

Keeping Evolving Requirements and Acceptance Tests Consistent via Automatically Generated Guidance

Sofija Hotomski

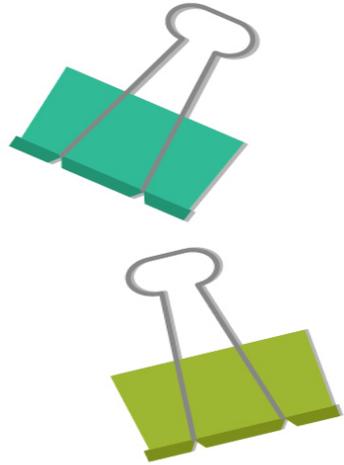


University of
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Department of Informatics

Requirements
Engineering
Research
Group





Agenda

1. Context and Background

2. Motivation

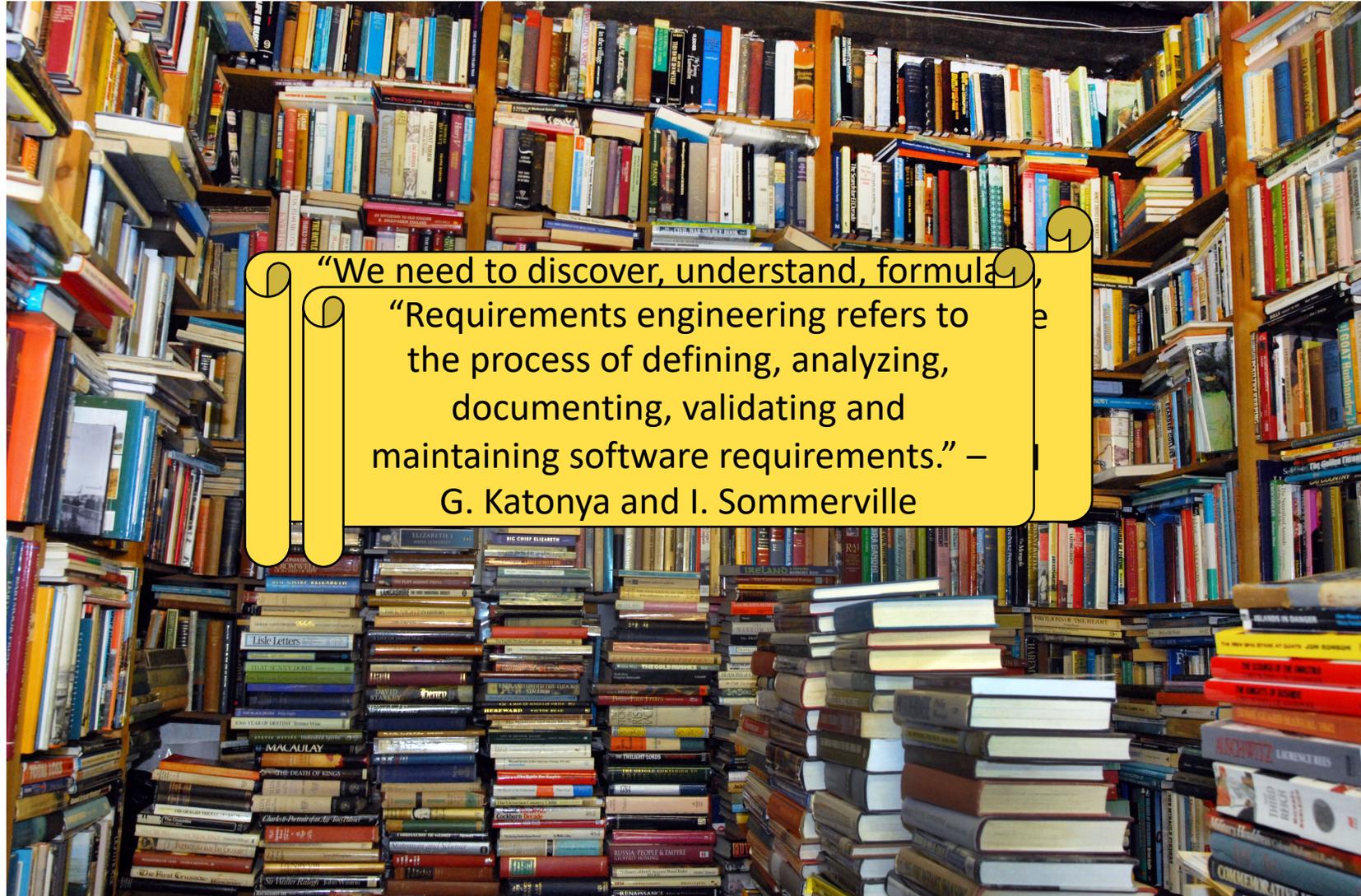
