

THE HUMAN FACTOR DUAL ROLE IN MODERN CYBERSPACE SOCIAL ENGINEERING

A PRACTICAL ADDRESS TO THREATS & RISKS PROBLEM SPACE



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NATO Advanced Training Course

“Terrorist Use of Cyberspace”, Ohrid, Macedonia

8-12 Dec, 2014

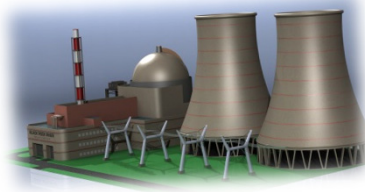


*This activity
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The NATO Science for Peace
and Security Programme



THE "SOCIAL ENGINEERING" PROBLEM



CYBER THREATS, AREAS & CHALLENGES TO 2020

THREATS

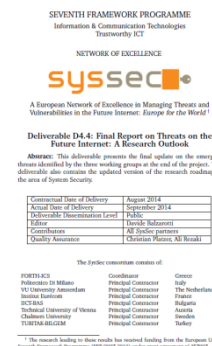
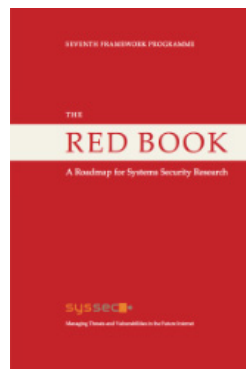
- Malware
- Targeted Attacks
- Social Engineering - Phishing

AREAS

- Mobile Devices
- Social Networks
- Critical Infrastructures

CHALLENGES

- No Device Should Be Compromisable
- Give Users Control Over Their Data
- Provide Private Moments in Public Places
- Develop Compromise-Tolerant Systems



≈ 30
Billions



...WEB 2.0 & WEB 3.0...



...critical services; changing cybersecurity nature..
...we educate for the unknown...

A STUDY ON IT THREATS AND USERS BEHAVIOUR DYNAMICS IN ONLINE SOCIAL NETWORKS



www.snfactor.com

CYBER THREATS MULTIPLE RISKS PROGNOSIS*

Time

2000

↓

2050

Technology/Dimension	Civil society	Banks & finances	State governance	Critical Infrastructure	Emerging technologies	Education
Web 1.0	5, Weak	5, Weak	5, Weak	5, Weak	5, Weak	5, Weak
Web 2.0 / Web 3.0	4, Moderate	5, Weak	4, Moderate	5, Weak	4, Moderate	4, Moderate
Web 4.0	4, Moderate	4, Moderate	4, Moderate	4, Moderate	4, Moderate	4, Moderate
Web 5.0	4, Moderate	4, Moderate	4, Moderate	4, Moderate	4, Moderate	4, Moderate

* THE CLASSIFICATION RESULTS ARE GATHERED FROM 250 NATIONAL & INTERNATIONAL EXPERTS IN THE FRAMEWORK OF BULGARIAN CYBER SECURITY STRATEGY DRAFT PREPARATION FROM JTSAC FOR MINISTRY OF DEFENCE IN 2013.

Risk levels:

- 5, Weak
- 4, Moderate
- 3, Severe
- 2, High
- 1, Uncertain

OTHER MULTICRITERIA EXPERTS' ASSESSMENT EXAMPLES*

SOCIAL NETWORKS CYBER THREATS MULTICRITERIA ASSESSMENT



Threat/Area	Human Factor	Digital Society	Governance	Economy	New Technologies	Environment of Living
Social Engineering						
Malware						
Spam & Scam						
Multimedia Influences						
Espionage & Privacy						

SMART HOMES CYBER THREATS MULTICRITERIA ASSESSMENT



Threat/Area	Human Factor	Digital Society	Governance	Economy	New Technologies	Environment of Living
Targeted Attacks						
Compromised Devices						
Malware						
Technologies Influences						
Privacy & Allianation						

Risk levels for Web 2.0/Web3.0 Technological Progress Stage Assessments:

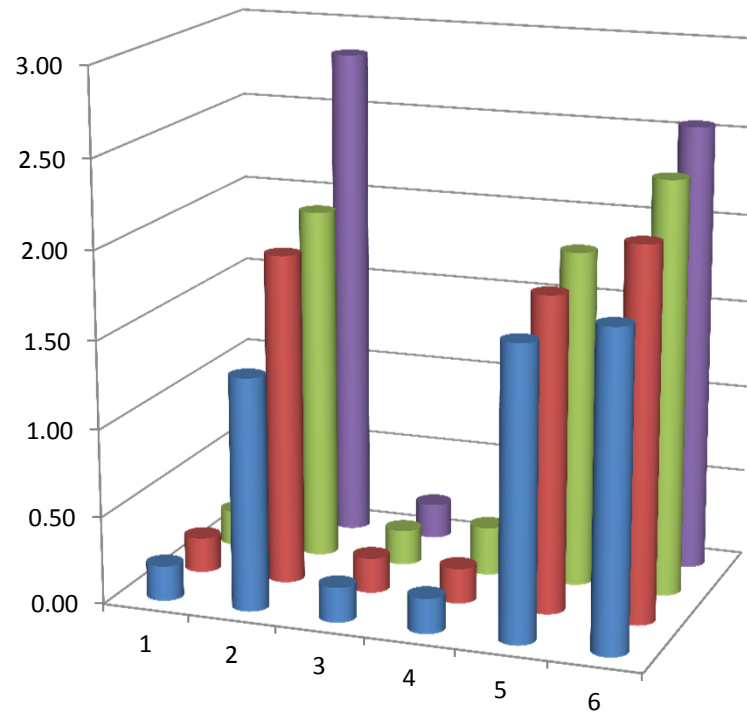
	2, High
	3, Severe
	1, Uncertain

*THE CLASSIFICATION RESULTS ARE GATHERED FROM 75 NATIONAL & INTERNATIONAL EXPERTS' BRAINSTORMING MEETING DISCUSSIONS IN THE FRAMEWORK OF DMU 03/22, DFNI T01/4 ACTIVE COLLABORATION WITH JTSAC IN 2014.

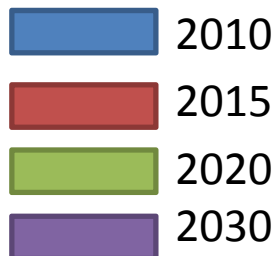
CLOUD SERVICES

ESGI 104

Total Investments



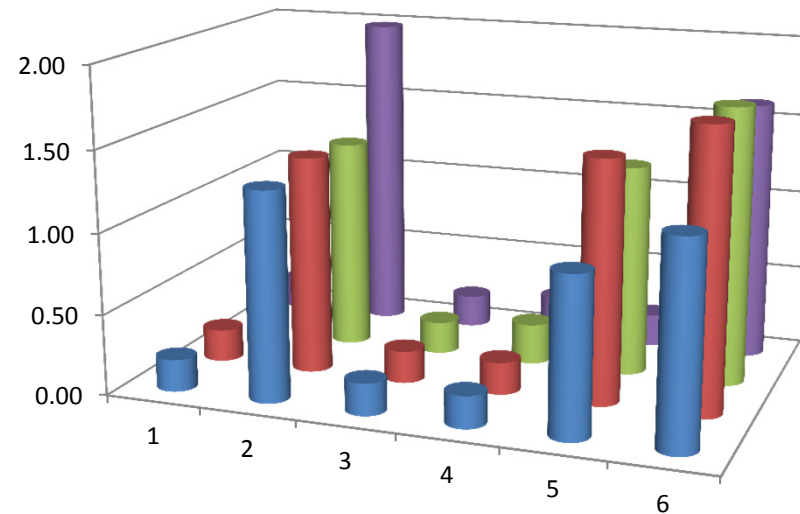
Periods:



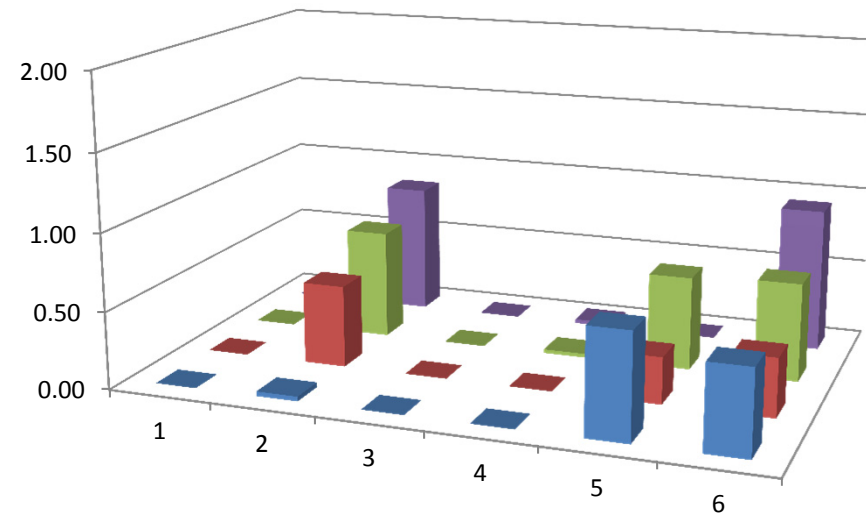
Areas:

- 1 – Human Factor
- 2 – Dig. Society
- 3 – Governance
- 4 – Economy
- 5 – New Tech
- 6 – Env. of living

