

SMART HOMES CYBERTHREATS IDENTIFICATION BASED ON INTERACTIVE TRAINING

Zlatogor Minchev & Luben Boyanov

Institute of Information and Communication Technologies

Bulgarian Academy of Sciences

UNDER THE AUSPICES OF



OUTLINE

- ❑ TECHNOLOGICAL CHALLENGES
- ❑ STUDIED CONTEXT
- ❑ METHODOLOGICAL FRAMEWORK
- ❑ PRACTICAL EXPERIMENTS
- ❑ DISCUSSION

TECHNOLOGICAL CHALLENGES

2000

Web 1.0



Web 2.0



Web 5.0



2050



Web 4.0



Web 3.0

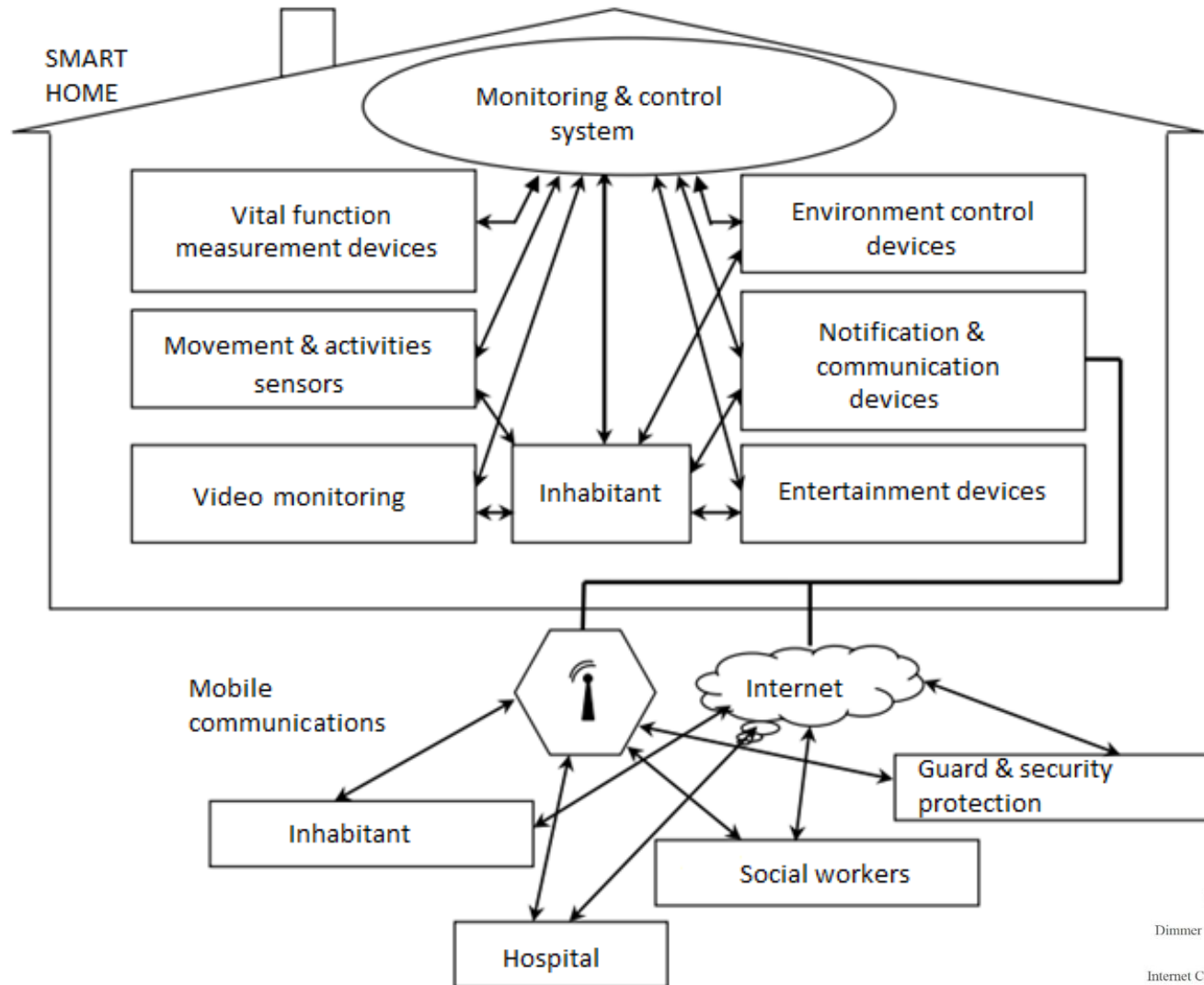


THE STUDIED CONTEXT



GENERAL SMART HOME ORGANIZATION

[Boyanov, 2013](#)