3. GuideGen Overview

4. Evaluation

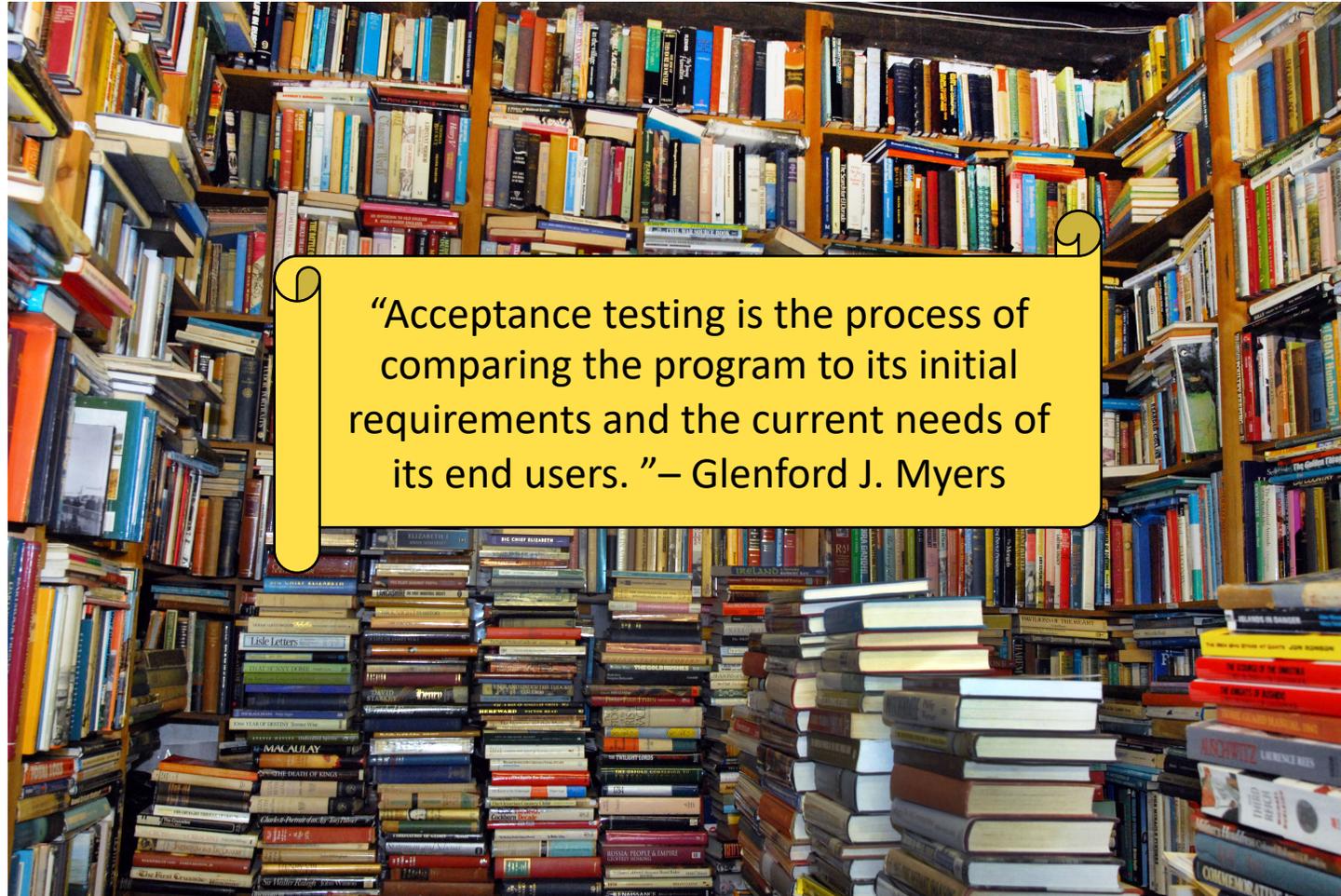
5. Future work and summary



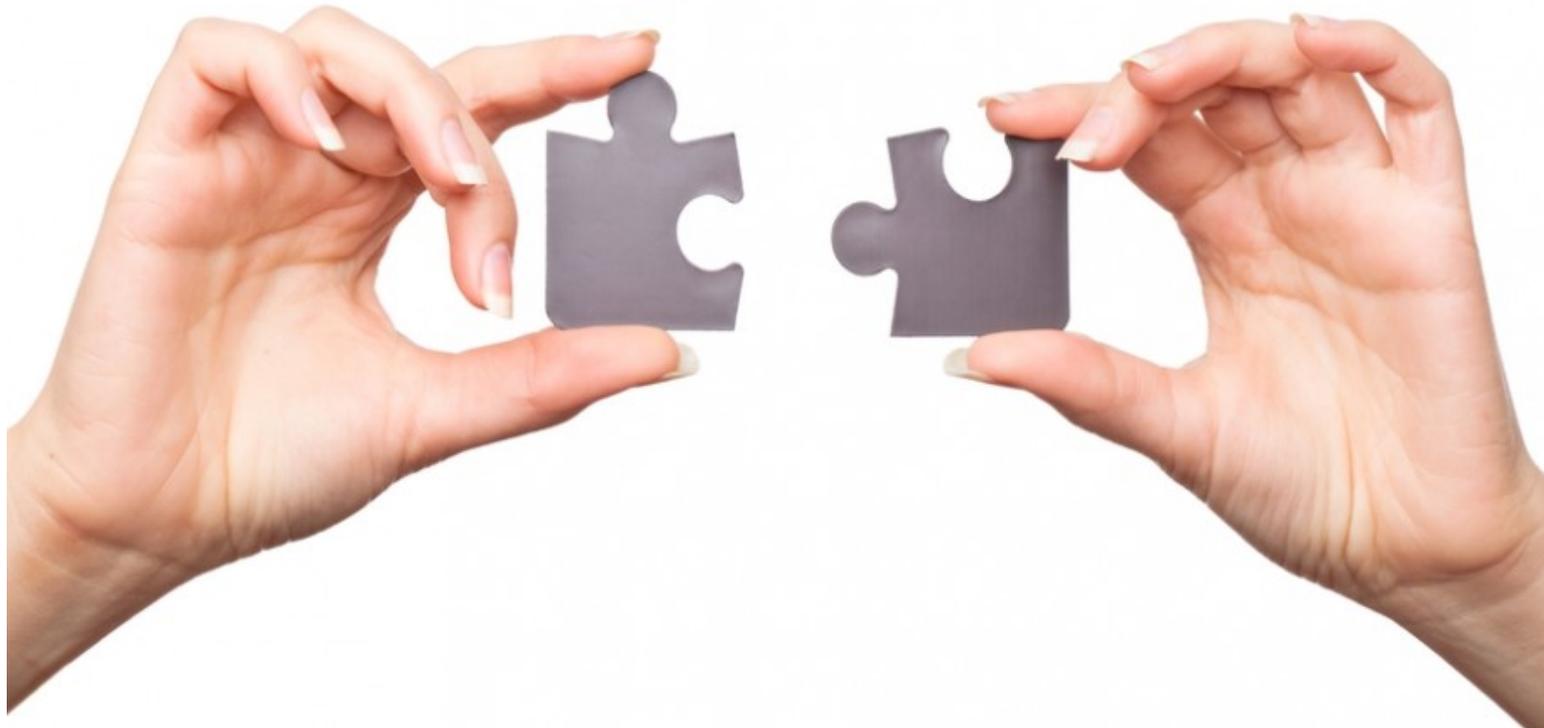
Context and Background – Requirements Engineering



