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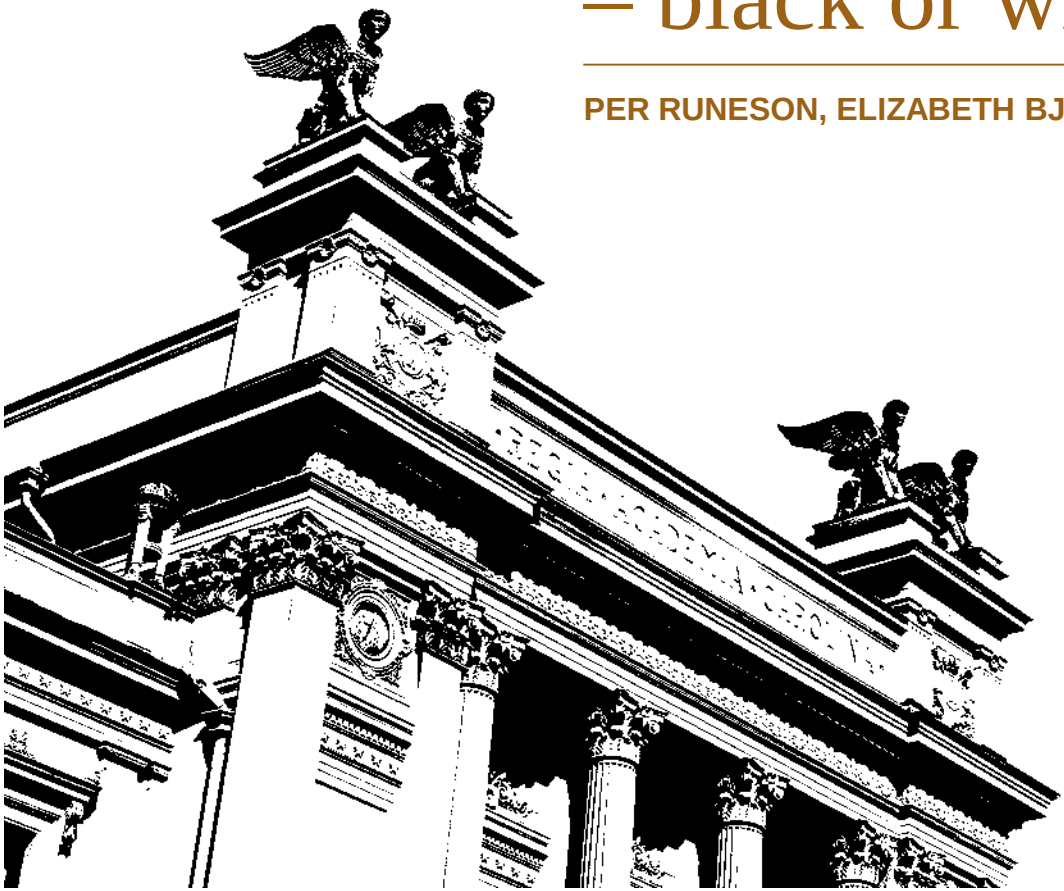
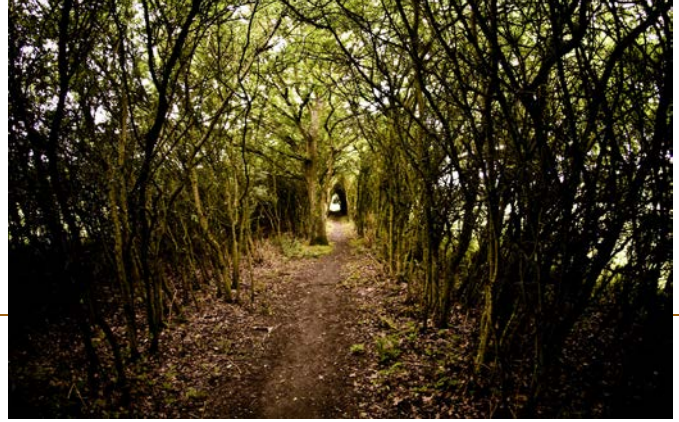
Exploratory testing – black or white?

PER RUNESON, ELIZABETH BJARNASON, KAI PETERSEN



Exploratory Testing



…a **powerful approach**, yet widely misunderstood

…orders of magnitude **more productive** than scripted testing

…**simultaneous learning**, test design and test execution

James Bach

Exploratory testing evangelist

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What is ET?

