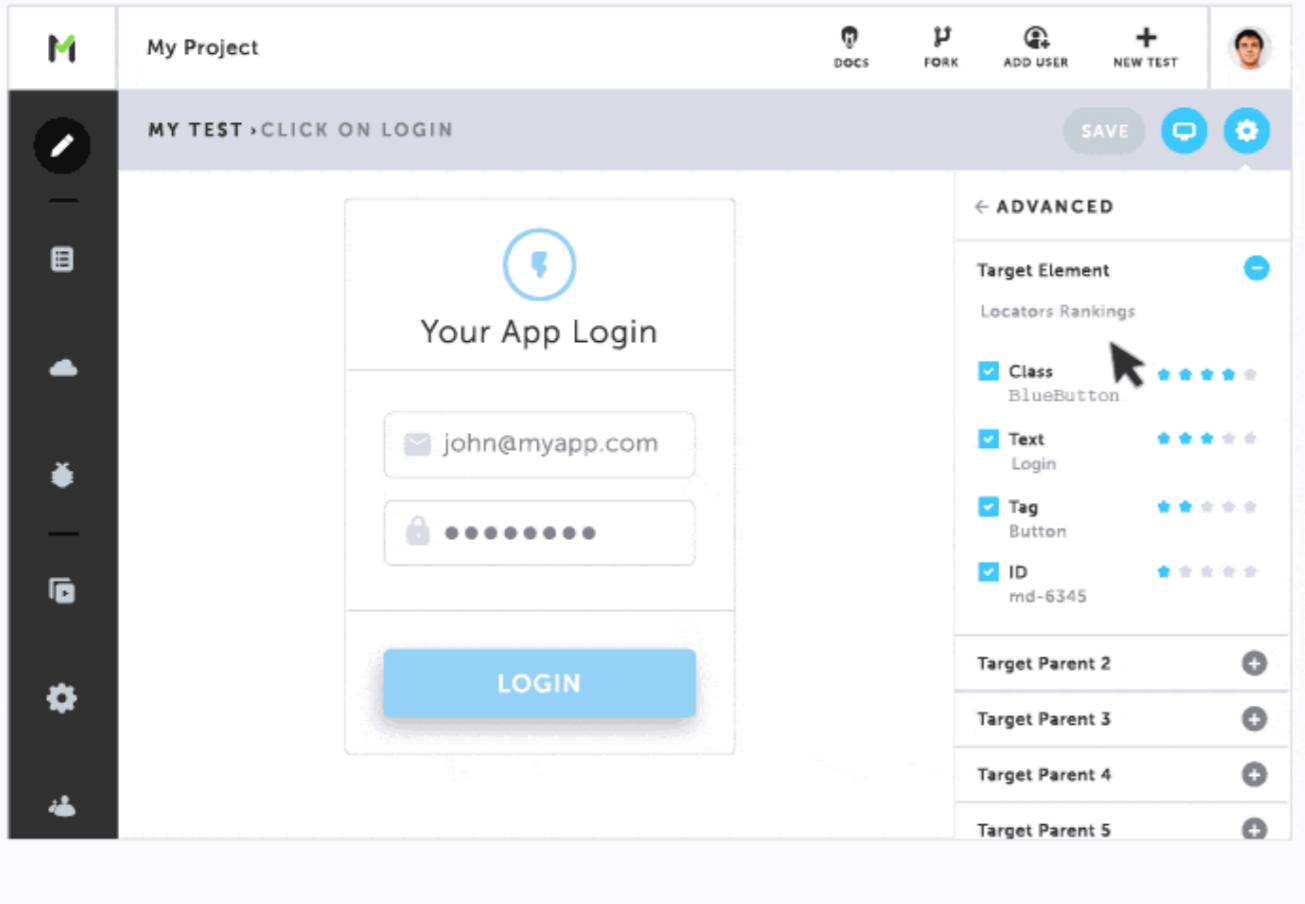
autonomous authoring - tests that learn

testiM

Retest

Finding the corresponding component after substantial changes

Tools applying ai to test scenarios

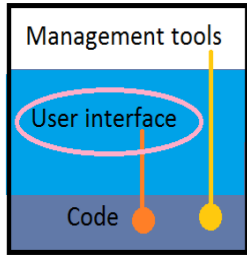|								
Germany	ai!	Ci?	lokaal	rapport		Java	?	
USA Israël	ai	Ci	online	rapport			0 for 100 runs/mnd	
Boston	ai	Ci	online	rapport	Chrome-extension		0,15per run	

