



ANALYSING GENDER DIFFERENCES IN BUILDING SOCIAL GOAL MODELS: A QUASI-EXPERIMENT

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Universidade NOVA de Lisboa, Portugal

25 September, 2019





COGNITIVE DIVERSITY AFFECTS HOW
DIFFERENT PEOPLE USE THE **SAME** SOFTWARE

INDIVIDUAL CHARACTERISTICS IN HOW PEOPLE
SOLVE PROBLEMS OFTEN CLUSTER BY **GENDER**





IN SOFTWARE SYSTEMS, FEATURES ARE MORE SUPPORTIVE OF
PROBLEM-SOLVING PROCESSES FOLLOWED BY **MALES**

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software



Information processing style

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software



Information processing style



Computer self-efficacy

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software



Information processing style



Computer self-efficacy



Attitude towards risk

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



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Computer self-efficacy



Attitude towards risk



Ways of learning new technology

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software



Information processing style



Computer self-efficacy



Attitude towards risk



Ways of learning new technology



Abby

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software
To perform tasks



Information processing style



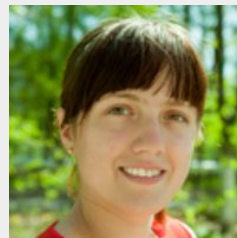
Computer self-efficacy



Attitude towards risk



Ways of learning new technology



Abby

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software
To perform tasks



Information processing style
Comprehensive



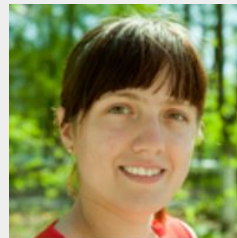
Computer self-efficacy



Attitude towards risk



Ways of learning new technology



Abby

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Motivation for using the software
To perform tasks



Information processing style
Comprehensive



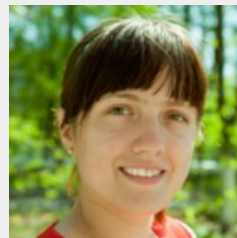
Computer self-efficacy
Low



Attitude towards risk



Ways of learning new technology



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GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software
To perform tasks



Information processing style
Comprehensive



Computer self-efficacy
Low



Attitude towards risk
Risk-averse



Ways of learning new technology



Abby

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Motivation for using the software
To perform tasks



Information processing style
Comprehensive



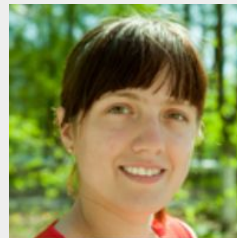
Computer self-efficacy
Low



Attitude towards risk
Risk-averse



Ways of learning new technology
Process-oriented



Abby

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software



Information processing style



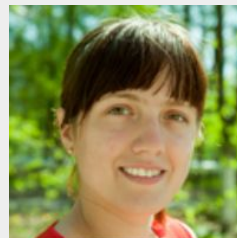
Computer self-efficacy



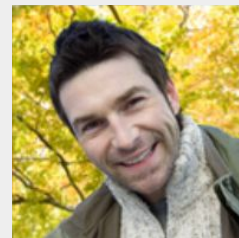
Attitude towards risk



Ways of learning new technology



Abby



Tim

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software
Source of fun



Information processing style



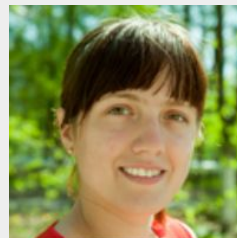
Computer self-efficacy



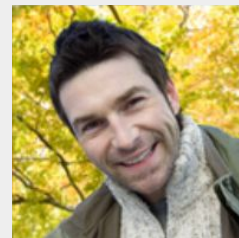
Attitude towards risk



Ways of learning new technology



Abby



Tim

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software
Source of fun



Information processing style
Selective



Computer self-efficacy



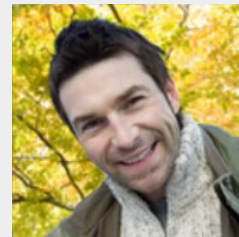
Attitude towards risk



Ways of learning new technology



Abby



Tim

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software
Source of fun



Information processing style
Selective



Computer self-efficacy
High



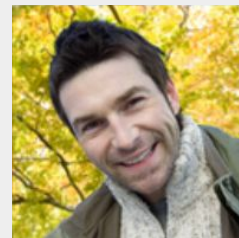
Attitude towards risk



Ways of learning new technology



Abby



Tim

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software
Source of fun



Information processing style
Selective



Computer self-efficacy
High



Attitude towards risk
Risk-tolerant



Ways of learning new technology



Abby



Tim

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software
Source of fun



Information processing style
Selective



Computer self-efficacy
High



Attitude towards risk
Risk-tolerant



Ways of learning new technology
Tinkering



Abby



Tim

GENDERMAG: FOR EVALUATING USABILITY WITH A FOCUS ON GENDER-INCLUSIVENESS



Motivation for using the software



Information processing style



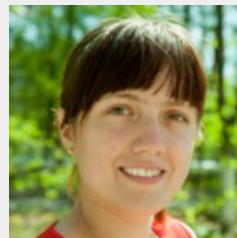
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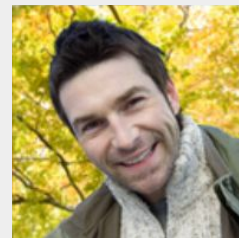
Attitude towards risk