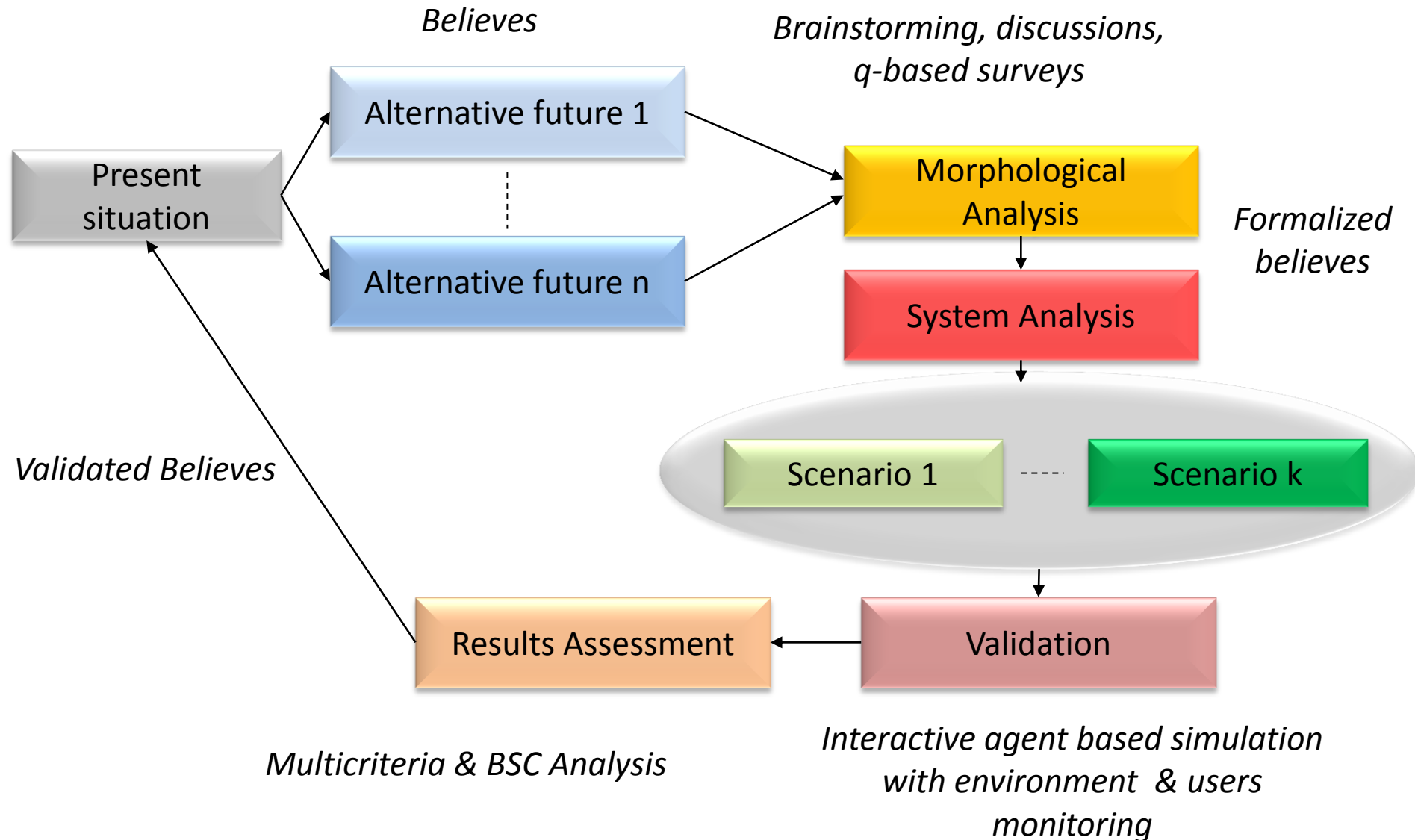
...?

SERVICE ORIENTED

SENSORS ORIENTED



METHODOLOGICAL FRAMEWORK



MULTIASPECT SURVEY FOR WEB TECHNOLOGIES CYBER THREATS EVOLUTION 2013

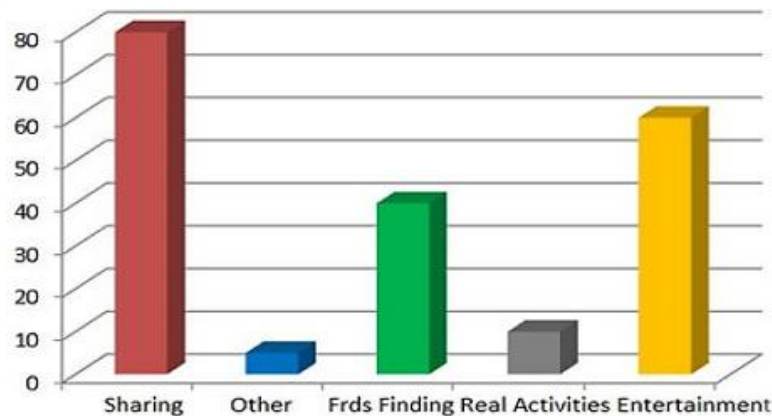
5 YEARS TIME HORIZON

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

Legend:

- Low
- Moderate
- Critical
- Uncertain

~ 150 participants

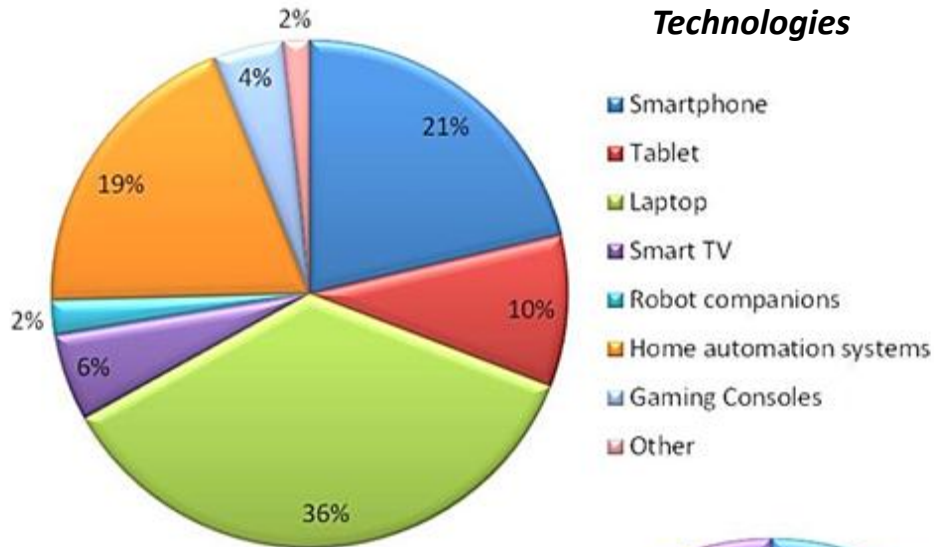


SOCIAL MEDIA
TRENDS 2012

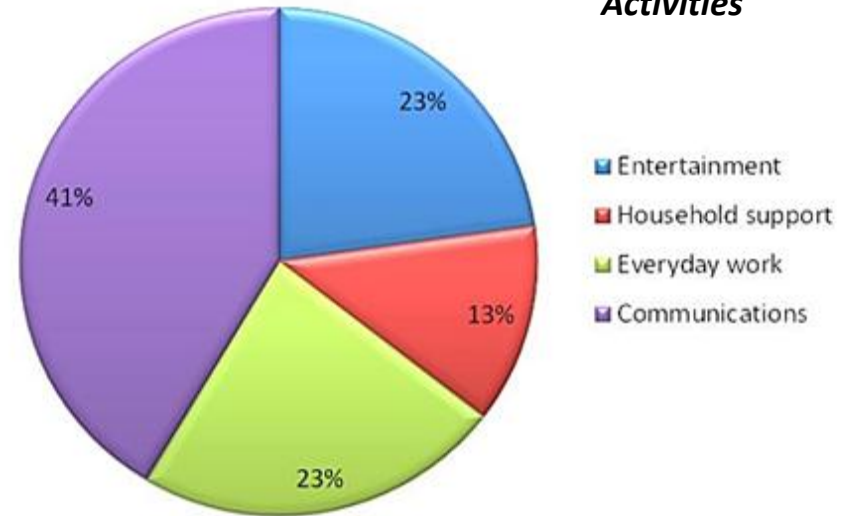


SMART DEVICES CYBERTHREATS SURVEY 2013

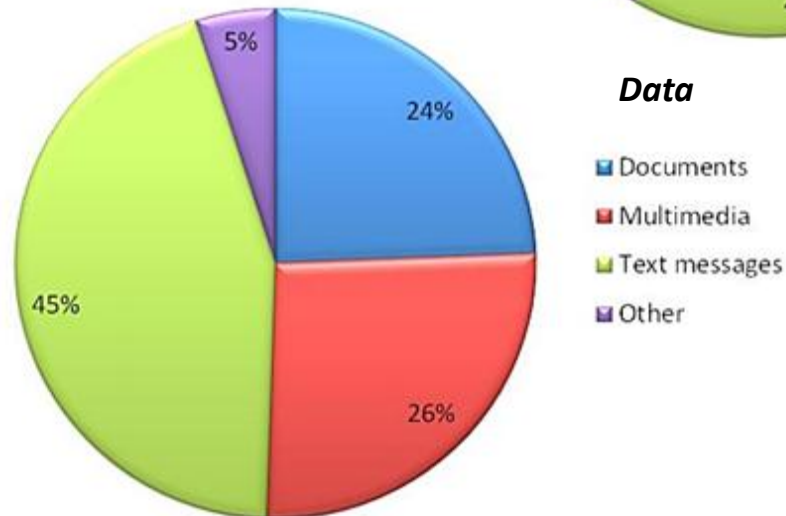
Technologies



Activities



Data



~ 250 participants



SMARTHOMES CYBERTHREATS CLASSIFICATION 2013

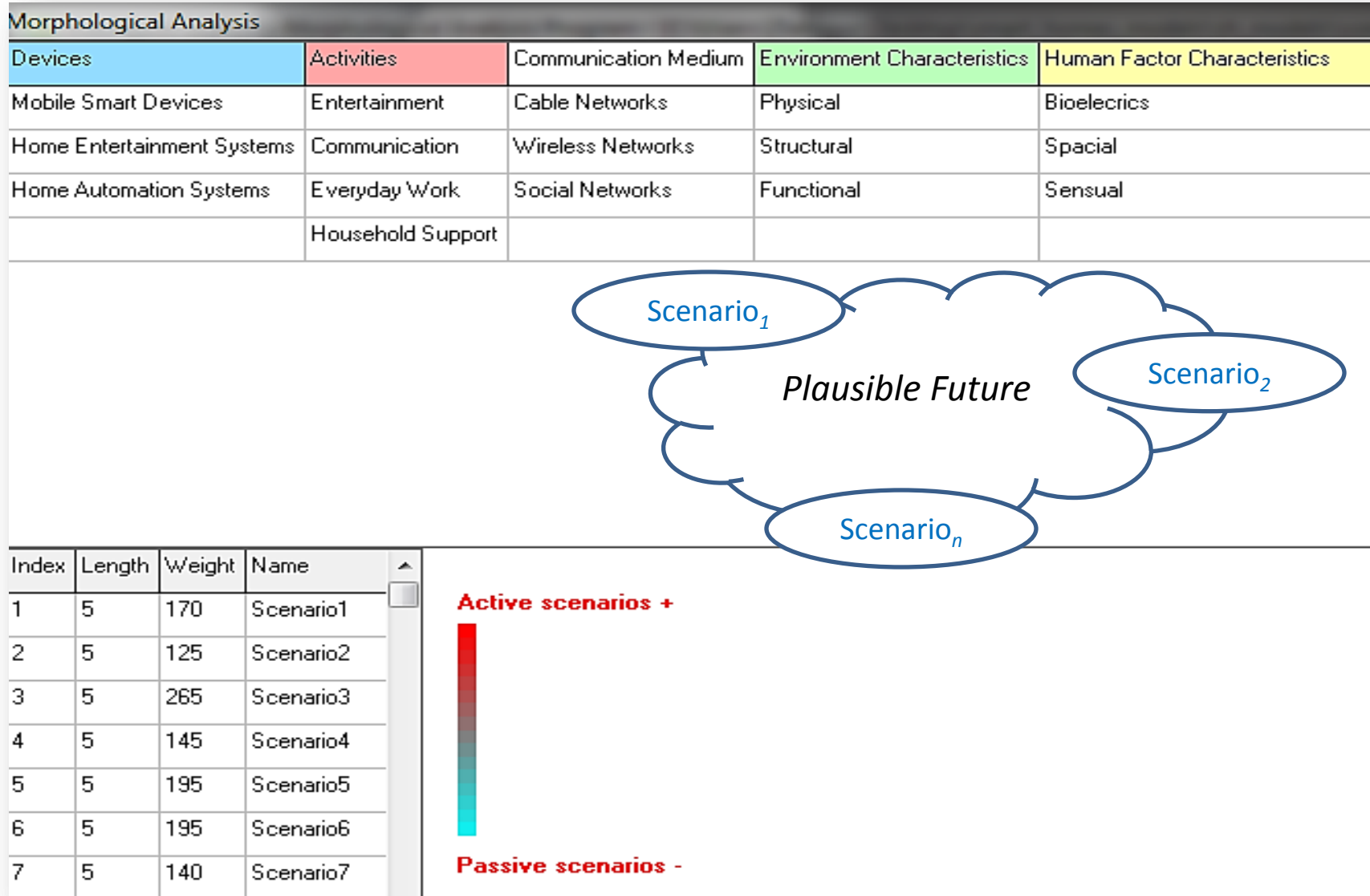
[Boyanov & Minchev, 2013](#)

SMART HOME SERVICES	POSSIBLE THREATS	CRITICAL ATTACK POINTS	POSSIBLE CONSEQUENCES FROM THE ATTACK
HEALTH CARE	DO NOT TAKE MEDICINE, PACEMAKER MALFUNCTIONING, ETC.	SENSORS, VIDEO SURVEILLANCE, COMMUNICATION SYSTEM, INTEGRATING SYSTEM, EXTERNAL COMMUNICATIONS	CRITICAL
CARE FOR CHILDREN OR PEOPLE WITH DISABILITIES	REQUIRES ATTENTION	SENSORS, VIDEO SURVEILLANCE, COMMUNICATION SYSTEM, INTEGRATING SYSTEM, EXTERNAL COMMUNICATIONS	CRITICAL
