

TestNet autumn event
10 October 2018



Test tools using AI

A central graphic featuring a silhouette of a person's head with a large white question mark inside. Surrounding this are various logos for AI testing tools, each with a brief description:

- testim**: Elastic Cloud on geving
- Test**: *execute thousands tests in minutes
- appliTools**: Exploratory test code coverage
- eggplant**: autonomous testing
- mabl**: lightning fast test creation
- retest**: Ai powered visual testing
- Sealights**: (no description)
- test.ai**: (no description)
- functionize**: adaptive event analysis system
- appvance IQ**: Test gap analysis
- AppTest.ai**: Beta

There are also two instances of the Buzzwords logo (the bee) within the collage.

What can you test
with it *right now*?

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

Hannie van Kooten
and Marek Lof

Index

History

Research: ai tools

Problems with the current generation tools

Solutions by ai tools

Test management tool

Code improvement

Visual testing

Generate Test cases

Bugs assistant

Generate baseline

Recap



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..



Vision on youtube:

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

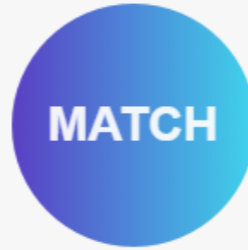
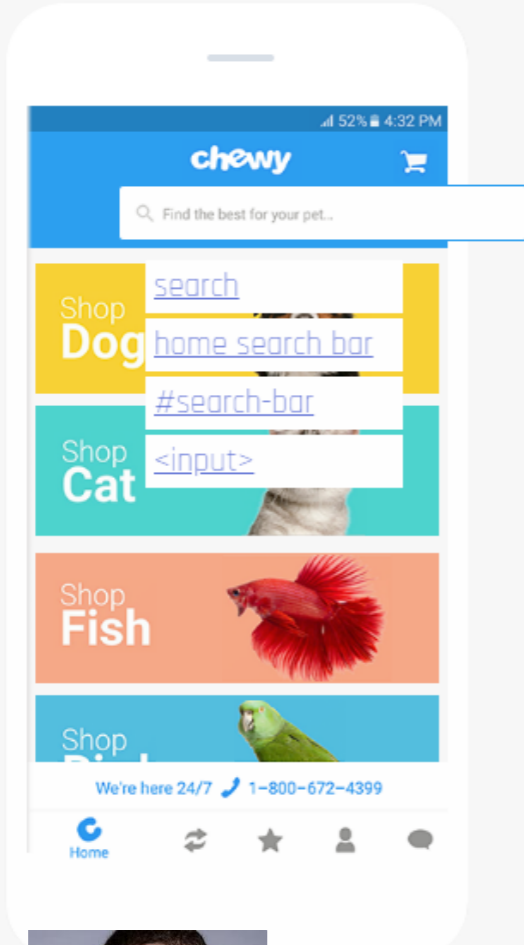


We test too little, too much or the wrong things

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

Differences with identifiers and layout

Baseline

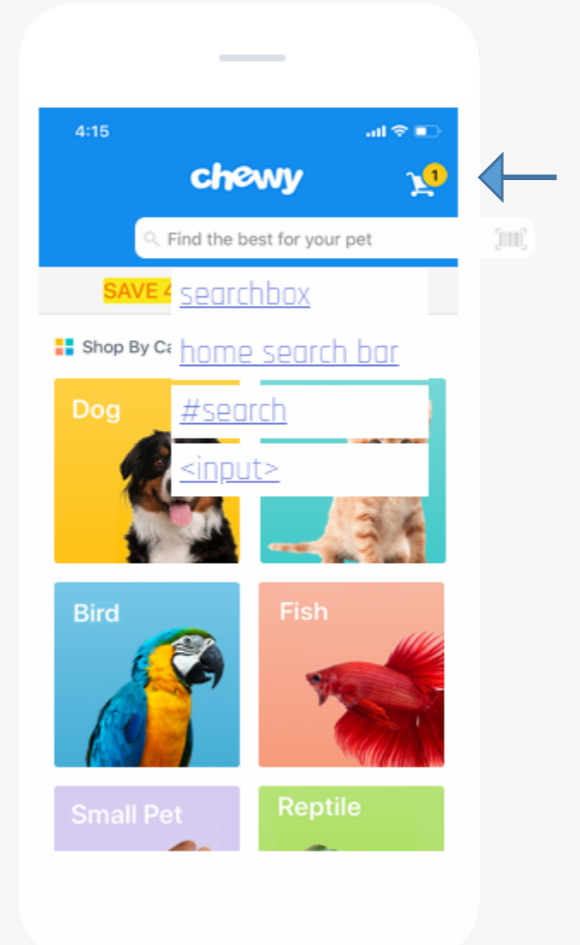


AI just like a real person, **IDENTIFIES** the screens and elements in your app

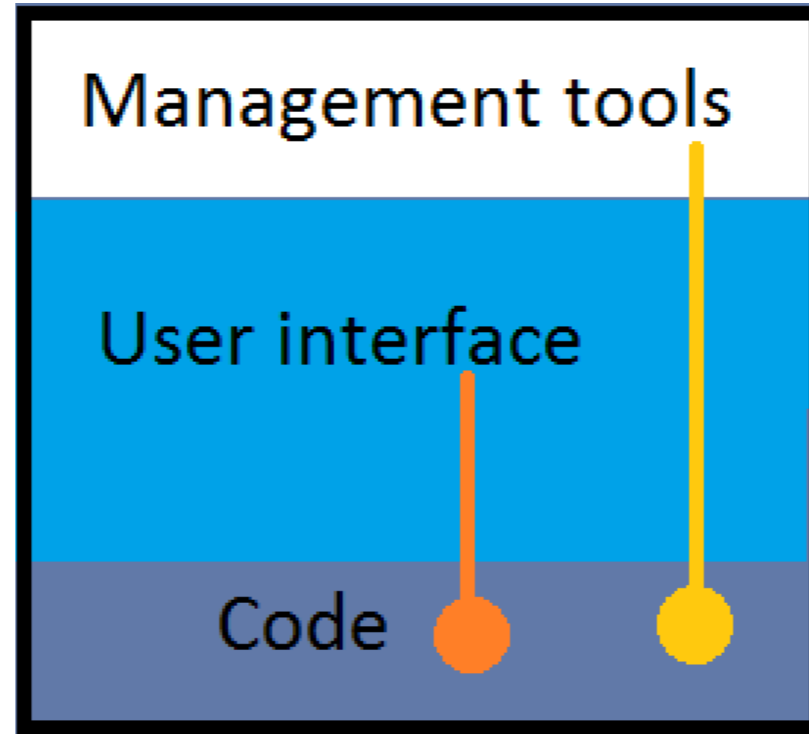
AI **EXECUTES** user scenarios—test on-demand whenever you're ready

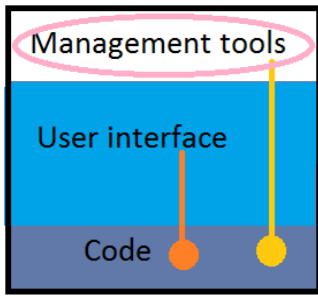
AI **RECOGNIZES** elements, so that even if things change, your test don't break.

Nieuwe run



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



A summary...

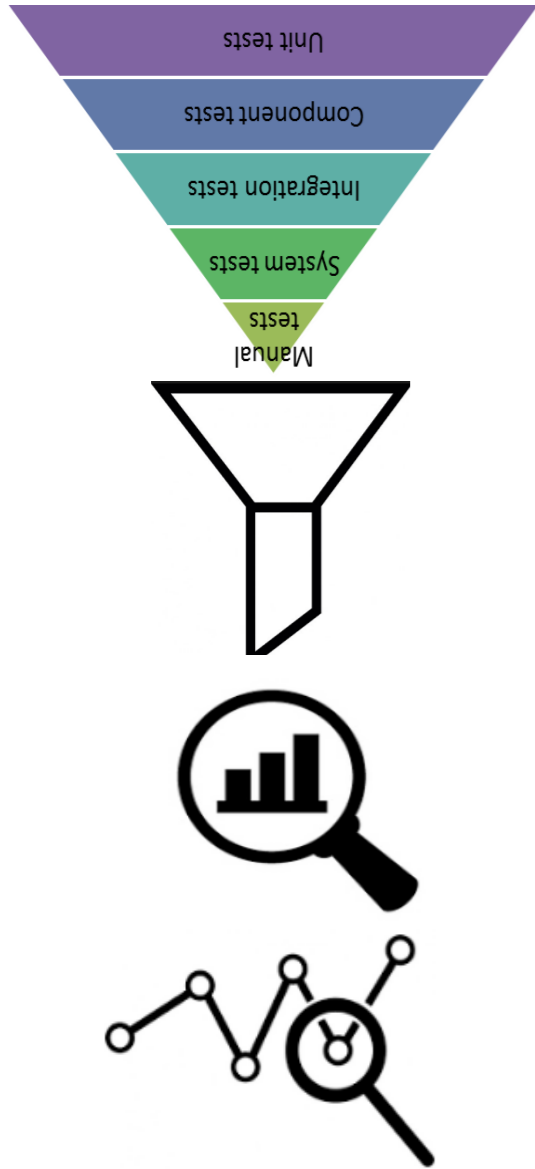
Data from all types of tests is collected and analyzed on code coverage.

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.