Ways of learning new technology



Abby



Tim



Patrick

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Motivation for using the software



Information processing style



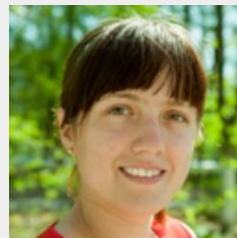
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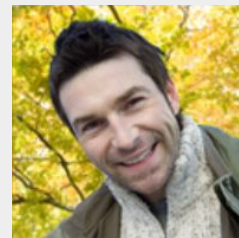
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Ways of learning new technology



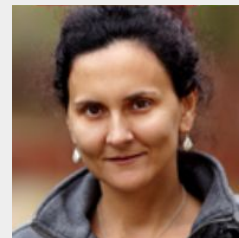
Abby



Tim



Patrick



Patricia

RESEARCH QUESTIONS

RESEARCH QUESTIONS

1

Does a difference in the level of each facet influence the accuracy, speed and ease when performing **creation** tasks on iStar 2.0 models?

A wooden desk with a microscope, pencils, and a coffee cup.

RESEARCH QUESTIONS

1

Does a difference in the level of each facet influence the accuracy, speed and ease when performing **creation** tasks on iStar 2.0 models?

2

Does a difference in the level of each facet influence the accuracy, speed and ease when performing **modification** tasks on iStar 2.0 models?

QUASI-EXPERIMENT WITH A COMBINATION OF MEASUREMENTS

QUASI-EXPERIMENT WITH A COMBINATION OF MEASUREMENTS



100 participants
50 per experiment

QUASI-EXPERIMENT WITH A COMBINATION OF MEASUREMENTS



100 participants
50 per experiment



1 eye-tracker,
1 EEG, 1 EDA

QUASI-EXPERIMENT WITH A COMBINATION OF MEASUREMENTS



100 participants
50 per experiment

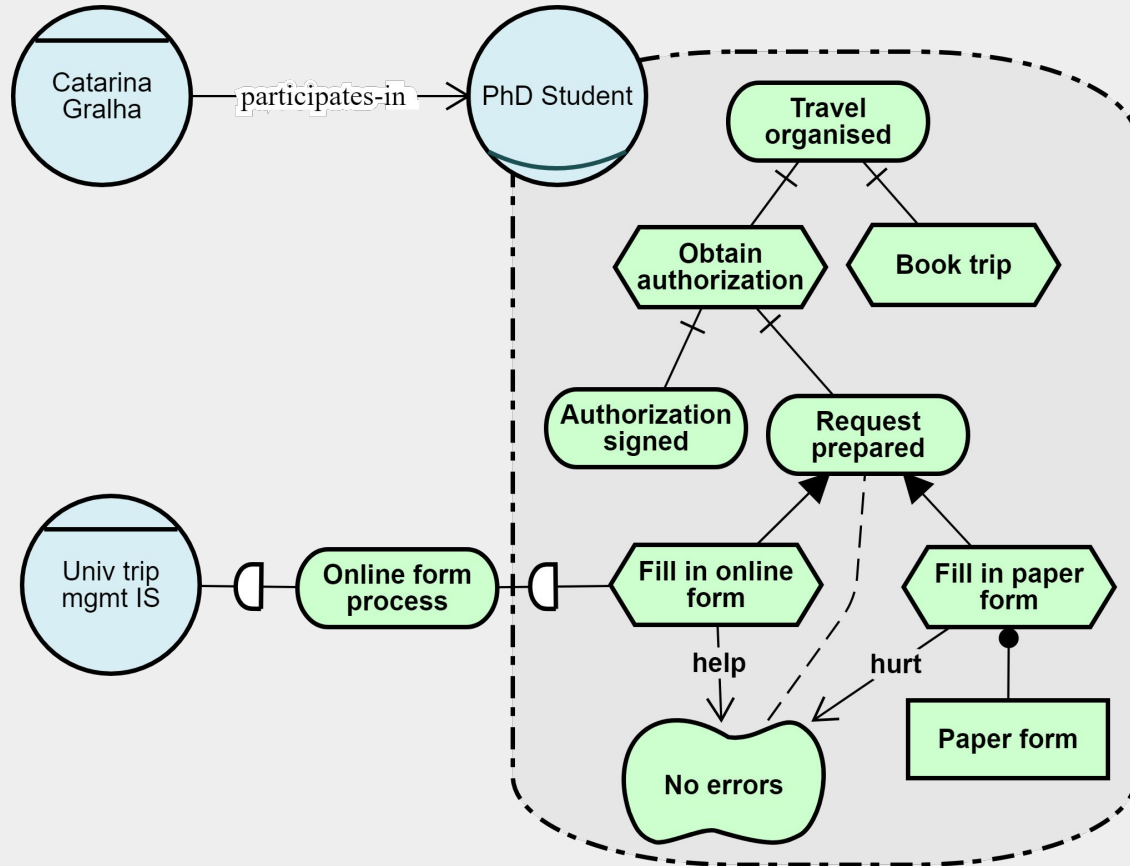


1 eye-tracker,
1 EEG, 1 EDA



booking management
system for an hotel

ISTAR 2.0 MODELS



CREATION AND MODIFICATION TASKS

Hotel Management System

Consider an hotel management system. The client accesses the system through the internet, and can book an hotel room, by choosing both check-in and check-out dates. The dates availability are verified and the reservation is confirmed and stored, if the selected dates are available. When booking a room in that hotel, the client needs to provide his/hers personal details.