SECURITY AND SAFETY	INTRUSION	SENSORS, VIDEO SURVEILLANCE, COMMUNICATION SYSTEM, INTEGRATING SYSTEM, EXTERNAL COMMUNICATIONS	CRITICAL
CARE FOR CHILDREN OR PEOPLE WITH DISABILITIES	REQUIRES ATTENTION	SENSORS, VIDEO SURVEILLANCE, COMMUNICATION SYSTEM, INTEGRATING SYSTEM, EXTERNAL COMMUNICATIONS	CRITICAL
HOME ENVIRONMENT	FIRE, FLOODING, GAS LEAKAGE	SENSORS, VIDEO SURVEILLANCE, COMMUNICATION SYSTEM, INTEGRATING SYSTEM, EXTERNAL COMMUNICATIONS	CRITICAL
SMART HOME APPLIANCE	DOES NOT TURN OFF, TURNS ON/OFF AT WRONG TIME	SENSORS, VIDEO SURVEILLANCE, COMMUNICATION SYSTEM, INTEGRATING SYSTEM	NON-CRITICAL, BUT DANGEROUS
PRIVACY	VIOLATION OF PRIVACY, DATA GATHERING	VIDEO SURVEILLANCE, COMMUNICATION SYSTEM, INTEGRATING SYSTEM, EXTERNAL COMMUNICATIONS	NON-CRITICAL BUT DANGEROUS
ENTERTAINMENT AND PLEASURE	MALFUNCTIONING OF THE PLEASURE, COMFORT AND ENTERTAINMENT SYSTEMS	SENSORS, COMMUNICATION SYSTEM, INTEGRATING SYSTEM	NON-CRITICAL

