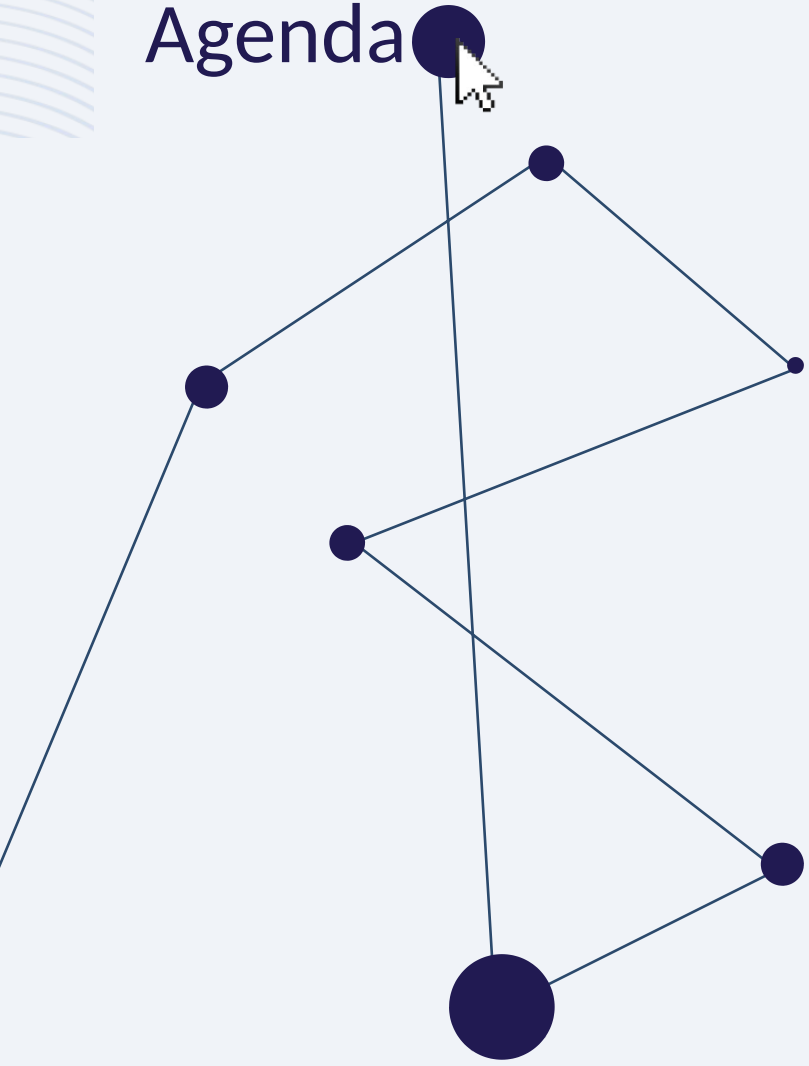
SMATA

Simple Mouse Attribute Analysis

Investigating the bivariate potential correlation of mouse movement attributes and the satisfaction with the usability for the determination of the users' satisfaction of a cloud- based vertical business software solution for managing soft data.

21ST INTERNATIONAL CONFERENCE ON HUMAN-COMPUTER INTERACTION

Agenda



- Introduction
- Usability
- Mouse pattern
- Examined mouse attributes
- Research Methodology
- Findings
- Conclusion

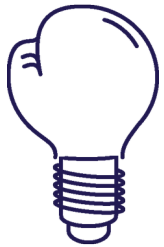
Introduction

As satisfied as you click

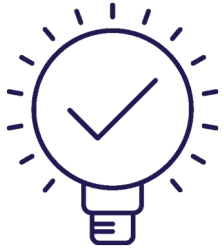
Main research goal is to examine the bivariate potential correlations between the pattern related mouse attributes and the factors of the satisfaction with the usability

Usability

- Three main points of usability (ISO, 1998):



Effectiveness
Do the right things



Efficiency
Doing things right

Satisfaction
The personal meaning

Nielsen & Norman:

Learnability,

Efficiency,

Memorability,

Errors,

Satisfaction

Usability: CSUQ

- satisfaction with the usability
- strong focus on business and it is very suitable for business applications
- 19 statements

SYSUSE system usefulness	INFOQUAL information quality	INTERQUAL interface quality
OVERALL		

The item assess:

perceived ease-of-use,

perceived ease of learning,

simplicity,

perceived effectiveness,

information,

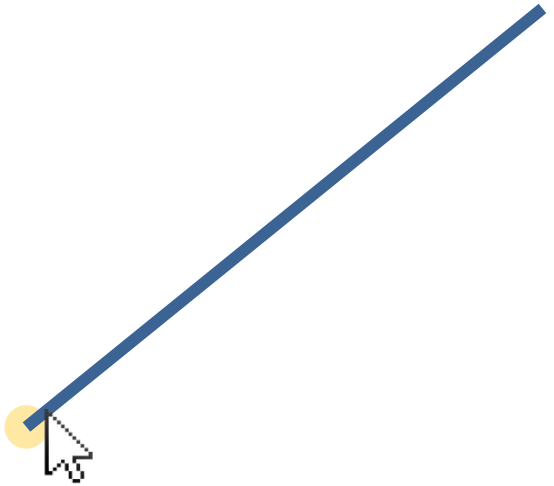
user interface,

efficiency,

errors

➤ Mouse patterns: Straight pattern

- Direct movements towards a target
  (after tracing the target)
- Characterised by a pause before the movement (Lee & Chen, 2007; Tzafilkou & Protogeros, 2018)
- Direct movements with no big pauses
  (Ferreira, Arroyo, Tarrago, & Blat, 2010; Tzafilkou, Protogeros, & Yakinthos, 2014).
- Can be interpreted as a confident move of the user
- may also reveal that a task was easy



➤ Mouse patterns: Hesitation pattern

- Two definitions:
  1) movement between two or more elements as hesitation
  2) the average time from the beginning of a mouse hover to the moment of the click (ClickTale, 2018).
- more hesitation patterns occurred during a task with a higher level of difficulty (Ferreira, Arroyo, Tarrago, & Blat, 2010).

➤ Mouse patterns: Random pattern

- movements without any specific intention, just playing around doing random movements with short pauses or not (Ferreira, Arroyo, Tarrago, & Blat, 2010)
- arise when the level of difficulty for the task was increased
- indicator of difficulty and low self-efficacy (Tzafilkou & Protogeros, 2018)
- indicator for the perceived usability of the system

➤ Mouse patterns: Fixed pattern

- describes a repose of the cursor
- Tzafilkou & Protogeros (2018) assumed that the user during this time evaluates the cost and benefits of the particular action to make
- evaluate the risk-perception as well as the level of usefulness

