# Scenario Variability Management

## Summary of the Activities

Rodrigo Bonifácio, Paulo Borba
Cristiano Ferraz,
Eduardo Aranha, Roberto Ferreira

# Activities Roadmap

- Discussion about existing approaches
  - PLUC, PLUSS, SVCM
  - AMPLE
- Practical class about PLUSS and SVCM

# Activities Roadmap

- Execution of two experiments
- General objective:
  - measure different responses of PLUSS and SVCM according to the extractive and reactive approaches for SPL development

# Hypothesis

- h1. SVCM reduces scattering and tangling
- h2. SVCM requires less time to evolve
- h3. SVCM adheres to the open-close principle
- h4. SVCM requires more time to specify a SPL

# Experiment Motivation

- Generalize conclusions in similar settings
- Different variables under control (experimental unities, subjects and treatments)
- Applicability:
  - Confirming theories
  - Exploring relationships between variables
  - Validating measures

# Experimental Design

- Aims to...
  - control and block noise factors
  - understand and minimize experimental errors
  - inherit statistical properties (distributions, ...)

# Experimental Design

- Two phases:
  - extract a PL from existing products (h4)
  - evolve an existing PL based on CRs (h1, h2, h3)
- Input data for the design activity:
  - number of students (~18)
  - number of experimental unities (2)
  - number of treatments (2)

# Experimental Design

- The same number of treatments and experimental unities => Latin Square Design
- Requires subjects randomly organized in groups of two students
- If all students were present, 9 replications. As greater the number of replication is, the greater is the confidence interval

# Experimental Design

## Latin Squares for the first experiment

| | eCommerce | Cyber Chair |
|---|---|---|
| S1 | PLUSS | SVCM |
| S2 | SVCM | PLUSS |

...

...

| | eCommerce | Cyber Chair |
|---|---|---|
| S17 | SVCM | PLUSS |
| S18 | PLUSS | SVCM |

# Experimental Design

## Latin Squares for the second experiment

| | CR 01 | CR 02 |
|---|---|---|
| S1' | SVCM | PLUSS |
| S2' | PLUSS | SVCM |

...

...

| | CR 01 | CR 02 |
|---|---|---|
| S17' | PLUSS | SVCM |
| S18' | SVCM | PLUSS |

# Experimental Unities and Tasks

- **First experiment:**
  - extract a SPL from existing products
  - SPLs from different domains
- **Second experiment:**
  - evolve an existing SPL (reactive approach)
  - base specifications + change requests

# First Experiment (Execution)

- 6 Latin Squares (9 expected)
- Most frequent questions:
  - how to create the configuration knowledge ?
  - how to define the step ids in PLUSS?
  - which features are related to a specific scenario (or steps)?

# First Experiment (Mistakes)

PLUSS: Not representing alternatives

| Id | User Action | Black Box System Response |
|---|---|---|
| 1<br>**[Register to Browser]** | Browses through the product catalog, by providing a search criteria or selecting specific (sub) categories. | The system verifies that the user is not authenticated, requesting the user's login and password. |
| 2<br>**[Register to Browser]** | Fills in the requested information (login and password). | The system authenticates the user and creates the user session. |
| 3<br>**[Register to Browser]** | - | The system retrieves and shows the list of products that satisfies the search criteria or selected categories. |
| 4 | Selects a specific product. | The system shows the details of the selected product. |

# First Experiment (Mistakes)

SVCM: inconsistent products

Advice Id: *ADV 01*

Advice Description: *Optional Fields, the author need fill the paper's* ***ABSTRACT***

After: **[Optional Fields]**

Required Time: *2 min*

| Id | User Action | System Response |
|---|---|---|
| OF01 | - | The system asks the main author to fill in the paper's abstract |
| OF02 | The main authors fills in the paper's abstract and selects the **Proceed** option. | The system verifies that the abstract does not have the maximum number of characters allowed in the conference. |
| OF03 | ... | The system updates the paper's submission with the informed abstract.**[Conflicts of Interest]** |

Advice Id: *ADV 02*

Advice Description: *Conflicts of Interest. The system verify if there is a conflict of interest.*