Please specify an iStar 2.0 goal model describing this scenario, by using the tool on the right. When you finish, click on the button below.

Continue



Hotel Management System

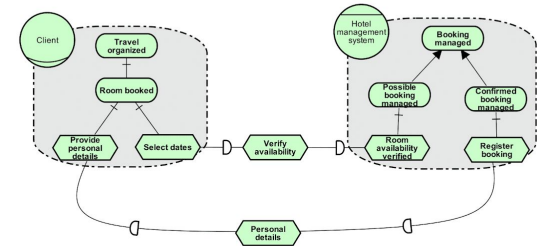
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Software engineers created an iStar goal model describing the previous scenario (presented on the **right side** of the screen). However, after a management meeting, a **new scenario appeared**:

At check-out, the system calculates the amount to be paid by the client. The payment can be made by using a debit or a credit card. When using a credit card, the client has to pay an extra fee.

Please change the iStar 2.0 goal model describing this scenario, by using the tool on the right. When you finish, click on the button below.

Continue



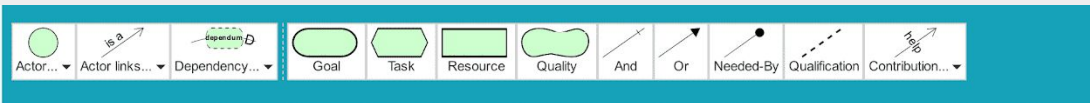
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**Problem
description**



CREATION TASK

Toolbar

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**Problem
description**



Canvas

MODIFICATION TASK

Hotel Management System

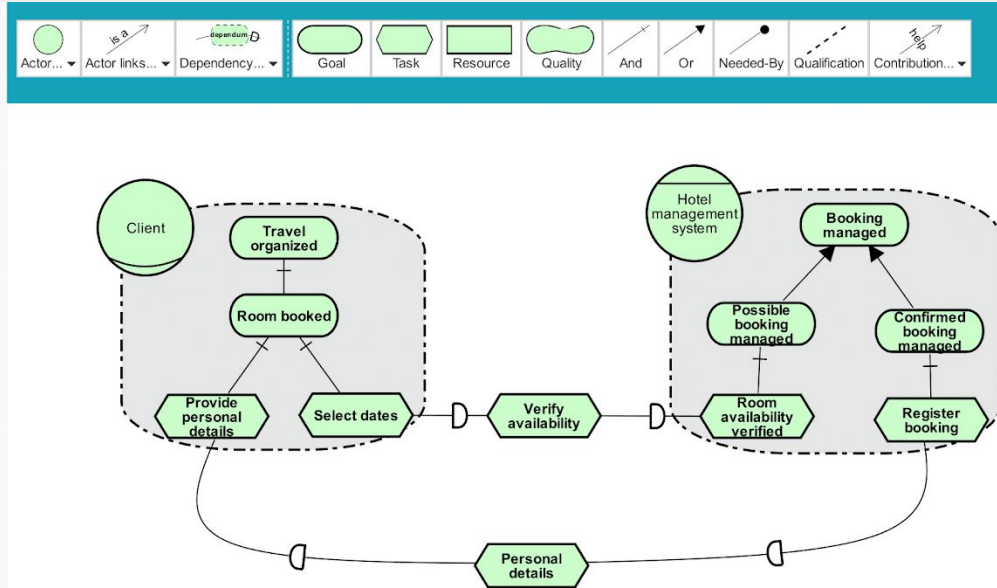
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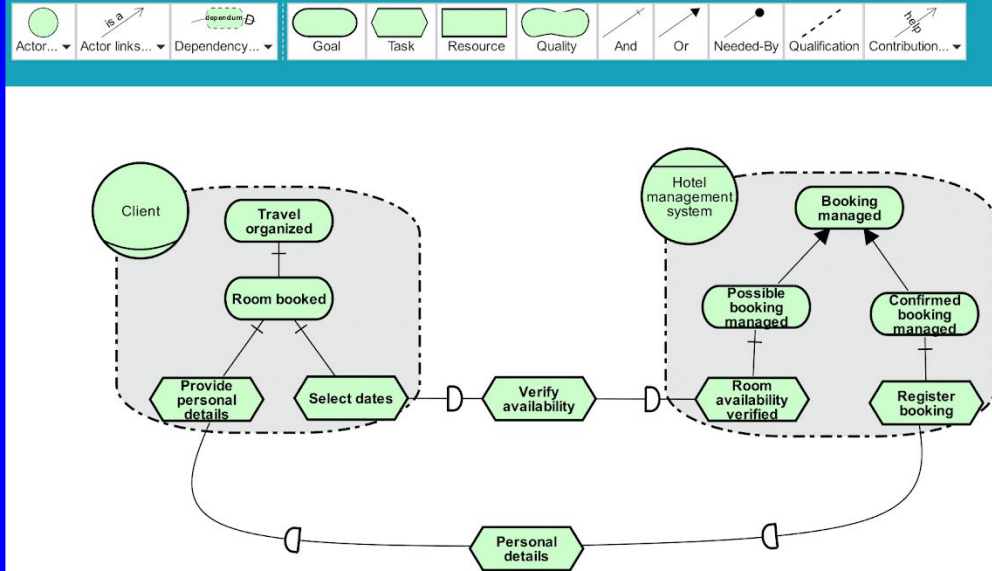
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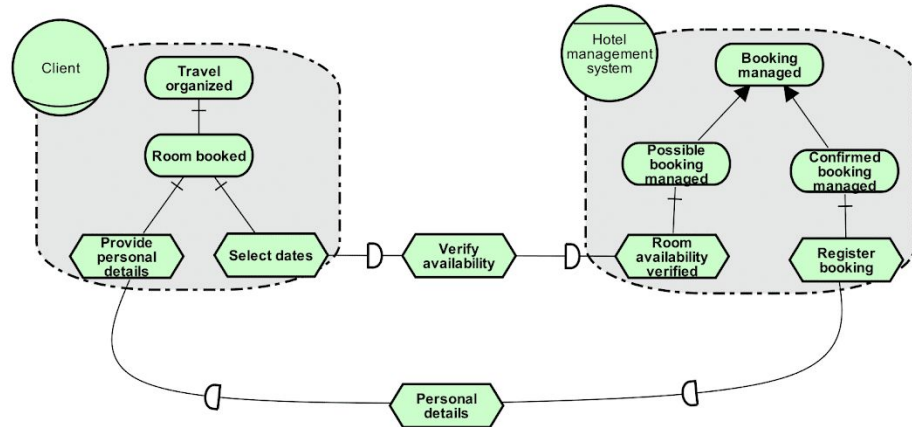
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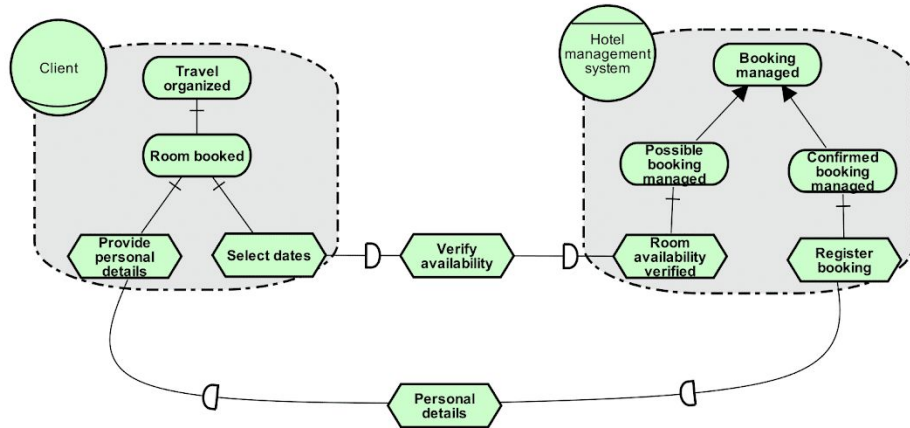
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Continue