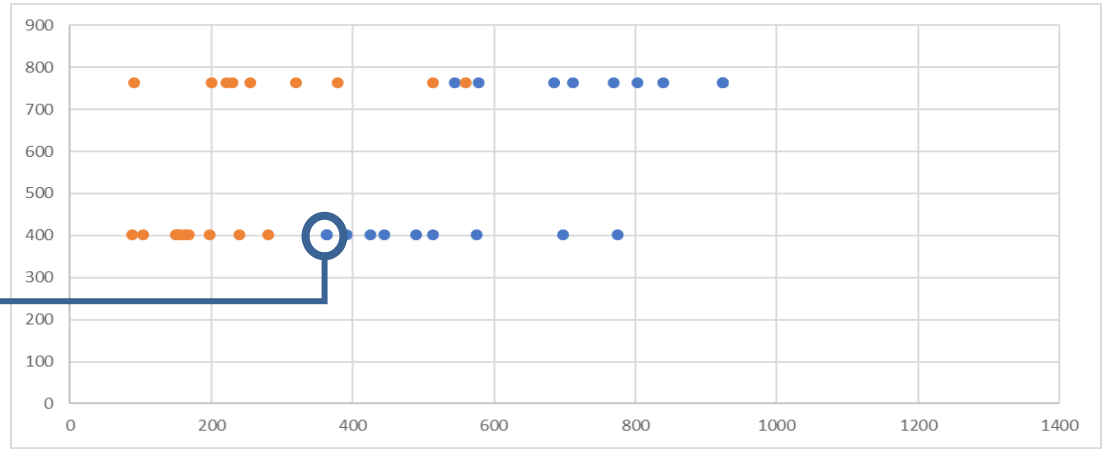
➤ Mouse attributes: pre-studies

1. To define a factor for the determination of the percentage deviation for straight movements

a = 1.0433

2. To define the of the perception of a slow movement

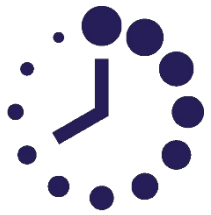
360 px/sec



Mouse attributes

Straight pattern attributes	Hesitation pattern attributes	Random pattern attributes	Fixed pattern attributes	Mouse attributes of activity
• Number of direct movements • Number of long direct movements (>1/4 of screen diagonal)	• Hovers that turned into clicks • number of pauses before clicks > 0.2 s • All hovers in general • Average time of pauses that turns into clicks	• Non-direct movements • Number of non- direct movements • Total number of movements	• Number of Pauses • Number of long Pauses (>4s) • Average time of pauses • Average time of long pauses	• Total amount of the covered distance during the tasks • Average velocity during the task • Total time of the task • Number of slow movements • Activity Level (Covered distance/ time of task)

