

**FRAUNHOFER FOKUS
INSTITUTE FOR OPEN COMMUNICATION SYSTEMS**

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IoT TESTWARE

Modern Automated Test Solutions for IoT Components and Systems

Ina Schieferdecker, February 22, 2018, Berlin

- over 500 employees
- appr. 35 European projects
- appr. 100 industry partners
- appr. 220 industry projects

We actively shape the networked world and make it secure, reliable, scalable as well as trustworthy!

Did you know that **YOUR PHONE...**



THE TESTING AND TEST CONTROL NOTATION



- Internationally standardized testing language for formally defining test scenarios
- Designed specifically for testing



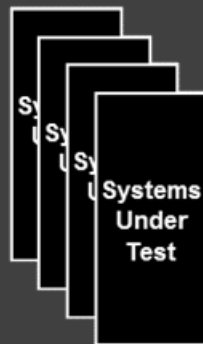
```
testcase Hello_Bob () {  
    p.send("How do you do?");  
    alt {  
        [p.receive("Fine!");  
            {setverdict( pass )};  
        [else]  
            {setverdict( inconc )} //Bob asleep!  
    }  
}
```

TEST EXECUTION

Test Specification

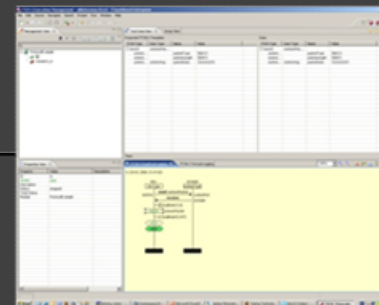


Test System



Communication /
Invocation

Automated Test
Execution and Reporting



TTCN-3 AT WORK

detecting vulnerabilities using fuzzing

SMART FUZZING



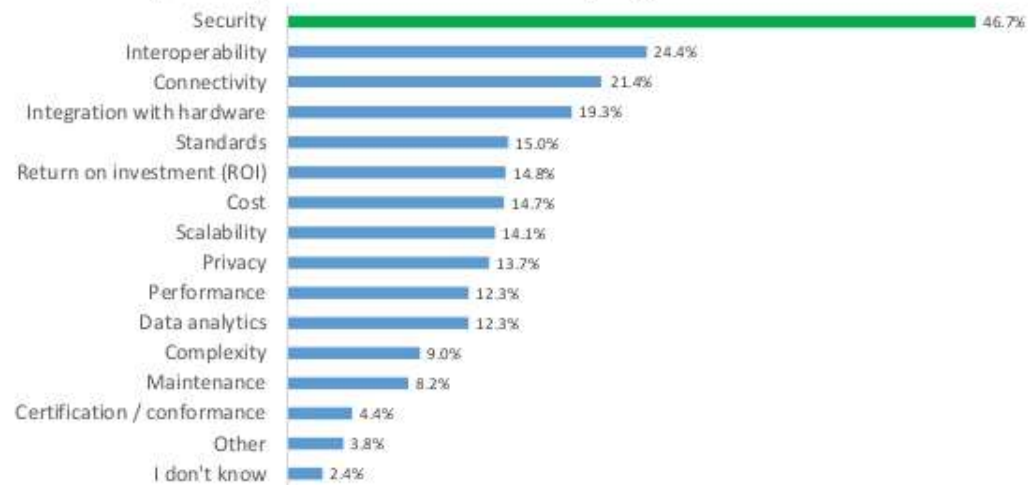
Giesecke & Devrient



CHALLENGE IOT TESTING

TOP IoT CONCERNS

What are your top 2 concerns for developing IoT solutions?



IoT Developer Survey 2017 - Copyright Eclipse Foundation, Inc.



CHALLENGE IOT TESTING

Combination of various testing approaches needed

System Testing

Software Testing

Protocol Testing

Security Testing

Test Automation

Model-Based Testing

...

