Research-focused Cyber Exercises: National State-of-the-Art Academic Experience and Perspectives

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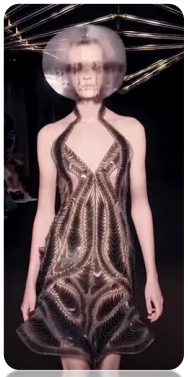
Some Accents in the New Digital Age

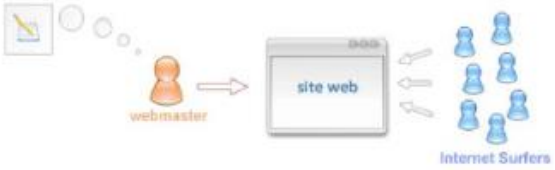


...AND EXPECTED TECH DEVELOPMENTS

2000

Web 1.0

Passive usage of the environment



Web 2.0

Interactive usage of the environment

Web 3.0

Interactive usage of the environment and user

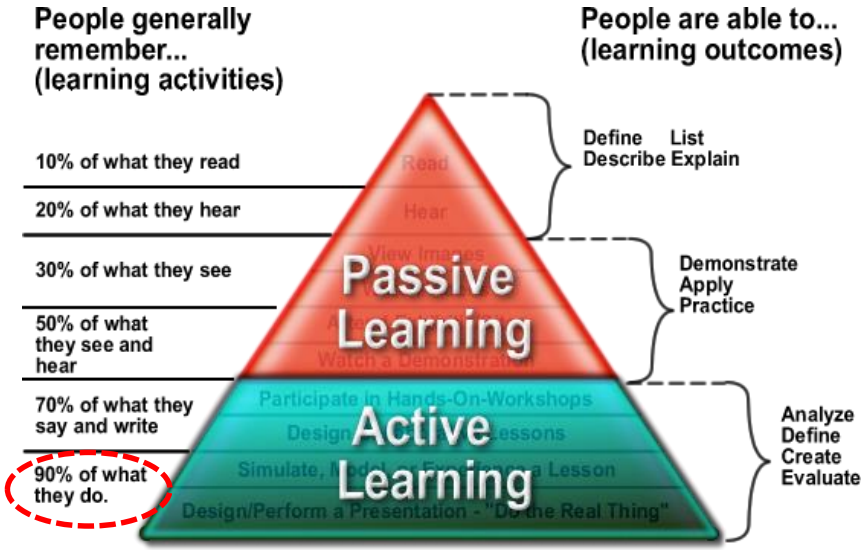
Web 5.0

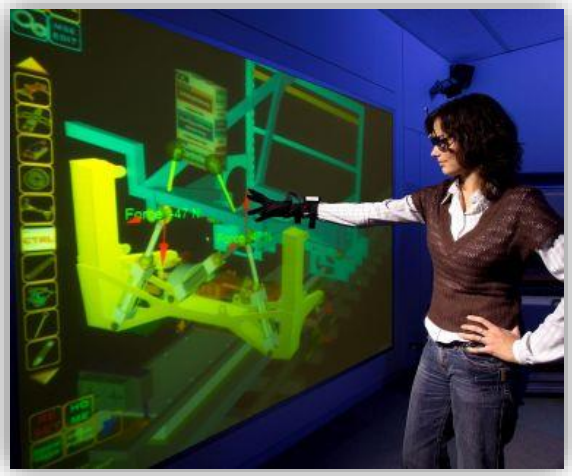
Web 4.0

2050

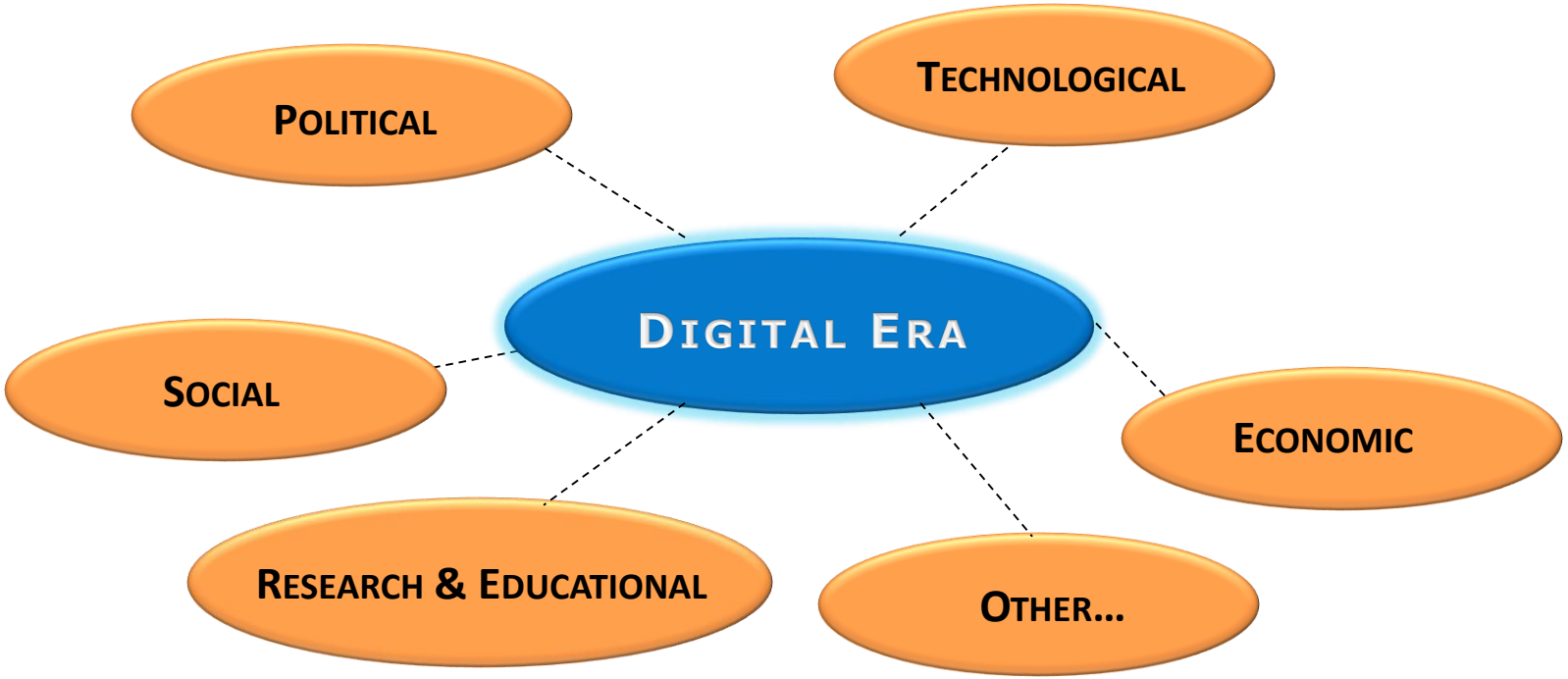
Noting Future Training General Uncertainties