Research Methodology: Tasks

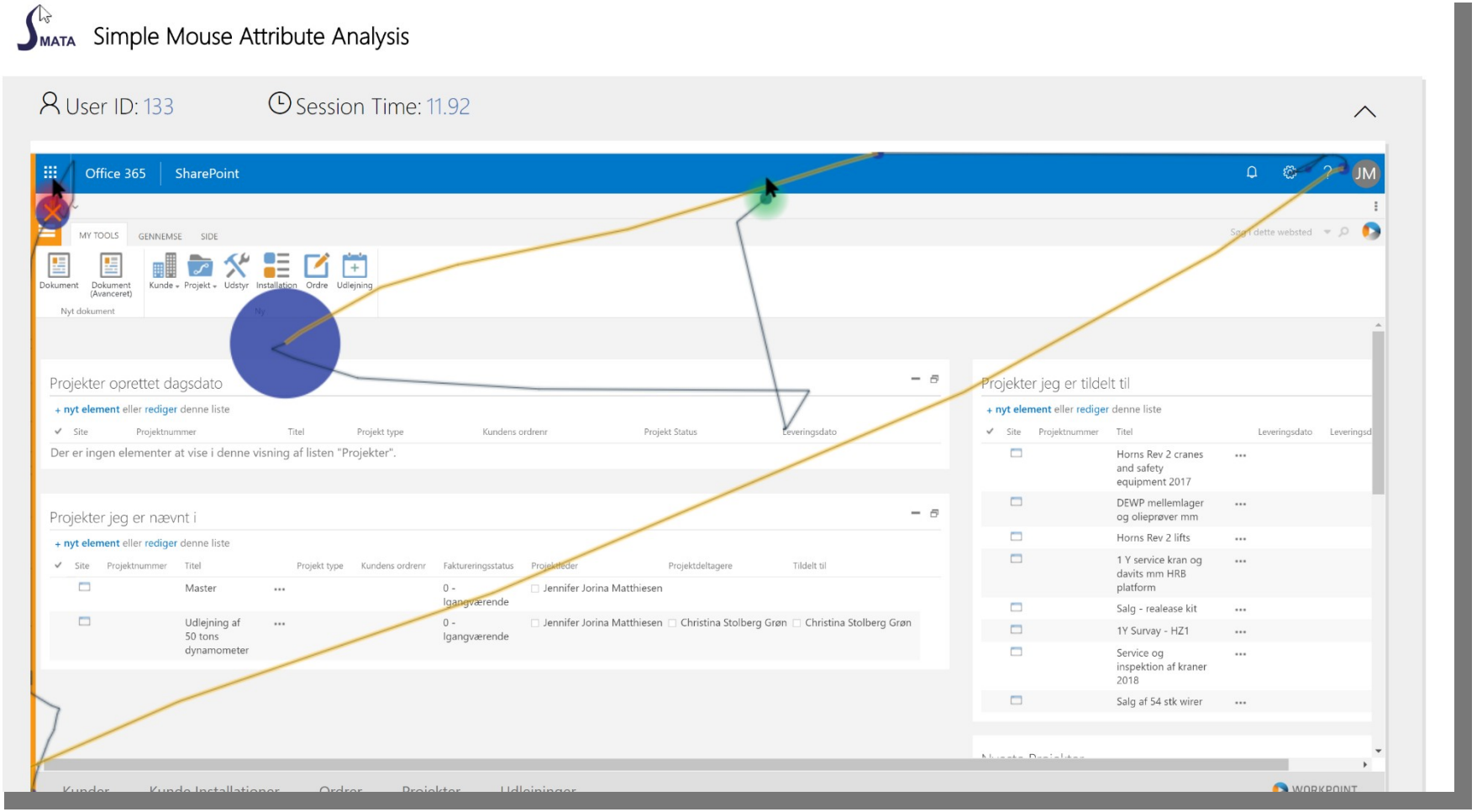


- small enough to be understood and conducted by the participants in a limited amount of time
- little loading time as possible

