

# GLOBAL RESEARCH CONFERENCE GRaCe 2020

## TEST CASE SELECTION APPROACHES : A SYSTEMATIC MAPPING STUDY

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# OUTLINE

## Test Case Selection Approaches: A Systematic Mapping Study



## Context

- Regression testing is a verification method where it is run only if there are new requirement changes. Regression testing is conducted to confirm that the new changes will not affect existing functionality

## Objectives

- To allow future researchers get a better grasp and understanding on the selection's approaches

## Method

- Perform a **systematic mapping** on test case selection approaches and we identified **91 papers** coming from conferences, symposium, workshops and journals

Empirical Evaluations of Regression Test Selection Techniques: A Systematic Review (Engström et al., 2008)

Regression Testing Minimization, Selection and Prioritization: A Survey (Yoo, S., Harman, 2012)

Test Case Selection: A Systematic Literature Review Everton (Narciso et al., 2014)

Regression Testing of Web Service: A Systematic Mapping Study (Qiu et al., 2014)

Effective Regression Test Selection: A Systematic Literature Review (Kazmi et al., 2017)

# RESEARCH METHOD

## Search Procedure

The primary studies are identified by using search strings on scientific databases or browsing manually through relevant conference proceedings or journal publications.

## Quality Assessment

Evaluate all selected studies by scoring them based on the quality assessment questions

## Data Synthesis

Extract data from classification. Tabulate data and plot a bubble chart. The size of a bubble is proportional to the number of articles that are in the pair of categories corresponding to the bubble coordinates.



## Research Questions

Research question need to be form accordingly following the objective study. In this case, four research question have been addressed

## Selection Studies

Selection from primary studies are conducted by applying Inclusion and exclusion criteria. Exclude papers which only mentioned main focus, variability, in introductory sentences in the abstract.

## Classification Scheme

Apply keywording technique. Read abstracts and look for keywords and concepts that reflects the contribution of the paper. Then, it can be clustered and used to form categories for the map

(Petersen et al., 2008)(Kitchenham et al., 2009)

## RESEARCH QUESTION

**RQ1 : What are the most popular approaches used in test case selection?**

These research questions aim to recognize the areas most frequently covered by TCS



**RQ2 : Which publication published the most number of test case selection papers?**

This research question aims to identify where the papers related to regression testing originate from



**RQ3 : How frequent is test case selection applied in each software testing?**

This research question aims to identify the novelty of TCS in other software testing phase