App verkennen-testgevallen-bugs oplossen

sofy is a machine learning and ai powered *software testing assistant*
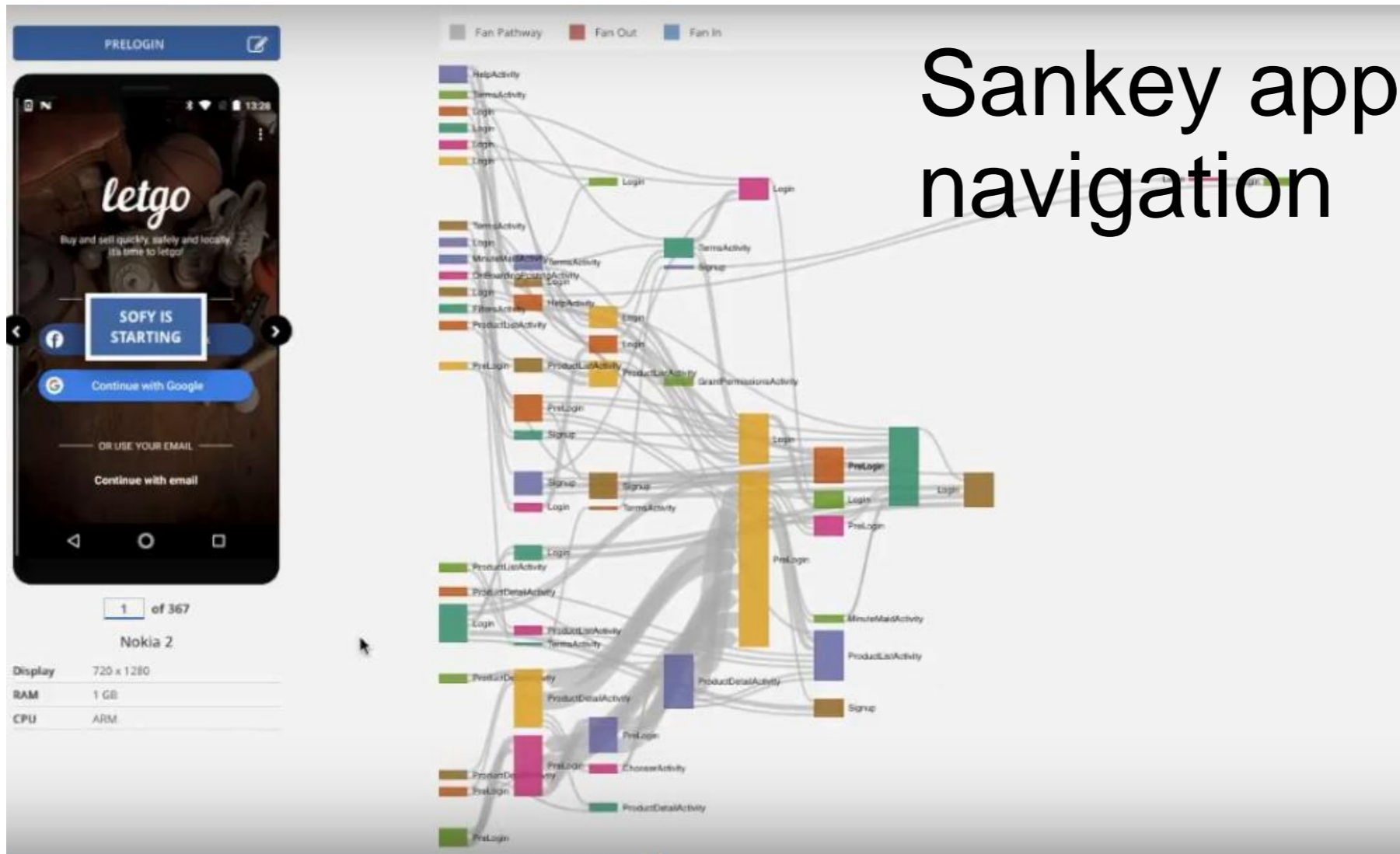
Upload Android and IoS apps