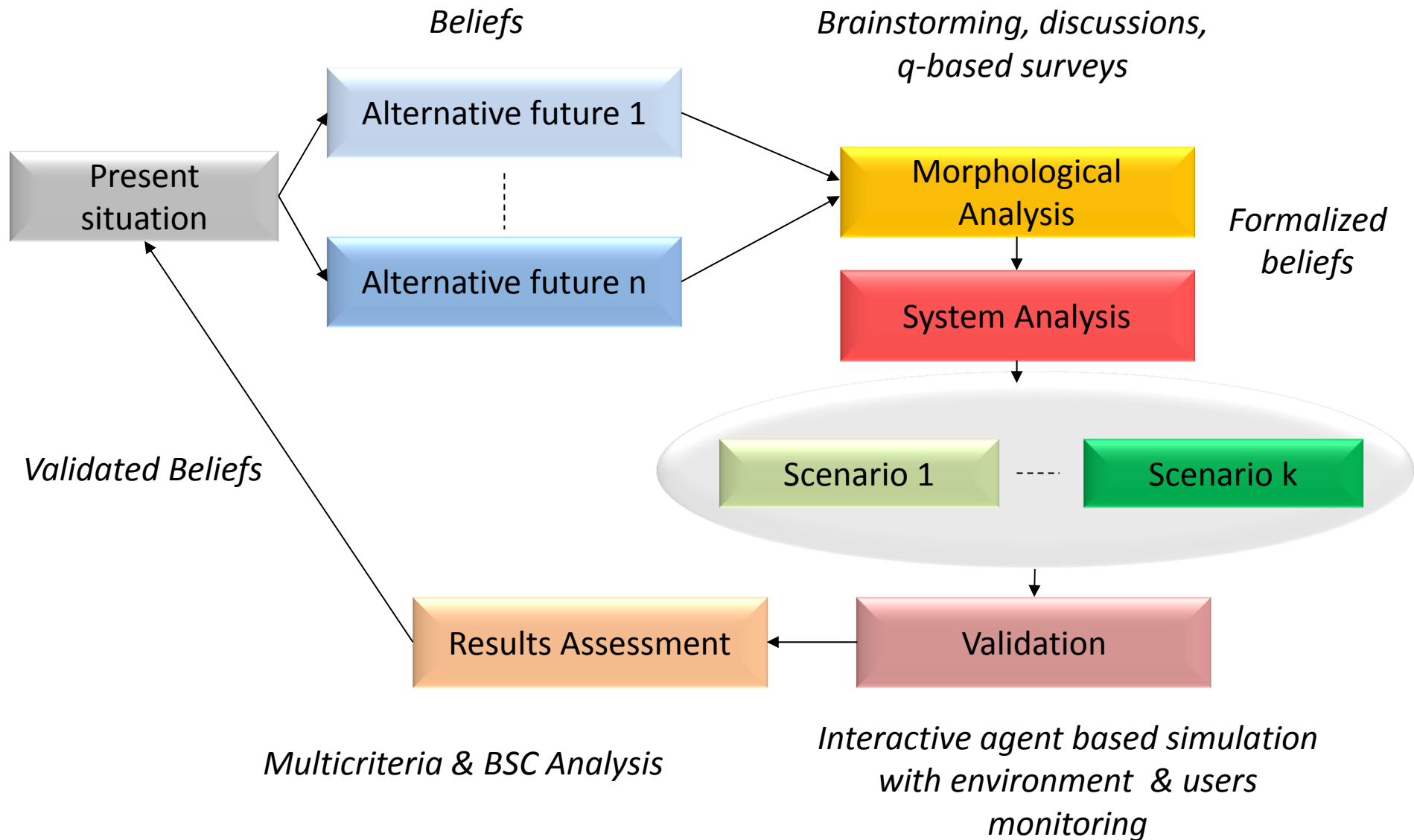
Prevention Investments



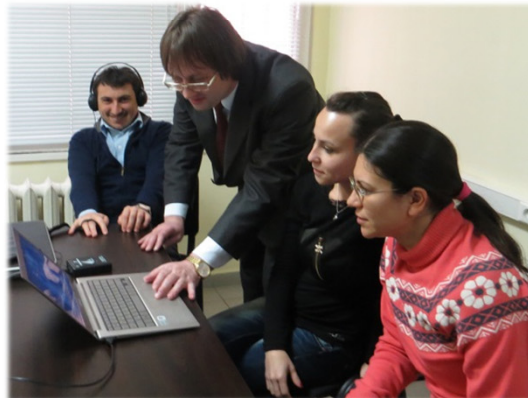
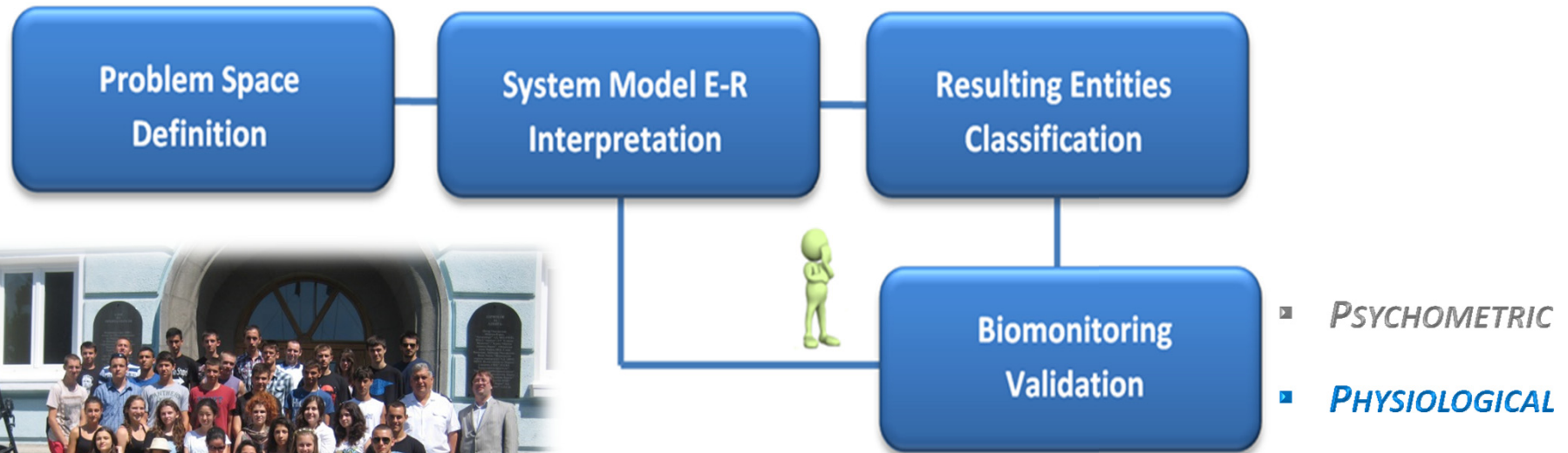
Repairing Investments



GENERAL METHODOLOGICAL FRAMEWORK



SOCIAL ENGINEERING FOCUS



...

SCENARIO CONTEXT

I-SCIP-MA[©]



Morphological Analysis

Users	Social Networks	Hardware Technologies	Communications	Software Platforms	Web standards	Activities
Students	Popular	Mobile Smart Devices	Wireless	Mobile OS	Web 2.0	Social Engineering
Workers	Relatively Popular	PCs and Servers	Cable	Desktop OS	Web 3.0	Entertainments
Other						Regular Surfing

$$N = 7 \times 3 \times 2 \times 2 \times 2 \times 2 \times 3 = 2016$$

$$N' = 96$$

Index	Length	Weight	Name
1	7	410	Scenario1
2	7	340	Scenario2
3	7	390	Scenario3
4	7	360	Scenario4
5	7	350	Scenario5
6	7	400	Scenario6
7	7	380	Scenario7