Exploratory software testing (ET) is a style of software testing that

emphasizes the **personal freedom and responsibility** of the individual tester

to **continually optimize the value** of her work

by treating test-related learning, test design, test execution, and test result interpretation as **mutually supportive activities that**

run in parallel throughout the project.

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Sounds promising…

…but…

- impossible to automate
- highly dependent on tester skills
- hard to replicate failures (if testing is not traced)

And, do we really know?

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Exploring Exploratory Testing – outline

- Variations of exploratory testing
- Empirical evidence on:
  - Efficiency
  - Relation to knowledge and skills
- Recommendations
- Making exploratory testing actionable

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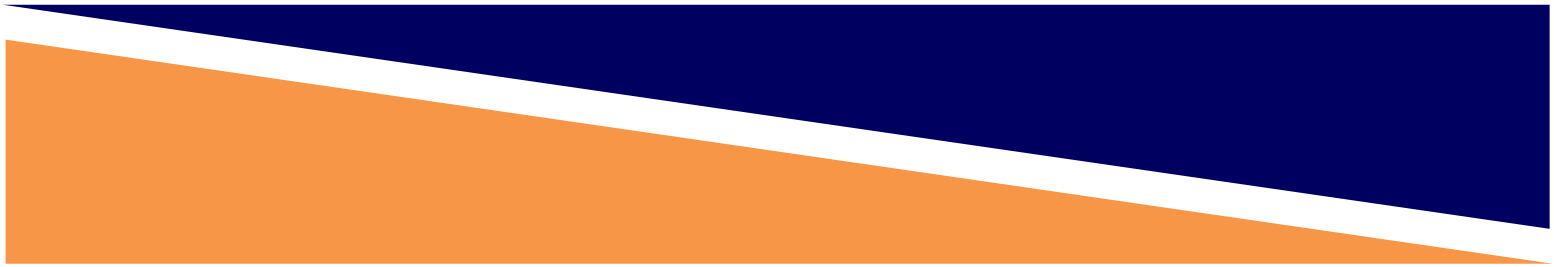
Variations of Exploratory Testing

Freestyle

Pure scripted



Test object only

Test goals, constraints

Test object, test steps, test data

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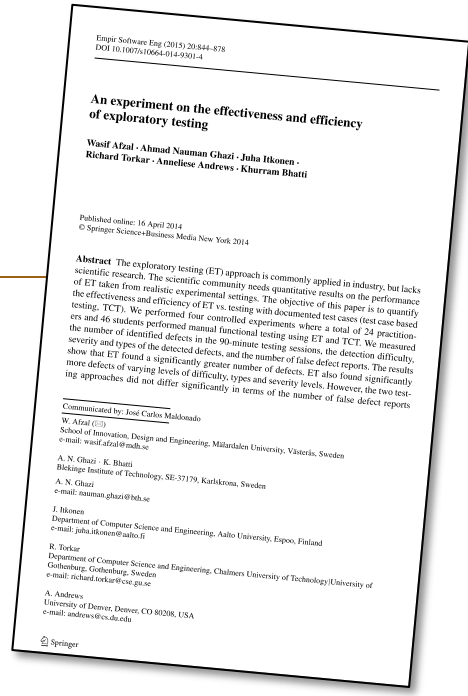
Is Exploratory Testing efficient?



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DOI 10.1007/s10664-014-9301-4

An experiment on the effectiveness and efficiency of exploratory testing

Wasif Afzal · Ahmad Nauman Ghazi · Juha Itkonen · Richard Torkar · Anneliese Andrews · Khurram Bhatti

Published online: 16 April 2014

Abstract The exploratory testing (ET) approach is commonly applied in industry, but lacks scientific research. The scientific community needs quantitative results on the performance of ET taken from realistic experimental settings. The objective of this paper is to quantify the effectiveness and efficiency of ET vs. testing with documented test cases (test case based testing, TCT). We performed four controlled experiments where a total of 24 practitioners and 46 students performed manual functional testing using ET and TCT. We measured the number of identified defects in the 90-minute testing sessions, the detection difficulty, severity and types of the detected defects, and the number of false defect reports. The results show that ET found a significantly greater number of defects. ET also found significantly more defects of varying levels of difficulty, types and severity levels. However, the two testing approaches did not differ significantly in terms of the number of false defect reports