IOT-TESTWARE

The screenshot shows the Eclipse IoT-Testware project page. At the top, the Eclipse logo is on the left, and 'Create account' and 'Log in' links are on the right. Below the logo is a navigation bar with 'GETTING STARTED', 'MEMBERS', 'PROJECTS', and 'MORE'. A 'DOWNLOAD' button is on the right. A breadcrumb trail reads 'HOME / PROJECTS / TECHNOLOGY PROJECT / ECLIPSE IOT-TESTWARE / ECLIPSE IOT-TESTWARE'. A green notification box states: 'This proposal has been approved and the **Eclipse IoT-Testware** project has been created.' The main heading is 'Eclipse IoT-Testware'. Below it, a 'BASICS' section contains text about the project proposal phase and a 'Parent Project: Technology Project' link. A 'Background:' section starts with 'The open source community has produced a lot of excellent technology, frameworks and products that help with implementing IoT applications...' On the right, there is a graphic with an 'eclipse incubation' egg and the 'IoT TESTWARE' logo.

<https://github.com/eclipse/iottestware.git>

THE OPEN SOURCE TEST EXECUTION TOOL

The screenshot shows the Eclipse website's project page for Eclipse Titan. At the top, the Eclipse logo is on the left, and 'Create account' and 'Log in' links are on the right. Below the logo is a navigation bar with 'GETTING STARTED', 'MEMBERS', 'PROJECTS', and 'MORE'. A search bar with 'Google Cus...' and a 'DONATE' button are also present. The breadcrumb trail reads 'HOME / PROJECTS / TOOLS PROJECT / ECLIPSE TITAN'. The main heading is 'Eclipse Titan'. Below it is a sub-navigation bar with 'Overview', 'Downloads', 'Who's Involved', 'Developer Resources', 'Governance', and 'Contact Us'. The 'Overview' tab is active, showing a description: 'Titan is a TTCN-3 compilation and execution environment with an Eclipse-based IDE. TTCN-3 is a modular language specifically designed for testing (the acronym itself stands for Test and Test Conformance Notation), standardized by ETSI (see www.ttcn-3.org) and endorsed by ITU. The user of the tool can develop test cases, test execution logic and build the executable test suite for several platforms. Titan consists of a core part, executing in a Unix/Linux-like environment and a set of Eclipse plug-ins.' Below the text is a diagram with two icons: a person icon labeled 'Test Platform' and a person icon labeled 'Eclipse IDE, Executor,'. To the right of the text is a large image of the Eclipse logo with the text 'eclipse incubation' above it.

Create account Log in

eclipse

GETTING STARTED MEMBERS PROJECTS MORE

Google Cus...

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Eclipse Titan

Overview Downloads Who's Involved Developer Resources Governance Contact Us

Titan is a TTCN-3 compilation and execution environment with an Eclipse-based IDE. TTCN-3 is a modular language specifically designed for testing (the acronym itself stands for Test and Test Conformance Notation), standardized by ETSI (see www.ttcn-3.org) and endorsed by ITU. The user of the tool can develop test cases, test execution logic and build the executable test suite for several platforms. Titan consists of a core part, executing in a Unix/Linux-like environment and a set of Eclipse plug-ins.

Titan

Test Platform

Eclipse IDE, Executor,

eclipse incubation

EXAMPLE: MQTT BROKER EVALUATION (AS OF JULY 2017)

Broker	Version	PASS		FAIL		INCONCLUSIVE	
		#	%	#	%	#	%
Mosquitto	1.4.14	40	88,89%	3	6,67%	2	4,44%
VerneMQ	1.1.0	39	86,67%	3	6,67%	3	6,67%
HiveMQ	broker.hivemq.org	39	86,67%	4	8,89%	2	4,44%
EMQ	2.0	36	80,00%	7	15,56%	2	4,44%
Iannister	?	31	68,89%	12	26,67%	2	4,44%
ActiveMQ	5.14.5	31	68,89%	12	26,67%	2	4,44%
RSMB	?	26	57,78%	17	37,78%	2	4,44%
RabbitMQ	3.5.7	21	46,67%	24	53,33%	0	0,00%
Mosca	2.5.1	19	42,22%	24	53,33%	2	4,44%
Moquette	0.10	16	35,56%	29	64,44%	0	0,00%
HBMQTT	0.9	15	33,33%	30	66,67%	0	0,00%

SUMMARY

- ✓ Advanced testing technology
- ✓ (Open source) IoT-Testware (code)
- ✓ Standardized IoT test purposes
- ✓ Certified Professionals for IoT



**Please be invited to
use or contribute
to our IoT Testware !**