Problem
description



Canvas

DATA COLLECTION AND ANALYSIS

DATA COLLECTION AND ANALYSIS

DATA COLLECTION AND ANALYSIS

Direct

DATA COLLECTION AND ANALYSIS

Direct

Indirect

DATA COLLECTION AND ANALYSIS

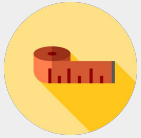
Direct

Indirect

Subjective

DATA COLLECTION AND ANALYSIS

Direct

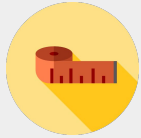


Indirect

Subjective

DATA COLLECTION AND ANALYSIS

Direct



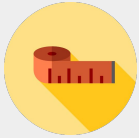
- Elements
- Relationships
- Dependencies
- Actors
- Main flow steps

Indirect

Subjective

DATA COLLECTION AND ANALYSIS

Direct



Elements
Relationships
Dependencies
Actors
Main flow steps

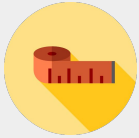


Indirect

Subjective

DATA COLLECTION AND ANALYSIS

Direct



Elements
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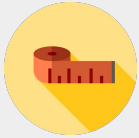
Duration
Detection time

Indirect

Subjective

DATA COLLECTION AND ANALYSIS

Direct



Elements
Relationships
Dependencies
Actors
Main flow steps



Duration
Detection time

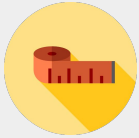


Indirect

Subjective

DATA COLLECTION AND ANALYSIS

Direct



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Duration
Detection time



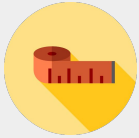
Precision
Recall
F-measure

Indirect

Subjective

DATA COLLECTION AND ANALYSIS

Direct



Elements
Relationships
Dependencies
Actors
Main flow steps



Duration
Detection time



Precision
Recall
F-measure

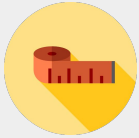
Indirect



Subjective

DATA COLLECTION AND ANALYSIS

Direct



Elements
Relationships
Dependencies
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Main flow steps