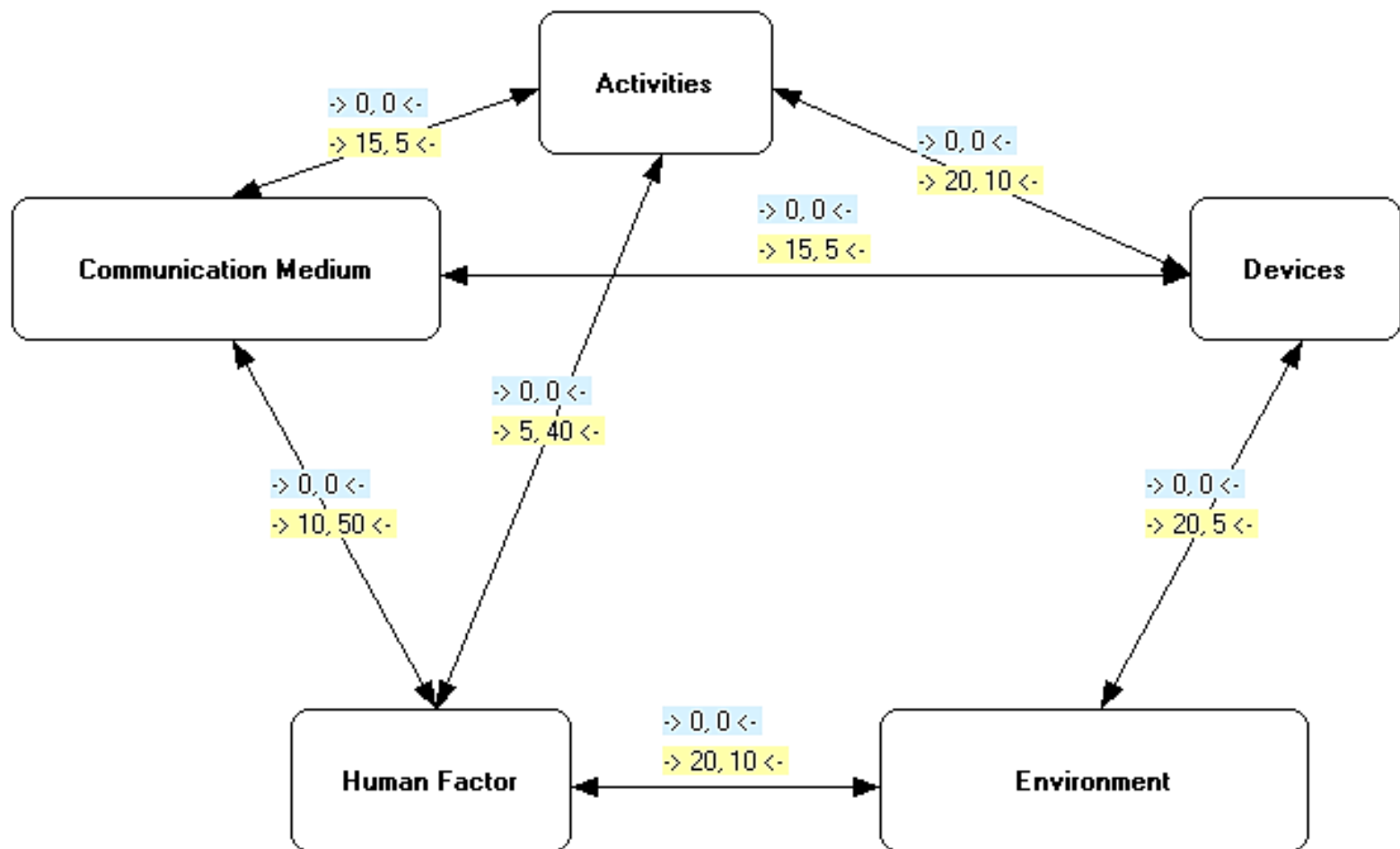
MORPHOLOGICAL ANALYSIS

1620 scenario combinations

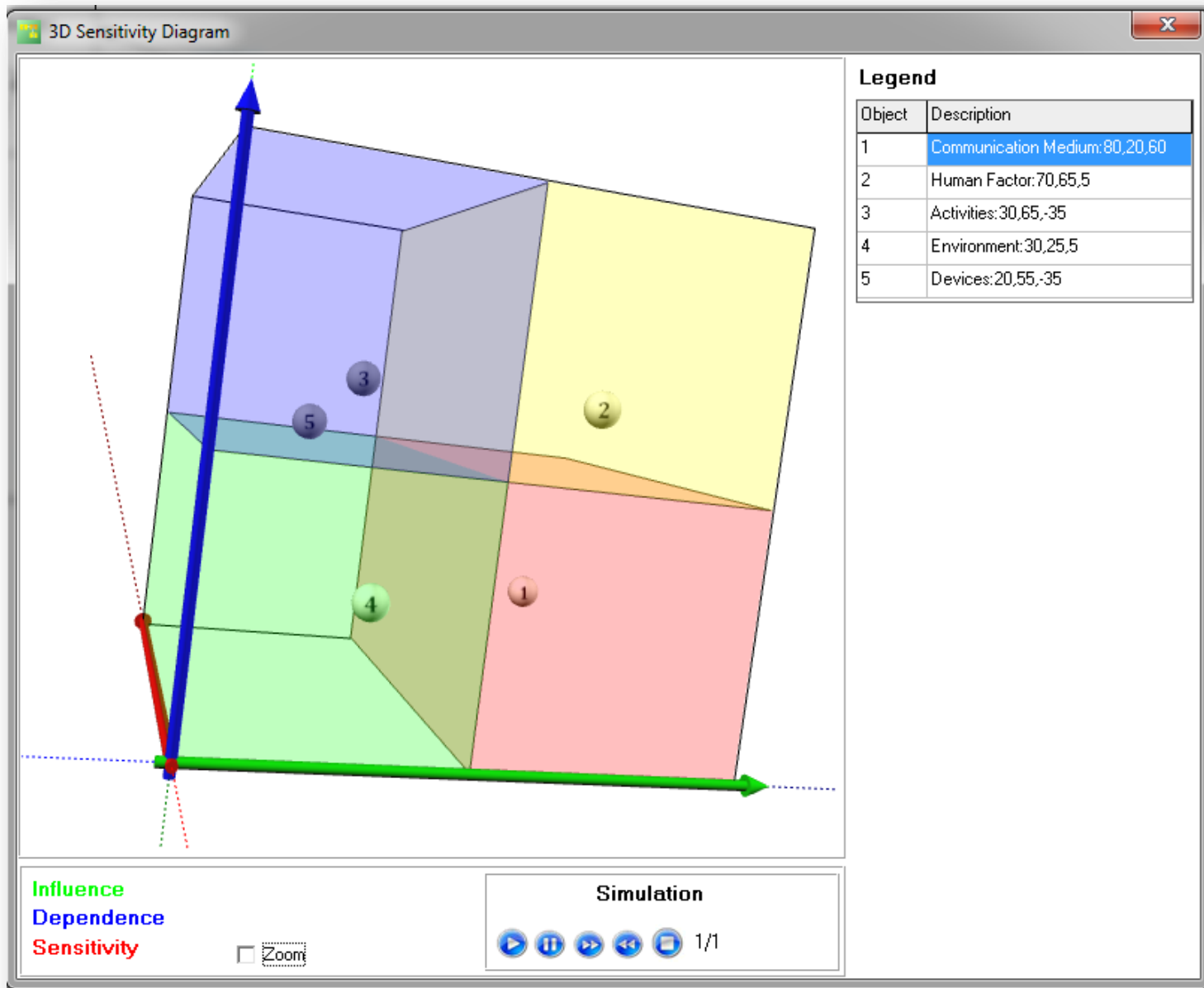
[Minchev, Boyanov & Georgiev, 2013](#)