vs



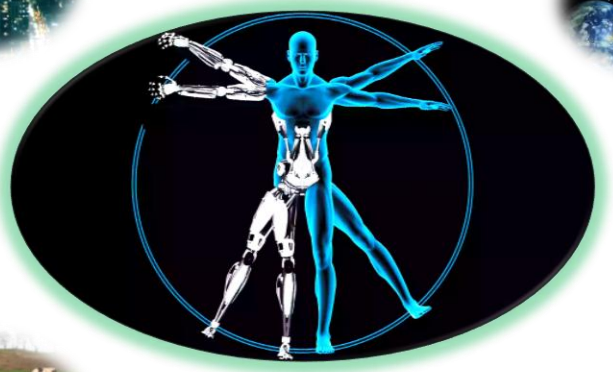


Creating Numerous Social Disambiguates…



WITH MULTIPLE FUTURE INTERACTIVE TRANSFORMATIONS…

H2M -> M2M -> M2H …?!



TECH CHALLENGES

AUTONOMY

INNOVATION

SCALE

SPEED

USER PHENOMENA

SOCIAL ENGINEERING

DIGITAL DEMENTIA

INFORMATION FLOODING & OVERLOAD

ATTENTION DEFICIT

NEW REGULATIONS

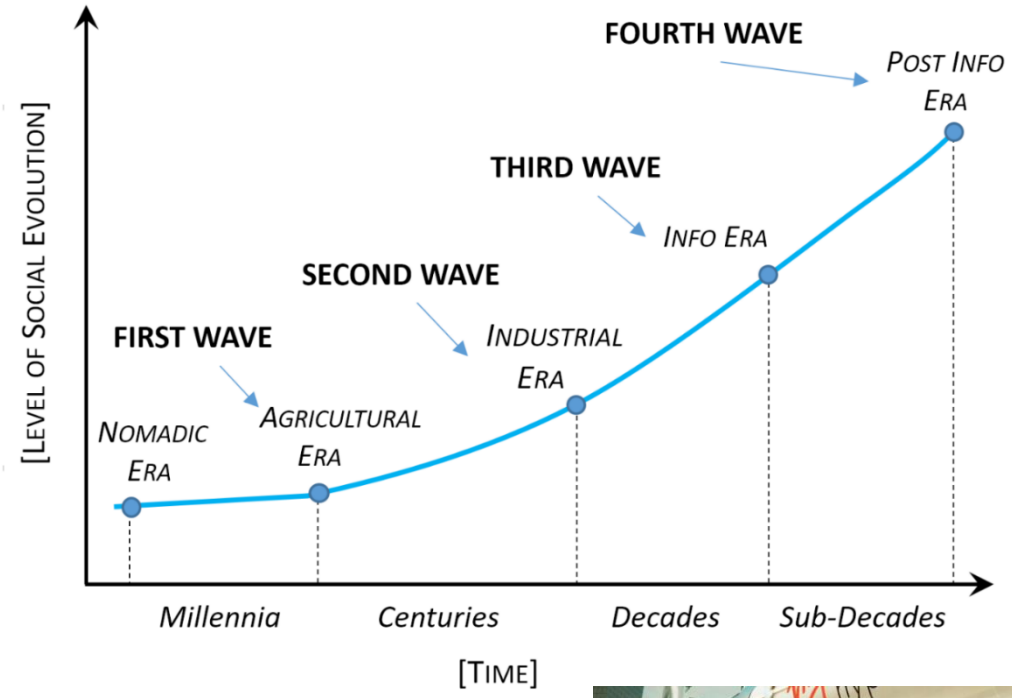
TRANSFORMED DIGITAL CULTURE

PARALLEL EXISTENCE

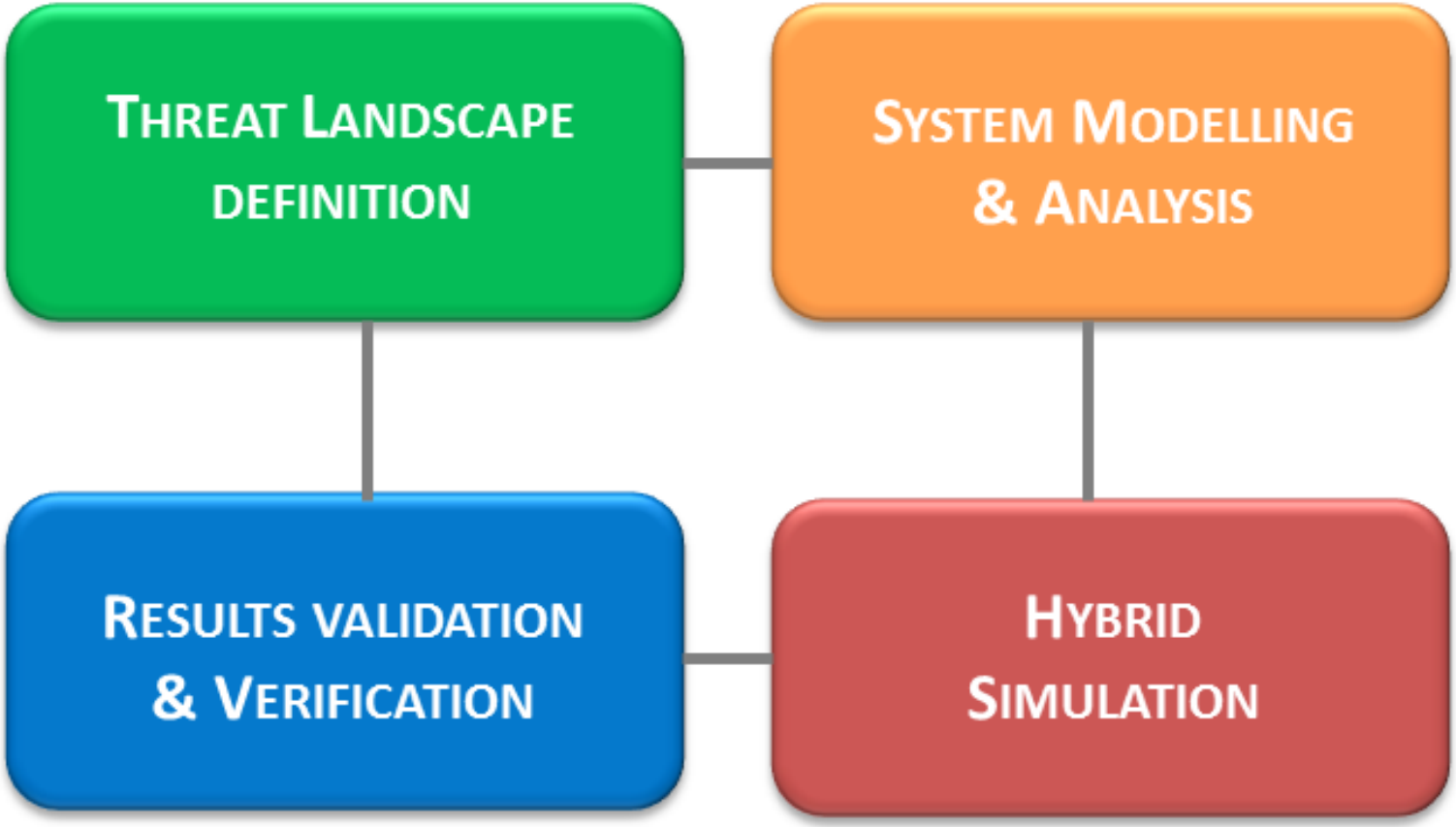
NEW CAPABILITIES

NEW VALUES & UNDERSTANDINGS

BUT WHERE WE ARE GOING...?



And how to cope this new world proactively?