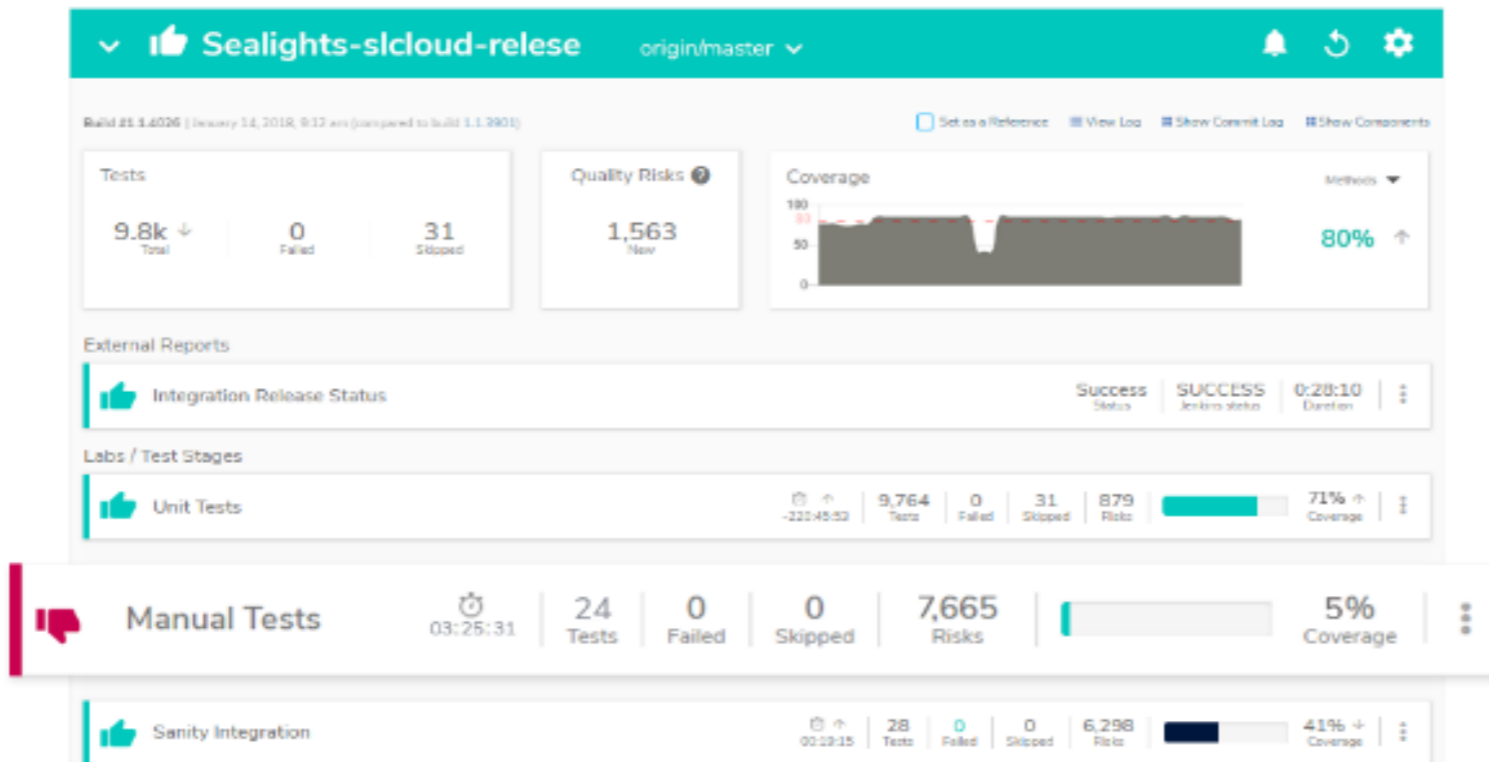


Exploratory test code coverage

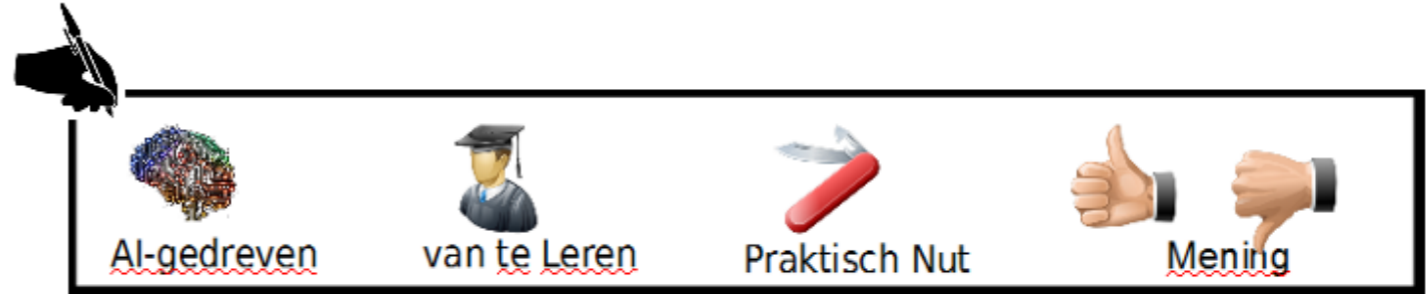
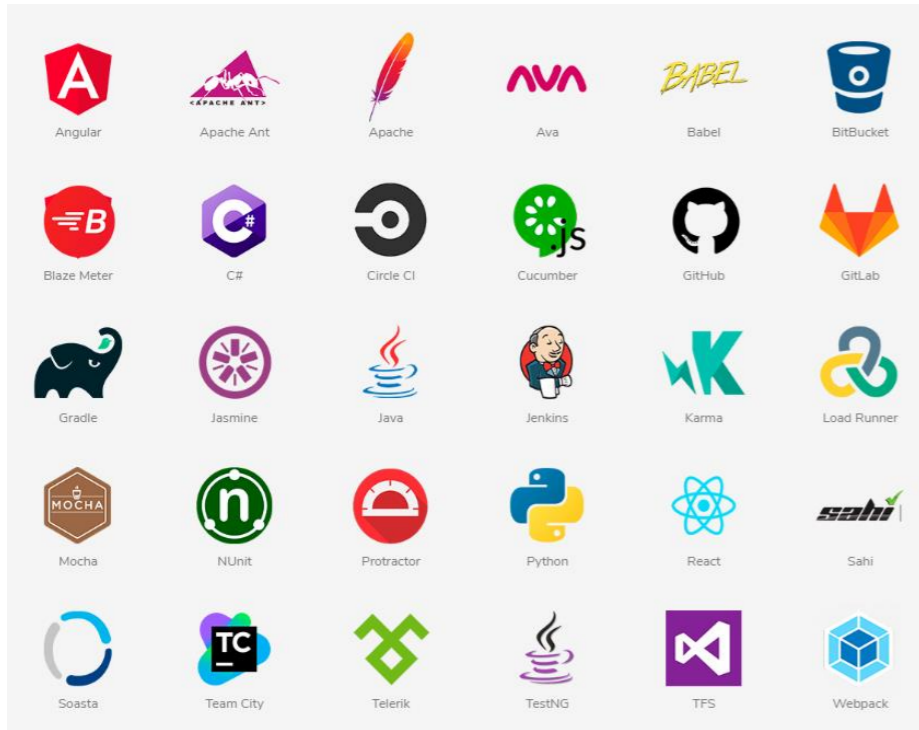


Provide insight into which code areas are tested with manual and exploratory tests to improve team efficiency and speed.

Reduce overlap with other test types to reduce test time



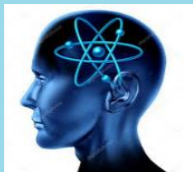
Details



Israël



ai-bi?



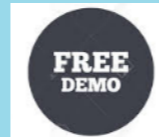
Ci integr.



internet rapport



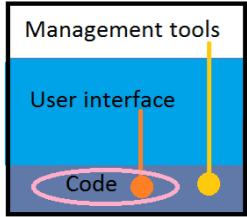
FREE DEMO



?



