The “Best” Testing Methods
Results From Two Research Studies

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Researching User Involvement in Agile

- Studied with IT professionals in Sweden and Iceland
  - 4 surveys (~250 part.) and 4 interview studies (~40 participants)
- Many collaborators
  - University professors and students

- Written many papers about it
  - Google profile: Marta Larusdottir
    - https://scholar.google.is/citations?user=cTb1MVIAAAAJ&hl=en&oi=ao

Survey Study in Iceland

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The Research Questions

1. How is testing practiced in Scrum projects in the industry?
2. To what extent is usability testing performed compared to other testing techniques?
3. Who performs the testing?
4. How does usability testing differ from acceptance testing in Scrum projects?

Research Methods

- Questionnaire
  - 26 questions, 21 multiple choice and 5 open
    - Background, the process, testing practises
  - Was sent out to 20 companies using the Scrum process
    - 25 responds from 18 companies
- Interviews
  - 6 persons, 3 software testers and 3 Scrum Masters
  - Main focus on usability and acceptance testing

The Respondents in the Survey

- 25 respondents from 18 companies
  - 76% have a degree in computer science or engineering
  - 68% male, 20% female, 12% did not reply
- Had various experience in the software industry
  - 16% > 15 years, around 25% 10 – 15 years, 4 – 9 years and 1- 3 years
- Scrum used in all the companies
  - Were asked to estimate the extent to which they use Scrum
    - Almost half 81 – 100%, 34% say 21 – 80%, 22% say 0 – 20%
  - 44% said that they use their own process beside Scrum
  - The size of the companies was various
    - 33% up to 19 employees, 28% 20 – 59 emp. , 33% over 60 employees
- Roles
  - 44% Scrum Masters, 24% testers, 20% Product Owners, 12% other