Context and Background – Acceptance Testing



1. Context and Background



REQUIREMENTS

ACCEPTANCE TESTS

Motivation



REQUIREMENTS
CHANGE



Exploratory study
with 15 companies
in Europe, USA

2. Motivation



**BUGS
FOR
FEATURES**

**OUTDATED,
INCONSISTENT
TESTS**

**TESTERS ARE
NOT AWARE**

REQUIREMENTS CHANGE

2. Motivation

Inconsistent documents



Poor communication



False expectations



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3. GuideGen Overview - Goals

When requirements evolve:

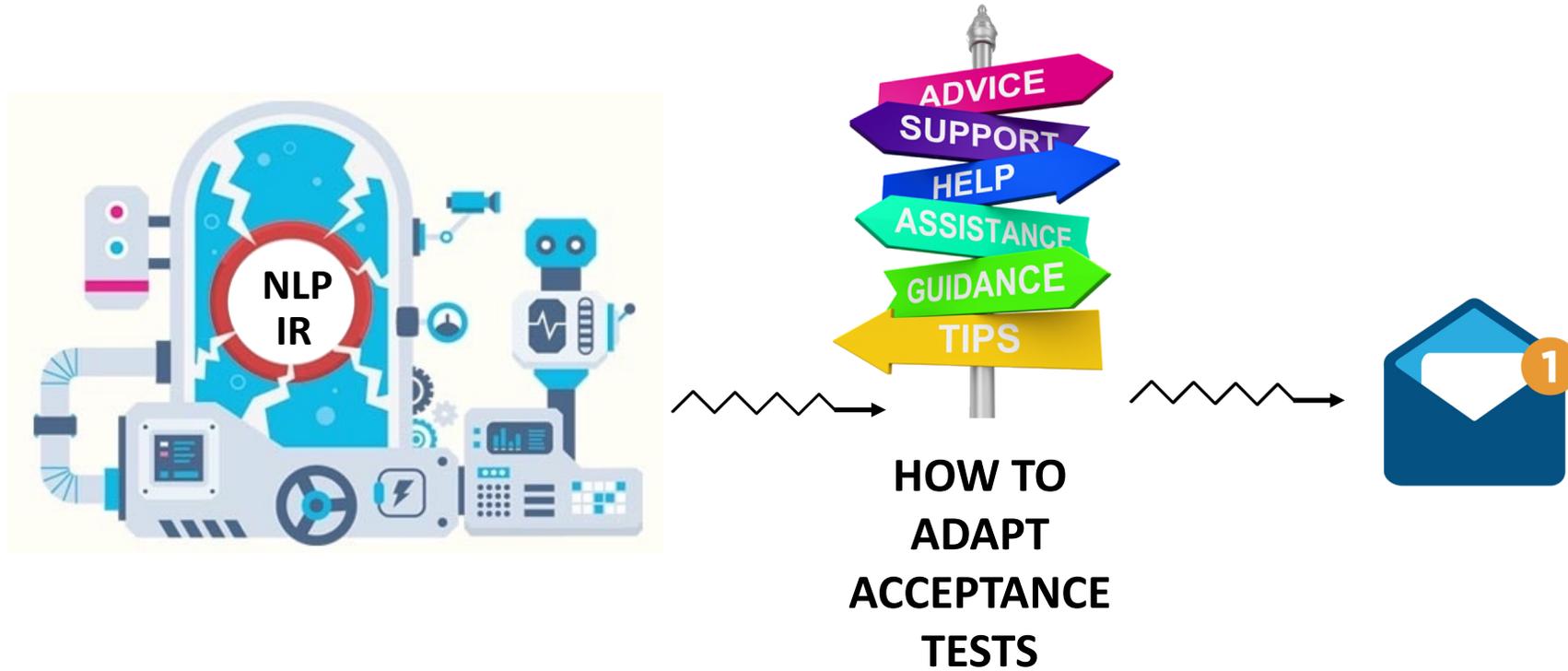
1. Support test engineers in making decisions on how to modify impacted acceptance tests.