Duration
Detection time



Precision
Recall
F-measure

Indirect

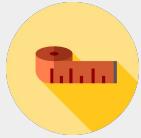


Fixations
Saccades

Subjective

DATA COLLECTION AND ANALYSIS

Direct



Elements
Relationships
Dependencies
Actors
Main flow steps



Duration
Detection time



Precision
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Indirect



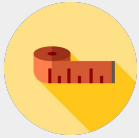
Fixations
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Subjective

DATA COLLECTION AND ANALYSIS

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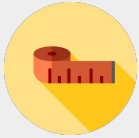


Frequency bands
Attention
Mental workload
Familiarity

Subjective

DATA COLLECTION AND ANALYSIS

Direct



Elements
Relationships
Dependencies
Actors
Main flow steps



Duration
Detection time



Precision
Recall
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Fixations
Saccades



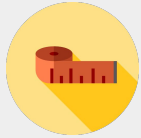
Frequency bands
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Subjective

DATA COLLECTION AND ANALYSIS

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Frequency bands
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Mental workload
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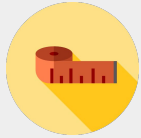


Heart rate variability
Skin conductive level

Subjective

DATA COLLECTION AND ANALYSIS

Direct



Elements
Relationships
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Main flow steps



Duration
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Precision
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Heart rate variability
Skin conductive level

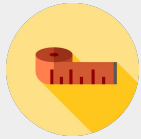
Subjective



Performance
Effort
Frustration
Mental demand
Physical demand
Temporal demand

DATA COLLECTION AND ANALYSIS

Direct



Elements
Relationships
Dependencies
Actors
Main flow steps



Duration
Detection time



Precision
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F-measure

Indirect



Fixations
Saccades



Frequency bands
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Mental workload
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Heart rate variability
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Subjective

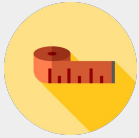


Performance
Effort
Frustration
Mental demand
Physical demand
Temporal demand



DATA COLLECTION AND ANALYSIS

Direct



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Precision
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Frequency bands
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Heart rate variability
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Subjective



Performance
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Frustration
Mental demand
Physical demand
Temporal demand



Motivation
Information processing
Computer self-efficacy
Attitude towards risk
Learning style

READ THE CONSENT LETTER

This experimental work is conducted within the NOVA Laboratory for Computer Science and Informatics (NOVA LINCS), in the context of a PhD thesis. NOVA LINCS is hosted at the Departamento de Informática of Faculdade de Ciências e Tecnologia of Universidade NOVA de Lisboa (DI-NOVA).

All information stated as part of this experiment is confidential and will be kept as such.

Prof. Miguel Goulão and João Araújo are the advisers of the PhD thesis where the results of this experiment will be used. They can be contacted at:
- mgoul@ict.unl.pt; +351 21 294 85 36 (ext 10731); Office: P2/17;
- joao.araujo@ict.unl.pt; +351 21 294 85 36 (ext 10747); Office: P2/3

Catarina Graha, the student responsible for the PhD thesis, can be contacted at:
- cgrahenda@campus.ict.unl.pt; Lab: P3/12

We would like to emphasize that:

- Your participation is entirely voluntary;
- You are free to refuse to answer any questions;
- You are free to withdraw at any time.

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EQUIP AND CALIBRATE THE SENSORS

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Catarina Graha, the student responsible for the PhD thesis, can be contacted at:

- cgrahenda@campus.fct.unl.pt; Lab: P3/12

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WATCH A VIDEO OF FISH SWIMMING

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WATCH A VIDEO TUTORIAL

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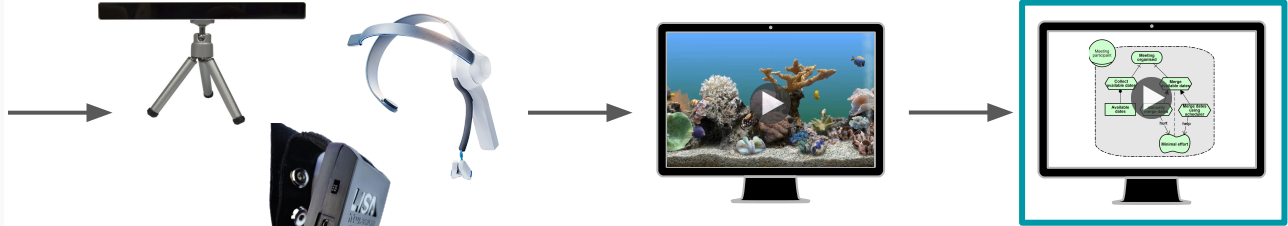
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PERFORM A TASK