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Springer

Experiments on **TCT** vs **ET**

- 46 students and 24 practitioners in 90 minute sessions [Afzal 2015]
  - Test design included in TCT session
  - **Faults found (ET) >> Faults found (TCT)**
- 79 students in 90 minute sessions [Itkonen 2007]
  - Test design NOT included in TCT session
  - **Faults found (ET) ≈ Faults found (TCT)**

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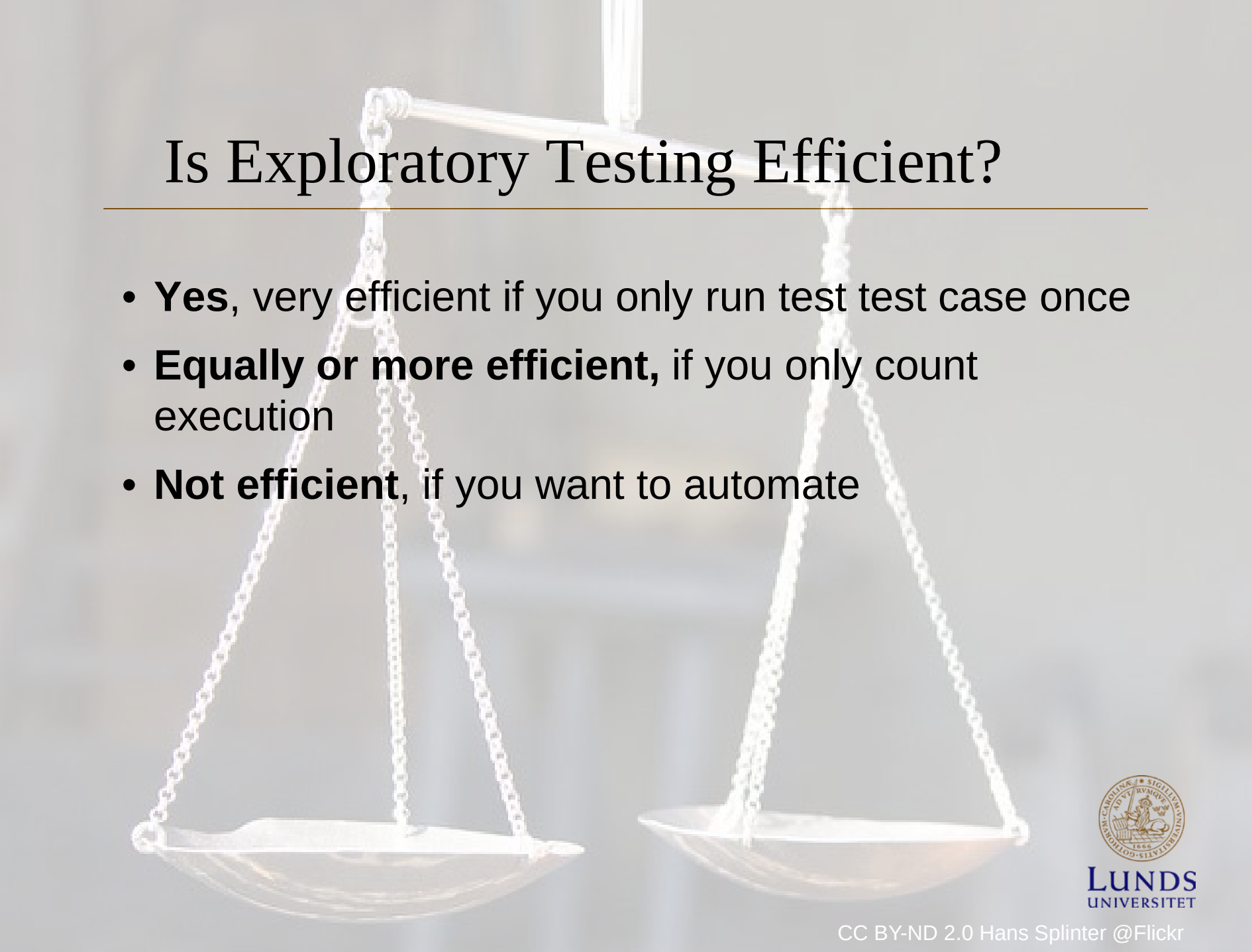
Is Exploratory Testing Efficient?