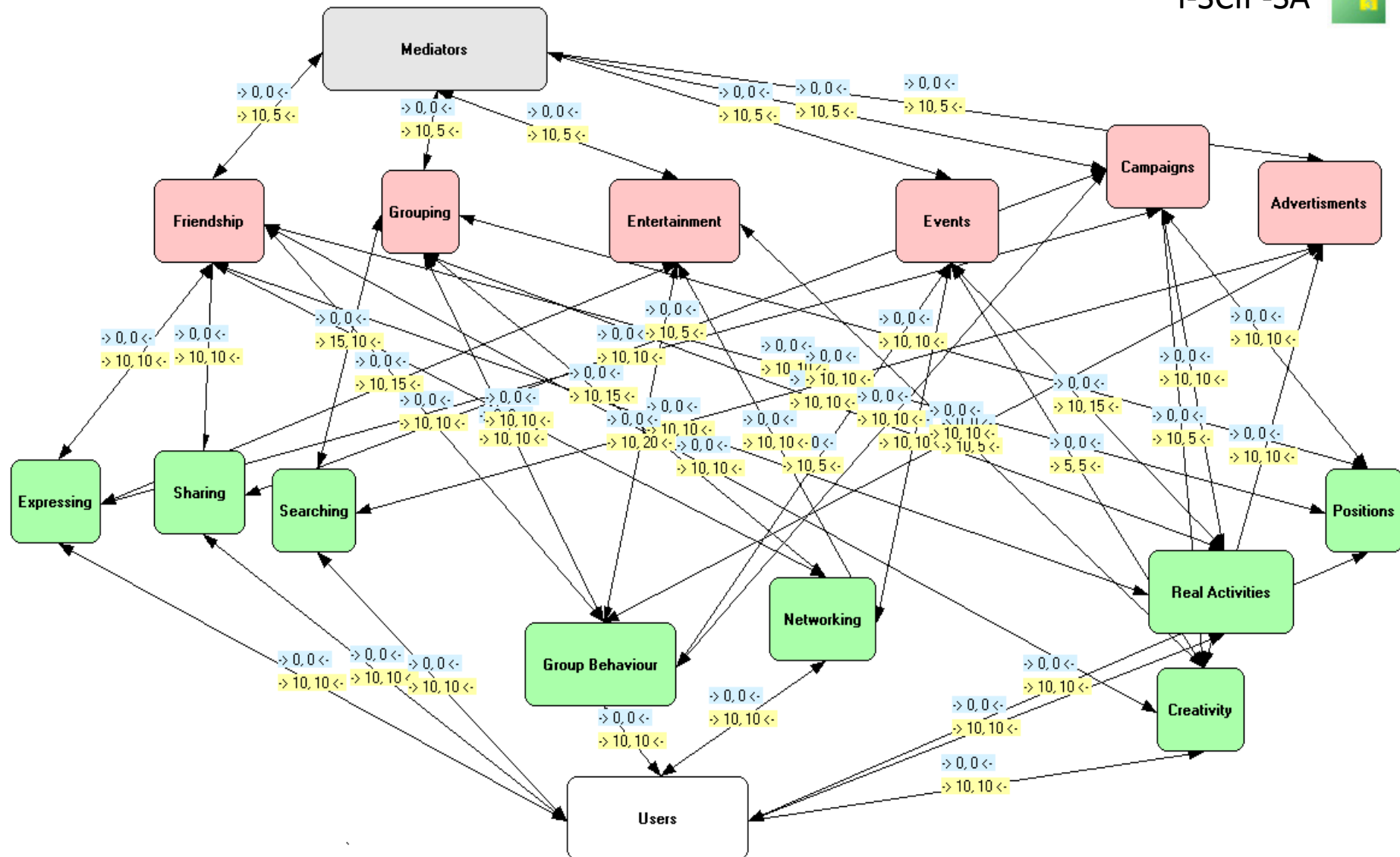
Active scenarios +



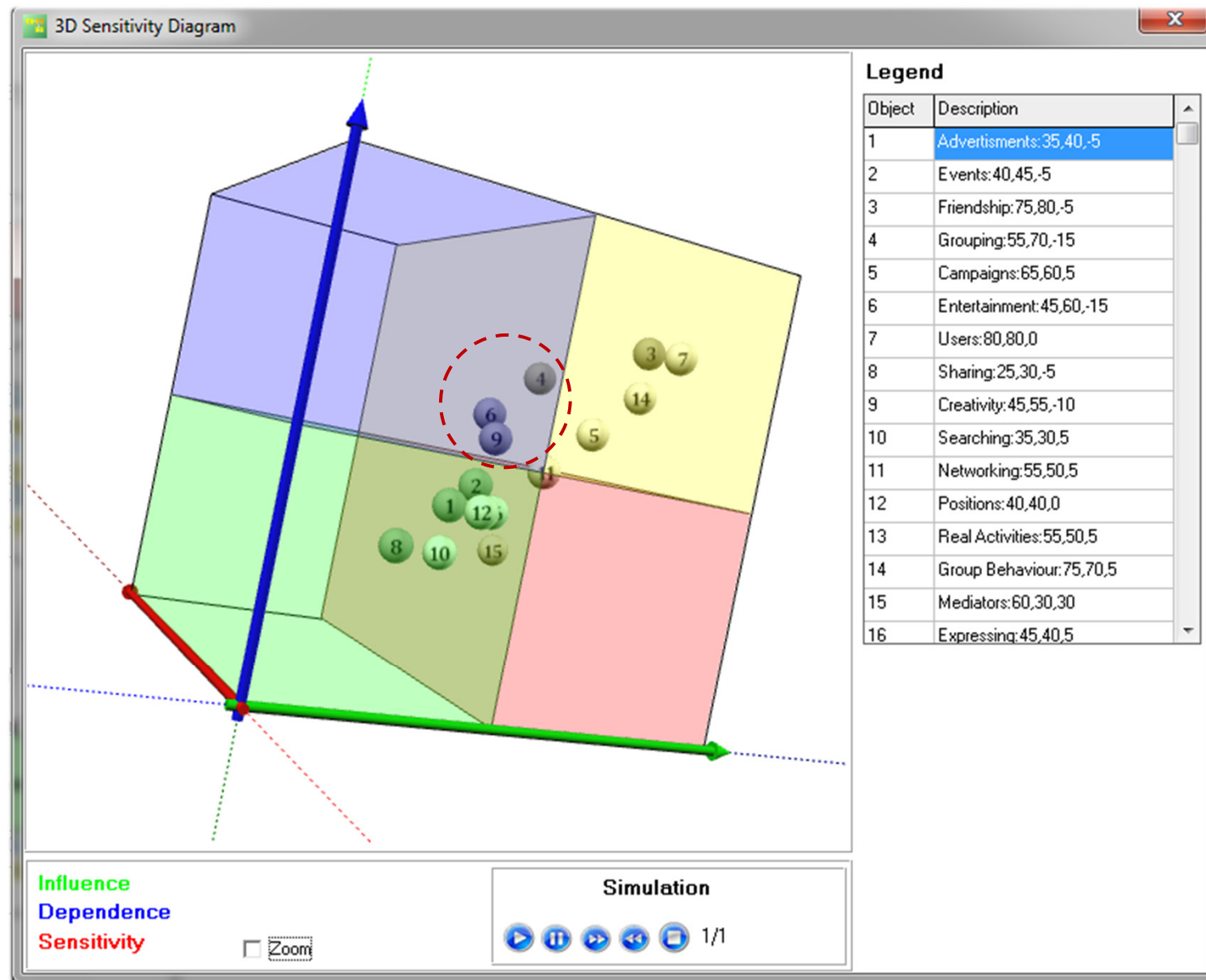
Passive scenarios -

MEDIATORS-USERS SYSTEM MODEL

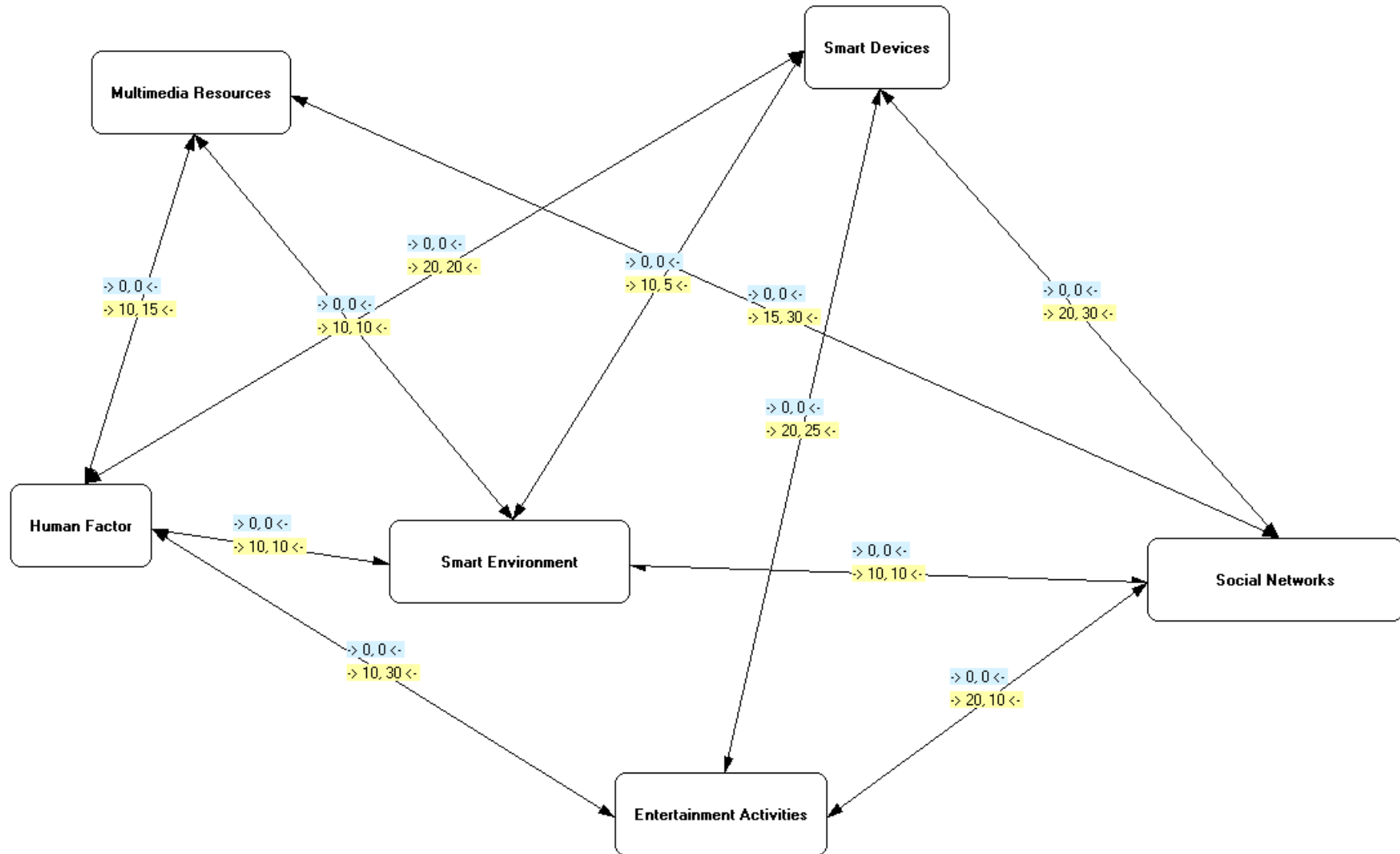
I-SCIP-SA[©] 