After: **[Conflicts of Interest]**

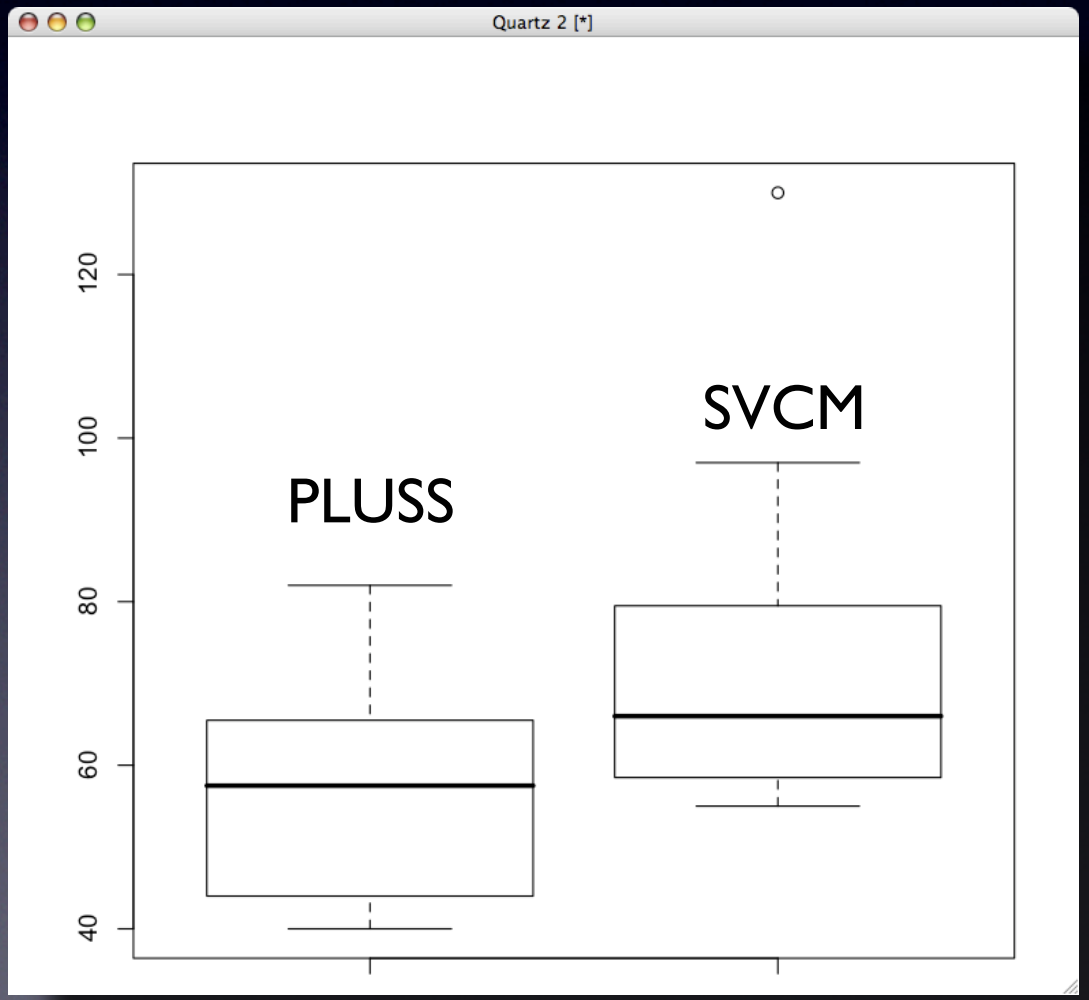
Required Time: *2 min*

| | | |
|---|---|---|
| CI01 | | The system asks the main author to inform any conflict of interest with the members of the program committee. |
| CI02 | The main authors selects the members of the program committee that have any conflict of interest. | The system updates the paper's submission with conflicts. |

# First Experiment (Preliminary Results)

Time required for restructuring the SPLs

Confirms h4
p-value = 0.01



# Second Experiment (Execution)

- 5 Latin Squares (9 expected)
- Most frequent questions:
  - which is the scope of each change?
  - how to define the step ids in PLUSS?

# Second Experiment (Mistakes)

PLUSS: Sequence of steps were not observed

| | | |
|---|---|---|
| | | ... |
| 2(a) **[Preference Based]** | The general chair selects a specific paper. | The system retrieves the reviewers that have previously informed interest in the research topics of the paper. The number of papers that has already been assigned to each reviewer is shown. |
| 2(b) **[Inference Based]** | The general chair selects the auto distribution process (available only in products that are configured with the Inference Based distribution process). | The system, automatically generate a distribution of the papers to the reviewers, showing it to the general chair the related topics of each paper.<br><br>This process considers:<br><br>a) the number of reviewers per paper<br>b) the number of papers per reviewer, and<br>c) the reviewer's interest and knowledge in the topics |
| 3(a) **[Preference Based]** | The general chair selects one of the reviewers and click on the **Assign** option. | The system assigns the paper to the selected reviewer. The process may be repeated until the general chair selects the option check distribution of papers. |
| 3(b) **[Inference Based]** | The general chair is able to change the assignment of papers to reviewers. | The system verifies that all constraints are being obeyed. If it this is not true, this process must repeat. |
| 4(a) **[Bulk Assignement]** | | The system asks the general chair to upload a file with the distribution of papers to reviewers.<br>An exemplar file must be available to download. |
| 4(b) **[Bulk Assignement]** | The general chair uploads the file with the assignment distribution. | The system verifies that the uploaded file is syntactically correct. |
| 4(c) **[Bulk Assignement]** | | The system updates the assignment of papers to reviewers, according to the data present in the uploaded file. |