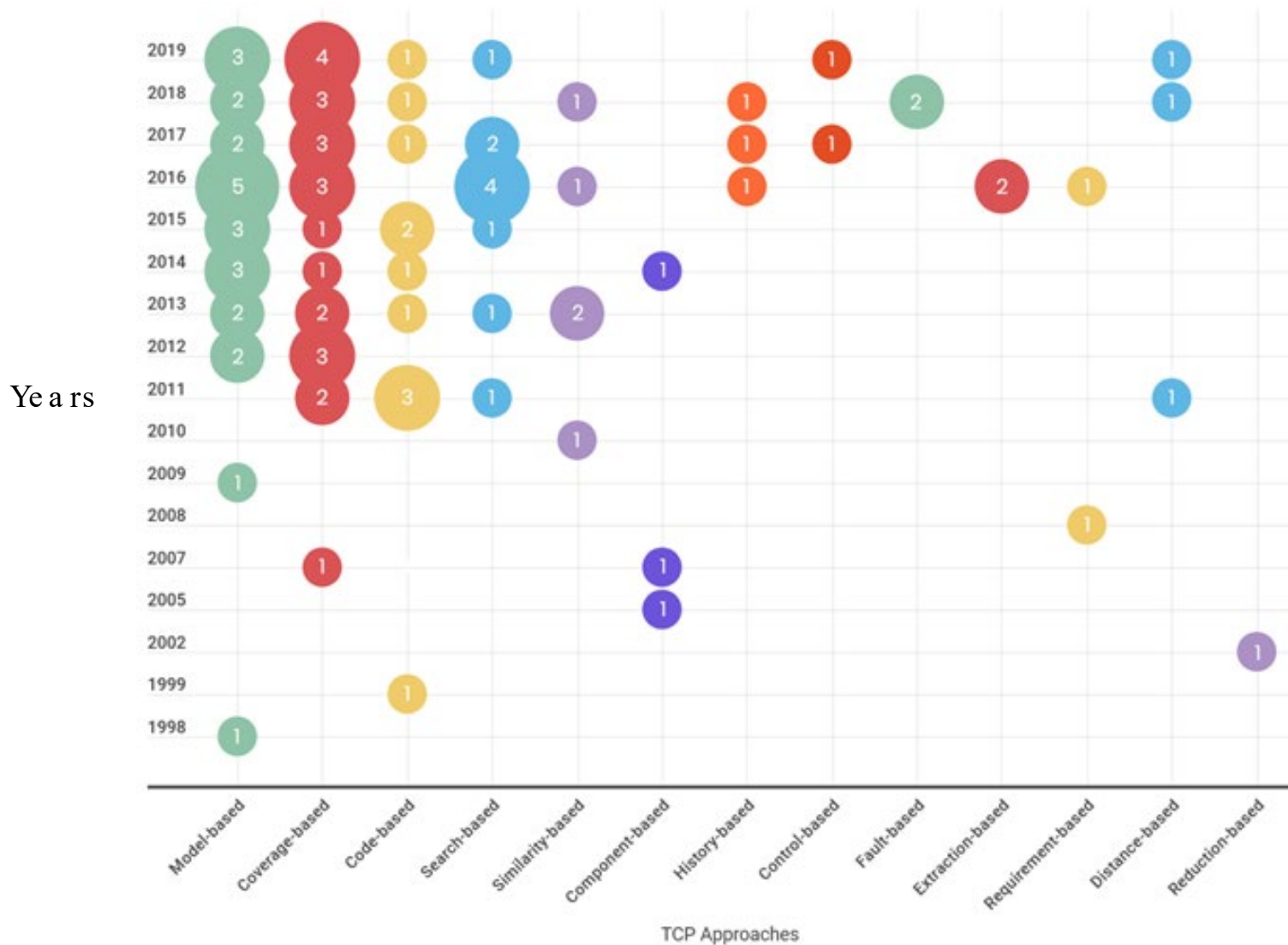
**RQ4: What are the case studies commonly used by researchers?**

This research question aims to identify the most frequent case studies used



# RESULT (RQ1)

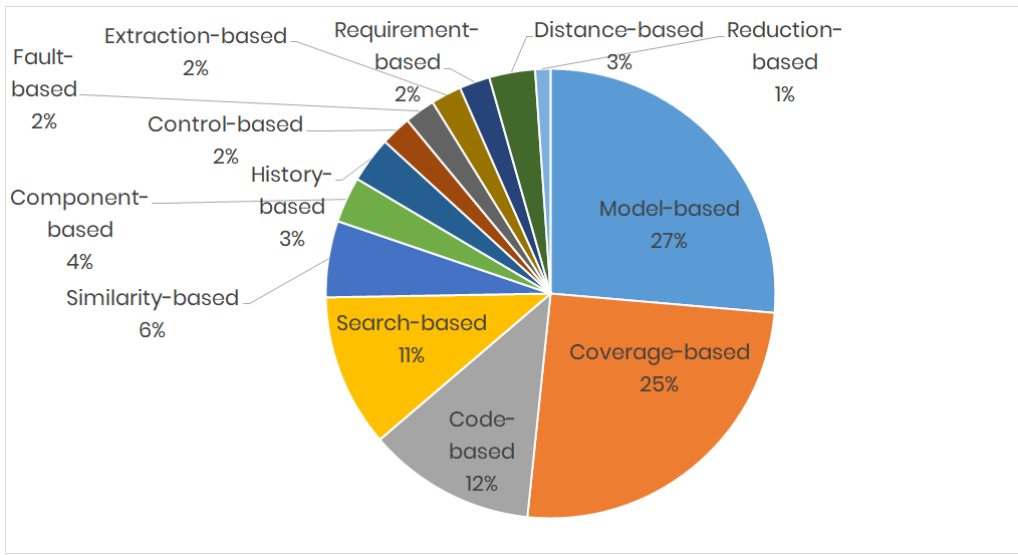
Number of paper published based on years