Generate guidance

2. Ensure on-time and smooth communication of changes between requirements and test engineers.

Notification system

3. GuideGen Overview



3. GuideGen Overview

A user can add new users to the group. ~~The addition of a new user must be first approved by the admin.~~ The admin and the user can modify personal data ~~and the status~~ of that a user. Only user can modify its status. The admin must be logged-in in order to modify personal data of a user. This should be communicated to Tom.

Change

Old version

Identify change patterns

Identify added, deleted and

Insert changes

localhost:8080/GuideGen/ChangeRequirement?reqID=REQ8

localhost:8080/GuideGen/UpdateTestCase?testId=TEST-8

Upload Requirements | List Requirements |

Edit requirement

Title
Group chat management - add users to a group

Status
new

External link

Requirement text
A user can add new users to the group. The addition of a new user modify personal data and the status of a user.

VERBS **NOUNS**

Edit test case

Description
Description of TEST-8

Steps and Expected Results

Steps:	Expected results:
Log-in as user	Login successful
2. Open the page with the list of groups	The page is opened and the list with users' groups is visible
3. Click on the button "Manage group" next	The group members are listed and there is a button "Add users"

1. Delete steps or their parts which verify that the addition of a new user must be first approved by the admin
2. Make sure that now the user can modify personal data of that user. Add the steps or modify the expected results which verify this activity
3. Delete steps or their parts which verify that the admin can modify the status of a user
4. Add new steps or modify existing steps which verify that only user can modify its status
5. Add new steps or modify existing steps which verify that only user can be logged-in in order to modify personal data of a user