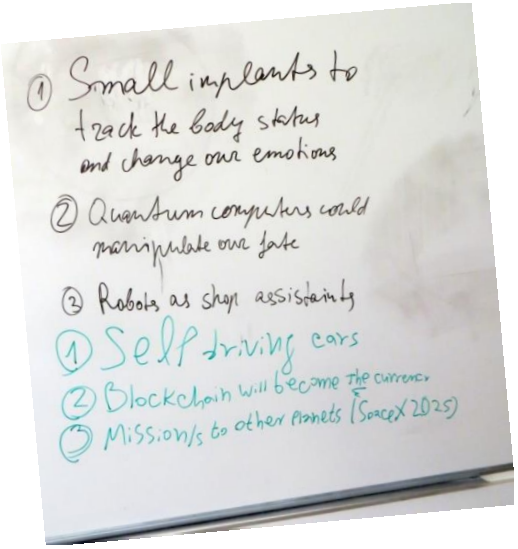


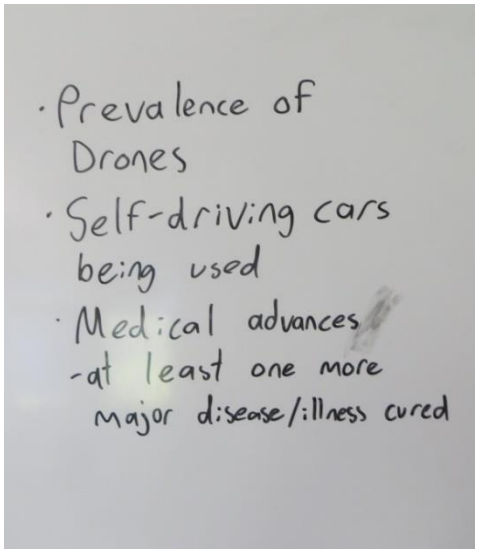
Knowledge elicitation

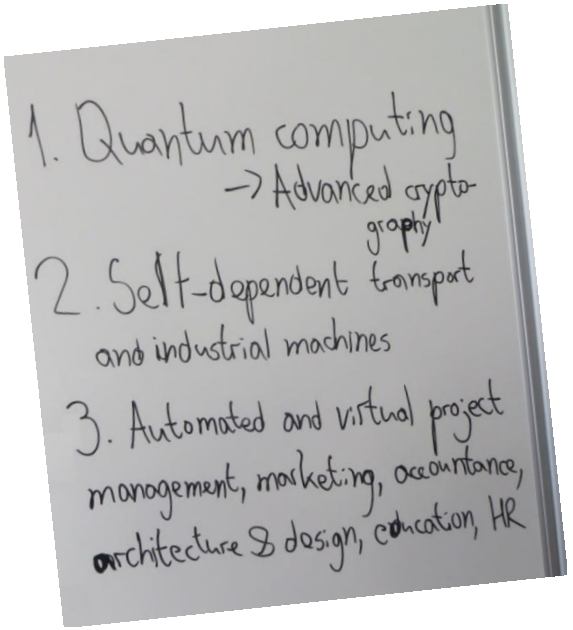
- Brainstorming
- Discussions
- Questionnaires, Delphi method, Interviews
- Big Data Analytics…

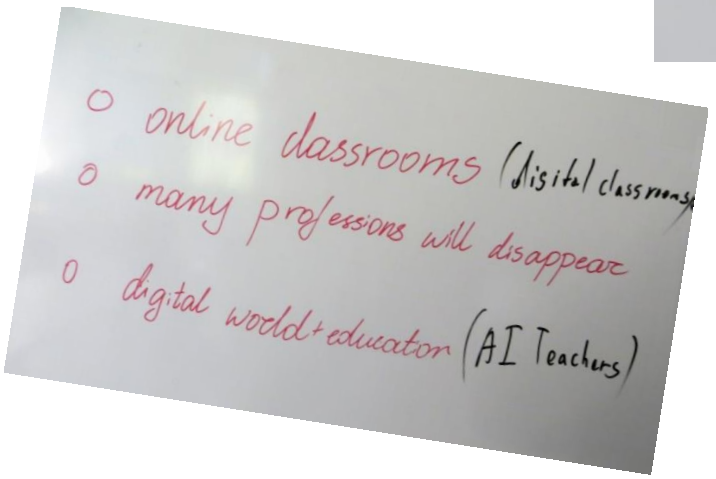
Threat/Area	IoT Gadgets	Mixed Realities	Advanced Communications	Enhanced Multimedia	E-Trading
Transformed Privacy					
Biometric Disturbances					
Social Engineering					
Advanced Malware					
Data Breaches					
Espionage					

Digital Future 2027









~ 50 millennial researchers from 11 countries: Bulgaria, Macedonia, Argentina, India, Italy, Iran, China, New Zealand, UK, USA & South Korea

Wider Prognosis towards 2050

Technology/Asset	Civil Society	Banks & Financing	State Governance	Critical Infrastructure	New Techs	Education
Web 1.0						
Web 2.0 / Web 3.0						
Web 4.0						
Web 5.0						

Legend:

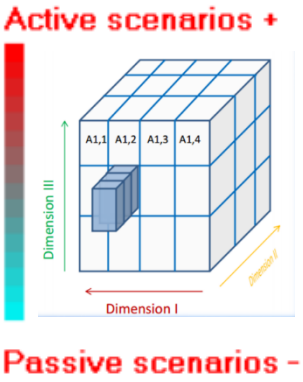
Weak Average Strong Uncertain

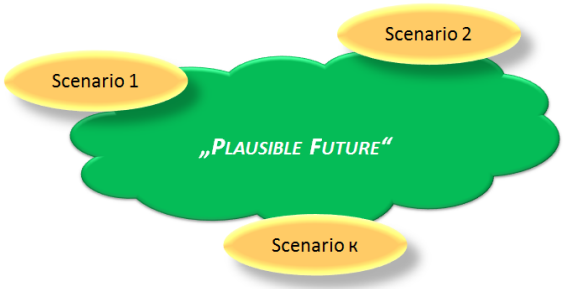
Threats Landscape Definition

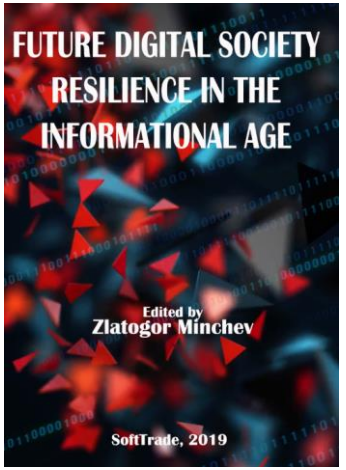
Morphological Analysis

Driving Factors	Digital Challenges	Digital Adversaries	Digital Divides	Digital Opportunities
Tech Innovations	Global Regulations	Total Digitalisation	Transhumanisation	Technological Progress
Reality Mixing	Digital Economy	Hybrid Securing	Technological Superiority	Transformed Society
Social Dynamics	Societal Resileience	Biohacking	Digital Services	Transcending People
Climate Changes	Transformed Privacy	Parallelism	Quality of Life	
Global Connectivity	Information Overload		Polyarchy	
	Huge Data			

Index	Length	Weight	Name
1	5	65	Scenario1
2	5	90	Scenario2
3	5	105	Scenario3
4	5	65	Scenario4
5	5	5	Scenario5
6	5	75	Scenario6
7	5	65	Scenario7