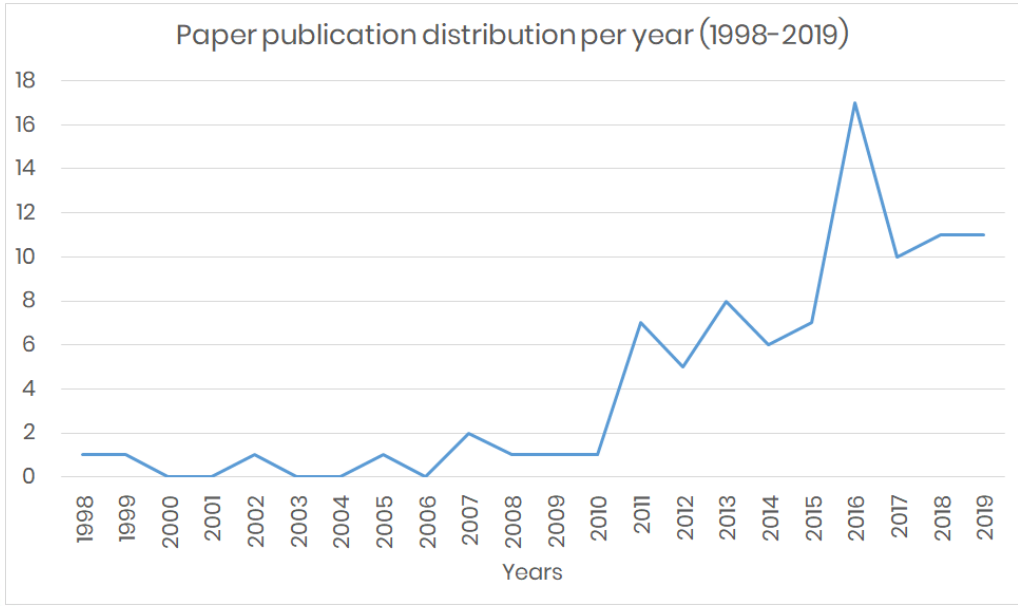
# RESULT (RQ1)

## Approaches Identified

- Model-based
- Coverage-based
- Code-based
- Search-based
- Similarity-based
- Component-based
- History-based
- Distance-based
- Control-based
- Fault-based
- Extraction-based
- Requirement-based
- Reduction-based



Model-based have the highest percentage of paper published, followed by coverage-based



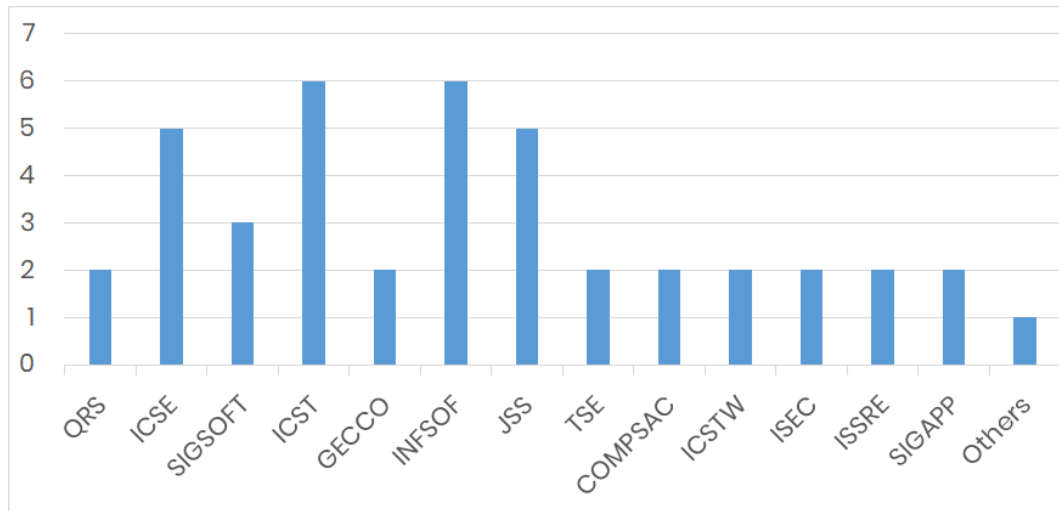
The year 2016 have the highest publications on TCS