- **Yes**, very efficient if you only run test test case once
- **Equally or more efficient,** if you only count execution
- **Not efficient**, if you want to automate



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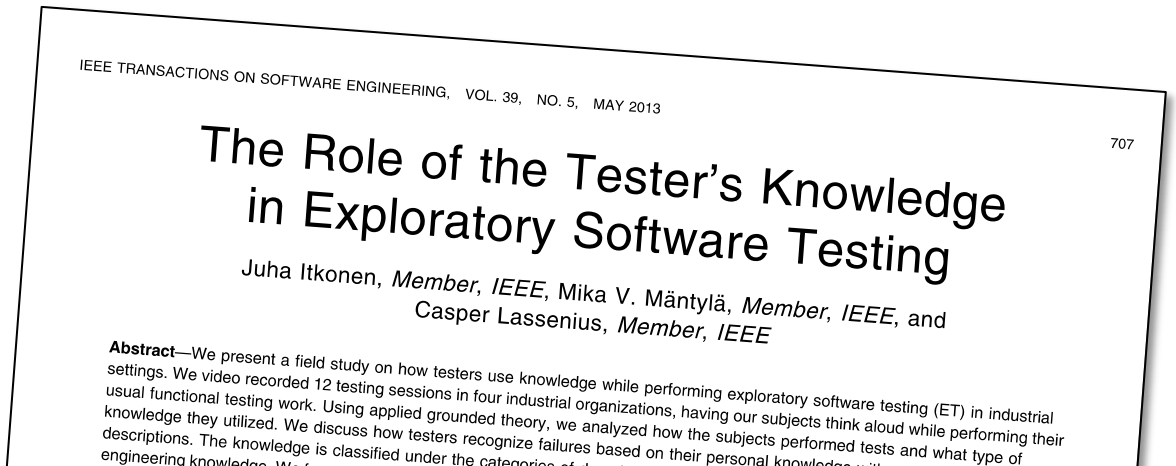
Knowledge in Exploratory Testing

Analysis of 12 ET sessions in 4 units of 3 companies, analyzing 88 failures [Itkonen 2013]

Knowledge types

- domain knowledge,
- system knowledge, and
- generic software engineering knowledge

} Design + Oracle



IEEE TRANSACTIONS ON SOFTWARE ENGINEERING, VOL. 39, NO. 5, MAY 2013

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The Role of the Tester's Knowledge in Exploratory Software Testing

Juha Itkonen, *Member, IEEE*, Mika V. Mäntylä, *Member, IEEE*, and Casper Lassenius, *Member, IEEE*

Abstract—We present a field study on how testers use knowledge while performing exploratory software testing (ET) in industrial settings. We video recorded 12 testing sessions in four industrial organizations, having our subjects think aloud while performing their usual functional testing work. Using applied grounded theory, we analyzed how the subjects performed tests and what type of knowledge they utilized. We discuss how testers recognize failures based on their personal knowledge descriptions. The knowledge is classified under the categories of engineering knowledge.

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Findings on Knowledge

1. ET is efficient since the testers **use different types of personal knowledge**, rather than restricting their focus
2. Failures are **incidentally found outside the actual target** features of the testing activities
3. A large fraction of the **failures do not require complicated test designs** to be provoked
4. Domain knowledge issues are **straightforward** to provoke, while **system or generic knowledge issues are more complicated** to provoke in terms of the number of interacting conditions.

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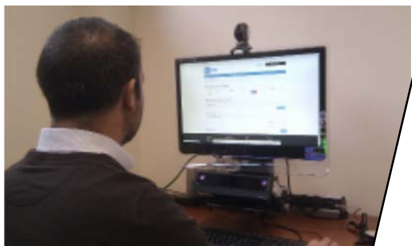
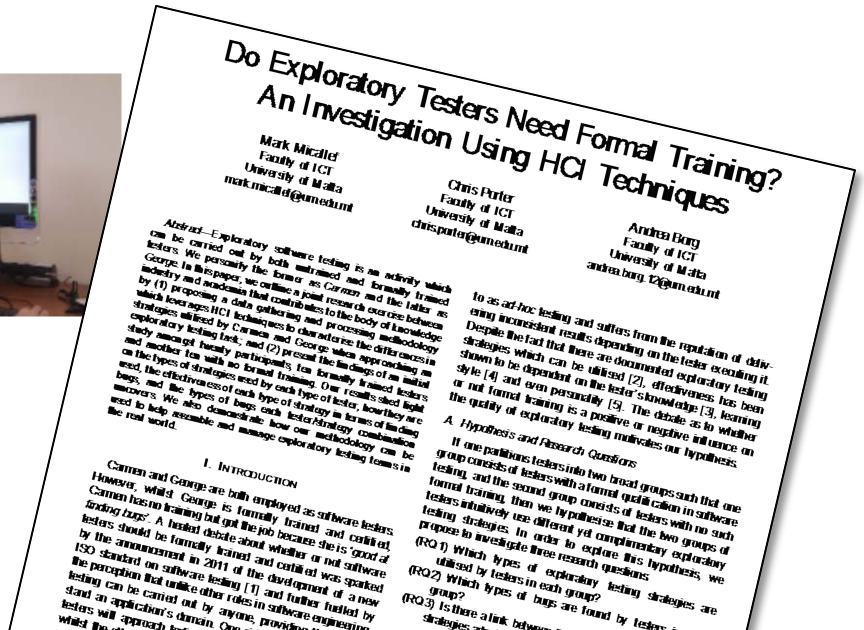
Formal Training in Exploratory Testing