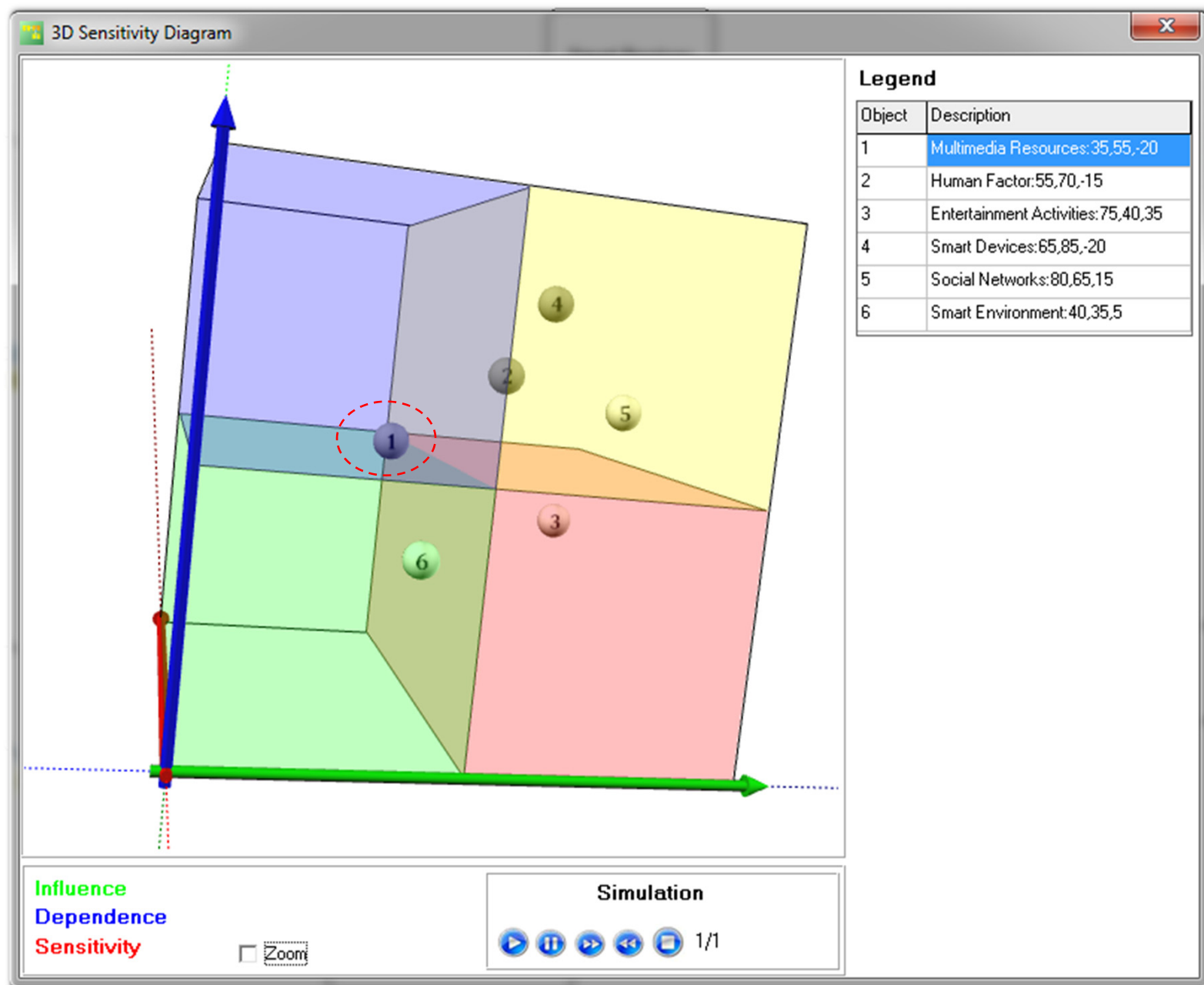
MEDIATORS-USERS MODEL CLASSIFICATION



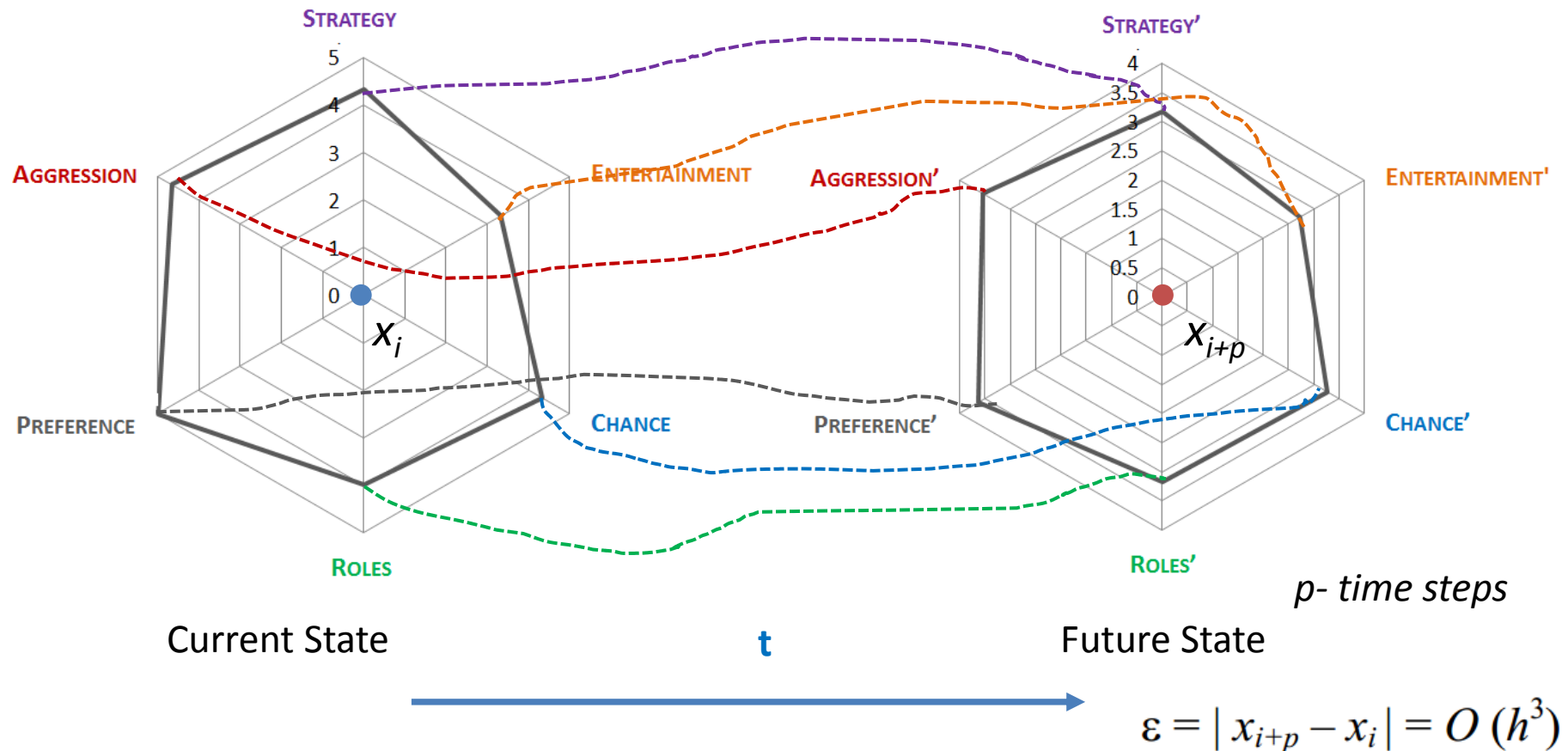
MULTIMEDIA & SOCIAL ENGINEERING



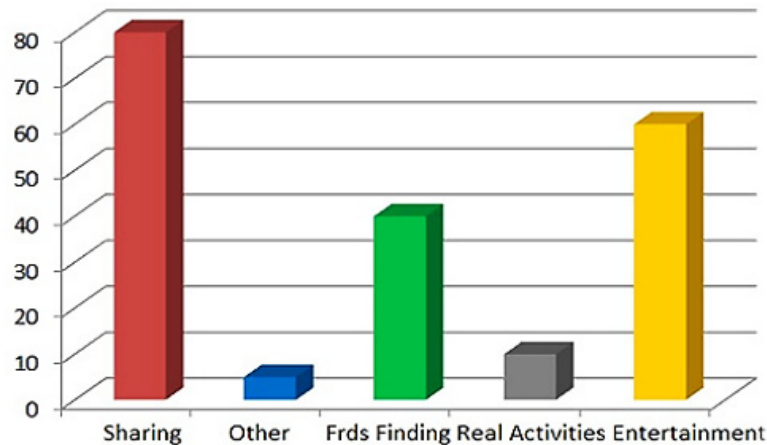
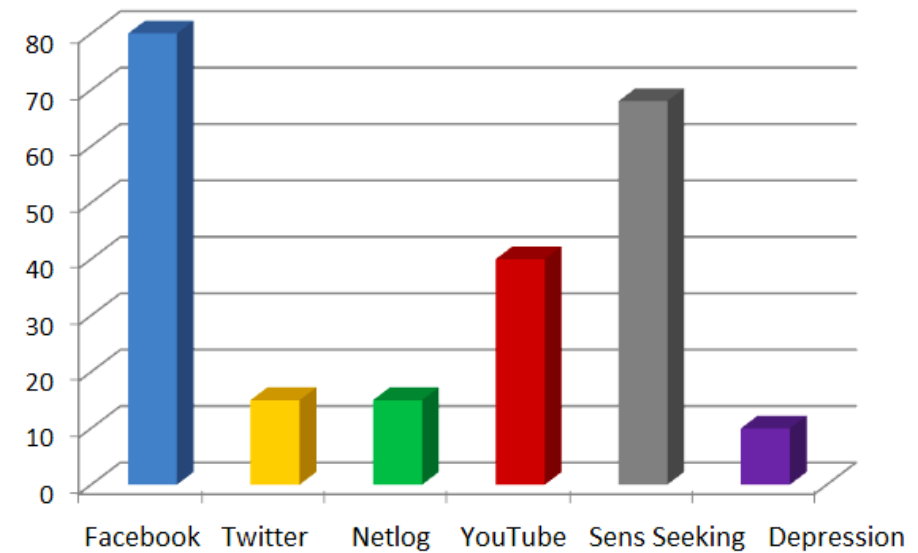
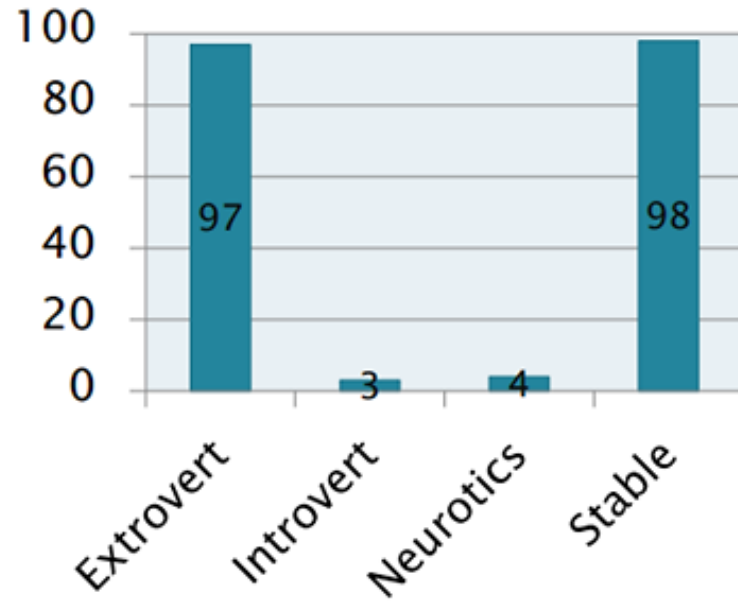
RESULTING CLASSIFICATION



AND HOW CERTAIN WE ARE?



IMPLEMENTED PSYCHOMETRIC MEASUREMENTS



Q-BASED SURVEYS UNDERSTANDING...?

- ☐ EYSENCK PERSONALITY TEST
- ☐ VON ZERSEN'S DEPRESSION SCALE
- ☐ ZUCKERMAN'S SENSATION SEEKING SCALE

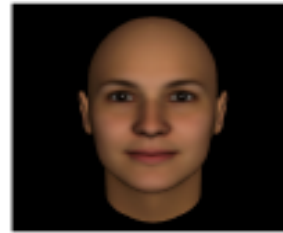
FACE PREDISPOSITIONS



Competence



Dominance



Extroversion



Trustworthiness

VOICE VS FACE MATCHING EXAMPLES

VOICES



Voice 1



Voice 2



Voice 3



Voice 4

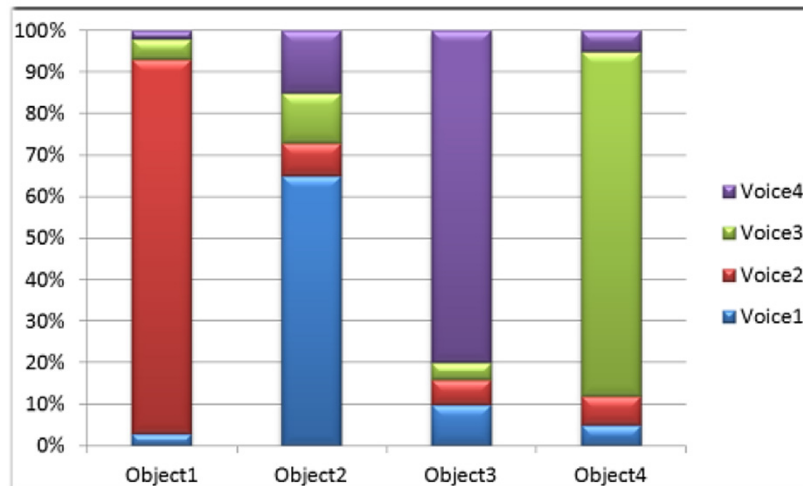
FACES



Object 1



Object 2



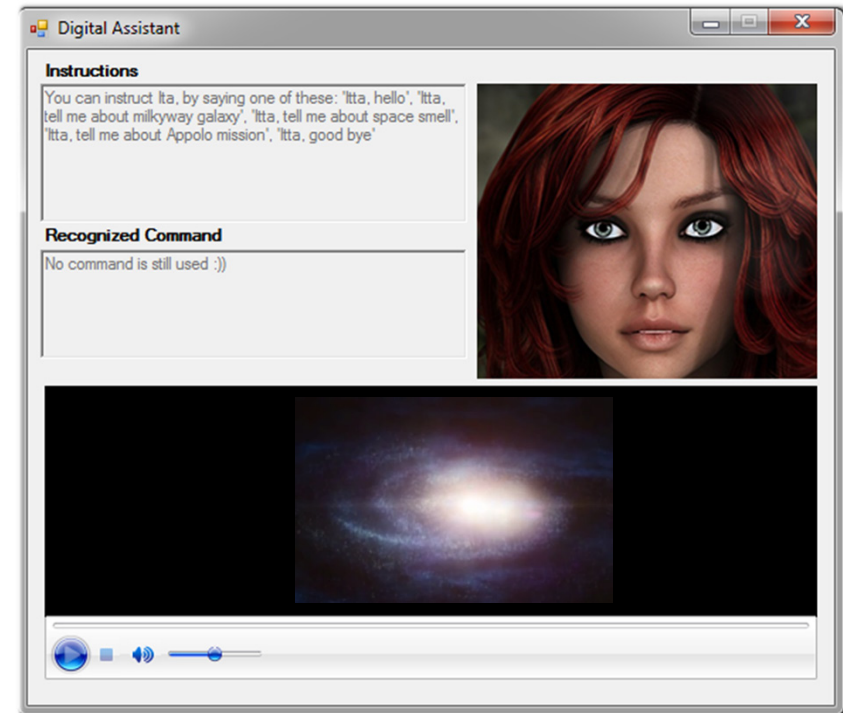
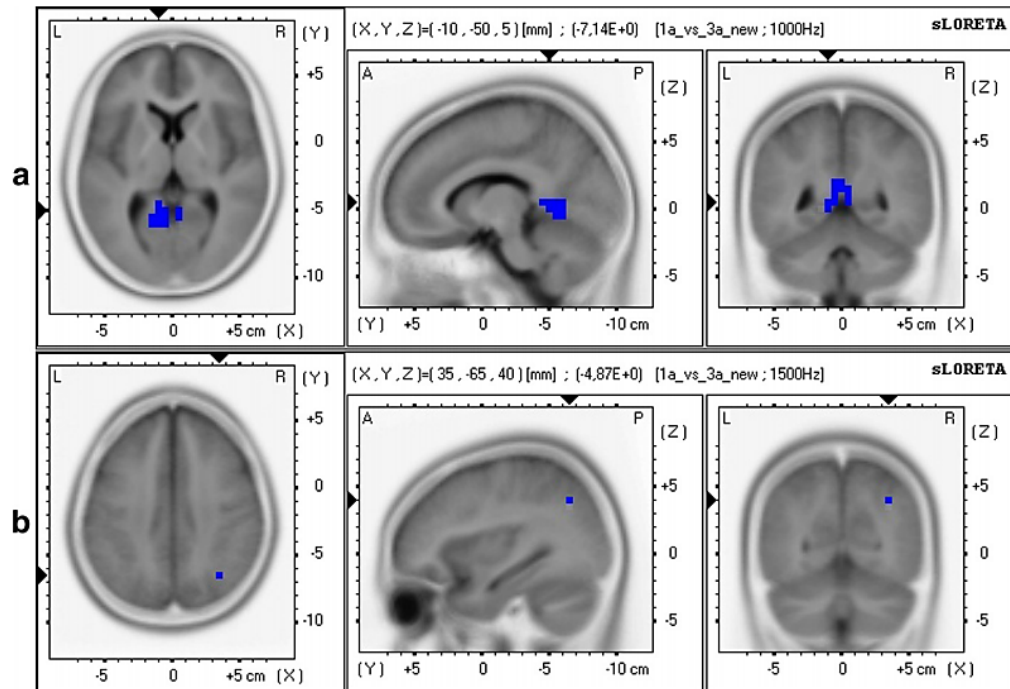
Object 3