Number of papers increase over the years



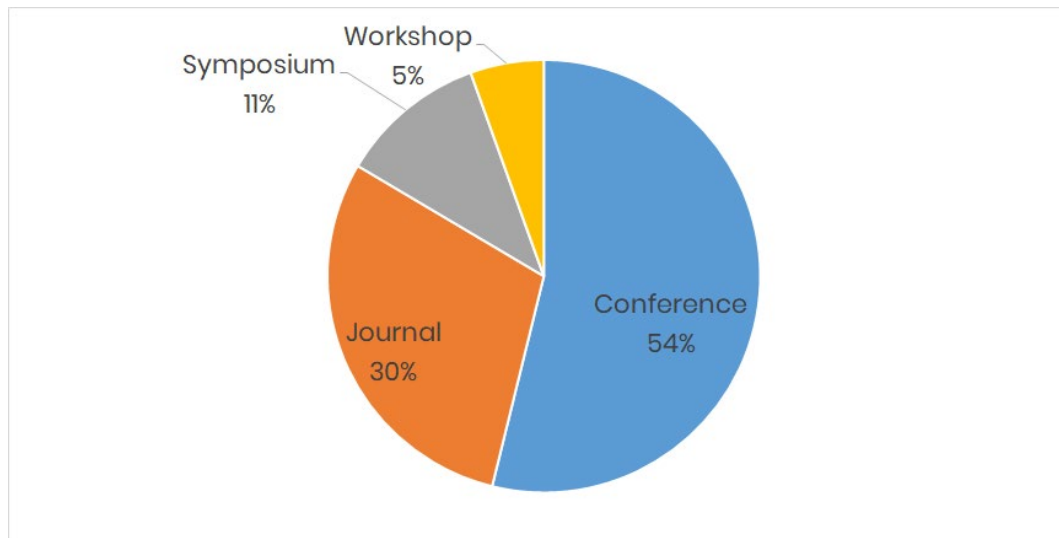
# RESULT (RQ2)

Number of paper published in every publication venue



IEEE International Conference on Software Testing, Verification and Validation (ICST) and Information and Software Technology (INFSOF) have the highest number of publications in TCS

ICST is a conference venue while INFSOF is a peer-reviewed scientific journal published by Elsevier BV