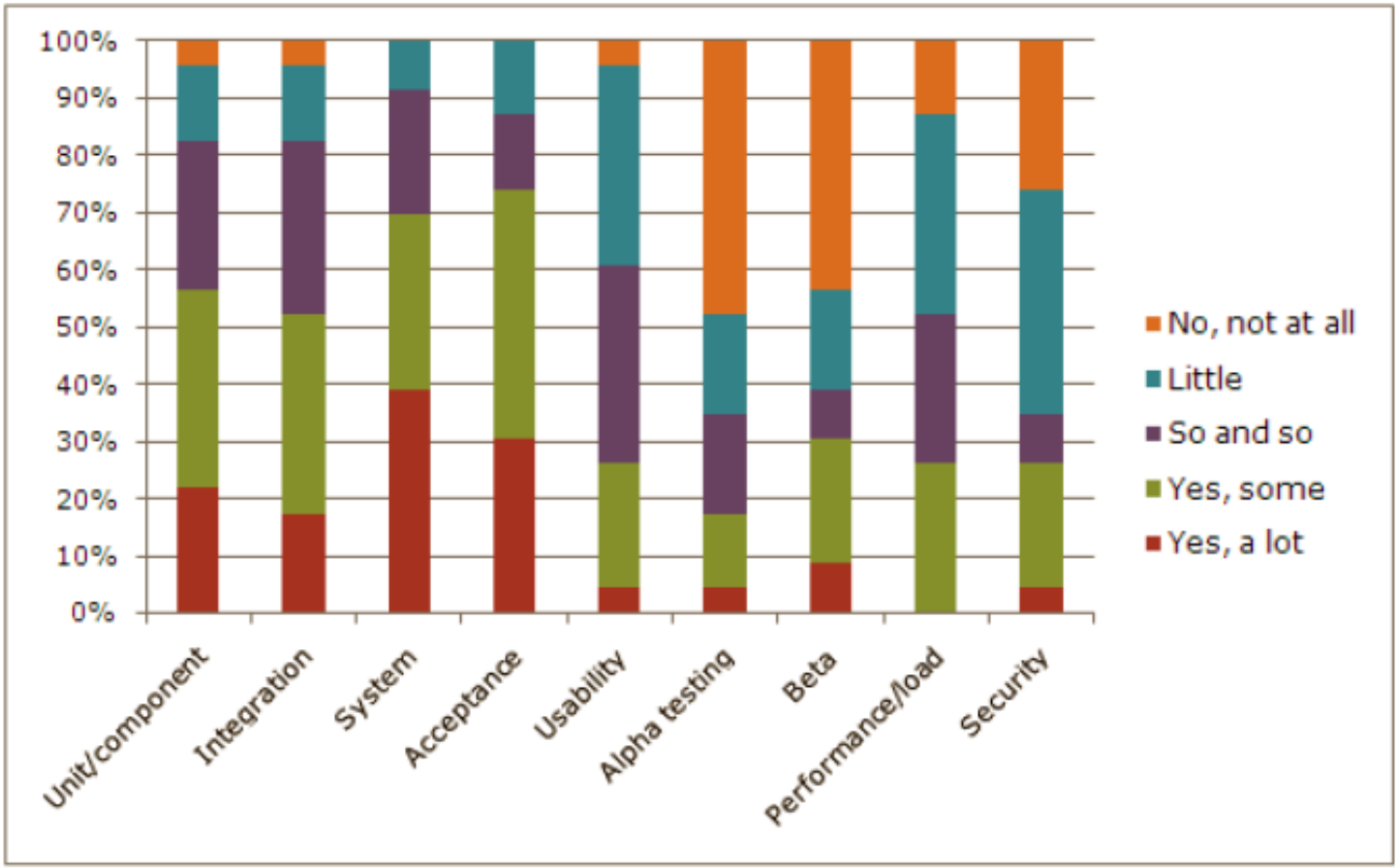
Testing Practices in Scrum

Testing practice	Percent of repondents
Software testing falls within the frame of "done" in each sprint	64%
Software testing is squeezed into the end of each iteration	36%
Software testing is not well integrated with coding and ends up one sprint behind	20%
Software testing is performed in a separate test environment	44%
Good management of version control	60%
Before a major version release, there is a bug-fix sprint	40%
Software testing became easier than in a parallel/prior process	44%
Overall more software testing is done than in a parallel/prior process	44%
Overall less software testing is done than in a parallel/prior process	12%
Programmers started using more test-driven development/design	48%
Software testers became more involved throughout the whole development	72%

Description of Testing Techniques

Testing technique	Description
Unit/component testing	The testing of individual software components.
Integration testing	Testing performed to expose defects in the interfaces and in the interactions between integrated components or systems.
System testing	The process of testing an integrated system to verify that it meets specified requirements. This includes test design techniques like boundary valued analysis and is usually done by internal software testers.
Acceptance testing	Formal testing with respect to user needs, requirements and business processes conducted to determine whether or not a system satisfies the acceptance criteria and to enable the users, customers or other authorized entity to determine whether or not to accept the system.
Usability testing	Testing to determine the extent to which the software product is understood, easy to learn, easy to operate and attractive to the users under specified conditions.
Alpha testing	Simulated or actual operational testing by potential users/customers or an independent test team at the developer' site, but outside the development organization. Alpha testing is often employed for off-the-shelf software as a form of internal acceptance testing.
Beta testing	Operational testing by potential and/or existing users/customers at an external site not otherwise involved with the developers, to determine whether or not a component or system satisfies the user/customer needs and fits within the business processes. Beta testing is often employed as a form of external acceptance testing for off-the-shelf software in order to acquire feedback from the market.
Performance/load testing	The process of testing to determine the performance and/or measuring the behavior of a component or system with increasing load, e.g. the number of parallel users and/or numbers of transactions, to determine what load can be handled by the component or system.
Security testing	Testing to determine the security of the software product.

To Which Extent is Testing Done?



To which extent are the following types of software testing done in Scrum (Agile) projects? Each type may be done by your Scrum (Agile) team members (company internal) and/or customers (company external).

Who Performs the Testing?