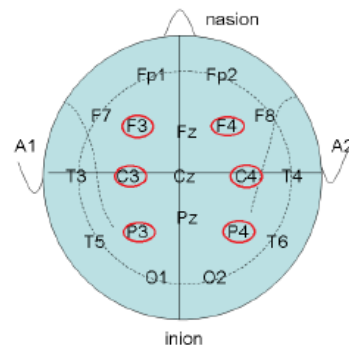
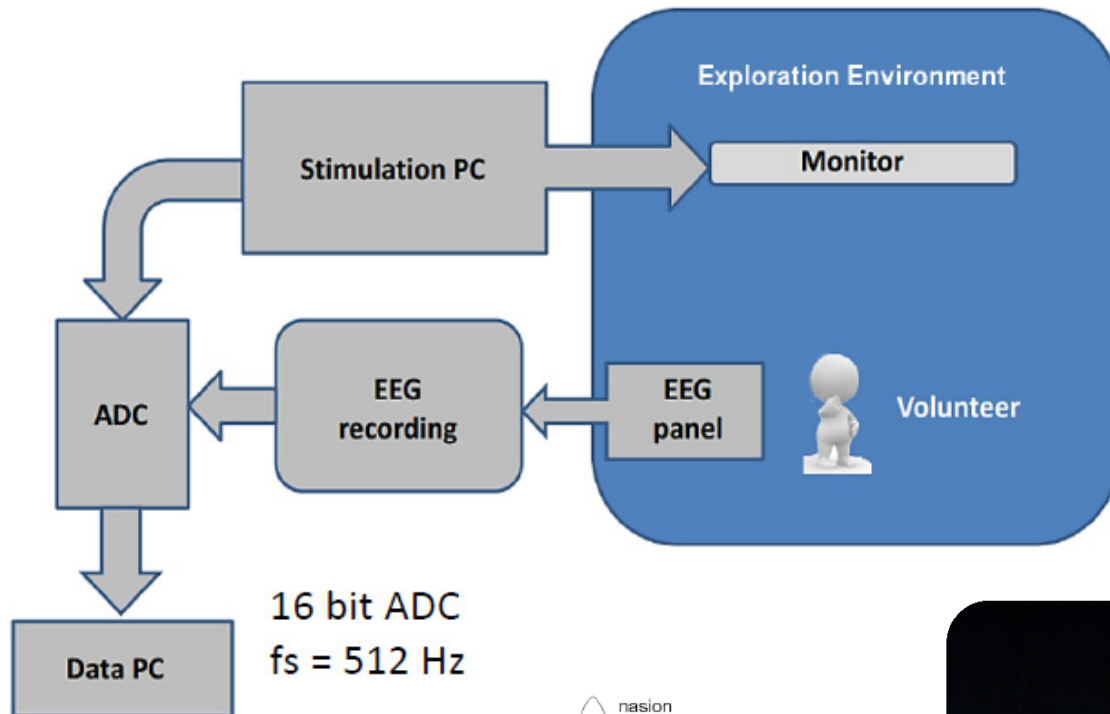
Object 4

57 PEOPLE, AVG. AGE = 31.25 YEARS,
25 MALE, 27 FEMALE; VAR = 0.35

RESULTING AVATAR EXAMPLE WITH ASSESSMENT

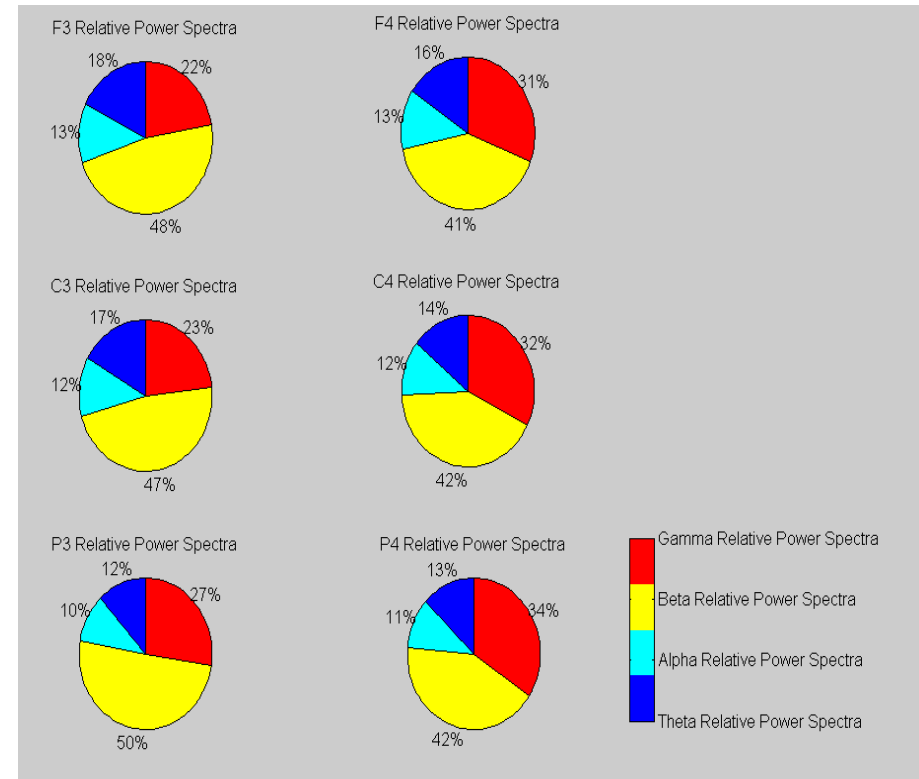
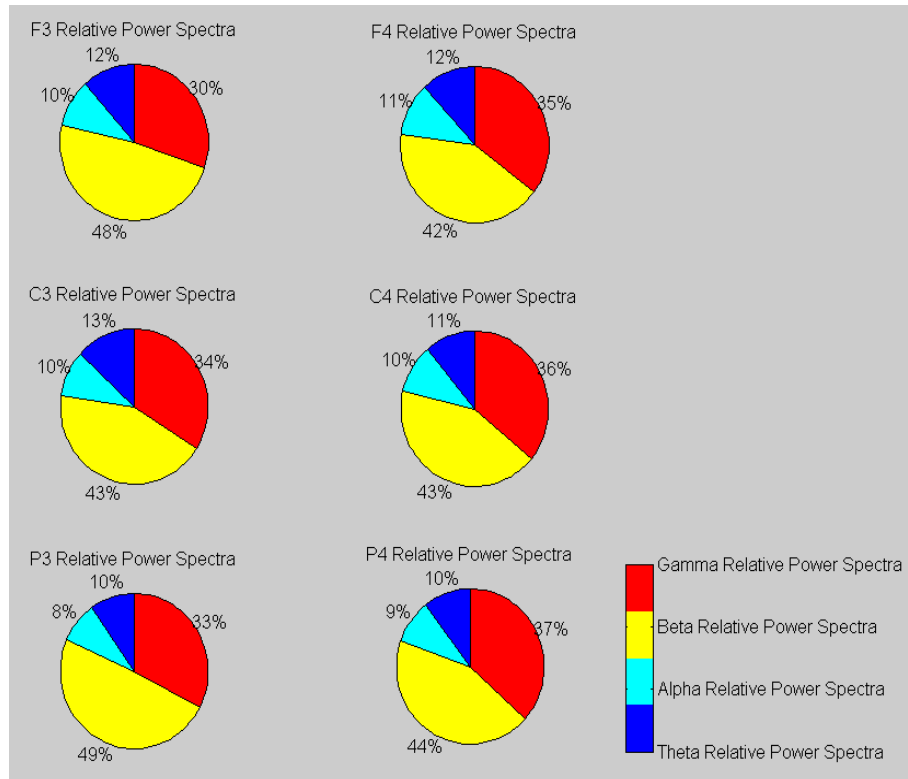
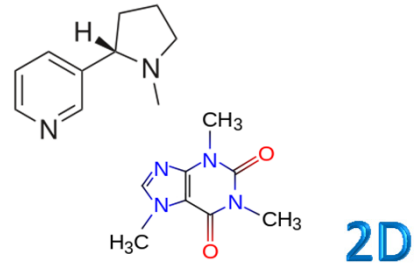


ENTERTAINMENT & SOCIAL ENGINEERING



RESULTS

*3 min gaming
episodes similar to
the effect of caffeine
& nicotine*



AV ENTRAINMENT STIMULATION

Left 14-10 Hz

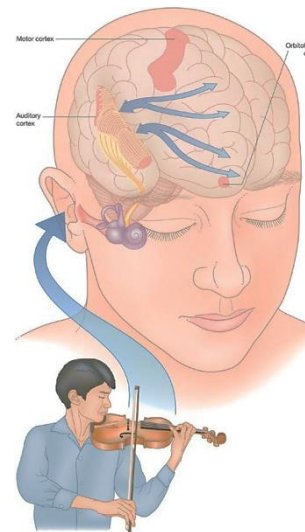
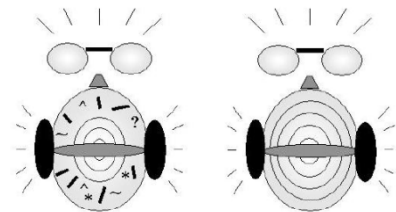
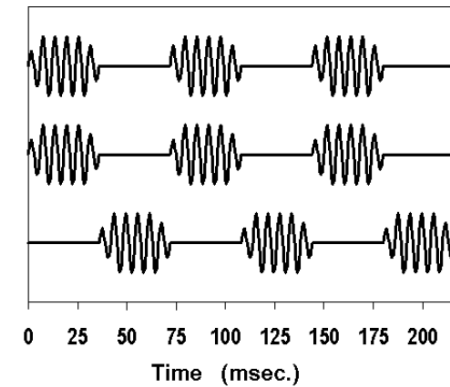
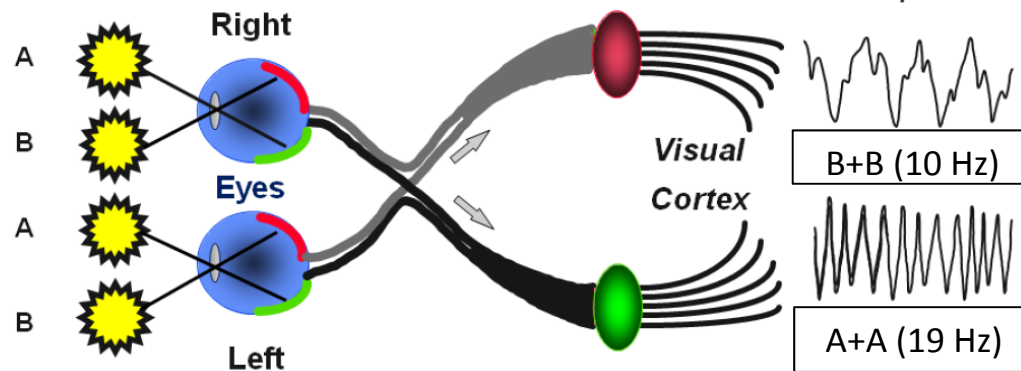
A OFF ON OFF