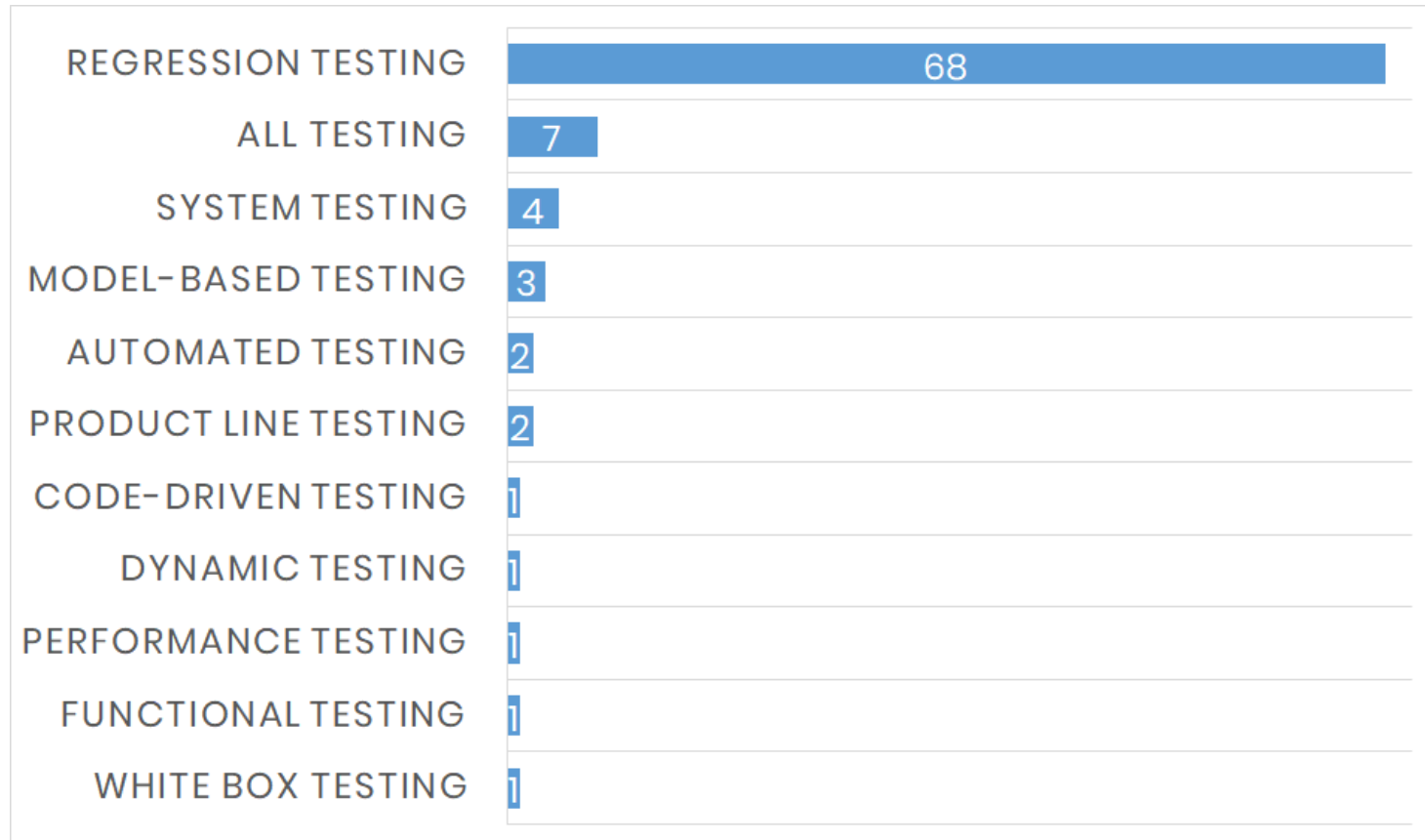


Researchers are likely to publish their work in conference followed by journals

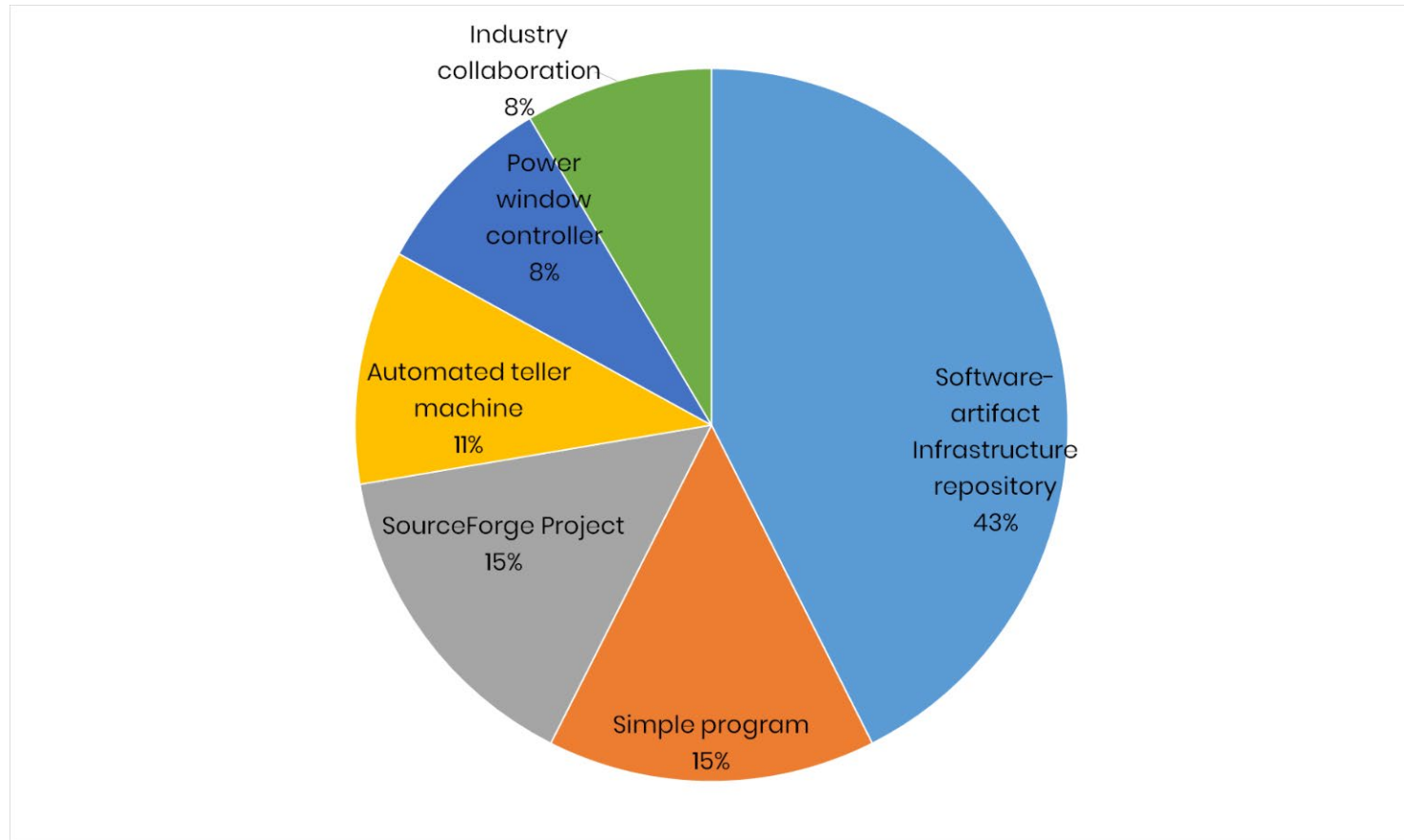
# RESULT (RQ3)

Software Testing

Number of Paper Published



## Case Study



Case study from Software-artifact Infrastructure Repository are frequently used by researchers for their experiment, followed by simple program (e.g: CRUD program)

## 01. Overview

A total of 91 papers have been collected. TCS technique are widely used by researchers, it is not difficult on searching studies that applied the technique

## 06. Future Work

The benefits of using the approaches have not been explored yet. Thus, a systematic literature review on the approaches is in order

## 05. Case Study

Almost half from our collected papers showed that researchers apply case study from Software-artifact Infrastructure Repository (SIR) in their experiment



## 02. Approaches

3 type of approaches have been identified. Among all approaches, model-based and coverage-based are the most frequently used by researchers

## 03. Publications

There are 27 journal, 49 conference papers, five workshop article and 10 symposium article. Researchers are likely to publish their work in conference. However, number of publications at Information and Software Technology (INFSOF) prove that journals are a also researcher's favourite

## 04. Software Testing

Based on the results, TCS can also be applied on other testing such as system testing, model testing, etc

# THANK YOU !