Sealights

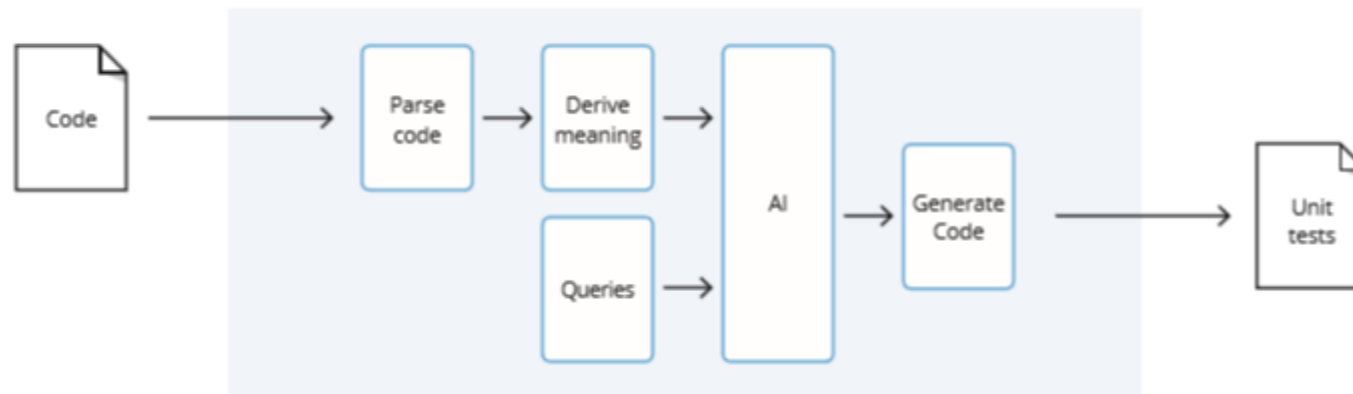


Improve code quality

Spin off from Oxford

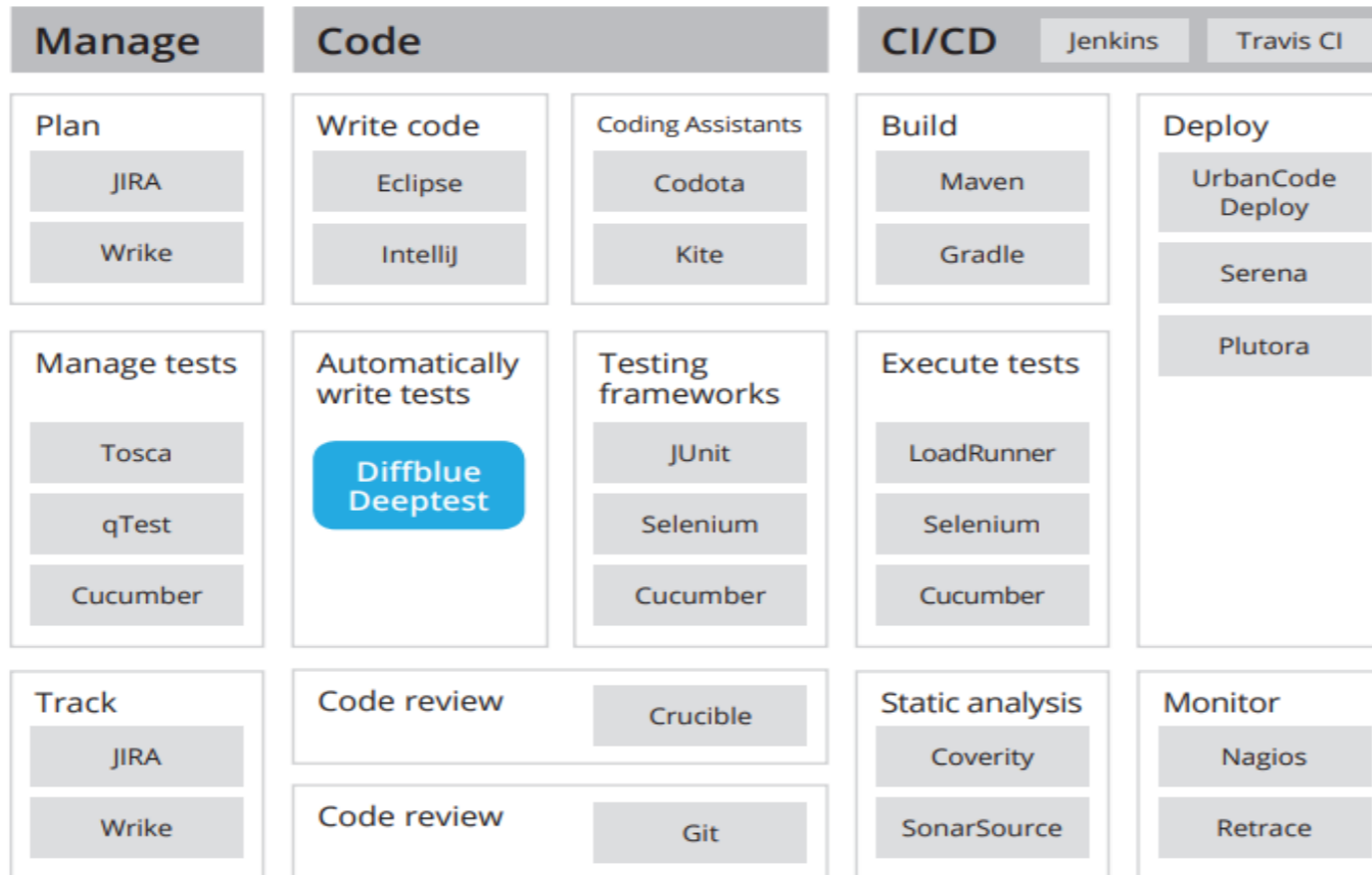
- Uses code and code history for
- Code coverage tests
- Automatically generates unit tests where they are missing after a sweep through the code

What does Diffblue Deeptest do with source code?



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

Where in software development?



Details

Probabilitstic Fault Localisation (paper)

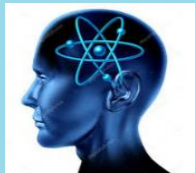
Lots of scientific articles



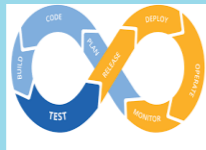
UK



Ai!



Ci?



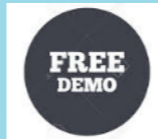
github



rapport



FREE
DEMO

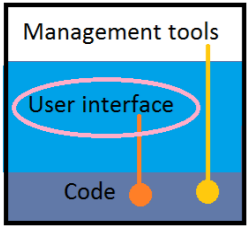


FREE
TRIAL



Github?





Visual validation of changes

Ai powered visual testing and monitoring



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

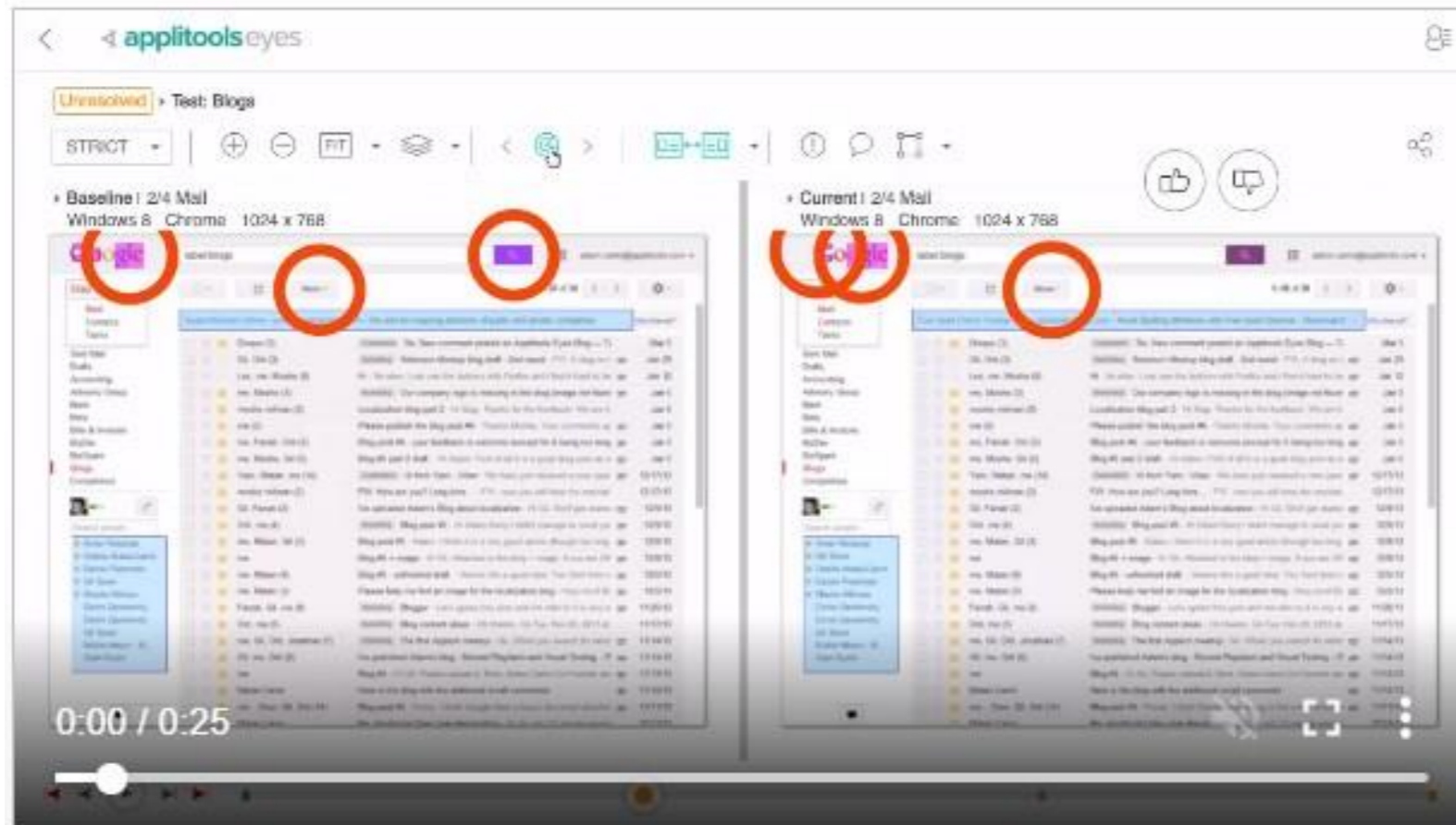


Wat kan applitools?

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

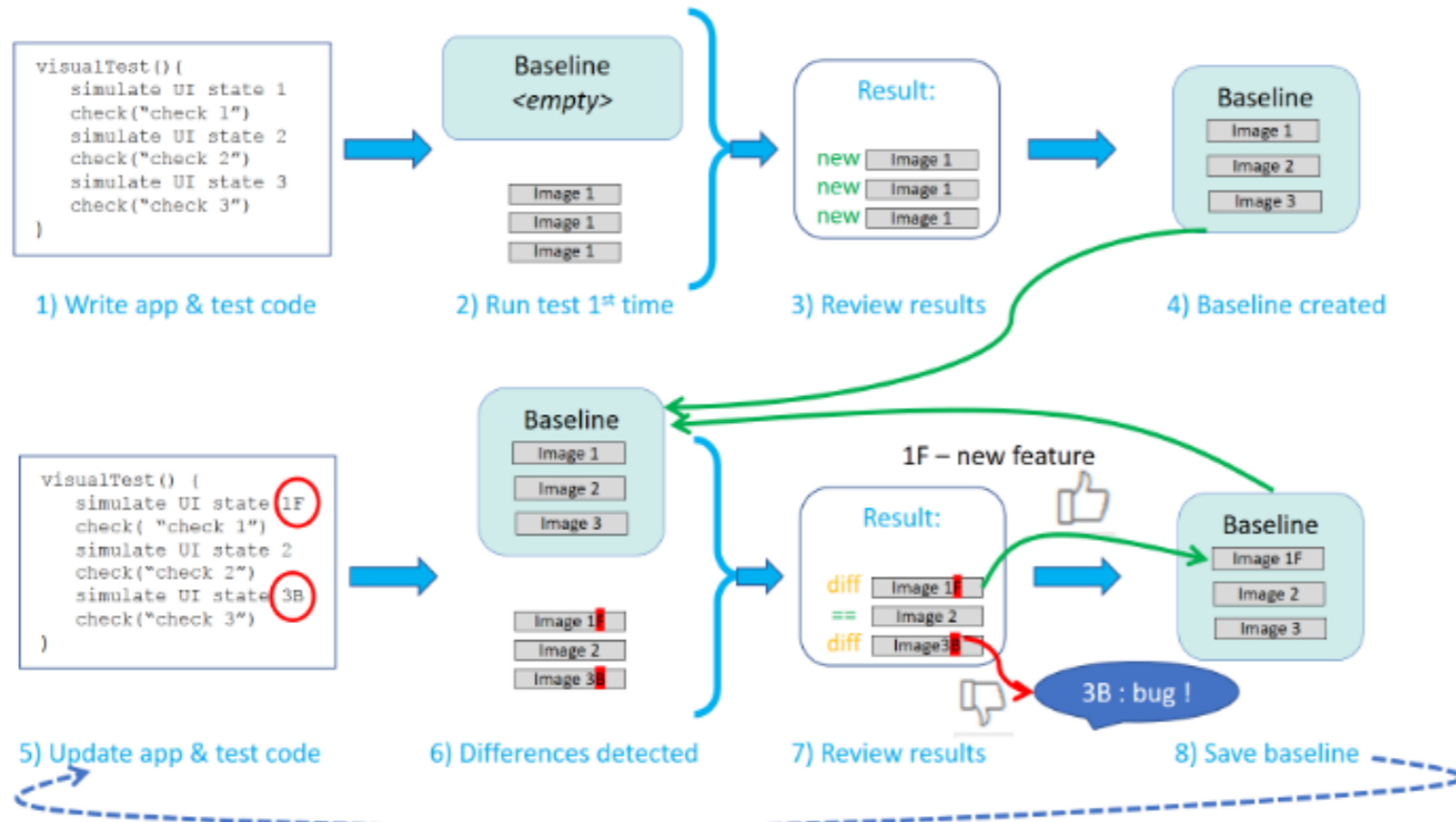
Applitoools use ai to prevent this and to learn which changes are meaningful and which not.