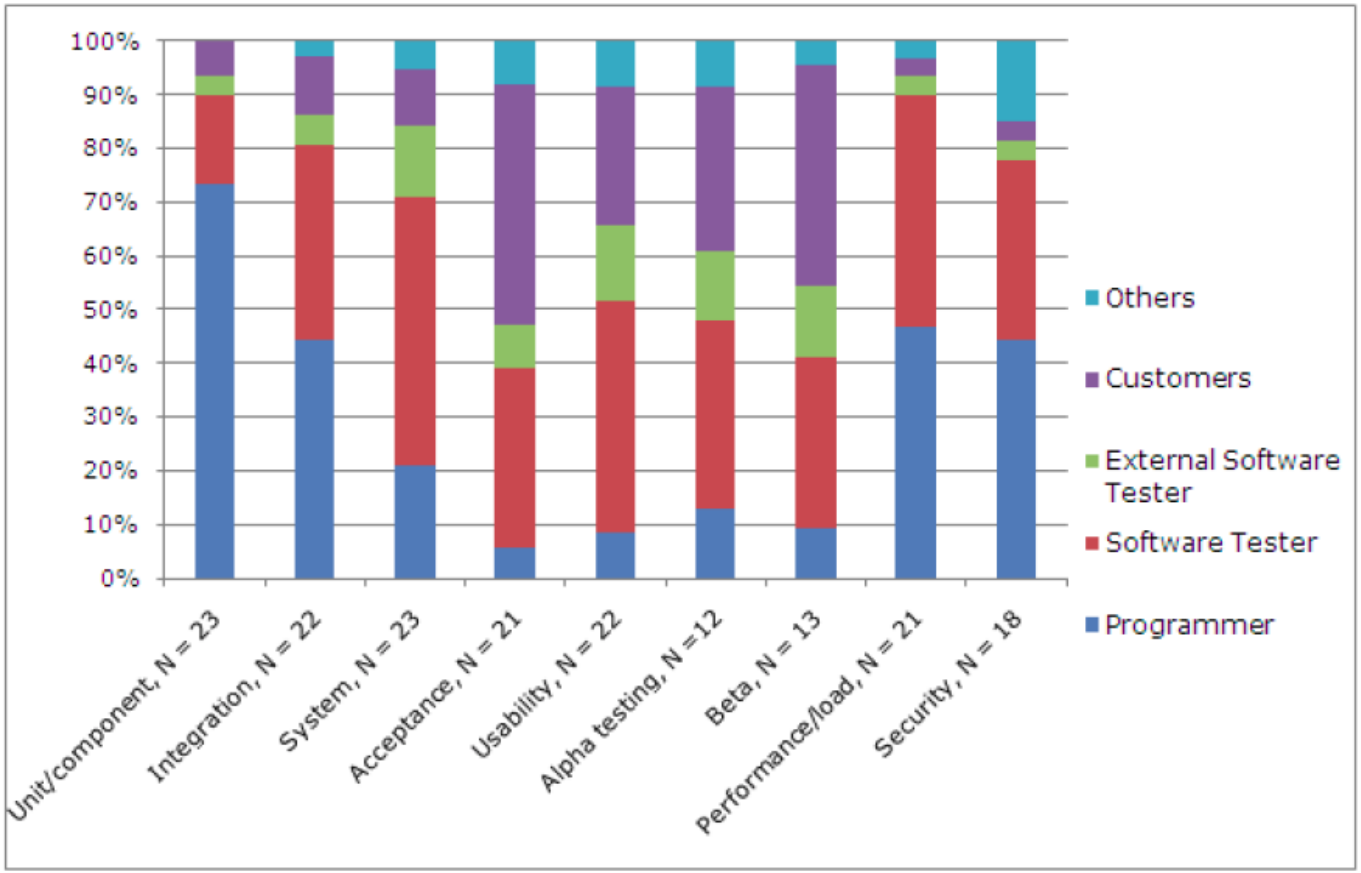


Figure 8: Who is performing each type of testing in Scrum projects.

Using a Testing Techniques Less than Others

Testing technique	Lack of training/ knowledge	Lack of budget	Lack of time	Other	N/A	N
Unit/compontent testing	**36%**	0%	32%	5%	27%	22
Integration testing	11%	0%	42%	0%	**47%**	19
System testing	7%	0%	**47%**	0%	**47%**	15
Acceptance testing	7%	0%	27%	7%	**60%**	15
Usability testing	*20%*	*15%*	***35%***	*10%*	*20%*	*20*
Alpha testing	0%	11%	11%	10%	**68%**	19
Beta testing	0%	11%	17%	11%	**61%**	18
Performance/load testing	26%	11%	**32%**	0%	**32%**	19
Security testing	**47%**	5%	16%	0%	32%	19