Click Save

Cancel Save

ADJECTIVES **NUMERICAL VALUES**

4. Evaluation of GuideGen

1. Quantitative
evaluation of
correctness,
completeness
and
clarity
of the generated
suggestions.

2. Qualitative
evaluation of
usefulness
and
applicability
of GuideGen to real,
industrial projects.

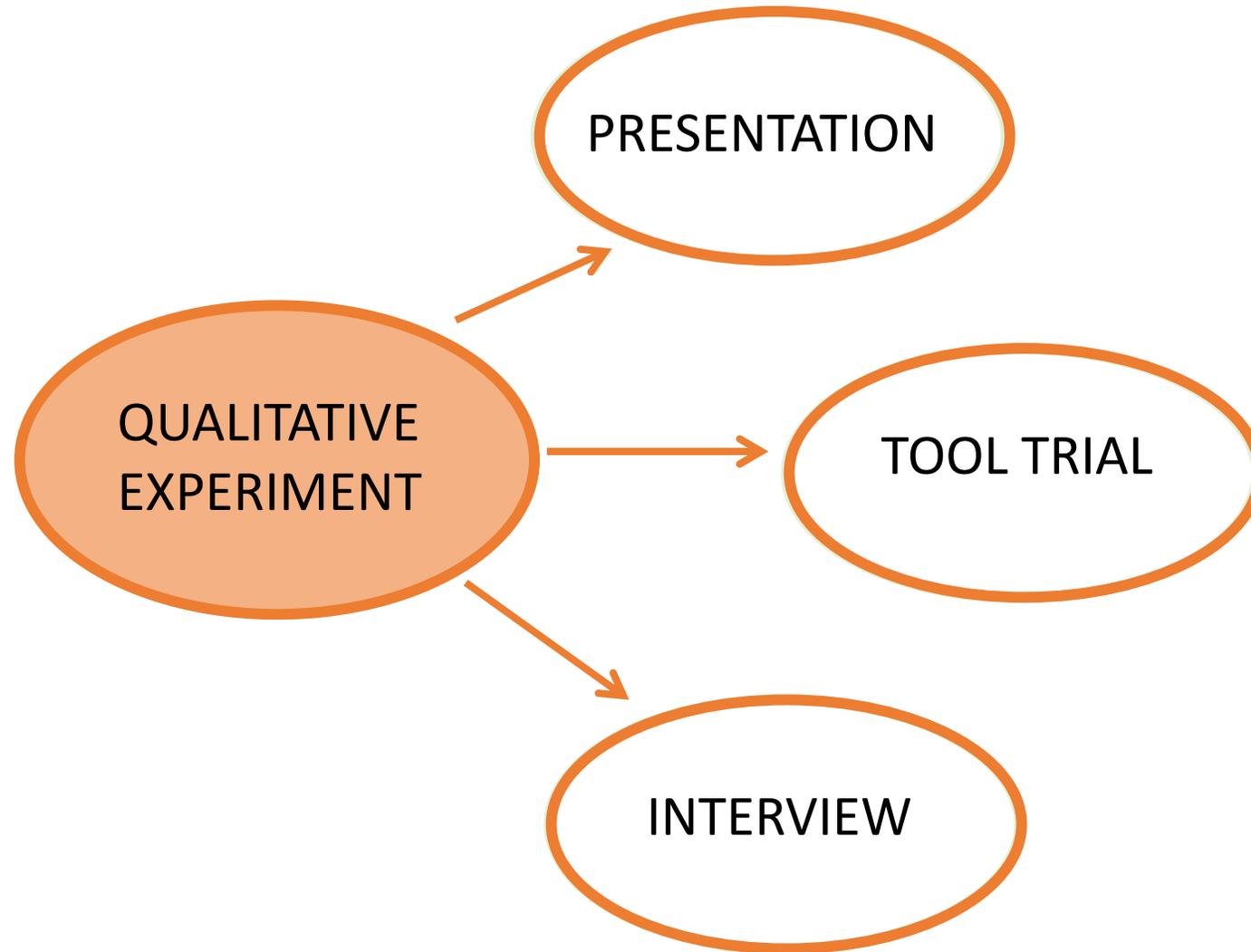
Evaluation 1 – Study Design

Dataset/Company	Type of requirements	Number of generated suggestions	Number of experts
DS1/C1 	User story	28	2
DS2/C2 	User story	37	2
DS3/C3 	Unstructured text	197	3

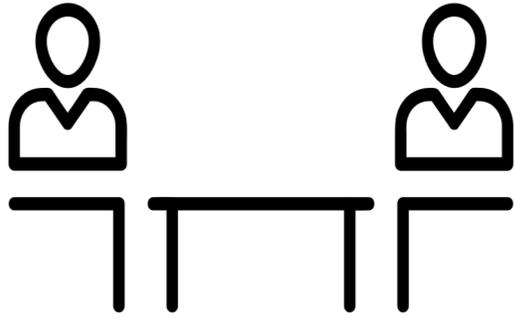
Evaluation 1 - Results

Correct actions	> 80% (user stories), ±67% (unstructured)
Grammatically correct	> 80% (DS1, DS3), 67.5% (DS2)
Complete	Almost all (> 95%)
Understandable	Almost all (> 95%)
Self-explanatory	± 73%
Redundant/Unnecessary	< 10% (DS1, DS2), ± 30%(DS3)
Missing	< 6%

Evaluation 2 – Study Design



Evaluation 2 – study design



13 EXPERIMENT SESSIONS



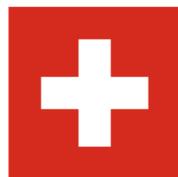
23 PARTICIPANTS



10 COMPANIES



Serbia (4)