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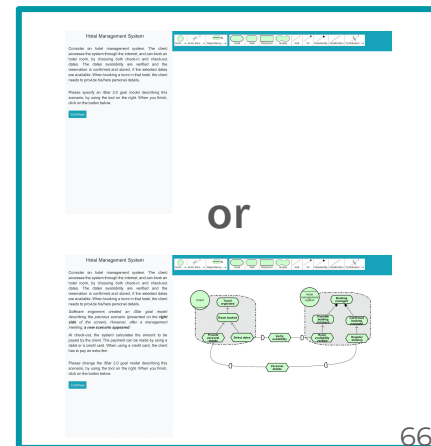
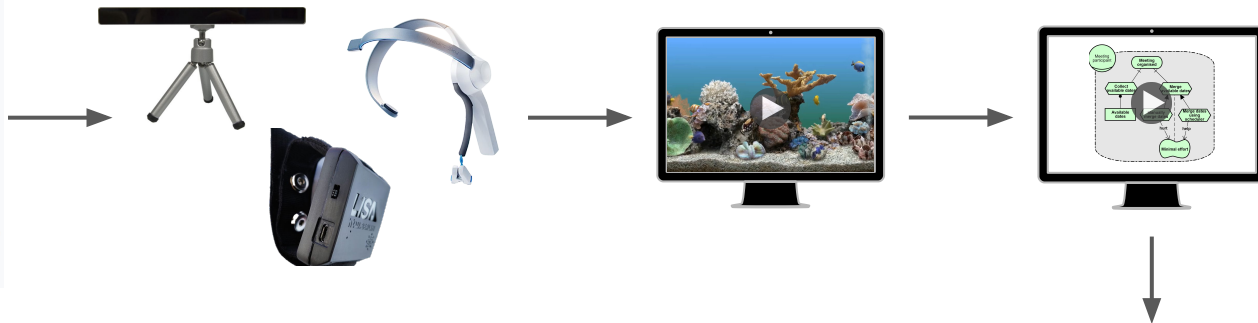
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ANSWER A NASA-TLX QUESTIONNAIRE

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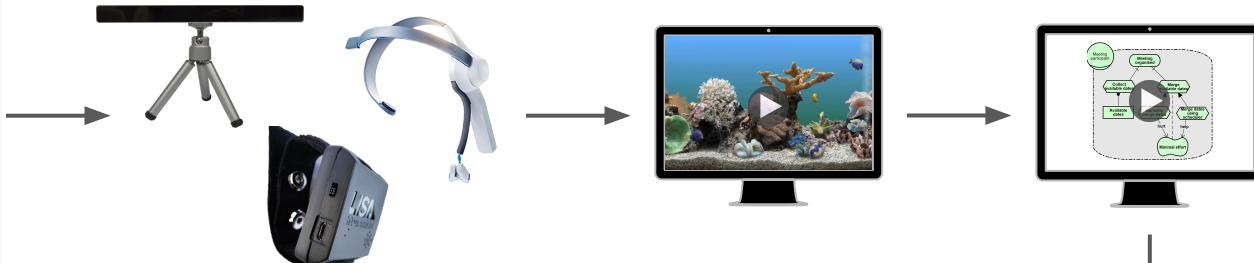


Figure 1 displays seven horizontal Likert scales for the Job Demand-Resources model. Each scale consists of 11 points. The scales are:

- Mental Demand:** Low (left) to High (right).
- Physical Demand:** Low (left) to High (right).
- Temporal Demand:** Low (left) to High (right).
- Performance:** Good (left) to Poor (right).
- Effort:** Low (left) to High (right).
- Frustration:** Low (left) to High (right).

or

Hotel Management System

Consider an hotel management system. The other users can only be viewing both status and check-in status. The other managers are adding, deleting, updating, and viewing status. The other users are available. When viewing a status (for hotel), the hotel status is shown in a table and the status is shown in a table.

Please specify in May 15 and your modeling the system is using the tool on the left. You have 30 min to do this task.

[View Solution](#)

or

Hotel Management System

Consider an hotel management system. The other managers can view the status of the hotel and can be added, deleted, updated, and viewed. The other managers are adding, deleting, updating, and viewing status. The other users are available. When viewing a status (for hotel), the hotel status is shown in a table and the status is shown in a table.

Please specify in May 15 and your modeling the system is using the tool on the left. You have 30 min to do this task.

[View Solution](#)

ANSWER TO DEMOGRAPHIC QUESTIONS

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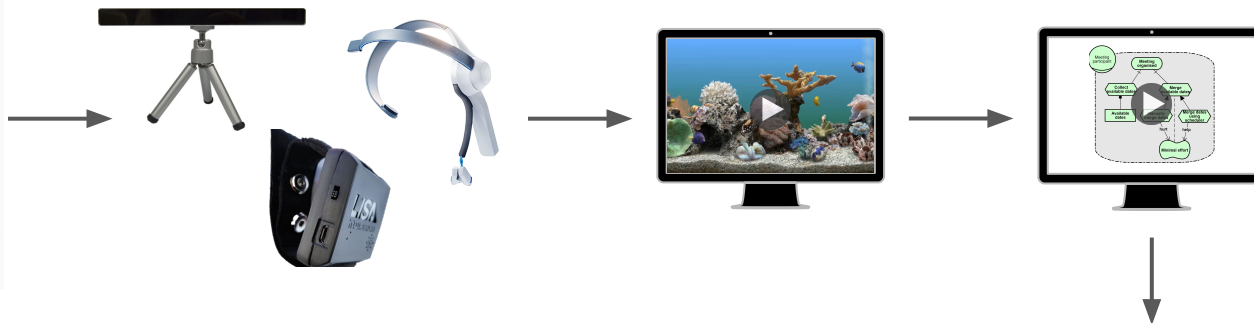
- mgoul@fct.unl.pt; +351 21 294 85 36 (ext 10731); Office: P2/17.
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If you want to receive the aggregated results, please give us your email (optional)

Nationality (*) Field of study (*)

Completed education (*) Current year of education (*)

Previous experience with the modelling language used in the task you just completed (*)

Other modelling languages that you know

(*) mandatory

Figure 1 consists of seven horizontal bar charts, each representing a different variable. The variables are Mental Demand, Physical Demand, Temporal Demand, Performance, Effort, and Frustration. Each chart has a scale from Low to High (or Good to Poor for Performance). The bars represent the frequency of responses at each point on the scale.