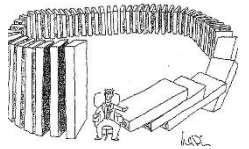


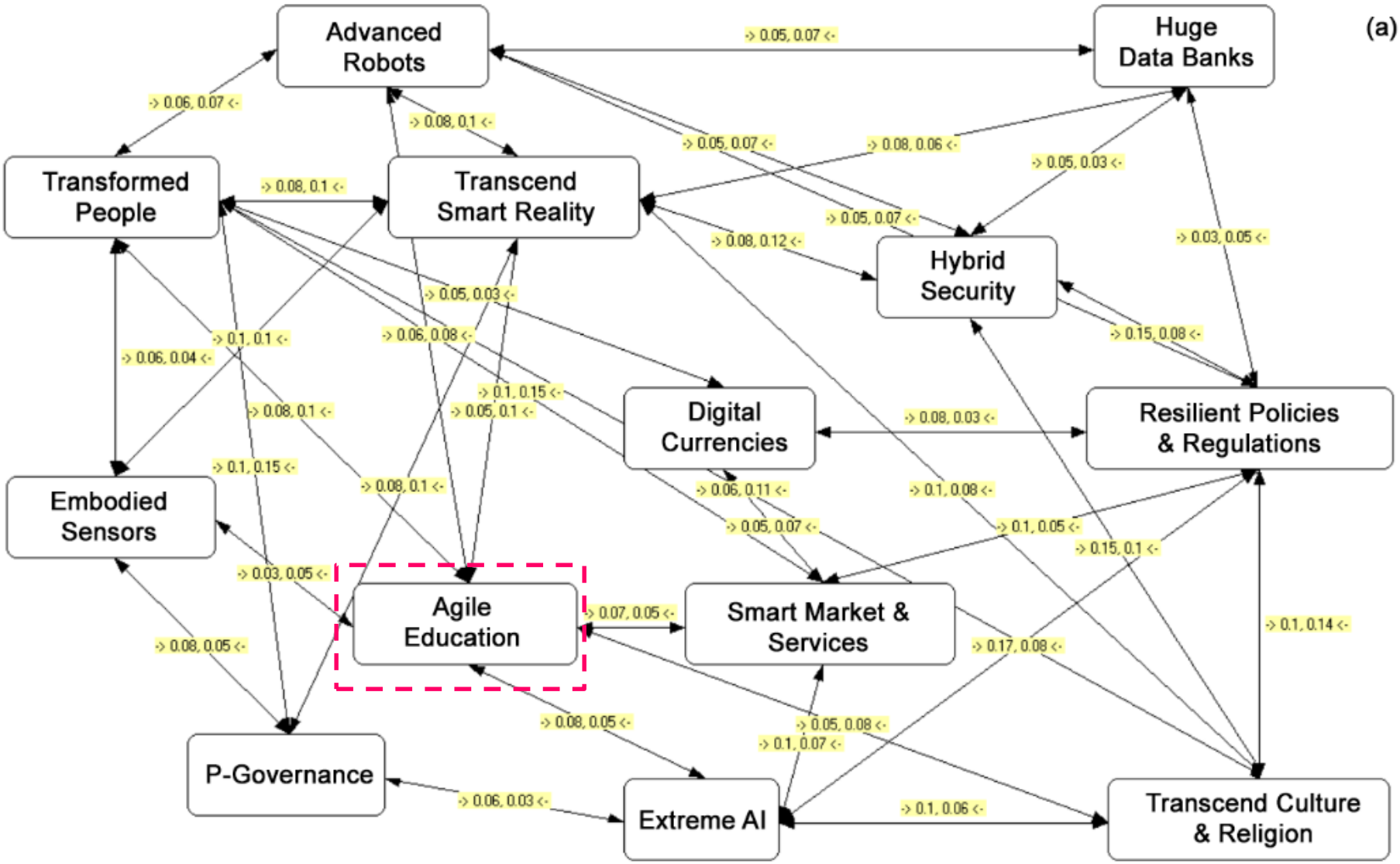


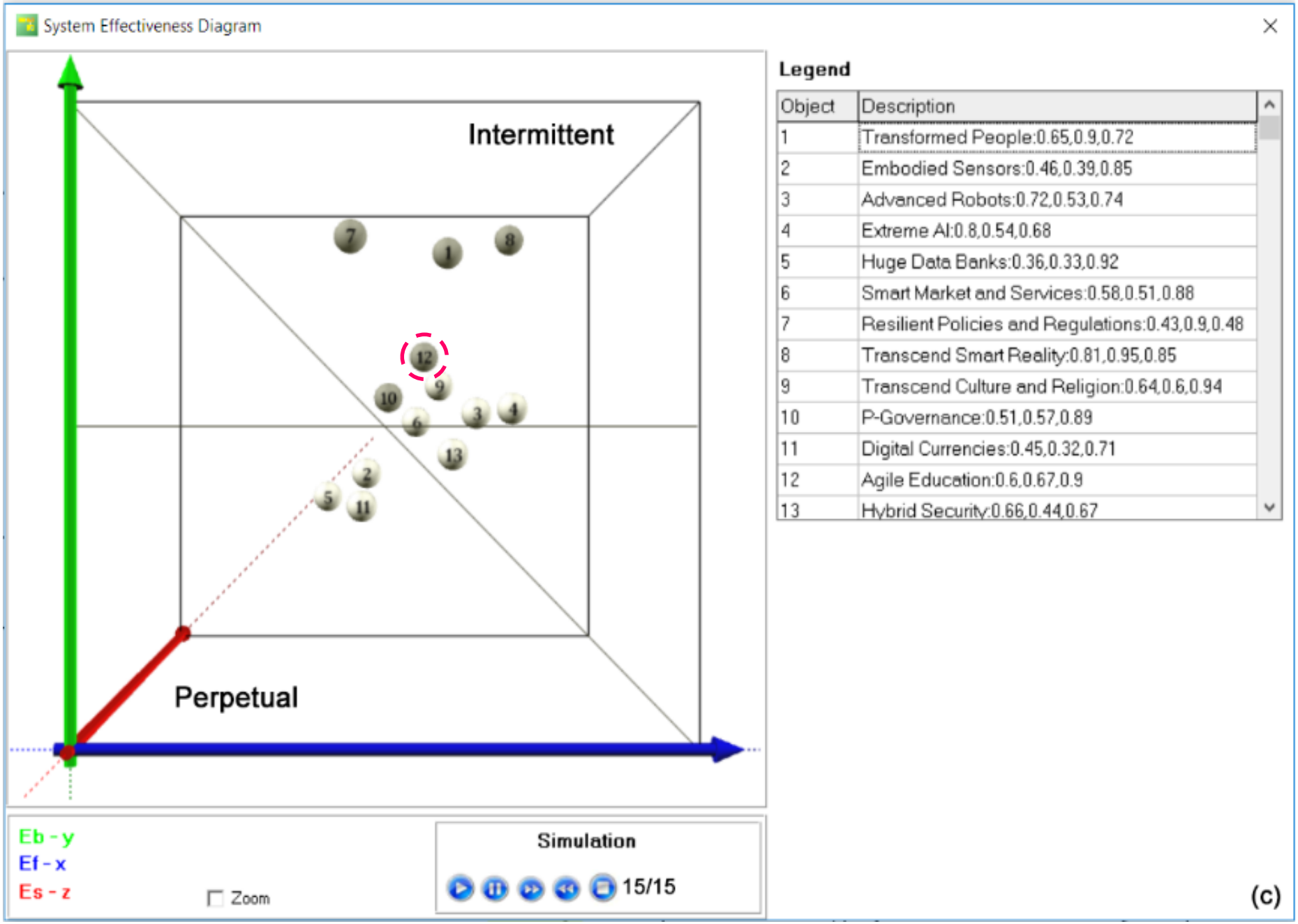
Possible Scenario Combinations N = 9000

2033

System Modelling & Analysis

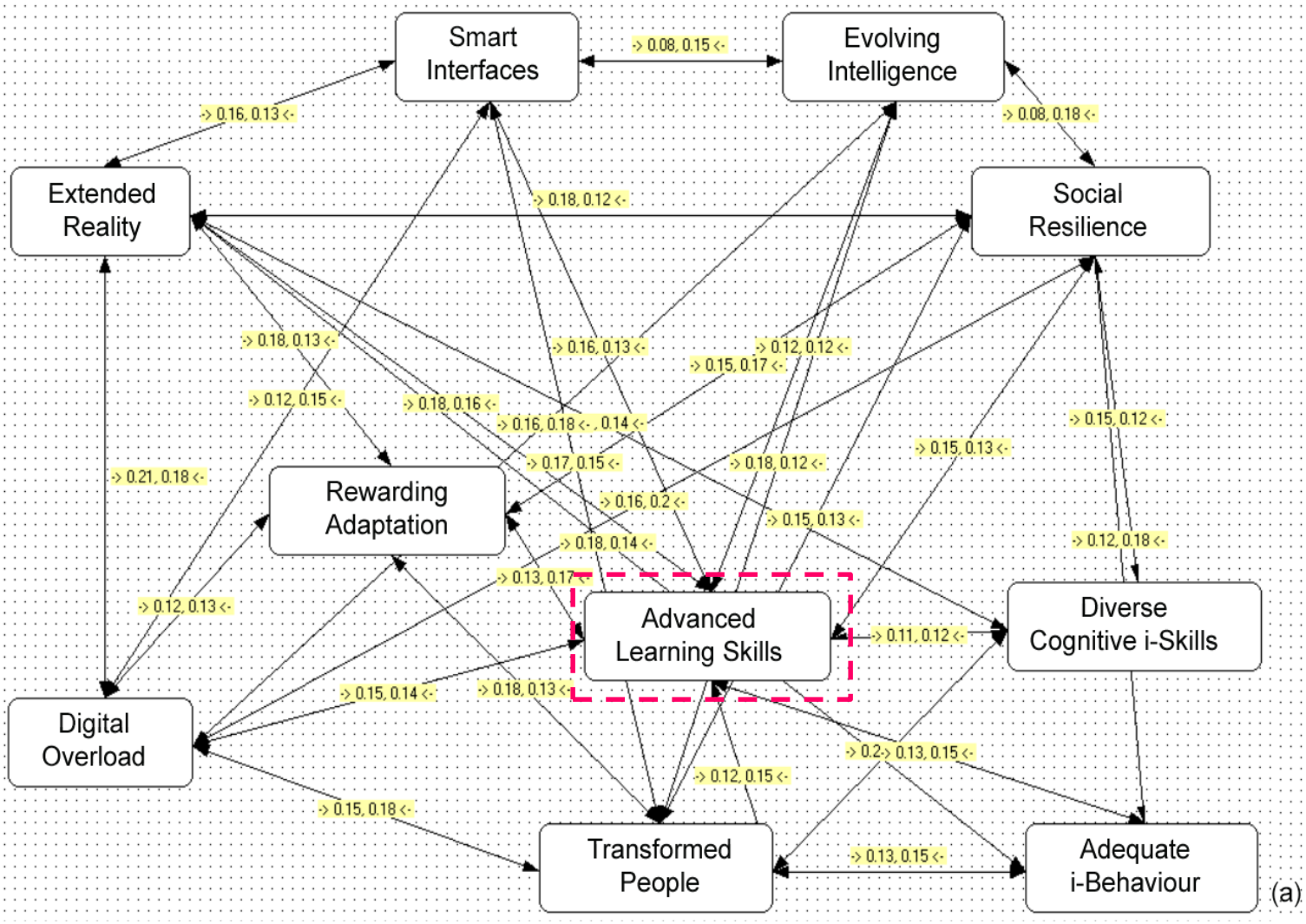


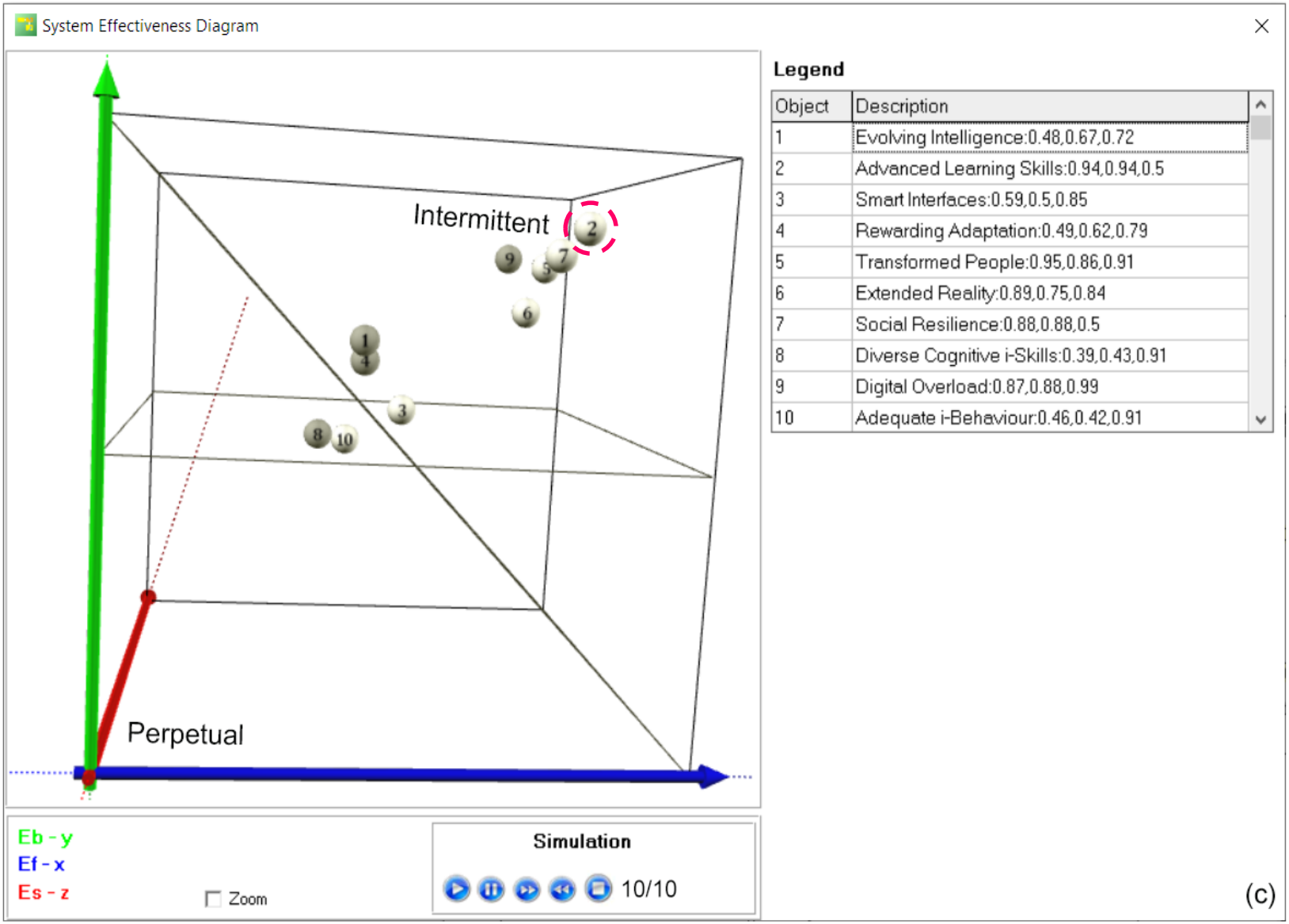



System Effectiveness Diagram
Intermittent
Perpetual
Legend
Object | Description