Crawler does its job

Bug encountered? Dashboardwith visual information.

Rapportage in Jira met log en reproductiepad

Bug rapport is alsoa test

Articles with known issues frameworks linked (stack overflow)
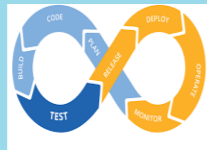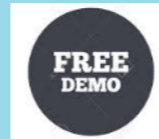
Extended cloud

Sankey app navigation
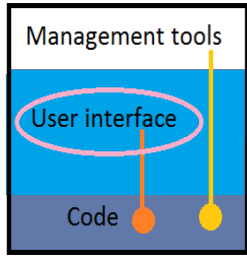
land   ai?   Ci?   internet   rapport   kosten

Generate baseline and compare runs

Management tools
User interface
Code

Accelerate Releases

Reduce time spent on regression creating and updating automated tests through TestRigor. TestRigor bot will autonomously discover all new functionality in your application.

Auto-adapting Tests

TestRigor is very stable to layout changes. We employ multi-level comparison algorithms to make sure we find the same information/controls on your page.

Screenshots of Each Step

TestRigor bot takes screenshots before and after each step.

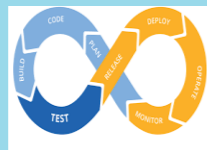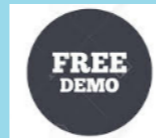functional regression testing without any human involvement

USA   ai   Ci?   internet   rapport   1200
                                                3999 mnd

testrigor

Generate baseline-match diffs - platform

How to use

1. Upload App Binary(*.apk).

Apptest.ai services can be easily integrated into your CI (Continuous Integration) environment for automating the build and testing process.

2. Click "Start Test" Button.

Optionally, you can choose any target phones, or specific account credentials for testing.

3. Get results in minutes.

When testing is completed, app screen flows, bug reports, and performance optimization guides will be generated.
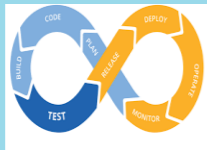
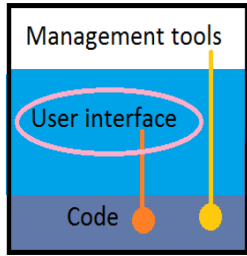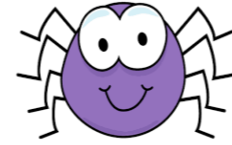Zd Korea   ai?   Ci   upload   rapport   0 trial

AppTest.ai Beta

Testar

Open University

University of Utrecht and Valencia

Start phase: running on its own

Detection of crashes and non-responsiveness

Error types can be added

Open source and downloadable

How does this tool work?