Baseline



New run

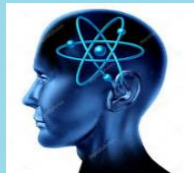
Visual differences, bugs and baseline



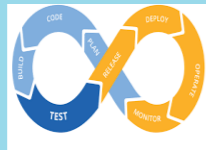
Israël
USA



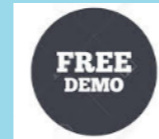
Ai



Ci

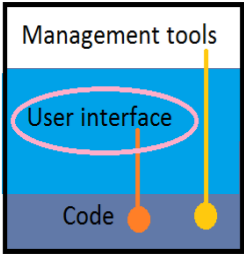


Sdk/api



Individual [\$299 p/m]
Enterprise Publ/ Priv Cloud





Real test cases



ultra high test engineer productivity-lightning fast test creation



Appvance ai explanation



appvance IQ

Short recap

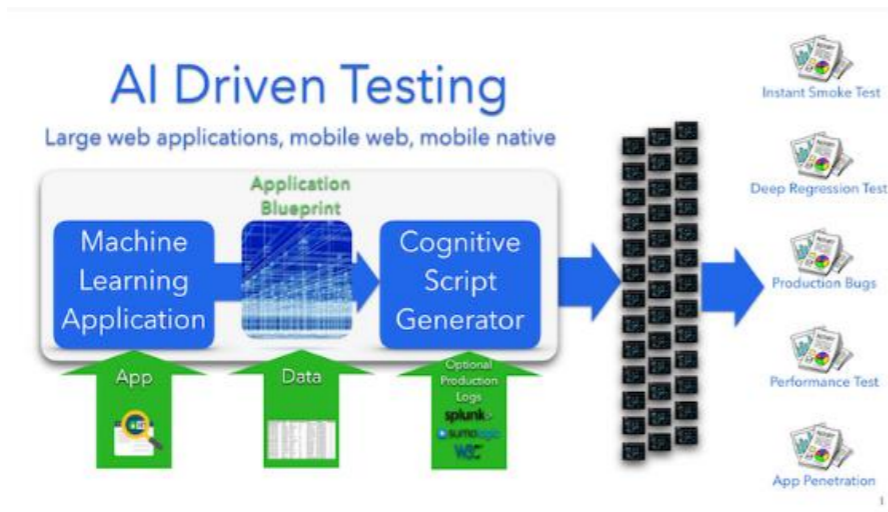
A scan of the application can be done in a few minutes

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

The screenshot displays the FullStory interface for a session replay. At the top, the 'fullstory' logo is on the left, and navigation buttons for 'BACK TO EVERYONE', 'SESSION REPLAY', 'PAGE INSIGHTS', and 'PRO' are in the center. On the right, 'PRE CONSULTANTS' is visible. Below the navigation bar, the browser address bar shows the URL: `https://apps.simapro.com/Survey/Survey/Workbench?id=bbbbf029-3ffc`. The main content area is titled 'Edit survey' and contains a grid of survey sections. Each section has a title and a description. The sections include:

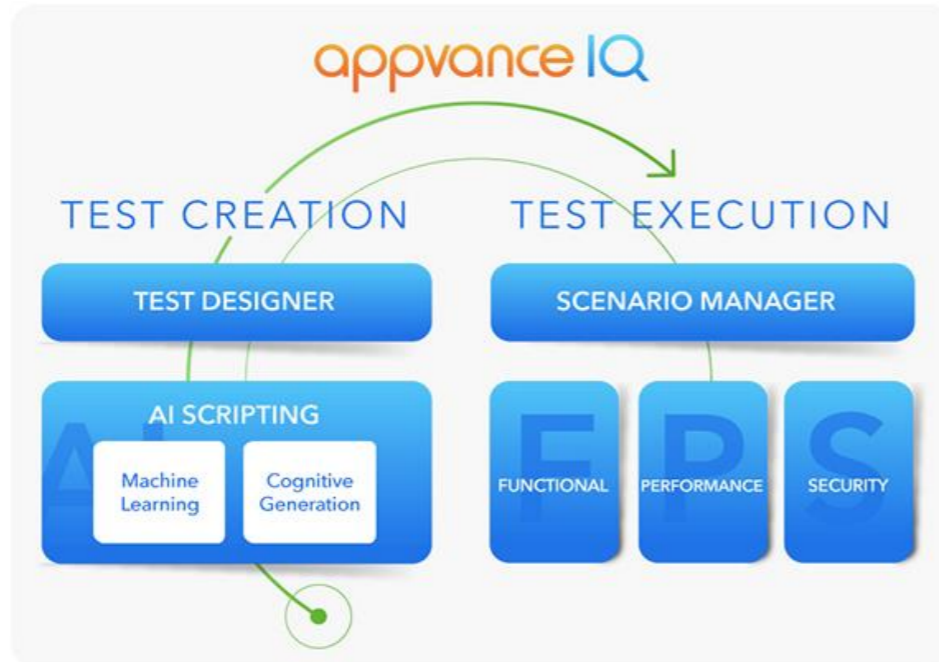
- Company name
- Which country are you based in? (Country on which your answers will focus on)
- Are companies using LCA/LET to set up their procurement strategy?
- How common is the application of LCA/LET for procurement?
- In which sectors is LCA/LET applied for procurement?
- Which policies or initiatives foster the use of LCA/LET for procurement? (See
- Are companies using LCA/LET for reporting at product and organization?
- How common is the application of LCA/LET for reporting?
- For which kinds of reports is LCA/LET applied? (See examples thanks to the "r"
- In which sectors is LCA/LET applied for reporting?
- Which policies or initiatives foster the use of LCA/LET for standard reporting? (See
- Are companies using LCA/LET as a basis for their overall sustainability strategies?
- How common is the application of LCA/LET for target setting?
- In which sectors is LCA/LET applied for target setting?
- Which policies or initiatives foster the use of LCA/LET for target setting? (See
- Are companies get external lab
- How common is LCA/LET for the
- In which sector labels and cert
- Which policies i

At the bottom of the survey editor, there is a 'Trash' button and a timeline. The timeline shows a play button, a refresh icon, a timer at '12:58 / 36:16', a 'SHARE' button, a '1X' zoom level, a 'SKIPPING INACTIVITY' status, and a 'FULL SCREEN' button. On the right side of the interface, there is a 'User 207' profile card with details: 'Yesterday, 3:08 pm · Chrome, Windows · 128 events, Amersfoort, UT, NL · 37.0.87.166'. Below the profile card is a list of events:

- Visit `https://apps.simapro.com/Survey...`
- Changed (""): `#ng-app body,height100...`
- Clicked `#surveydetailscontainer div.sp...`
- Clicked `#emailtemplatemodal div.pre-f...`
- Clicked `#emailtemplatemodal div.pre-f...`
- Clicked `#surveyTitleTextArea` (highlighted in blue)
- Clicked `#surveydetailscontainer div.sp...`
- Clicked `#surveydescription`
- Clicked `#surveydescription`

A 'Help' button is located at the bottom right of the event list.