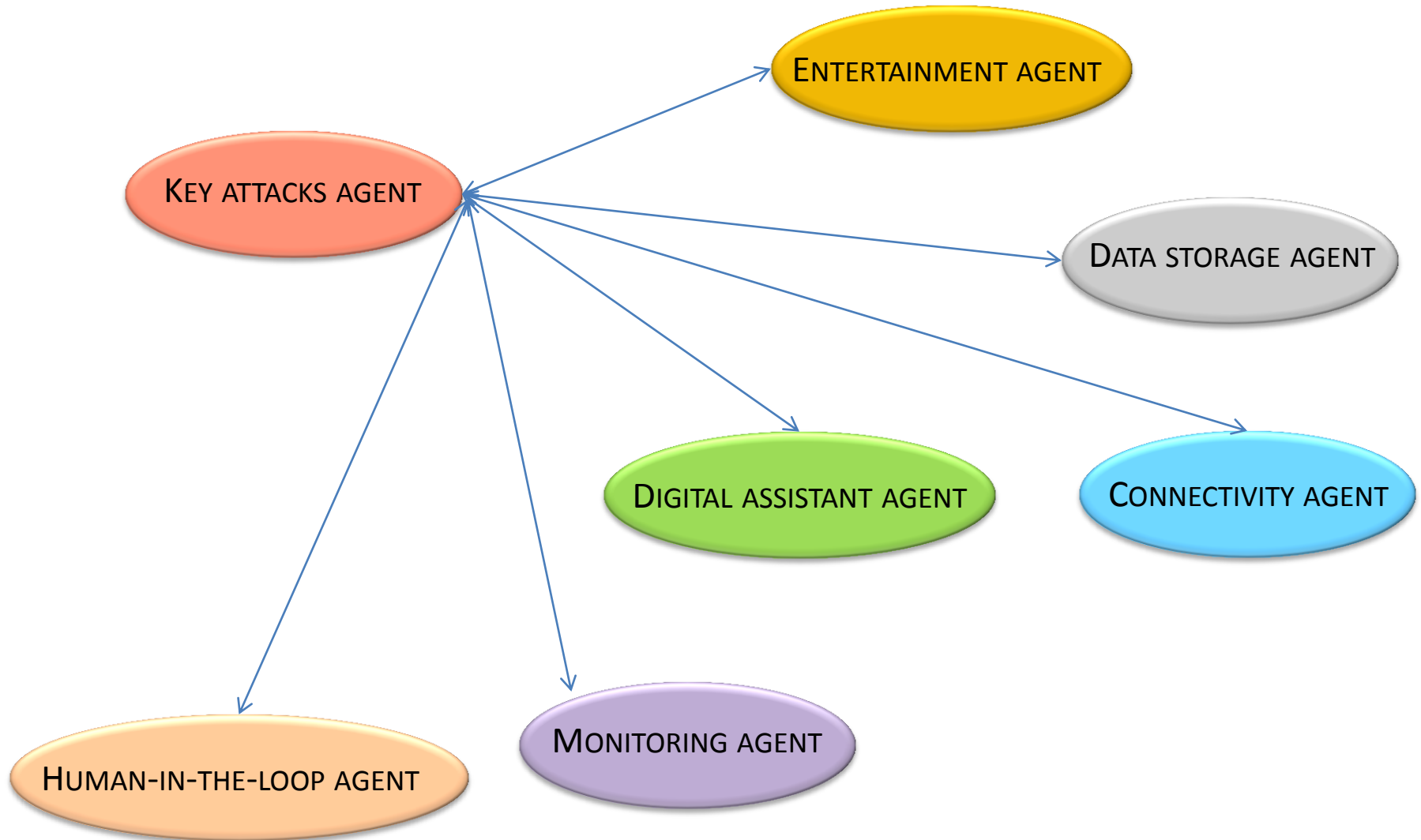
SYSTEM ANALYSIS



RESULTING CLASSIFICATION



SMART HOME TEST-BED VALIDATION