Crash test
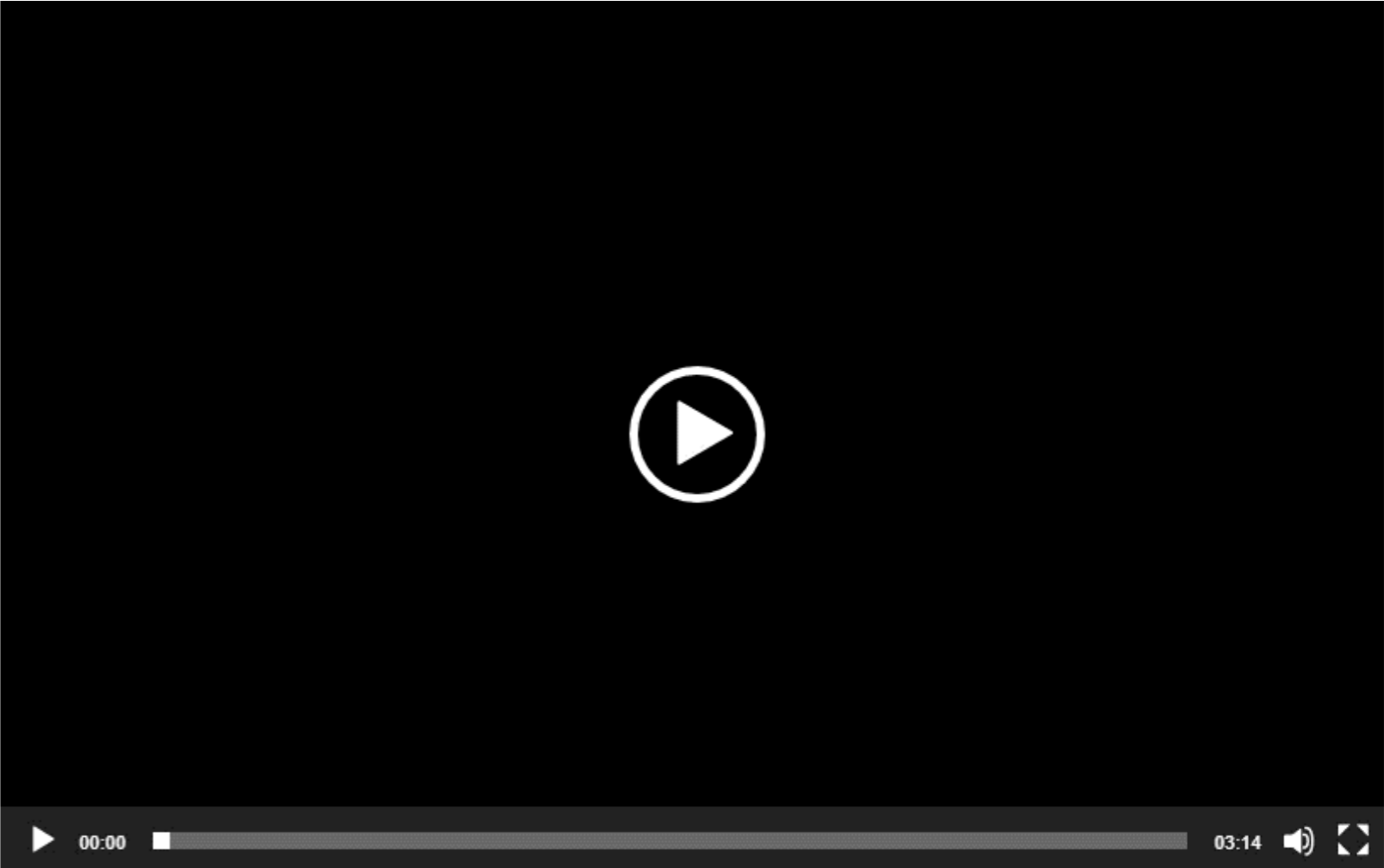
Recap

Increase test coverage and test economically   Sealights

Code improvements   diffblue

Visual differences

      Applitools

Functional tests a basis for ai test   Functionize, Mabl,

Testim, Retest

Generate testcases   (all except

Sealights)

      real users

      Appvance en Functionize

      automatic

      Functionize, AppTest, Testrigor, Sofy

Metrics quality

      Sealights, Eggplant

Crash tests

      Testar

What did you think of the tools?

Recap

- The future?
- How much ai/ml is used in the tools?
- Are the tools useful?

- Marketing is King!
- AI is unstoppable→ Game Changer! (buzzword alert)
- To be continued…

Thanks!