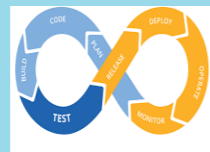
Details



Customers mentioned on website: large companies

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

USA
Costa Rica
India



internet



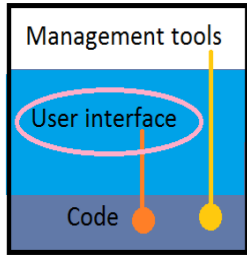
yes



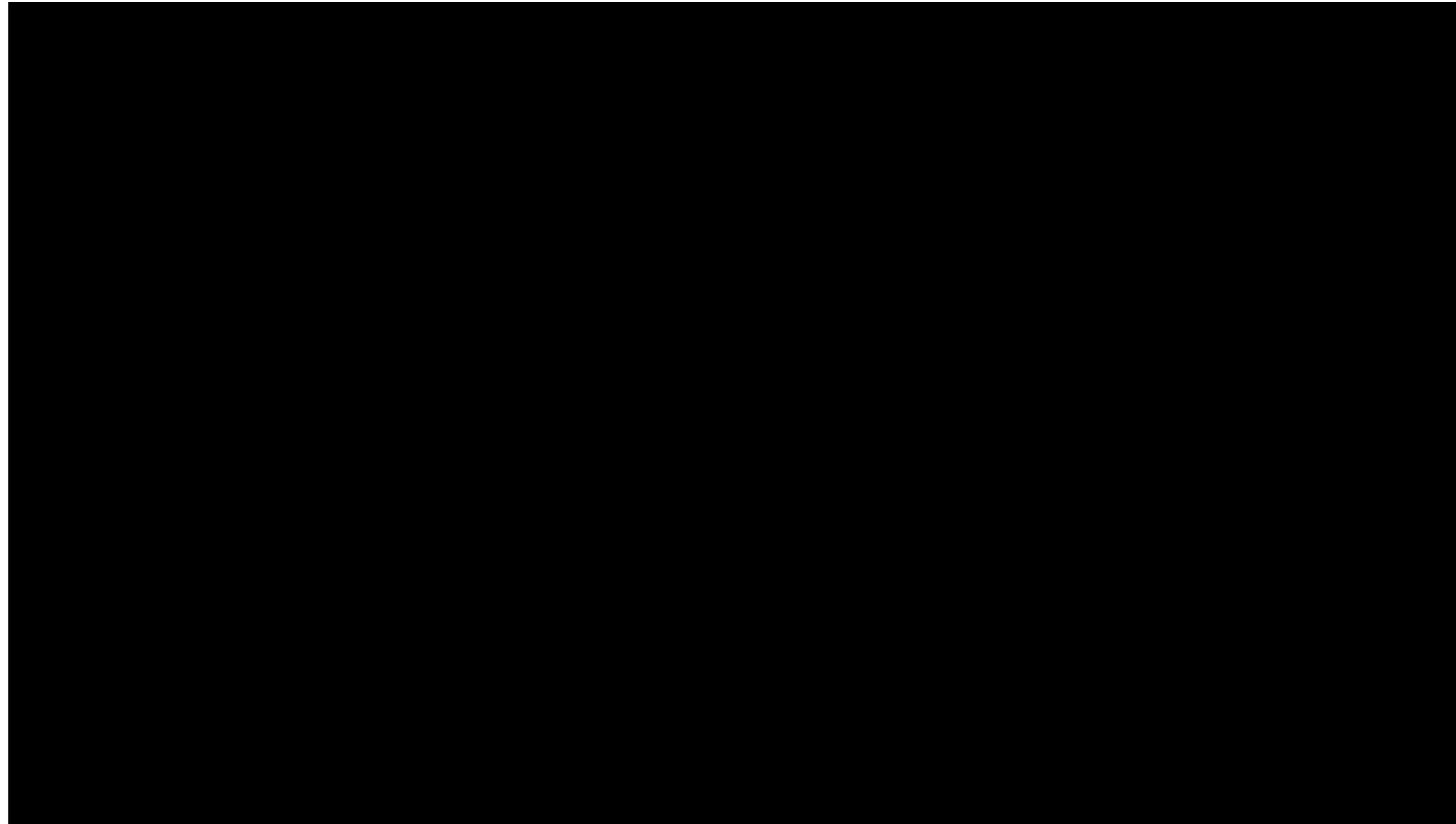
?



appvance IQ



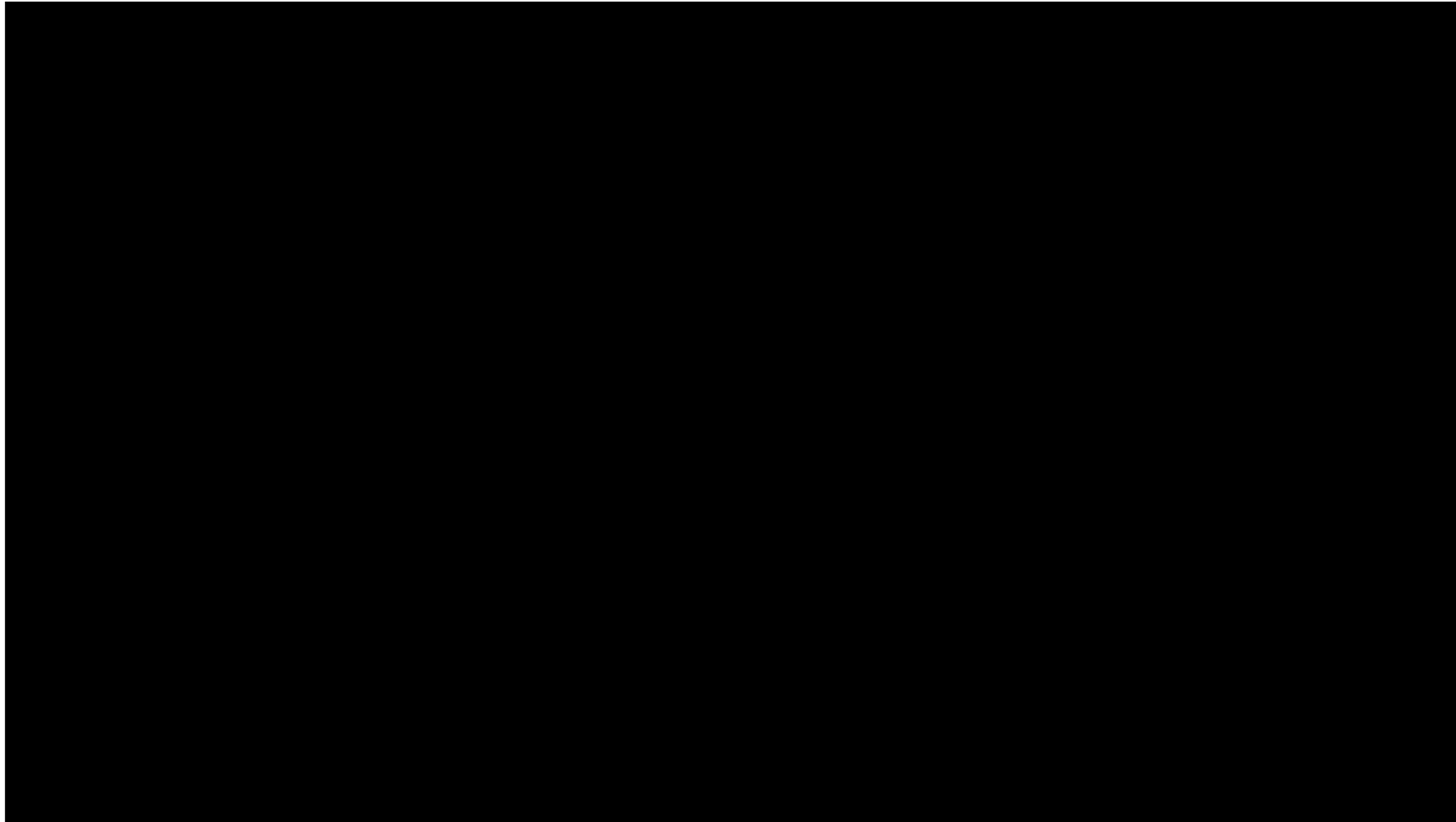
Generate cases & self healing tests



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



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

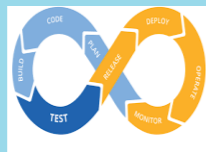
San
Francisco



ai



CI



internet



rapport

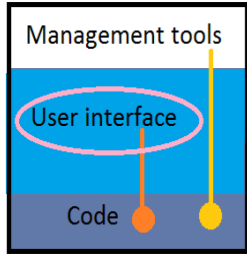


FREE
DEMO



?