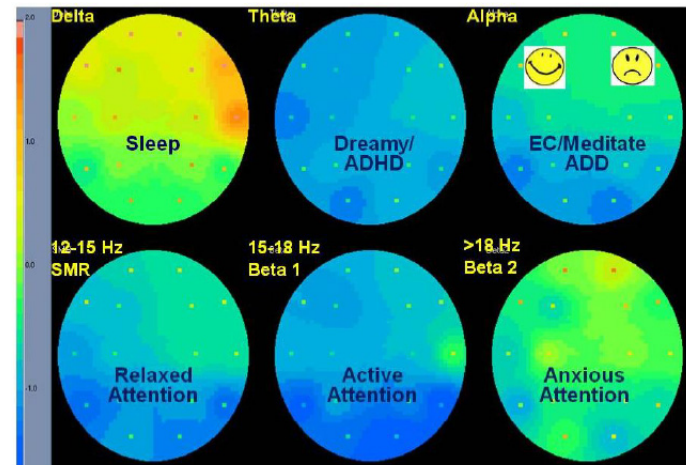
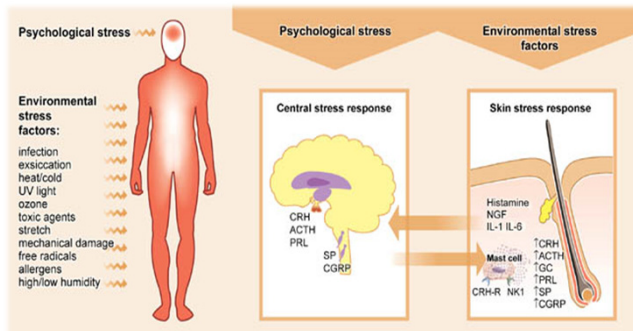
Brain Booster Session

Right 19-10 Hz

B OFF ON OFF



Brain-skin crosstalk

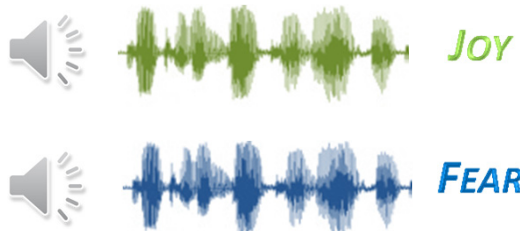
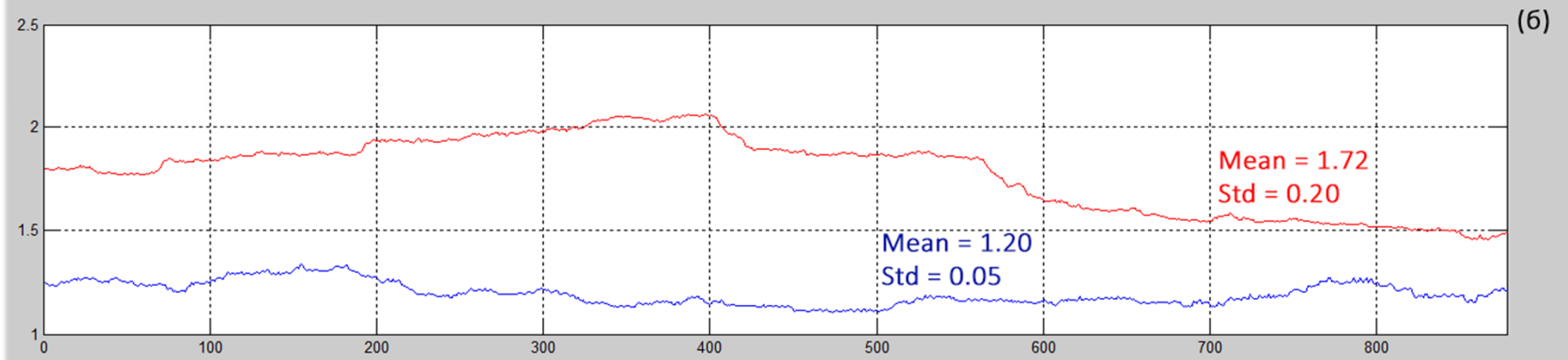
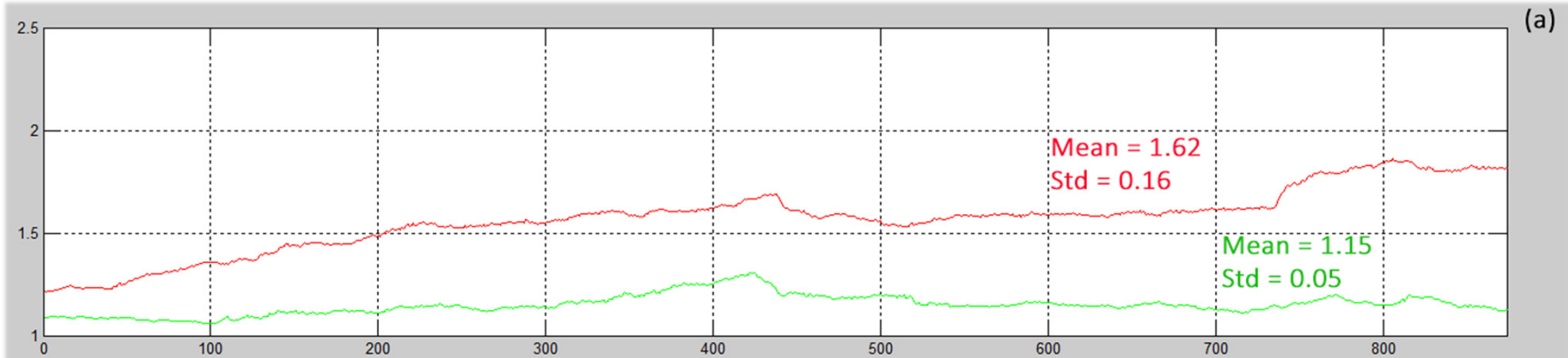


SKIL Data Base

MULTIMEDIA & GSR RESPONSE

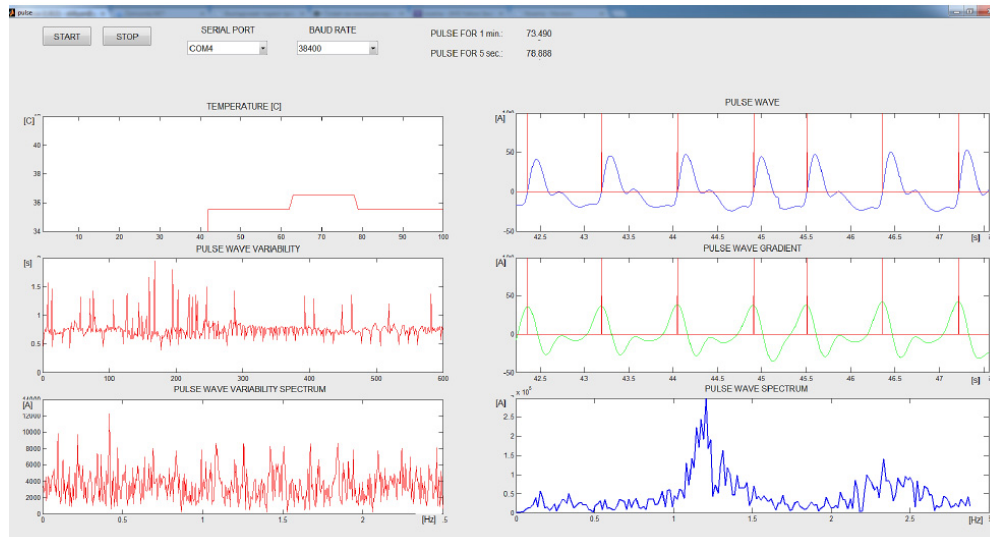
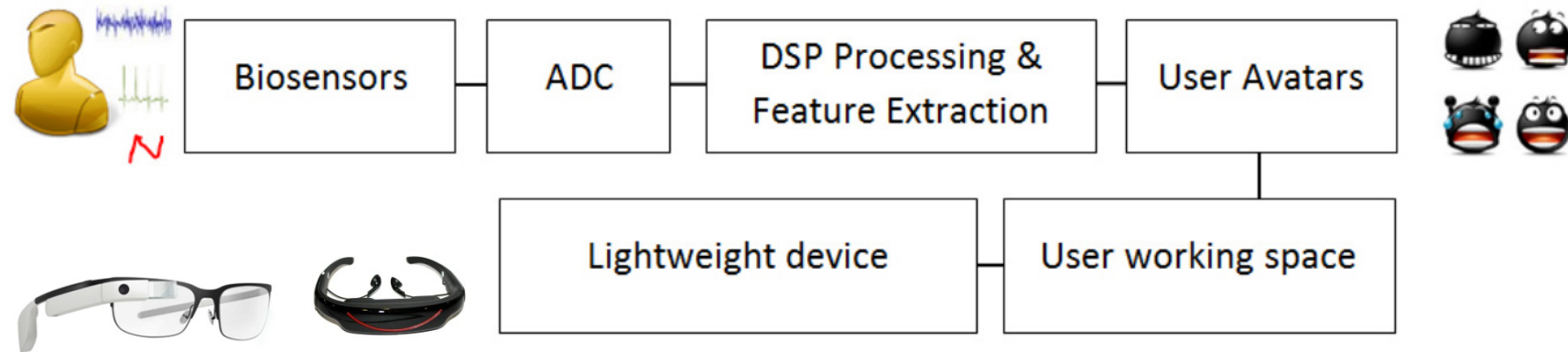