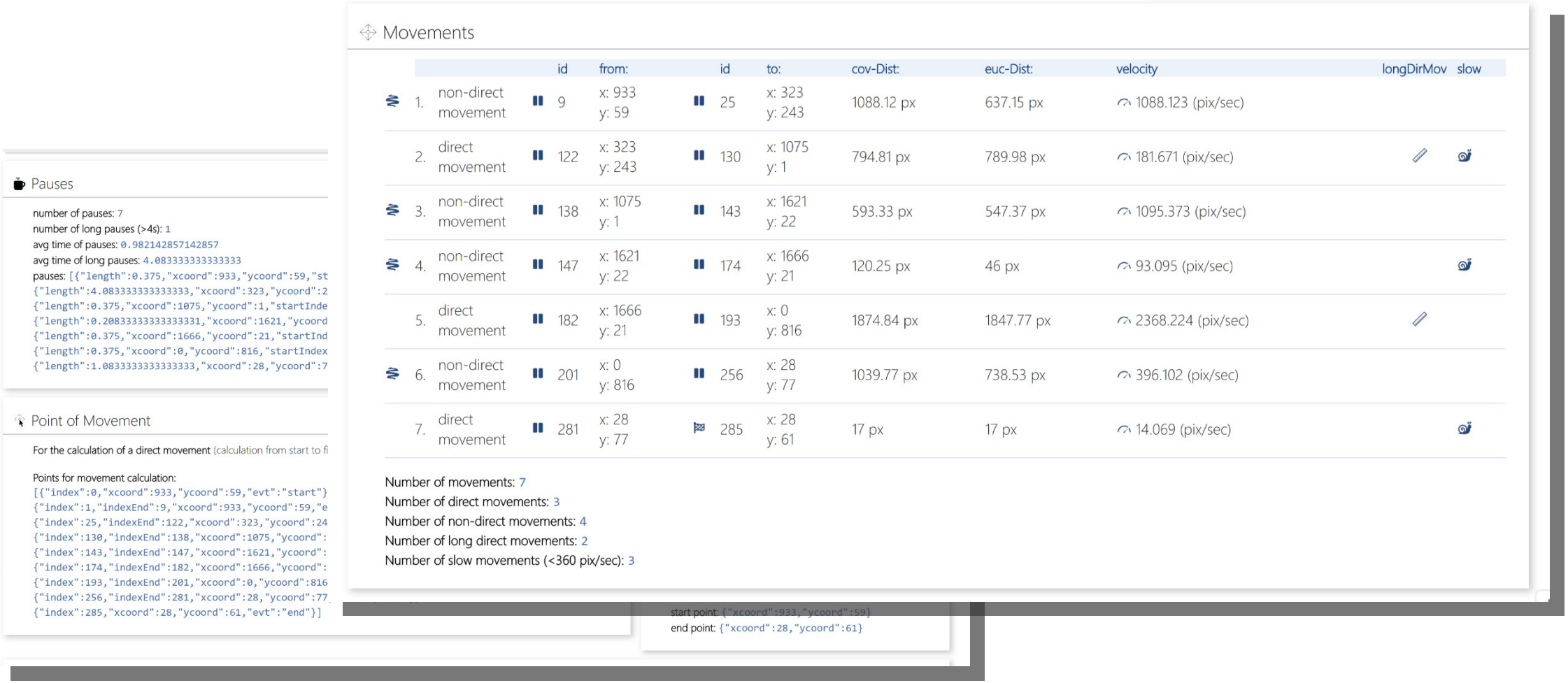
first task
find specific information

second task
create a task

➤ Research Methodology: SMATA



Research Methodology: SMATA



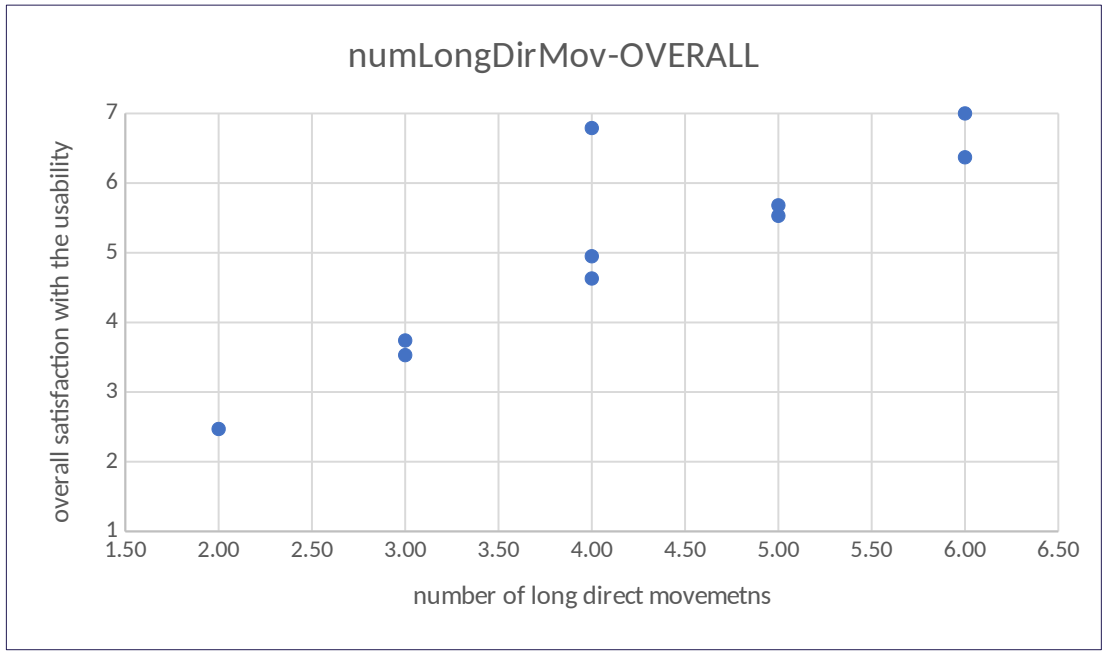
Findings

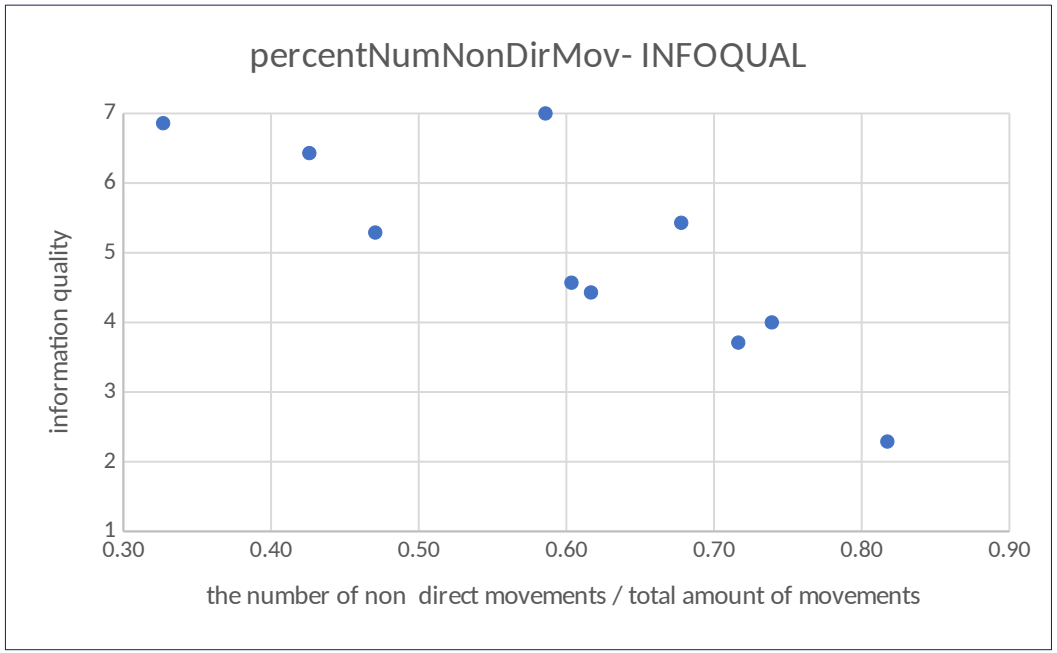
Pattern category	Mouse attribute	Correlation	SYSUSE	INFOQUAL	INTERQUAL	OVERALL
Straight pattern	numDirMov	Pearson	-.708*	-.852**	-.770**	-.797**
	numLongDirMov	Pearson	-.871**	-.819**	-.799**	-.882**
Hesitation pattern	pausesBfrClick	Pearson	-0.078	-0.005	0.103	-0.02
	numHover	Pearson	0.334	0.263	0.406	0.341
Random pattern	numMov	Pearson	0.347	0.339	0.29	0.355
	percentNumNonDirMov	Pearson	.739*	.813**	.670*	.787**
	numNonDirMov	Pearson	0.581	0.625	0.549	0.621
Fixed pattern	numPauses	Pearson	.747*	.699*	0.592	.741*
	numLongPauses	Pearson	0.187	0.324	0.119	0.229
	avgPause	Pearson	-0.134	0.146	-0.077	-0.041
	avgLongPause	Pearson	-0.311	-0.356	-.639*	-0.398
Mouse attributes of activity	numSlowMov	Pearson	0.324	0.305	0.302	0.334
	numClicks	Pearson	-0.080	0.048	0.207	0.014
	covDist	Spearman's	0.48	0.345	0.492	0.467
	actLevel	Pearson	0.187	0.139	0.273	0.198
	avgVelocity	Pearson	0.144	0.173	0.091	0.153
	sessTime	Pearson	0.606	.774**	0.595	.688*