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.“

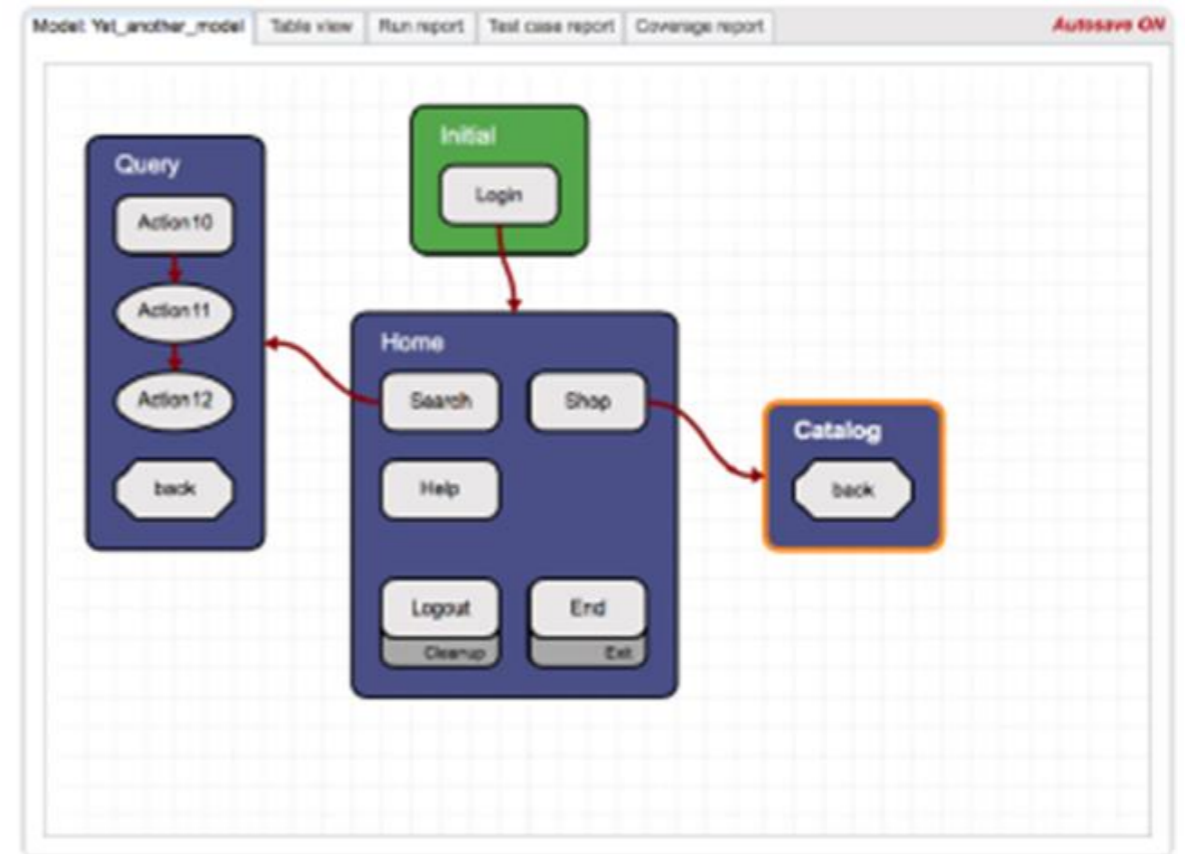


Functional tests and model

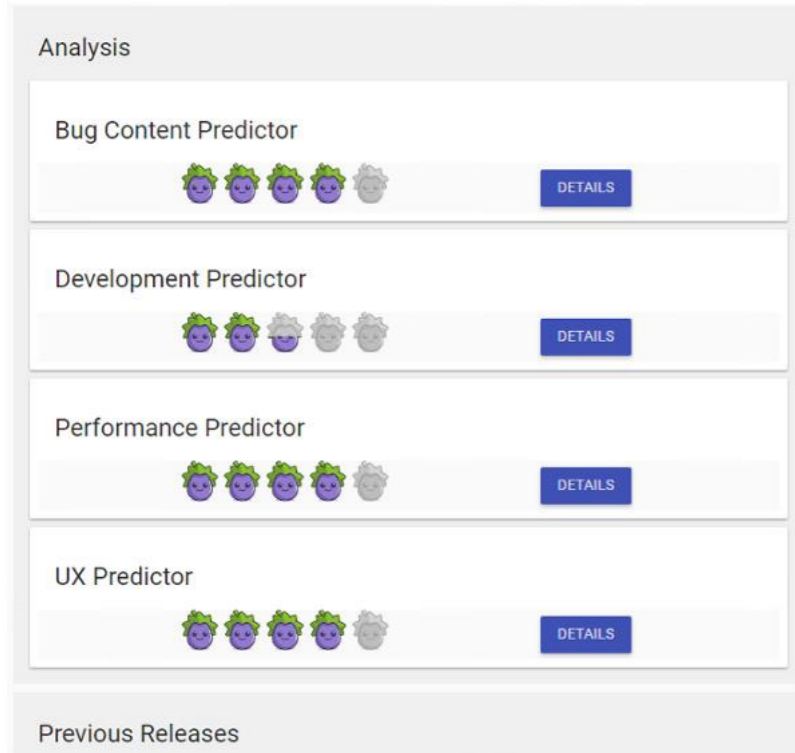
Functional test suite of eggplant is needed for ai module

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-network-cloud automation-management tool ..

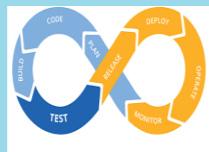
London
USA



ai



Ci



internet



rapport



FREE
DEMO



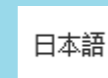
FREE
TRIAL



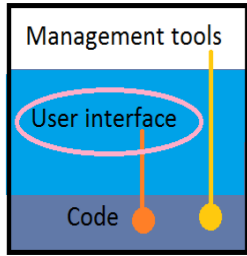
?



日本語



eggplant



Record & playback as a base for ai testing



mabl

Help Default Insights 20 reza@the5thseason.net

Dashboard

Explore mabl

Journeys

Plans

Team

Recent Runs

Most Recent Status by Environment

Http

The 5th Season

The 5th Season 2e rond.

Passed Search Movies

Visit home page 00:00:22 Passed

mabl Trainer

2 Visit the default URL, e.g. <https://app.mabl.com>

3 Click on the link "Signup" to <https://app.mabl.com/signup>

4 Click on the "Name" text field

5 Generate a random string with format "Dan {{alpha:10}}" and assign it to variable "name", e.g. "Dan koaeNSwFan"

6 Insert value of variable "name" into the "Name" text field

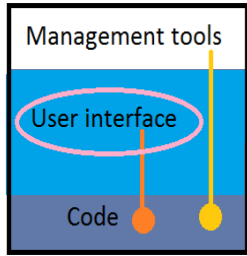
7 Assert "value" of the "Name" text field equals "undefined"

Save Cancel

Install Extension

Why do I need to install an extension?





Demo MABL

The screenshot shows the website for Burenstad (www.burenstad.nl). The header includes the logo, social media icons (Facebook, Twitter, LinkedIn, WhatsApp, Email), and a 'powered by Screencastify' badge. The navigation menu contains: Home, Oranjestad, Nieuws, Agenda, Kijken, kopen en doen, Eten, drinken en verblijven, and Evenementen. The main content area features a large image of a town square with a church tower. Overlaid on the page is the 'mabl Trainer' interface, which displays a list of steps for a test script:

- 19 Switch context to the root frame
- 20 Hover over the <h1> element with text "Oranjestad Buren"
- 21 Hover over the <div> element with text "Home Oranjestad Nieuws Agenda Kijken, kopen en doen Eten, drinken en verblijven Evenementen Home /Oranjestad Buren Oranjestad Buren Een rijke geschiedenis en veel bezienswaardigheden Buren mag zich Oranjestad noemen, vanwege de band met de koninklijke familie. Willem van Oranje trouwde namelijk in 1"

The trainer interface also includes playback controls (grid, back, play, forward, record), search, and options for 'Hovers: Record' and 'Hide'. 'Save' and 'Cancel' buttons are at the bottom.



Make a plan

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



What do you want to call this plan?



** 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

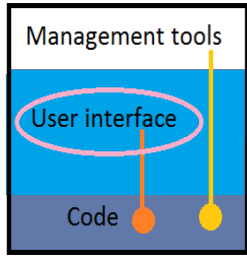
Visit all linked pages within the app

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

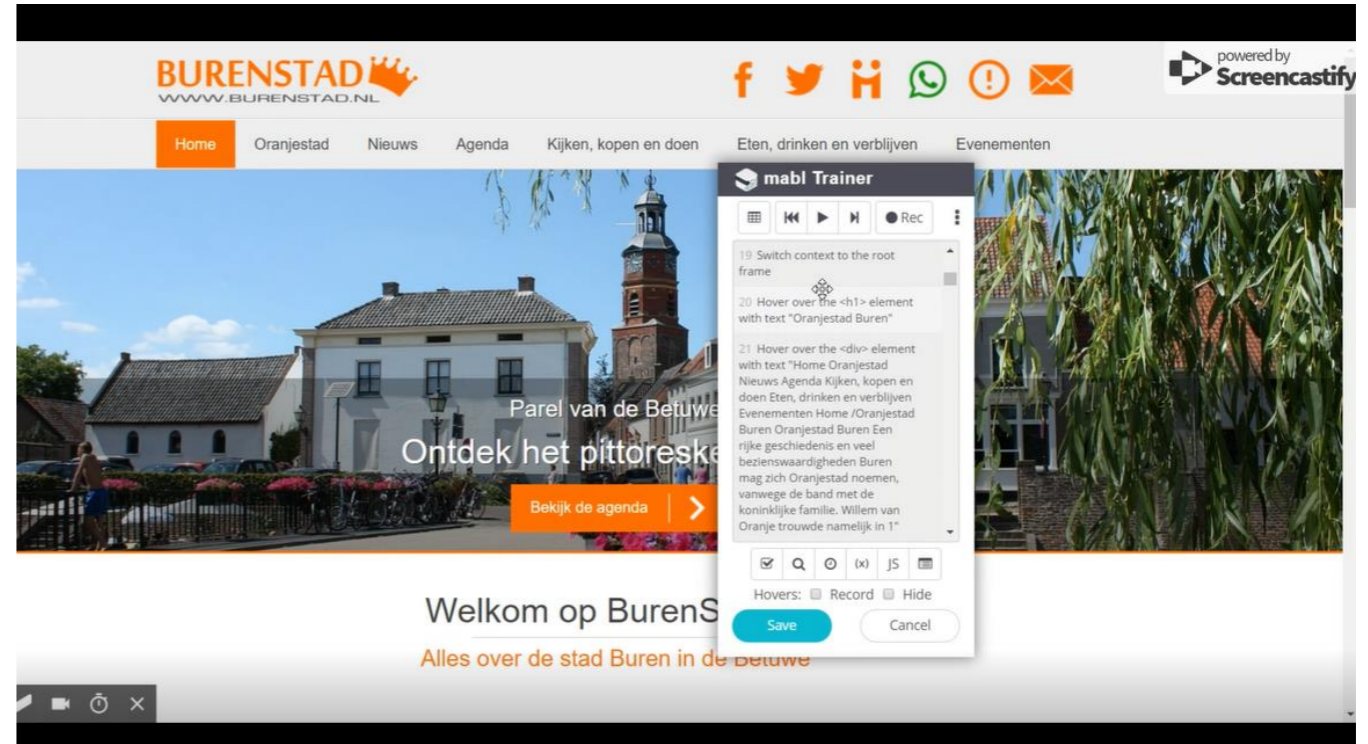
Dive films



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





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

Status

00:02:58

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

2018-08-29 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 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"

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

Dashboard

Plans

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

Plans [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	<ul style="list-style-type: none"> BurenStad PRD BurenStad PRD https://www.burenstad.nl 	<input checked="" type="checkbox"/> 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.	<ul style="list-style-type: none"> ⚡ event: deployment ⚡ timer: 4 Hr 0 Min 	<ul style="list-style-type: none"> BurenStad PRD BurenStad PRD https://www.burenstad.nl 	<input checked="" type="checkbox"/> On
BurenStad PRD 4hrs Recurrent	Aug 29, 2018 11:05 AM	None	<ul style="list-style-type: none"> ⚡ timer: 4 Hr 0 Min ⚡ event: deployment 	<ul style="list-style-type: none"> BurenStad PRD BurenStad PRD https://www.burenstad.nl 	<input checked="" type="checkbox"/> On

Plans

BurenStad PRD 4hrs Recurrent

[Edit](#) [Notifications](#) [Share](#) [Delete](#)

Enabled On [Run](#)