GSR HFD RESULTS

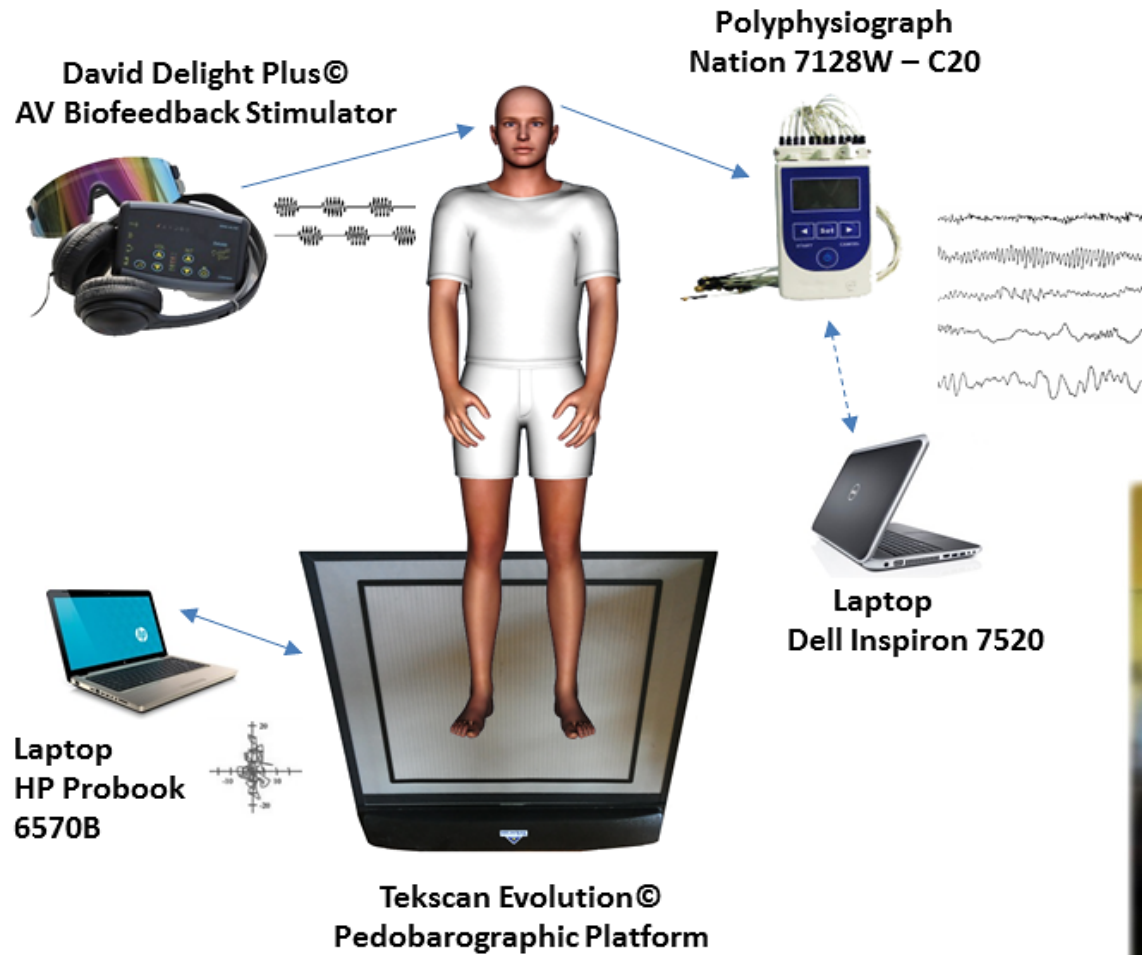


95 % correlation with
IADS emotions
classification

WEARABLE BIOMETRIC DEVICES



AVE EEG & POSTURAL DYNAMICS

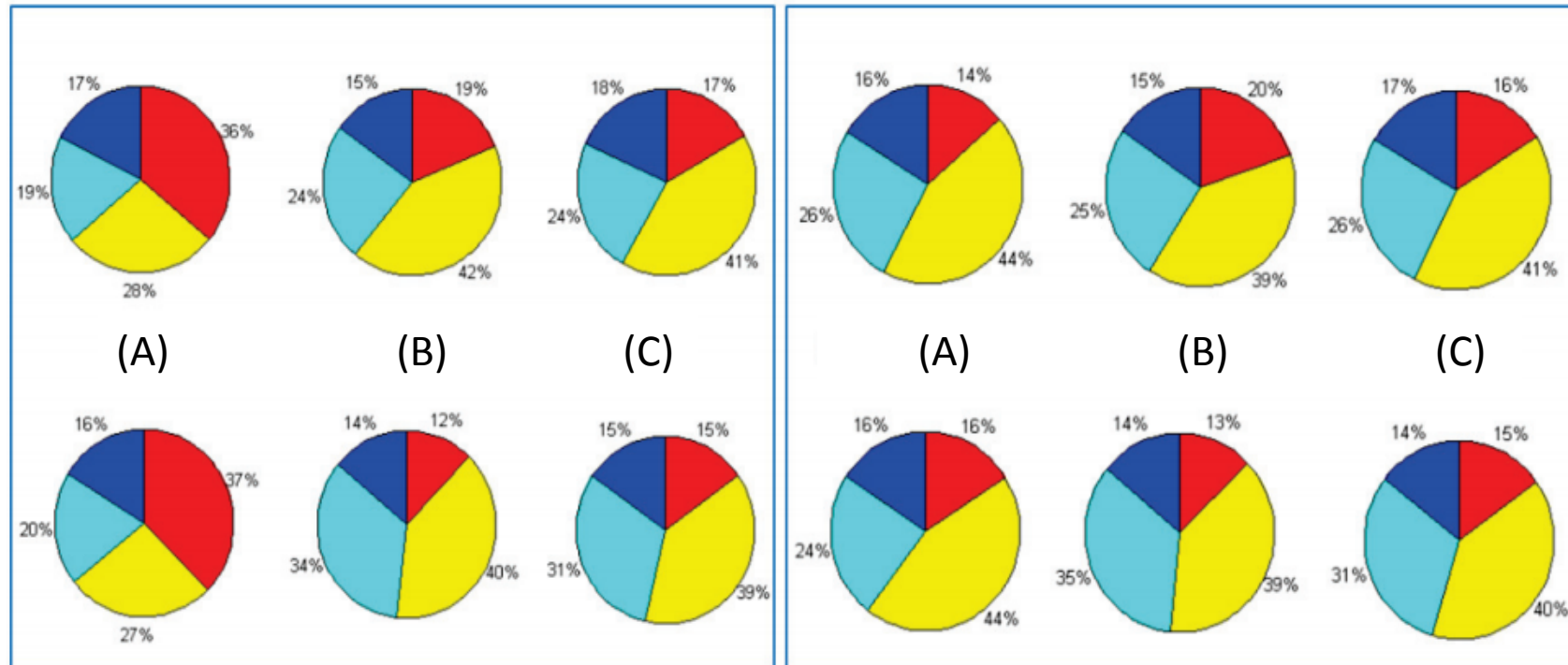


EEG RESULTS

RELATIVE FOURIER PS

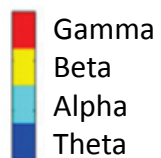
C3 EYES OPENED

C4 EYES OPENED



C3 EYES CLOSED

C4 EYES CLOSED

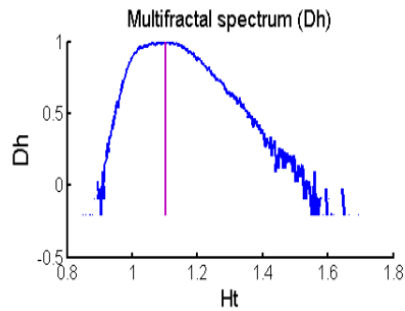


(A) - Before AV Stimulation
(B) - 10 min after AV Stimulation
(C) - 30 min after AV Stimulation

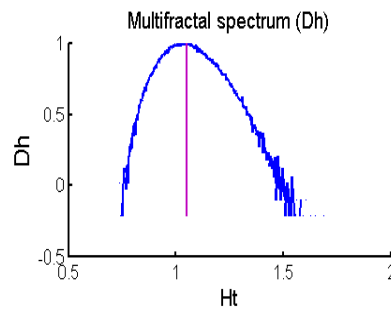
MULTIFRACTAL SPECTRUM

EYES OPENED

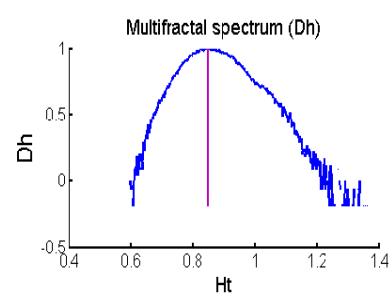
C3 Before Stimuli



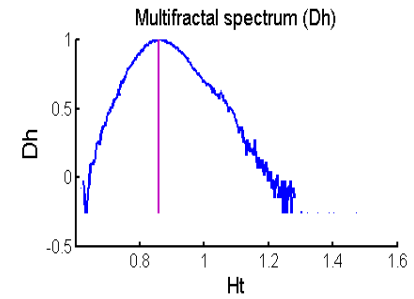
C4 Before Stimuli



C3 10 min after AV Stimulation



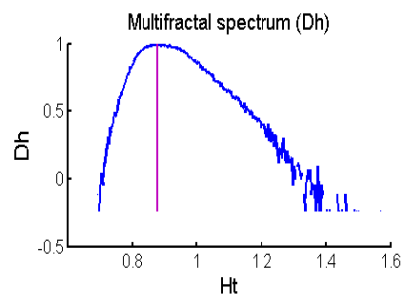
C4 10 min after AV Stimulation



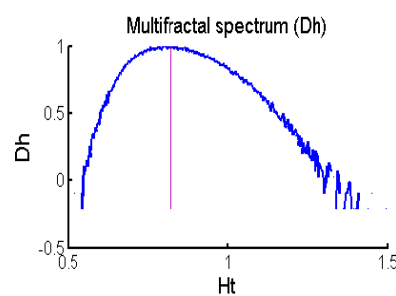
Ht = 0.7 - 1.5 -> Ht = 0.5 - 1.3

EYES CLOSED

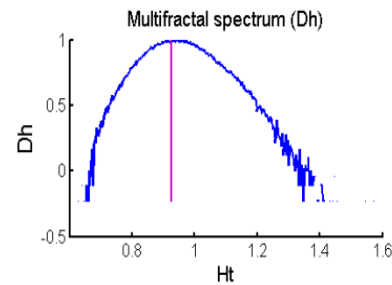
C3 Before Stimuli



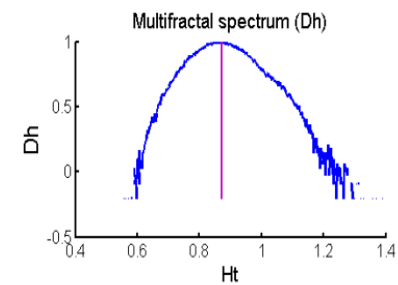
C4 Before Stimuli



C3 10 min after AV Stimulation



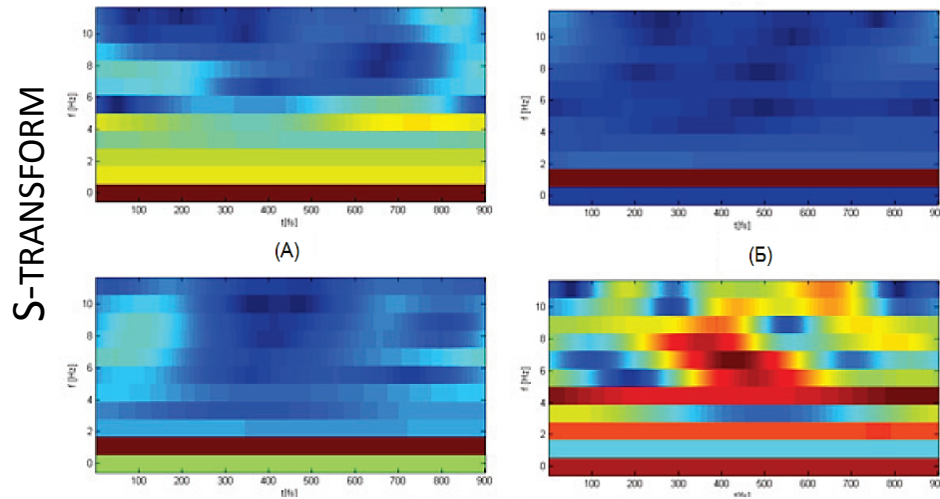
C4 10 min after AV Stimulation



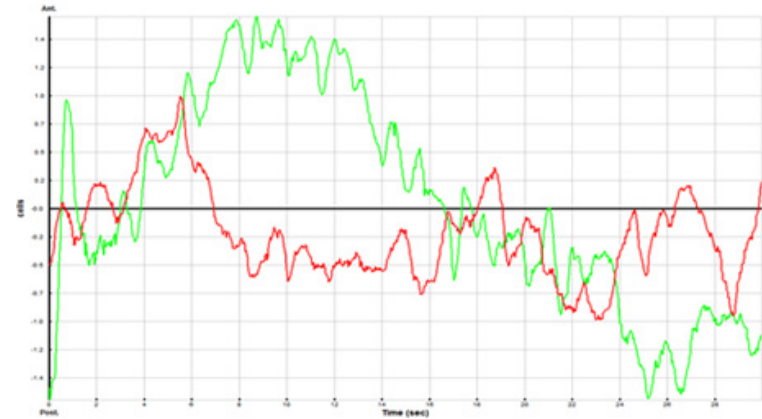
Ht = 0.5 - 1.5 -> Ht = 0.6 - 1.3

STABILOGRAM A/P RESULTS

(A) EYES OPENED (B)