# Second Experiment (Mistakes)

SVCM:
a) Redundant variation points

**Scenario SC03**

| Id | User Action | System Response |
|---|---|---|
| AP01 | The general chair selects the **Assign Papers to Reviewers** option in the main menu. | The system retrieves and shows the list of submitted papers. The number of reviewers assign to each paper is shown to the general chair. **[AssignProcess]** **[Bulk Assignement]** |
| AP02 | The general chair selects the **Close Assignment of Papers** option. | The system sends the evaluation forms and URLs of assigned papers to each reviewer. |
| AP03 | - | The system starts the period of paper evaluation, allowing the members of the program committee to send their revisions. |

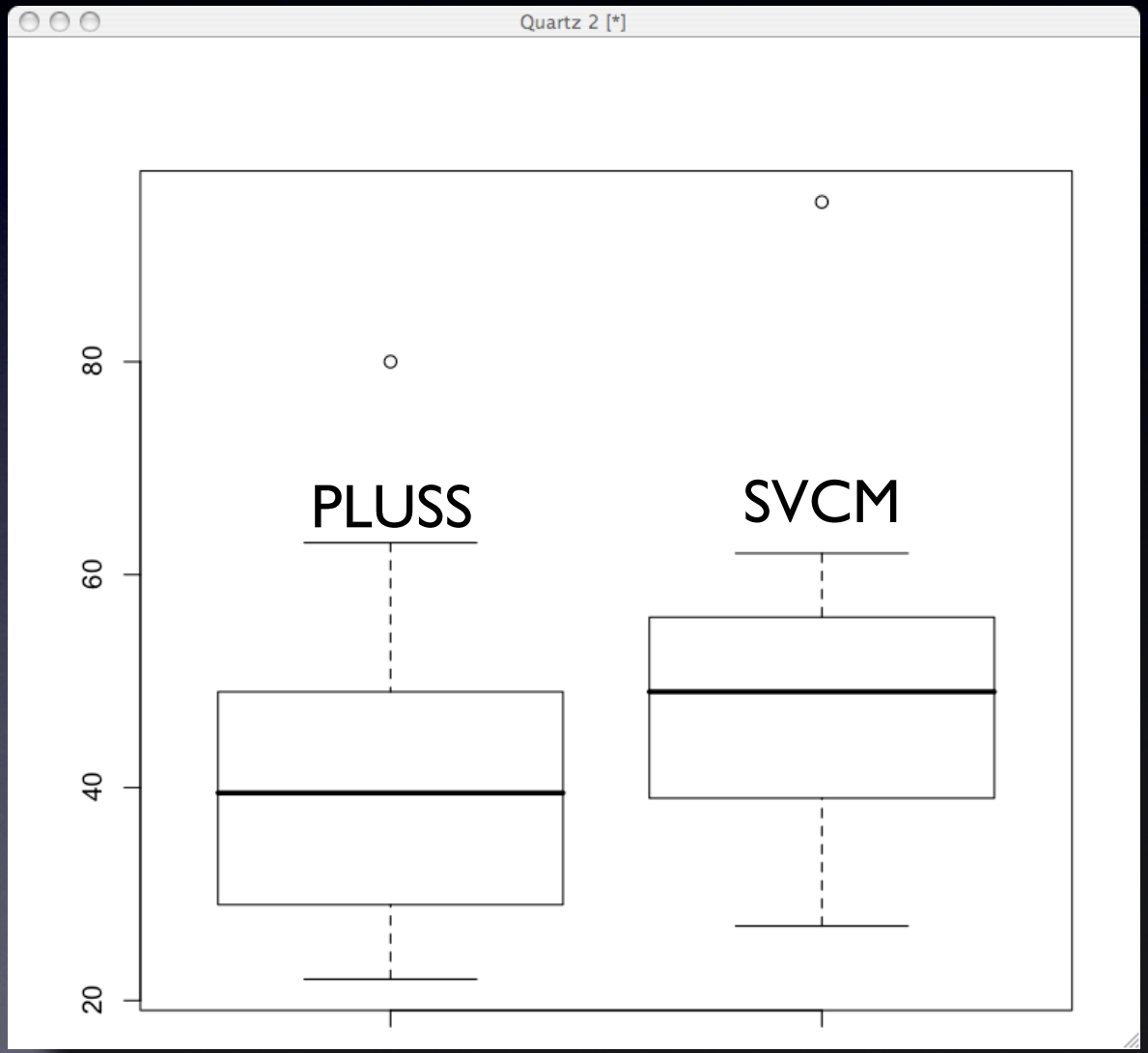
b) CRs not well modularized

| | | |
|---|---|---|
| S06 | | The system presents a summary of the submission and sends a message to the paper's authors. |
| S07 | | The system retrieves the members of the program committee that are interested in the paper's related topics. |
| S08 | | The system retrieves the members of the program committee that are interested in the paper's related topics. |