- Experiment with 20 professionals [Micalef 2016]
  - with/without formal test training
  - 20 injected faults in e-commerce system
  - up to 40 minute session with eye-tracking device





Do Exploratory Testers Need Formal Training?
An Investigation Using HCI Techniques

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Do Exploratory Testing need Formal Training?

DISTRIBUTION OF BUGS FOUND ACCORDING TO CATEGORY AND THE TYPE OF TESTER THAT FOUND THEM.

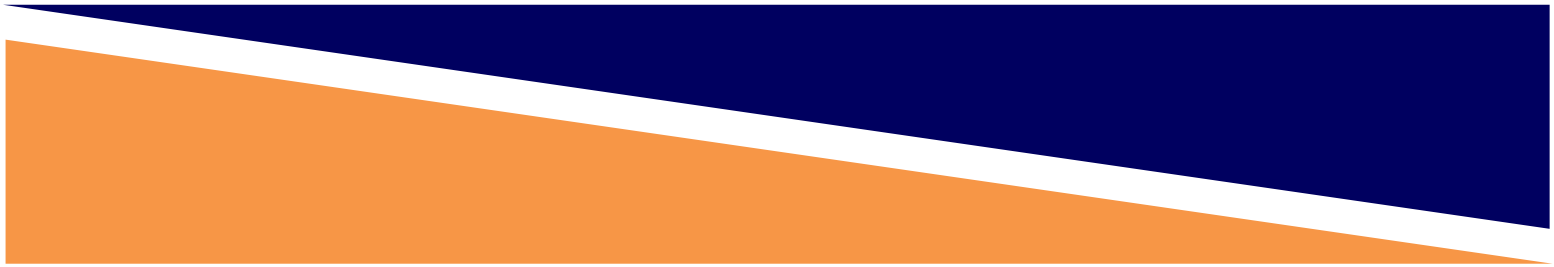
Category	w/o training	w training	Total
Content Bugs	35 (54%)	30 (46%)	65
Input Validation Bugs	6 (21%)	23 (79%)	29
Logical Bugs	5 (50%)	5 (50%)	10
Functional UI Bugs	10 (48%)	11 (52%)	21
Nonfunctional UI Bugs	1 (11%)	8 (89%)	9
	57	77	134

[Micalef 2016]

Recommendations on Exploratory Testing

Freestyle

Pure scripted



Domain issues
Little repetition

System issues
Much repetition –> automation

Use both
Train your testers

Actionable Exploratory Testing

EASE
Embedded Applications Software Engineering

Workshop agenda

- Introduction (10 min): research context, team & participants
- The principles of exploratory testing (5 min)
- Alternative types of test charters (20 min)
- Exercise: Write test cases according to test charter templates (15 + 25 min)
- Reflect on improvements (10 min)
- Closing (5 min): Sum up; next steps

SONY

AXIS COMMUNICATIONS

BLEKINGE TEKNISKA HÖGSKOLA · BTH ·

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Further reading

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- Itkonen J., Mäntylä M. V. and Lassenius, C. **The Role of the Tester's Knowledge in Exploratory Software Testing** IEEE Transactions on Software Engineering (2013) 39(3):707–724
- Micalef M, Porter C, Borg A, **Do Exploratory Testers Need Formal Training?** An Investigation Using HCI Techniques, TAIC-PART, ICST Workshops 2016: 305-314
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Exploratory testing - black **and** white!

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