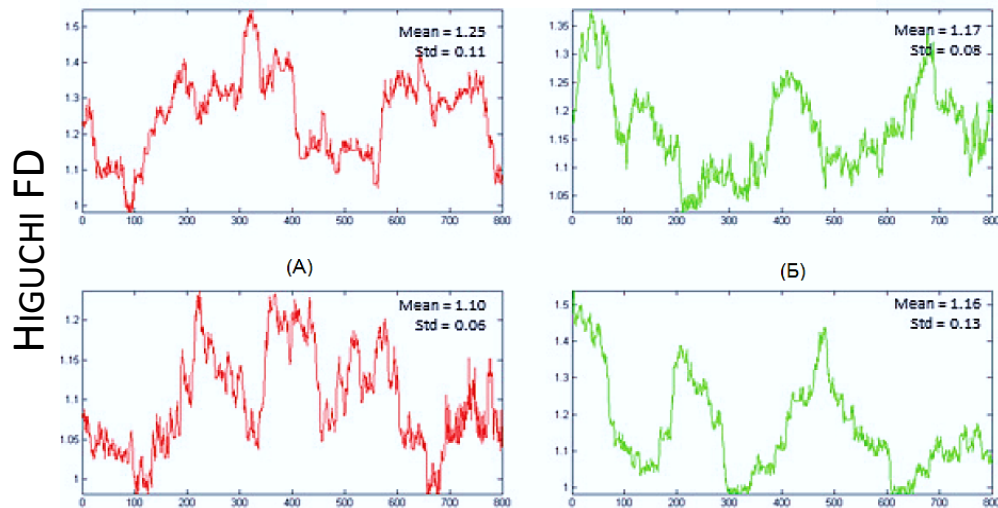


A/P COP DYNAMICS EYES OPENED

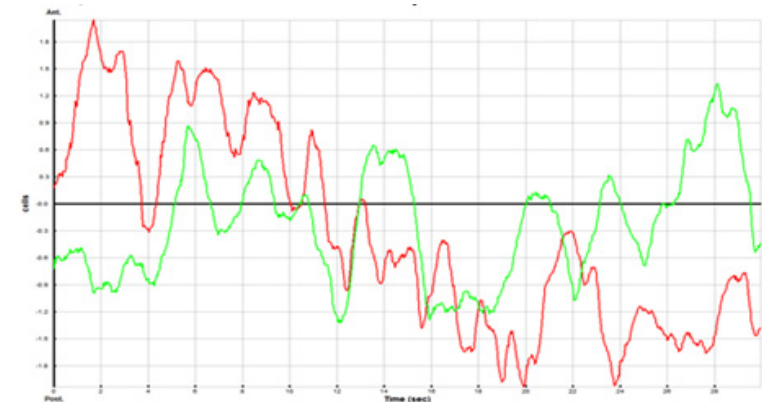


(A) EYES CLOSED (B)

(A) EYES OPENED (B)



A/P COP DYNAMICS EYES CLOSED



(A) - Before AV Stimulation
(B) - 10 min after AV Stimulation

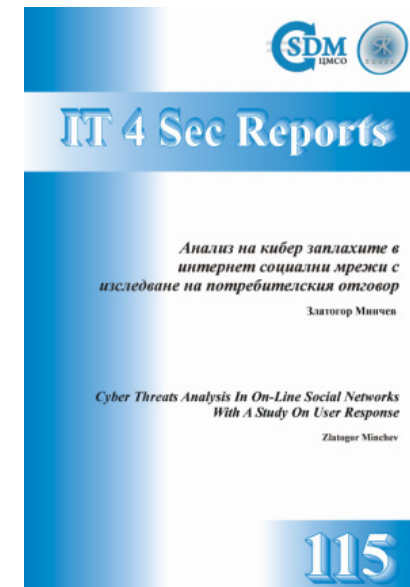
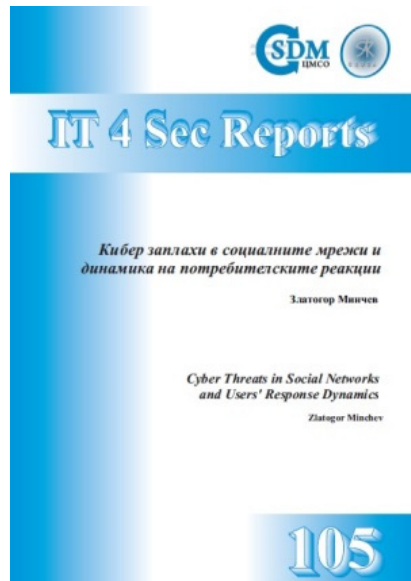
(A) EYES CLOSED (B)

DISCUSSION

EVIDENTLY, “SOCIAL ENGINEERING” IS A COMPLEX PROBLEM EMERGING IN THE NEW DIGITAL WORLD. WHILE IT HAS SIGNIFICANT IMPORTANCE FOR THE ESTABLISHMENT OF A RELIABLE CYBER SECURITY ENVIRONMENT THE THREATS/RISKS IDENTIFICATION AND HUMAN FACTOR DUAL ROLE AS A GENERATOR OF STABILITY & UNCERTAINTY IS INEVITABLE.

IN ORDER TO ACHIEVE A RESILIENCE IN THE AREA A COMPLEX THREATS IDENTIFICATION HAVE TO BE USED, IMPLEMENTING: EXPERTS DATA CONTEXT GENERATION, MODELLING, AND VALIDATION, ENCOMPASSING PSYCHOPHYSIOLOGICAL & MATHEMATICAL ASSESSMENT. THESE WILL PRODUCE A PLAUSIBLE & VALIDATED FUTURE CYBER THREATS/RISKS IDENTIFICATION AND THUS - A RESILIENT DIGITAL SOCIETY.

SELECTED REFERENCES



Threats Identification Experiment

DEFINE YOUR FUTURE...



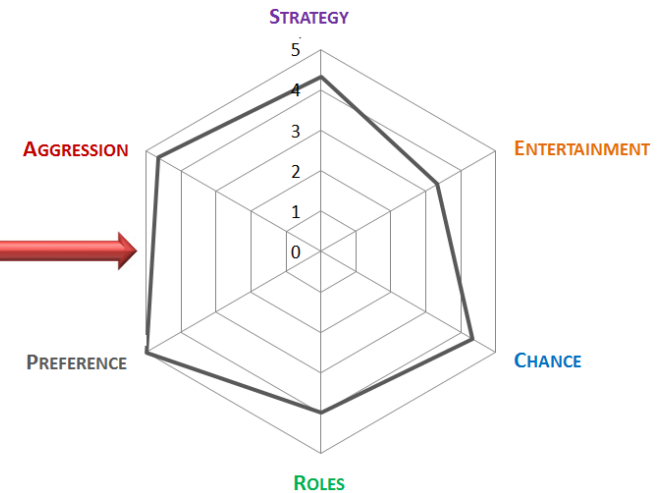
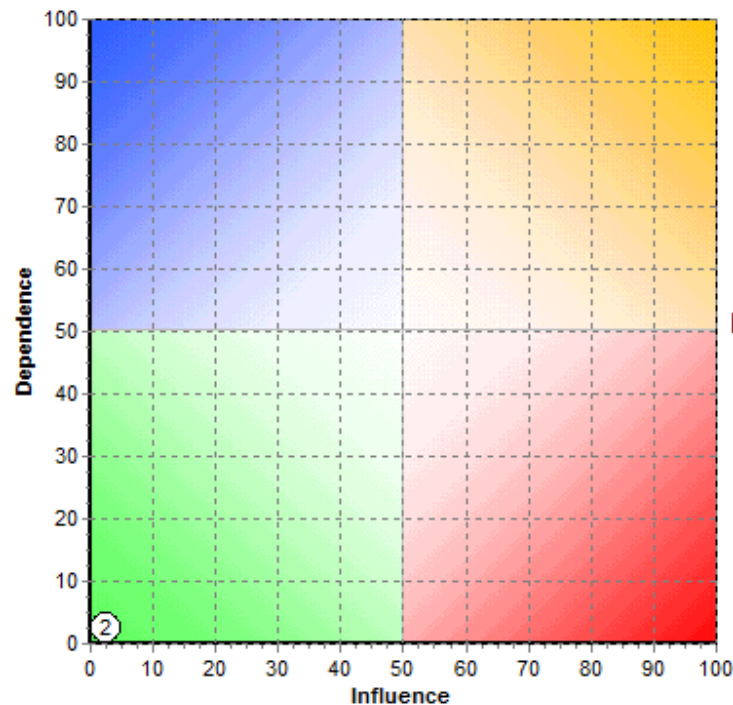
Identify

Classify

Model

Threat 1

Threat n



ACKNOWLEDGEMENTS

THE RESULTS IN THIS STUDY ARE SUPPORTED BY:

 A STUDY ON IT THREATS AND USERS BEHAVIOUR DYNAMICS IN ONLINE SOCIAL NETWORKS, DMU03/22, NSF, YOUNG SCIENTISTS GRANT, WWW.SNFACTOR.COM

 EU NETWORK OF EXCELLENCE IN MANAGING THREATS & VULNERABILITIES FOR THE FUTURE INTERNET – SYSSEC, WWW.SYSSEC-PROJECT.EU

 CORTICAL REGULATION OF THE QUIET STANCE DURING SENSORY CONFLICT, TK 02/60, NSF, WWW.CLEVERSTANCE.COM

 A FEASIBILITY STUDY ON CYBER THREATS IDENTIFICATION AND THEIR RELATIONSHIP WITH USERS' BEHAVIOURAL DYNAMICS IN FUTURE SMART HOMES, DFNI-T01/4, NSF, WWW.SMARTHOMESBG.COM

THANK YOU FOR THE ATTENTION!