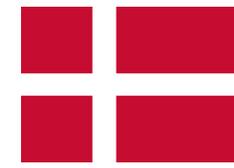
Switzerland (3)



The Netherlands (1)

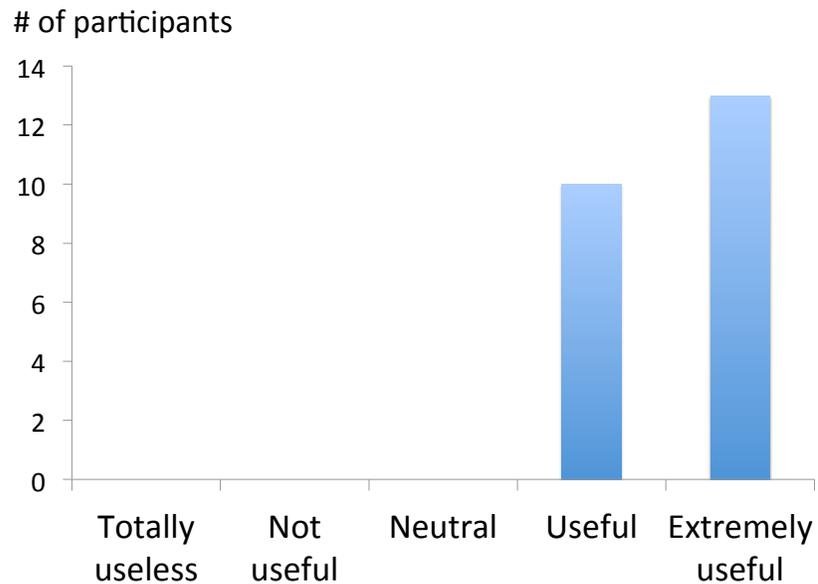


Germany (1)

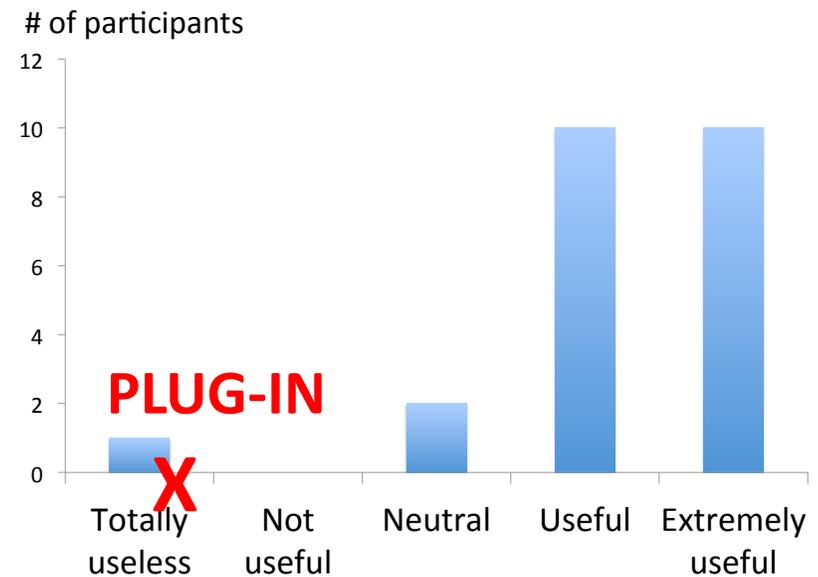


Denmark (1)

Evaluation 2 – Results (Usefulness)