PRACTICAL EXPERIMENTS



SOME INTERESTING RESULTS



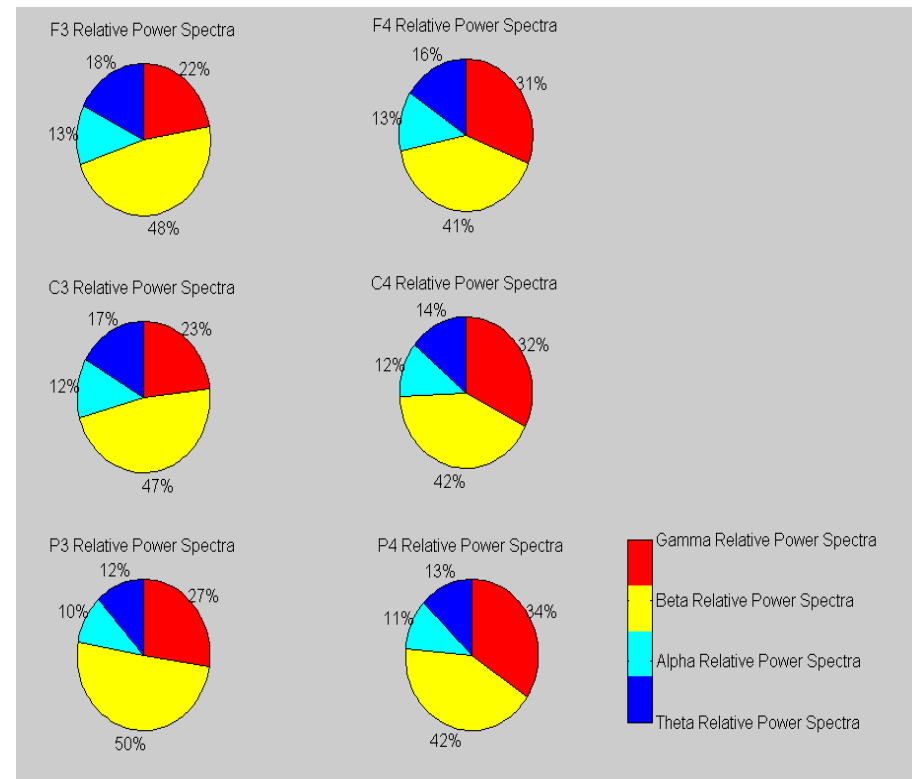
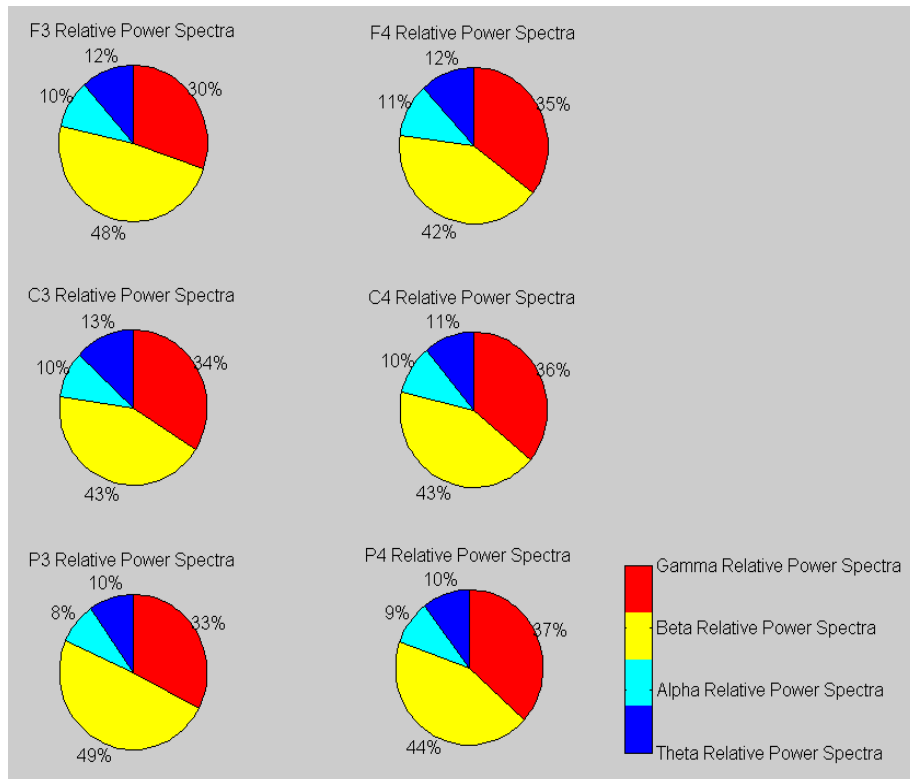
2D