# Second Experiment (Preliminary Results)

Time required for evolving the SPLs

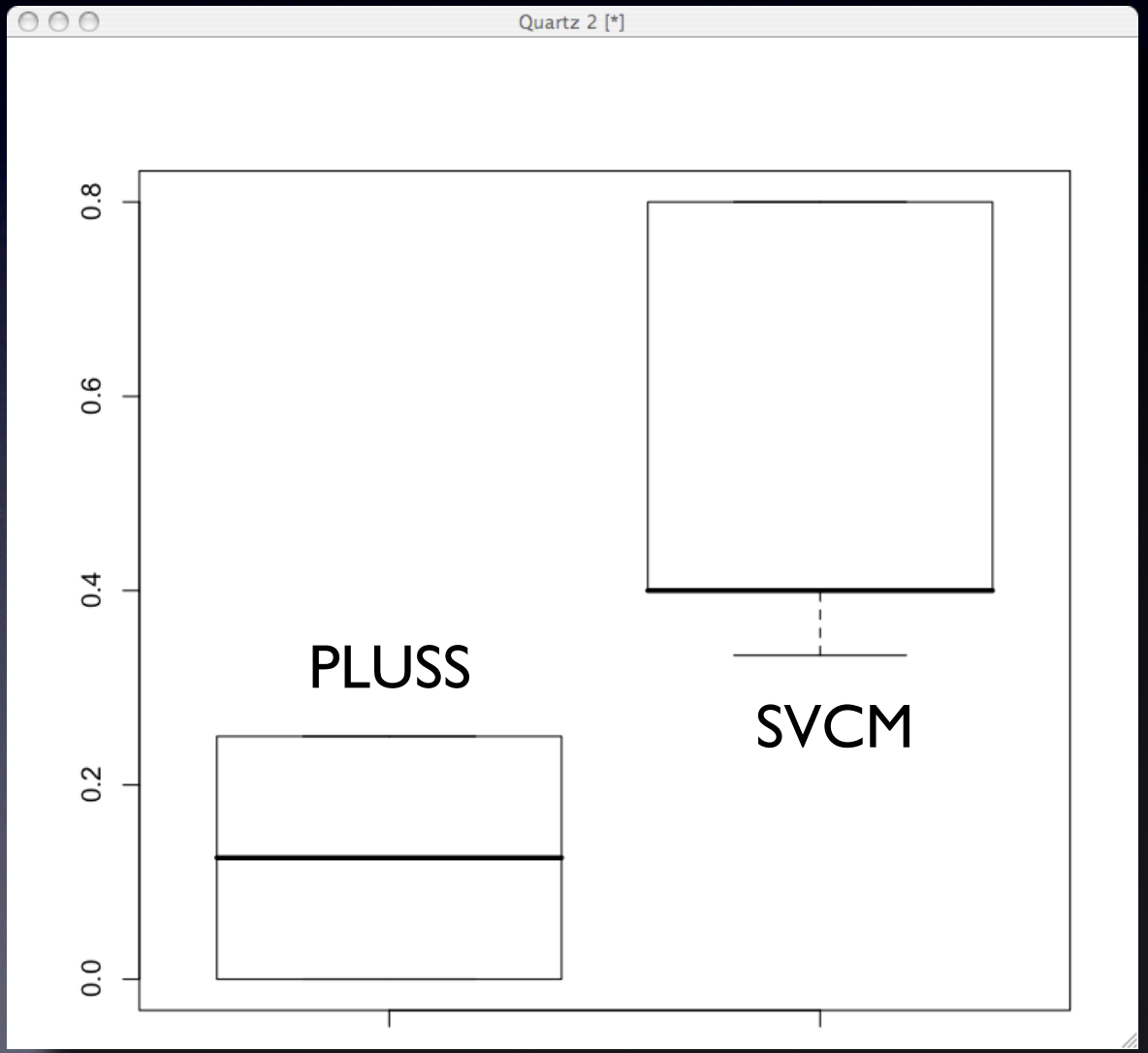
Not conclusive about h2
p-value = 0.16



# Second Experiment (Preliminary Results)

Open-close principle

Confirms h3
p-Value < 0.01



# Second Experiment (Under Investigation)

- h1. Scattering and Tangling (some evidences that SVCM reduces both of them)
- ... how do the CRs modify DOS and DOF?
- ...

# Threats to Validity

- Data collection procedure (specially for time)
- Are the CRs really representative?
- The exemplar products of eCommerce and Cyber Chair PLs are not complete