- Mental Demand:** Scale from Low to High. The distribution is skewed towards the High end.
- Physical Demand:** Scale from Low to High. The distribution is skewed towards the High end.
- Temporal Demand:** Scale from Low to High. The distribution is skewed towards the High end.
- Performance:** Scale from Good to Poor. The distribution is skewed towards the Poor end.
- Effort:** Scale from Low to High. The distribution is skewed towards the High end.
- Frustration:** Scale from Low to High. The distribution is skewed towards the High end.

[illegible]

ANSWER A GENDERMAG QUESTIONNAIRE

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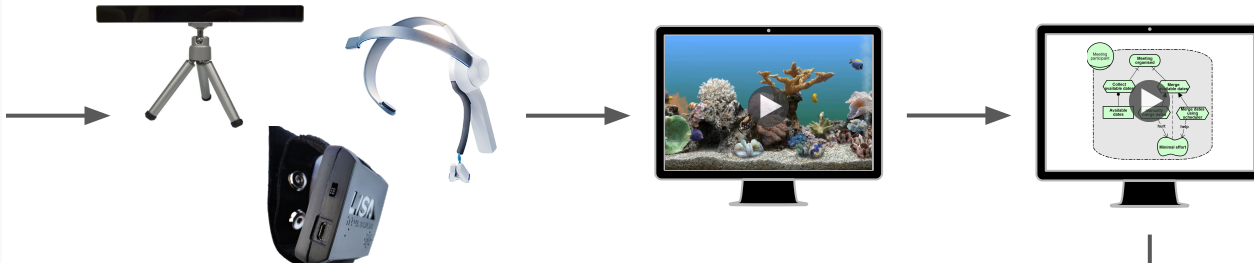
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[illegible]

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Current year of education (*)

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Other formal modelling languages that you know

(*) mandatory

or

PROTOCOL OF THE EXPERIMENTS

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Indicate your level of agreement with each of the statements listed below, selecting one per row (*)

	strongly disagree	1	2	3	4	neutral	5	6	7	8	strongly agree
I am able to use unfamiliar technology when...											
...I have just the built-in help for assistance											
...I have seen someone else using it before trying it myself											
...no one is around to help if I need it											
...someone else has helped me get started											
...someone shows me how to do it first											
...I have used similar technology before, to do the same task											
...I have never used anything like it before											

(*) mandatory

If you want to receive the aggregated results, please give us your email (optional)

email@mail.com

Nationality (*)

e.g., portuguese

Field of study (*)

e.g., computer science

Completed education (*)

Current year of education (*)

Previous experience with the modelling language used in the task you just completed (*)

Other modelling languages that you know

e.g., UML, BPMN

(*) mandatory

Mental Demand

Low High

Physical Demand

Low High

Temporal Demand

Low High

Performance

Good Poor

Effort

Low High

Frustration

Low High

or

Model Management System

Consider an ideal management system. The ideal system for managing the system through the lifecycle, from the initial design to the final deployment, and the final deployment. The ideal system is a system that is able to manage the lifecycle of the system, from the initial design to the final deployment, and the final deployment. The ideal system is a system that is able to manage the lifecycle of the system, from the initial design to the final deployment, and the final deployment.

Please specify in the 10 and 11 grid models describing the system lifecycle. The 10 and 11 grid models are the same as the 10 and 11 grid models in the previous figure.