EEG STUDY



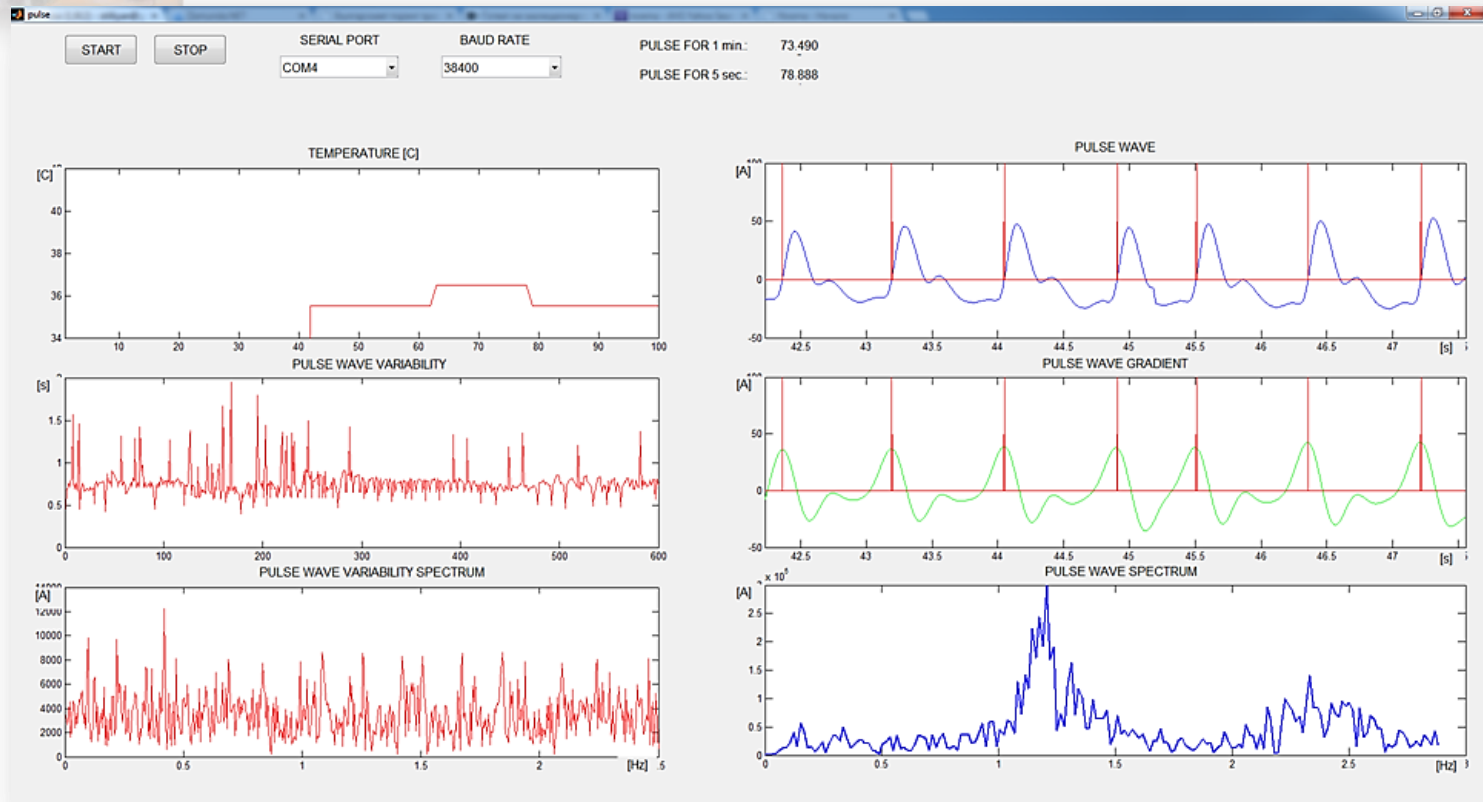
[Minchev, 2013](#)

3D



MORE RESULTS

ECG & BODY TEMPERATURE STUDY



DISCUSSION

STUDYING TODAY'S FAST PROGRESSING DIGITAL WORLD IS A COMPLEX TASK. THE PRESENT COMMUNICATION AND LIVING ENVIRONMENT IN THE WEB 2.0/WEB 3.0 ERA ARE JUST OPENING AN INCREDIBLY HUGE FIELD FOR DIFFERENT ICT APPLICATIONS. THESE HOWEVER ARE GENERATING A NUMBER OF CYBER THREATS FOR THEIR USERS. THE PRESENT METHODOLOGICAL STUDY BASED ON INTERACTIVE TRAINING OF CYBER THREATS NATURE AND HUMAN FACTOR RESPONSE, SHOWED USEFUL SUPPORT TO FURTHER IMPROVEMENTS IN THE DIGITAL WORLD SECURITY EVOLUTION.

ACKNOWLEDGEMENT

THE AUTHORS EXPRESS A SPECIAL GRATITUDE FOR THE FINANCIAL SUPPORT TO: “A FEASIBILITY STUDY ON CYBER THREATS IDENTIFICATION AND THEIR RELATIONSHIP WITH USERS' BEHAVIOURAL DYNAMICS IN FUTURE SMART HOMES, RESEARCH GRANT 'FUNDING OF FUNDAMENTAL & APPLIED SCIENTIFIC RESEARCH IN PRIORITY FIELDS', BULGARIAN SCIENCE FUND, MINISTRY OF EDUCATION YOUTH AND SCIENCE, 2012-2014, DFNI-T01/4”, WWW.SMARTHOMESBG.COM.

THE EXPERIMENTS IN THE STUDY WERE METHODOLOGICALLY SUPPORTED BY: “A STUDY ON IT THREATS AND USERS' BEHAVIOUR DYNAMICS IN ONLINE SOCIAL NETWORKS”, DMU03/22, BULGARIAN SCIENCE FUND, YOUNG SCIENTISTS GRANT, 2011-2013, WWW.SNFACTOR.COM.

A SPECIAL GRATITUDE FOR THE CONTEXT DEFINITION AND Q-BASED SURVEY SUPPORT IS GIVEN TO: EU NETWORK OF EXCELLENCE IN MANAGING THREATS AND VULNERABILITIES FOR THE FUTURE INTERNET – SYSSEC, FP7 GRANT AGREEMENT No. 257007, 2010 – 2014, WWW.SYSSEC-PROJECT.EU.

THANK YOU FOR THE ATTENTION!