The Importance of Usability Testing

- Usability testing is important
  - None wanted to ignore it – wanted more testing occasionally
- Testers are often part of the teams
  - Know what functionality they are going to test
  - Test simultaneously
- BUT did not have time for usability testing
  - “Could be good to do it once a year”
  - “It is always on my mind”
  - The increments are not that big, no need for usability testing
  - The users are sometimes not willing to take part
- Acceptance testing more structured
  - The customer has to sign that he or she has accepted

Summary From this Study

- Testing became easier in Scrum
  - Than in prior process – only a few said less testing was done
- Usability and performance testing are similar
  - Unit, integration, system and acceptance testing are much more frequent
  - The testers want to carefully plan their tests
  - They do not have time for that in Scrum

Survey: Usability Techniques in Scrum

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Main Questions

- How many participants have used the methods
  - Out of the 13 user centred design techniques selected?
- How often are the techniques used?
- How do the IT professionals rate the techniques they have used?

- Paper in 2012
- 49 participants in Scrum Projects mainly in Sweden

How Many Have Used each Method?

Table 1. The Usage of Usability Techniques

Usability techniques	Used	Total	Percentage
Workshops	30	41	73%
Lo-fi prototyping	20	36	56%
Interviews	25	46	54%
Meetings with users	21	40	53%
Scenarios	17	36	47%
Digital prototyping	17	36	47%
Personas	15	35	43%
Field studies	17	40	46%
Usability goals	15	38	40%
Formal usability evaluation with users	11	36	31%
Informal usability evaluation with users	8	35	23%
Questionnaires	9	42	21%
Heuristic evaluation	4	35	11%

How Often Do They Use the Methods?

Table 2. The Frequency of Using the Usability Techniques

Usability techniques	Once a week or more	2 -3 times a month	7 – 12 times a year	2 – 6 times a year	Once a year or less	N*
Interviews	9%	13%	22%	44%	13%	25
Questionnaires	0%	0%	0%	25%	75%	9
Workshops	7%	7%	25%	50%	11%	30
Meetings with users	15%	10%	30%	35%	15%	21
Field studies	0%	0%	7%	53%	40%	17
Usability goals	21%	7%	29%	29%	14%	15
Scenarios	24%	24%	18%	24%	12%	17
Personas	6%	19%	13%	25%	38%	15
Digital prototyping	24%	12%	6%	35%	24%	17
Lo-fi prototyping	40%	20%	15%	20%	5%	20
Formal usability evaluation**	0%	0%	18%	82%	0%	11
Informal usability evaluation**	25%	25%	13%	50%	13%	8
Heuristic evaluation	0%	25%	0%	50%	25%	4

* N represents the number of respondents who had used the technique in their projects.
** With users participating.

What is the Best Method?

Table 3. The Rating of the Usability Techniques

Usability techniques	Very good	Fairly good	Neither good or bad	Fairly bad	Very bad	N*
Interviews	28%	60%	8%	4%	0%	25
Questionnaires	0%	33%	56%	11%	0%	9
Workshops	38%	62%	0%	0%	0%	30
Meetings with users	38%	57%	5%	0%	0%	21
Field studies	59%	29%	12%	0%	0%	17
Usability goals	53%	20%	27%	0%	0%	15
Scenarios	35%	59%	0%	6%	0%	17
Personas	40%	40%	13%	7%	0%	15
Digital prototyping	59%	30%	12%	0%	0%	17
Lo-fi prototyping	50%	25%	20%	5%	0%	20
Formal usability evaluation**	73%	18%	9%	0%	0%	11
Informal usability evaluation**	25%	75%	0%	0%	0%	8
Heuristic evaluation	25%	50%	0%	25%	0%	4

* N represents the number of respondents who had used the technique in their projects.
** With users participating.

What Can We Learn From These Studies?

- The „core“ testing types are frequently used
  - But the testing with quality aspects not frequently practised
- Formal usability testing gets high rating
  - For including users in the software development
  - But is not frequently practised either
- Measurements are getting more popular
  - With lean management – more need for user testing?
- User testing in agile way
  - Is that possible?