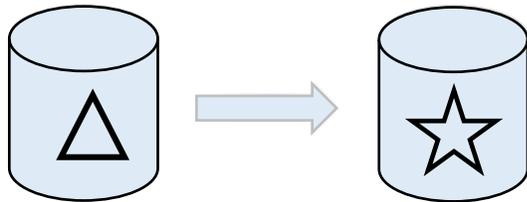
Useful in general



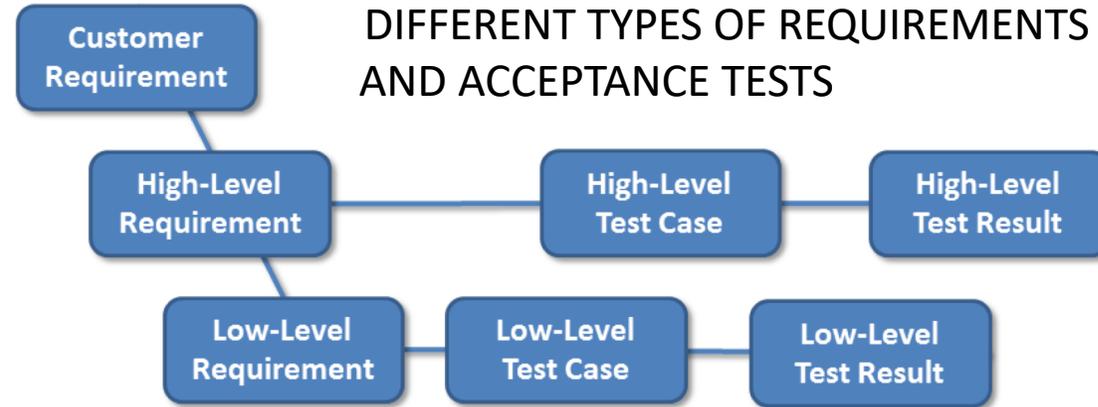
Useful for their company

Evaluation 2 – Results (Applicability concerns)

DATA MIGRATION



DIFFERENT TYPES OF REQUIREMENTS AND ACCEPTANCE TESTS



REQUIREMENTS



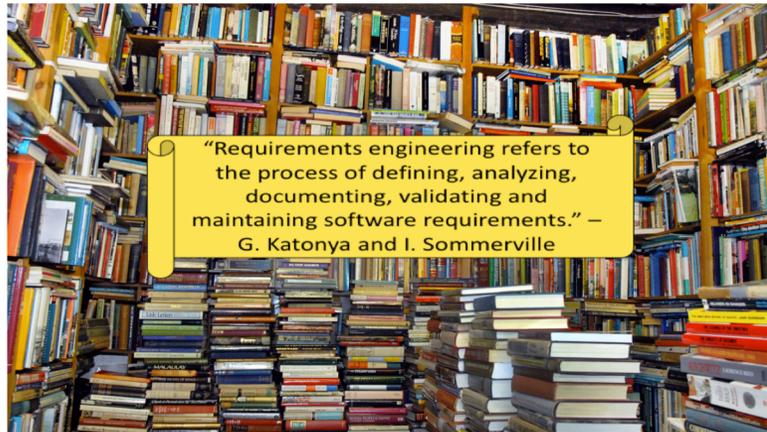
Future work

Improve GuideGen:
implement a plugin or add missing features to increase usefulness and applicability.

Identify first **which** documents are impacted before generating guidance on **how** to adapt them.

Extend applicability to other types of document artifacts (e.g. requirements to **source code**, requirements to **design...)**

Summary

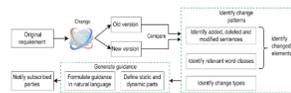


BUGS FOR FEATURES

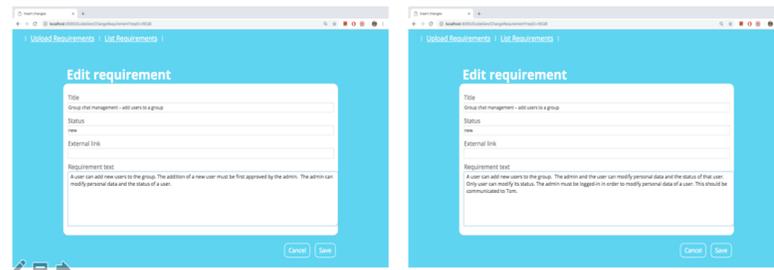
OUTDATED, INCONSISTENT TESTS

TESTERS ARE NOT AWARE

REQUIREMENTS CHANGE



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