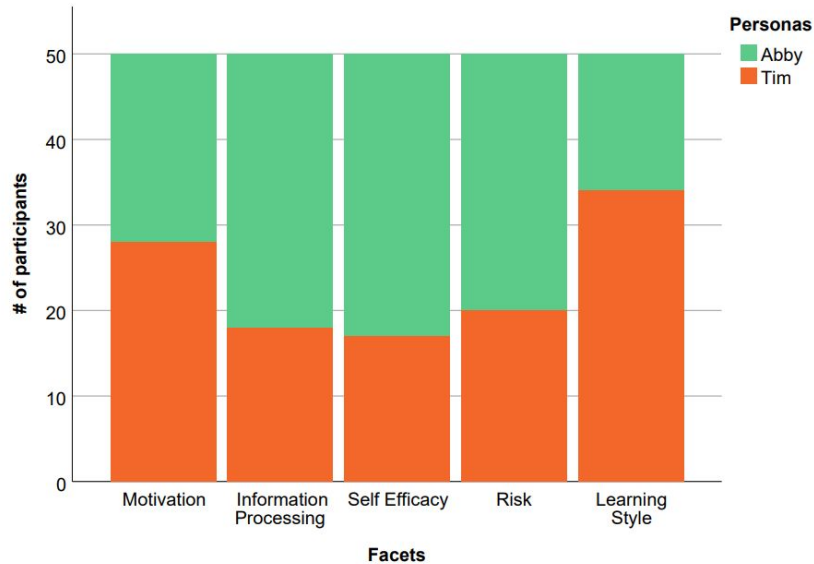
Model Management System

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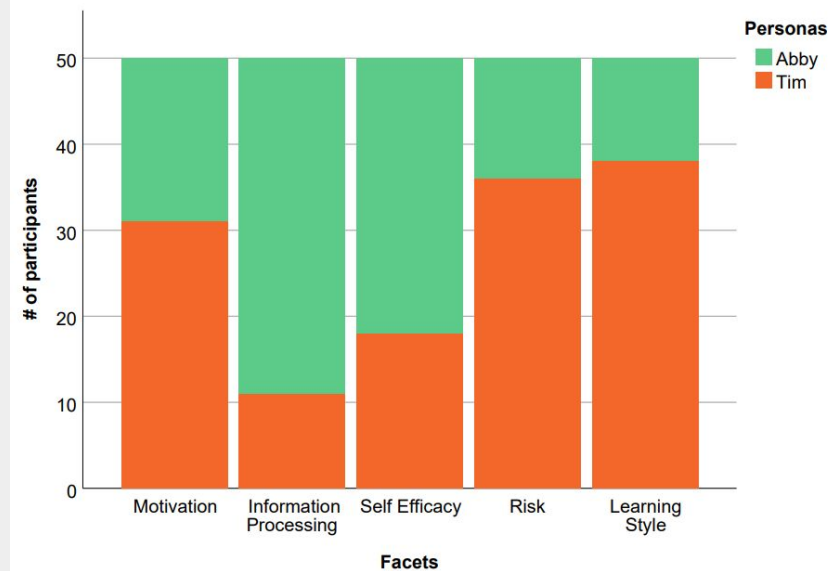
Please specify in the 10 and 11 grid models describing the system lifecycle. The 10 and 11 grid models are the same as the 10 and 11 grid models in the previous figure.

PARTICIPANTS GENDERMAG

CHARACTERISATION



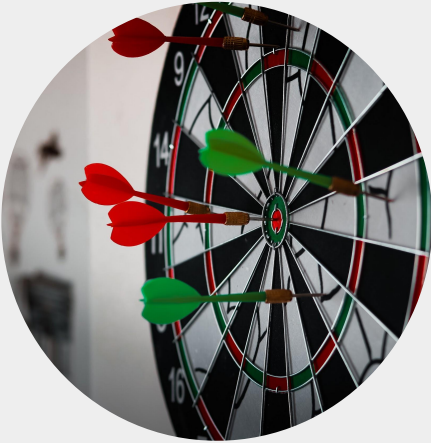
Creation task



Modification task

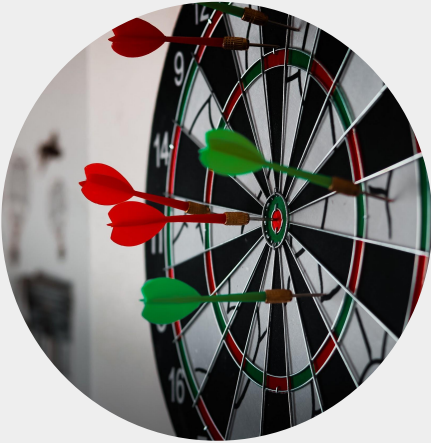
INFERENCES

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information processing and
risk have impact on **accuracy**

INFERENCES

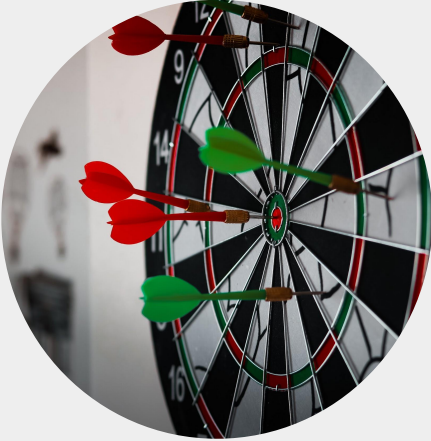


information processing and risk have impact on **accuracy**



information processing, self-efficacy, risk and learning style have impact on **speed**

INFERENCES



information processing and risk have impact on **accuracy**



information processing, self-efficacy, risk and learning style have impact on **speed**



information processing, self-efficacy and risk have impact on **ease**

THREATS TO VALIDITY

THREATS TO VALIDITY



conclusion

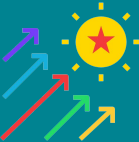
number of participants
distribution of participants on the facets

THREATS TO VALIDITY



conclusion

number of participants
distribution of participants on the facets



internal

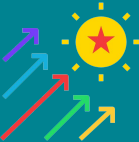
convenience sampling
limitations of biometrics devices

THREATS TO VALIDITY



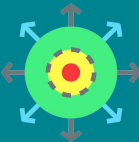
conclusion

number of participants
distribution of participants on the facets



internal

convenience sampling
limitations of biometrics devices



external

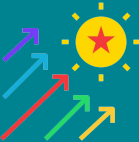
size of the models, problem domain
little or no prior knowledge on iStar 2.0

THREATS TO VALIDITY



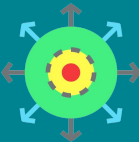
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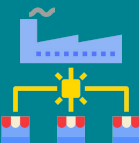
internal

convenience sampling
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external

size of the models, problem domain
little or no prior knowledge on iStar 2.0



construct

video tutorial
no information on what was being tested



DIVERSITY IS KEY

THANK YOU

QUESTIONS?