Each execution starts 1 journey runs

Updated 27 minutes ago

BROWSERS



TRIGGERS

⚡ timer: 4 Hr 0 Min
⚡ event: deployment

APPLICATION

BurenStad PRD

ENVIRONMENTS

BurenStad PRD

https://www.burenstad.nl

JOURNEYS

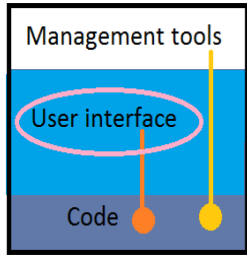
BurenStad PRD

History



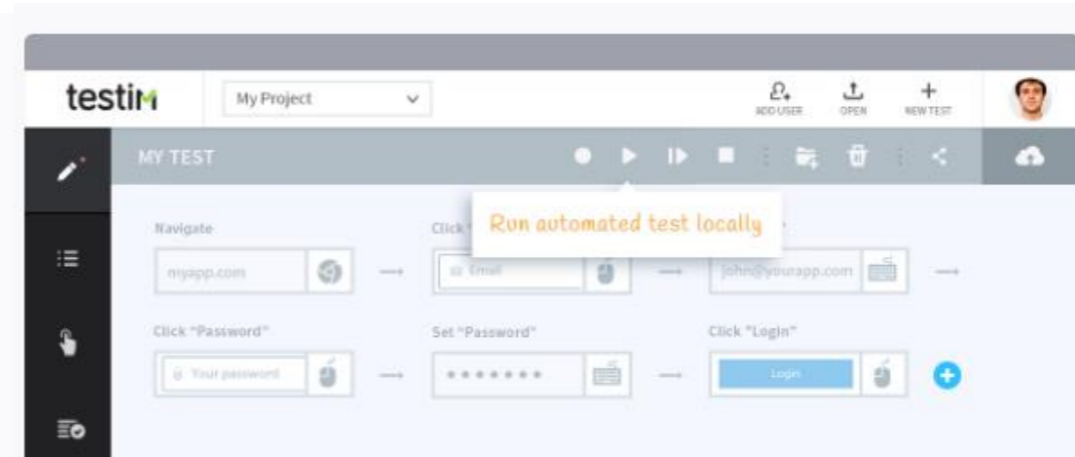
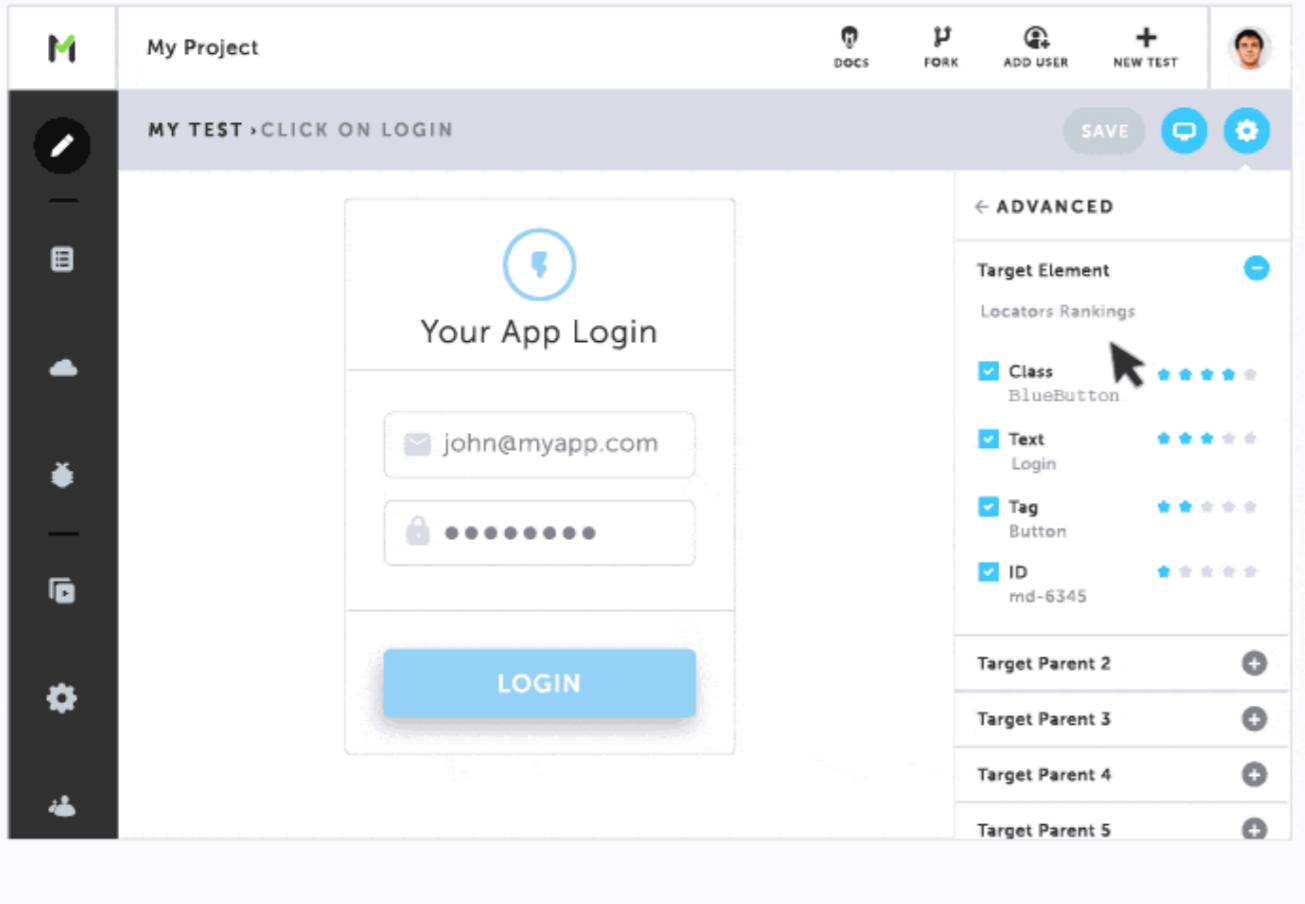
Status	Triggered By	Triggered ↑	Run Time	Actions	Journeys			
Running	Manual	Aug 29, 2018 11:31 AM	Running		BurenStad PRD	⚙ Running	00:00:23	View output
Passed	Schedule	Aug 29, 2018 11:06 AM	00:13:27		BurenStad PRD	✔ Passed	00:13:19	View output

[Show more runs](#)



Testim

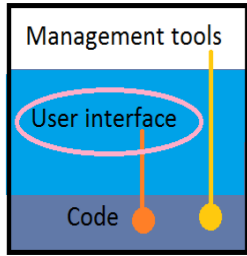
Testim uses machine learning automation to speed-up the authoring, execution, and maintenance of automated tests.



autonomous authoring - tests that learn



testim



Retest



Finding the corresponding component after substantial changes

retest is Perfect for Agile Testing

“ We have come to value:

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

That is, while there is value in the items on the right, we value the items on the left more.

From the [Agile Manifesto](#)

Individuals and Interactions over Processes and Tools

If you have a challenge in your team or culture, no tool is going to save you—not even retest. Aside from that, retest is specifically well-suited for agile testing (see below).

Working Software over Comprehensive Documentation

We should document as few as possible, and only what's necessary. Agile teams make an effort to bring everyone to the table, making astonishingly little documentation necessary. Although this reduces effort, in a changing team with changing requirements, this also means that no one remembers what a specific field in a specific situation should actually contain. This then makes even manual testing impossible.

retest helps by documenting the current state of the software in minute detail, serving as an additional documentation that can be automatically compared to the current version of the software and is easy to maintain.

Customer Collaboration over Contract Negotiation

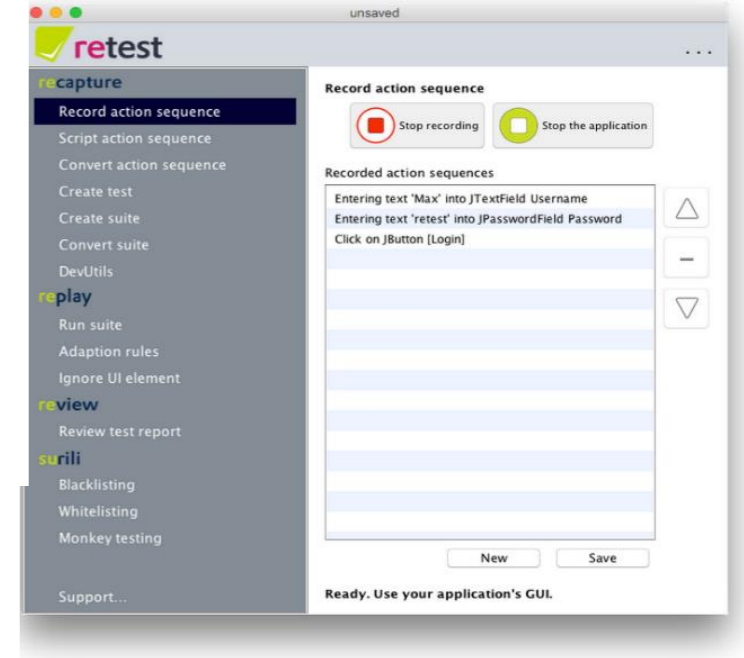
By focusing on ease of use, retest does not require technical knowledge and thus makes it easy to collaborate with business customers and lets them record valuable use cases or review questionable changes.

Responding to Change over Following a Plan

We should use an iterative, incremental approach to software development. Traditional GUI automation tools result in brittle and hard-to-maintain tests. This is why most practitioners caution to bring in GUI automation early when the GUI has not yet stabilized—which it ideally never does.

However, retest was built around the process of a changing GUI. Tests are robust and maintaining tests becomes as simple as a single click.

All of this makes retest the best tool to use for GUI automation in agile testing.