***. Correlation is significant at the 0.05 level (2-tailed).**

****. Correlation is significant at the 0.01 level (2-tailed).**

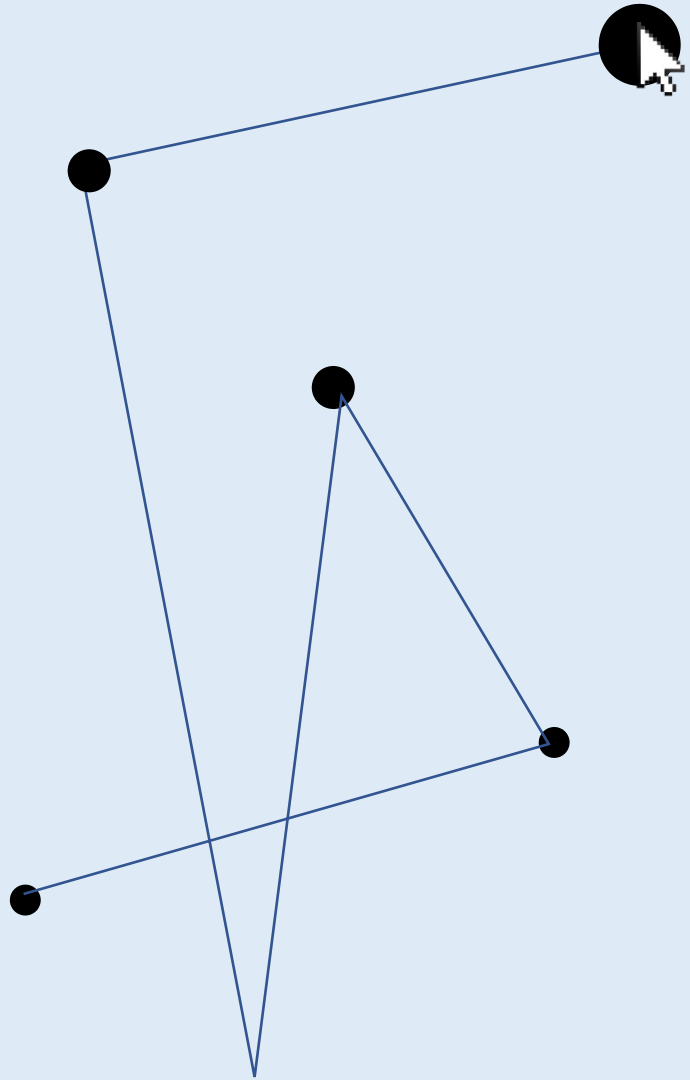
Findings


numLongDirMov-OVERALL
overall satisfaction with the usability
7
6
5
4
3
2
1
1.50
2.00
2.50
3.00
3.50
4.00
4.50
5.00
5.50
6.00
6.50
number of long direct movemetns


percentNumNonDirMov- INFOQUAL
information quality
7
6
5
4
3
2
1
0.30
0.40
0.50
0.60
0.70
0.80
0.90
the number of non direct movements / total amount of movements

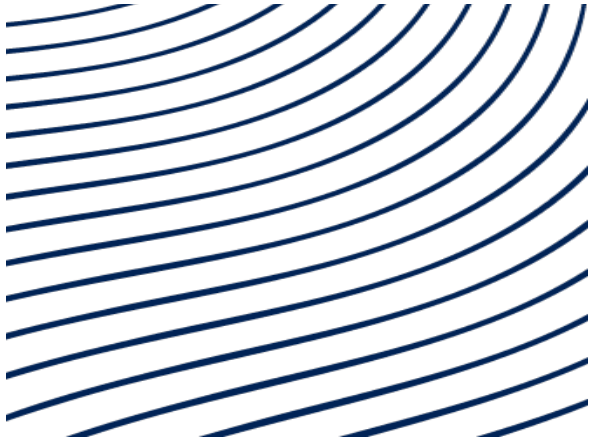
Conclusion

- SMATA: a prototype tool for the analysation and calculation of mouse attributes have been designed and implemented
- significant factors in the determination of the users' satisfaction with the usability in ECM systems are:
  - the number of direct movements,
  - the number of long direct movements,
  - the number of pauses
  - the covered distance
  - the session time



End

Thank you for your attention!



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