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

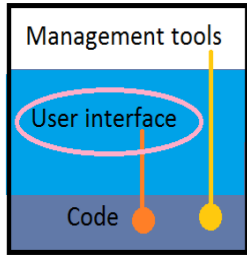
online

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

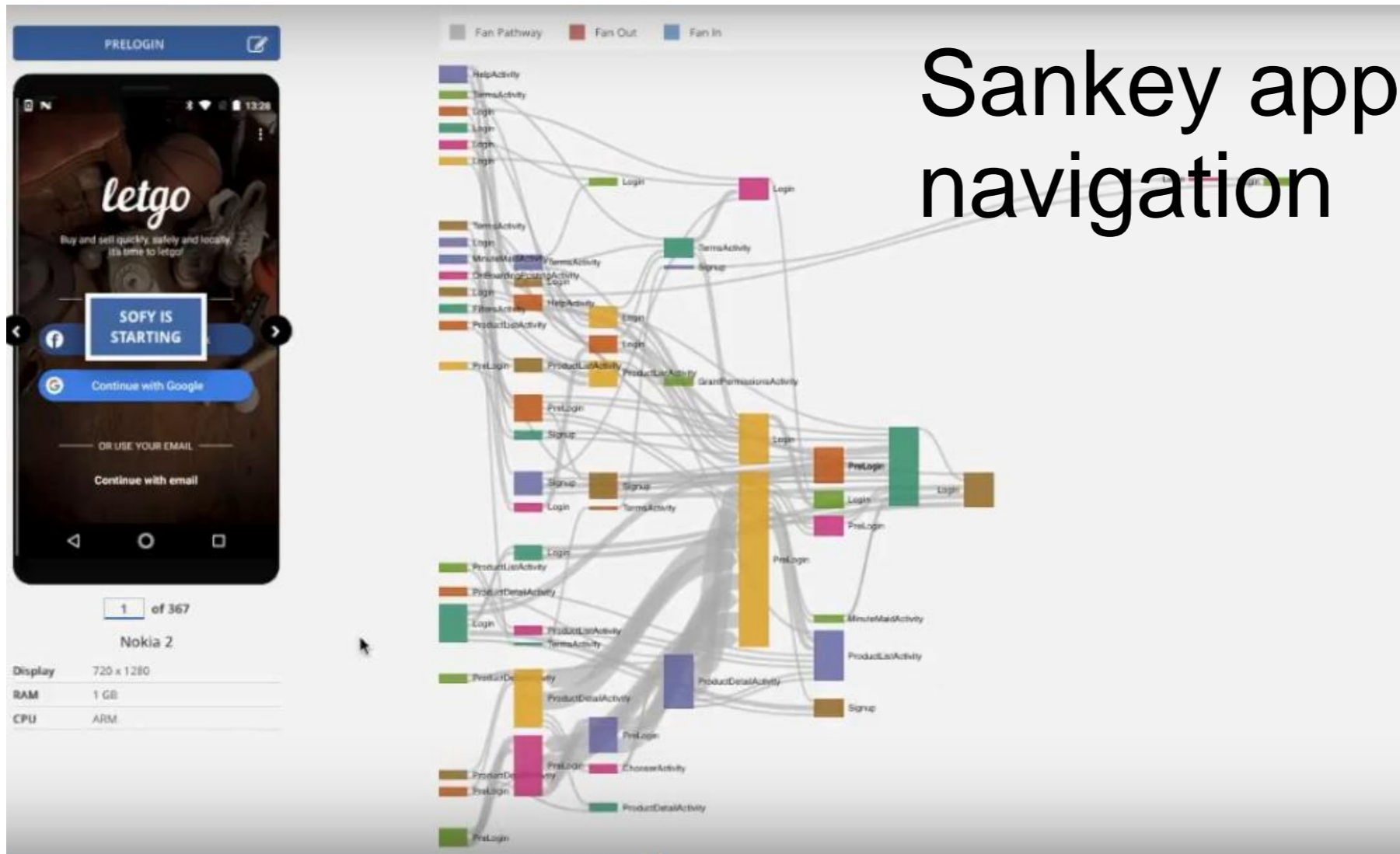
Bug encountered? Dashboard with visual information.

Rapportage in Jira met log en reproductiepad

Bug rapport is also a test

Articles with known issues frameworks linked (stack overflow)

Extended cloud



Sankey app navigation

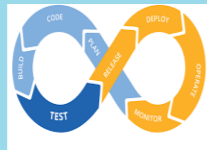
land



ai?



CI?



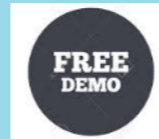
internet



rapport



FREE DEMO

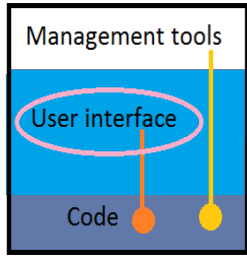


FREE TRIAL



kosten





Generate baseline and compare runs



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

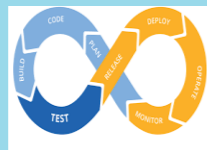
USA



ai



Ci?



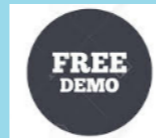
internet



rapport



FREE DEMO



FREE TRIAL



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.

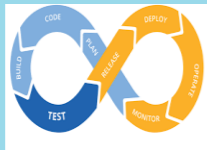
Zd Korea



ai?



ci



upload



rapport



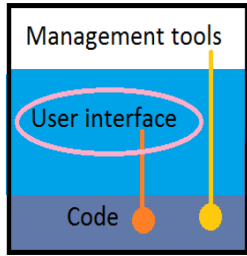
FREE DEMO



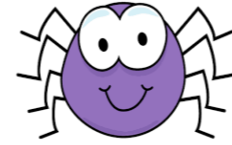
0 trial



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

Test*

How does this tool work?

UNIVERSITÄT
Test Automation at the user interface level (Testar)

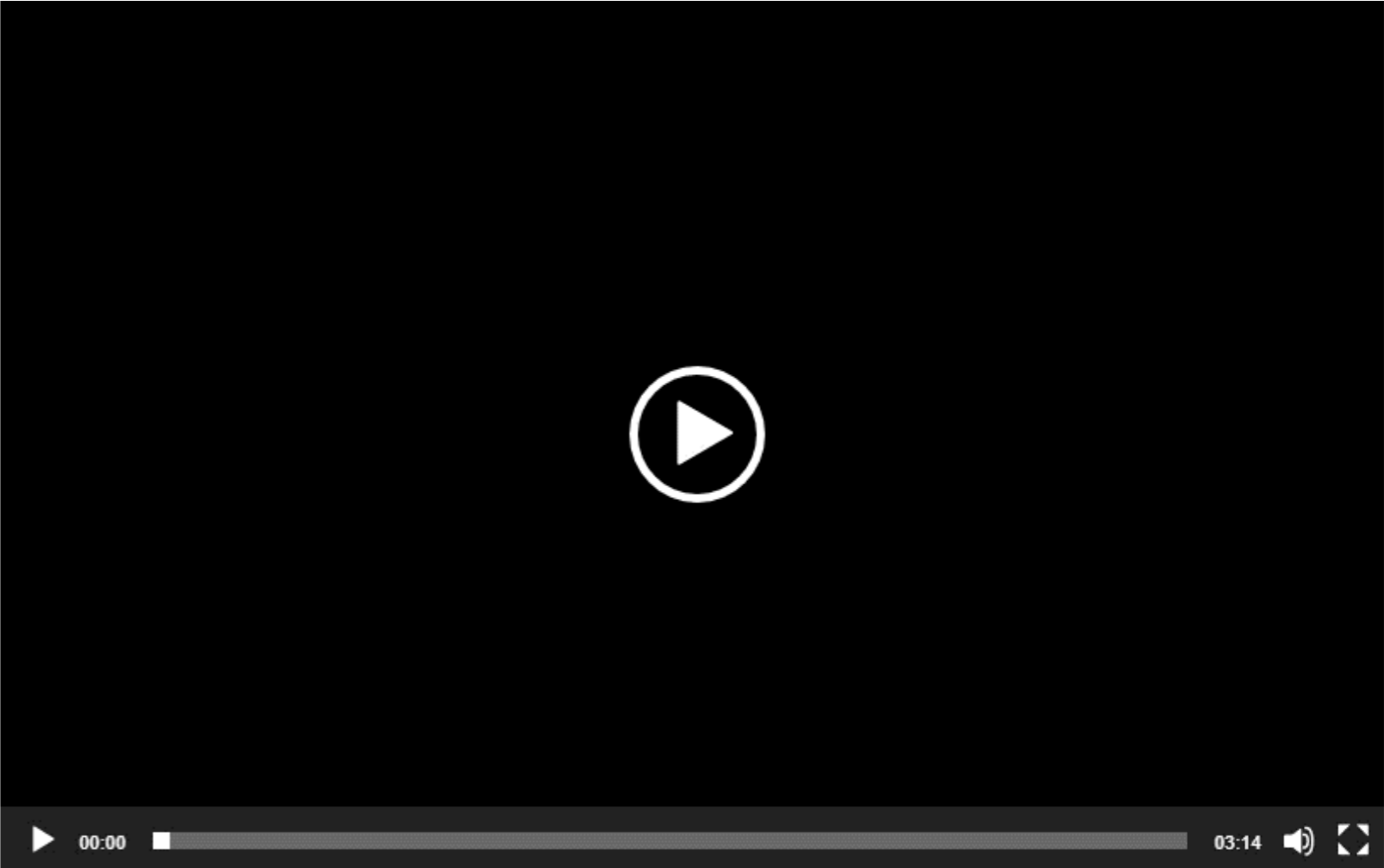
¿What **T**est* is not ?

- It is not capture/replay
- It is not visual testing
- It does not generate scripts

poliMedia



Crash test



NL/SP



Not yet lokaal





Recap

Increase test coverage and test economically

Code improvements

Visual differences

Applitoools

Functional tests a basis for ai test

Testim, Retest

Generate testcases

Sealights)

real users

Appvance en Functionize

automatic

Functionize, AppTest, Testrigor, Sofy

Metrics quality

Sealights, Eggplant

Crash tests

Testar

Sealights

diffblue

Functionize, Mabl,

(all except

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!