1 | Transformed People:0.65,0.9,0.72
2 | Embodied Sensors:0.46,0.39,0.85
3 | Advanced Robots:0.72,0.53,0.74
4 | Extreme AI:0.8,0.54,0.68
5 | Huge Data Banks:0.36,0.33,0.92
6 | Smart Market and Services:0.58,0.51,0.88
7 | Resilient Policies and Regulations:0.43,0.9,0.48
8 | Transcend Smart Reality:0.81,0.95,0.85
9 | Transcend Culture and Religion:0.64,0.6,0.94
10 | P-Governance:0.51,0.57,0.89
11 | Digital Currencies:0.45,0.32,0.71
12 | Agile Education:0.6,0.67,0.9
13 | Hybrid Security:0.66,0.44,0.67
Eb - y
Ef - x
Es - z
Zoom
Simulation
15/15
(c)

2028

GOING EVEN DEEPER

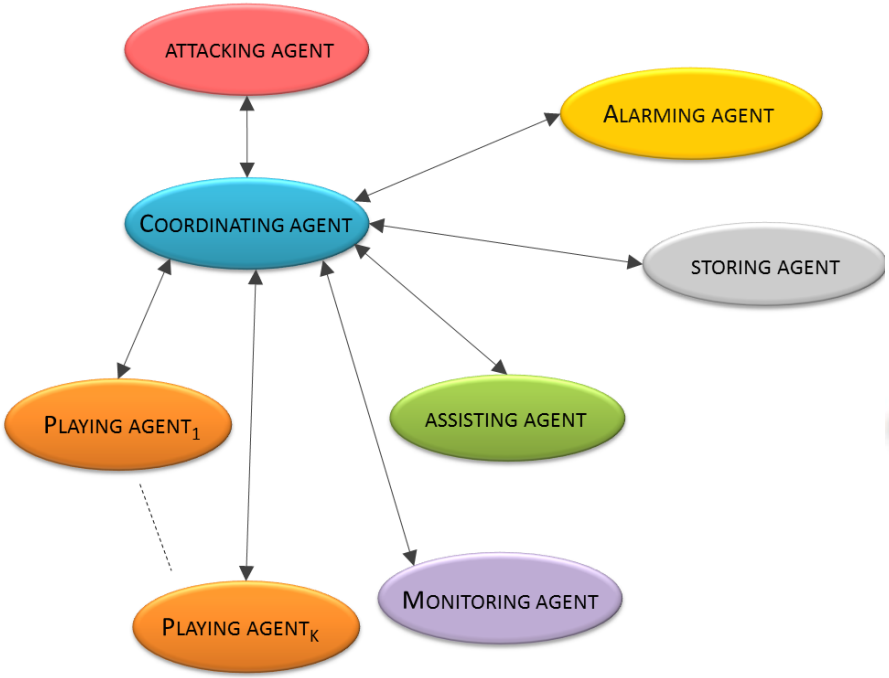



System Effectiveness Diagram
Intermittent
Perpetual
1
2
3
4
5
6
7
8
9
10
Legend
Object
Description
1 Evolving Intelligence:0.48,0.67,0.72
2 Advanced Learning Skills:0.94,0.94,0.5
3 Smart Interfaces:0.59,0.5,0.85
4 Rewarding Adaptation:0.49,0.62,0.79
5 Transformed People:0.95,0.86,0.91
6 Extended Reality:0.89,0.75,0.84
7 Social Resilience:0.88,0.88,0.5
8 Diverse Cognitive i-Skills:0.39,0.43,0.91
9 Digital Overload:0.87,0.88,0.99
10 Adequate i-Behaviour:0.46,0.42,0.91
Eb - y
Ef - x
Es - z
Zoom
Simulation
10/10
(c)

2029

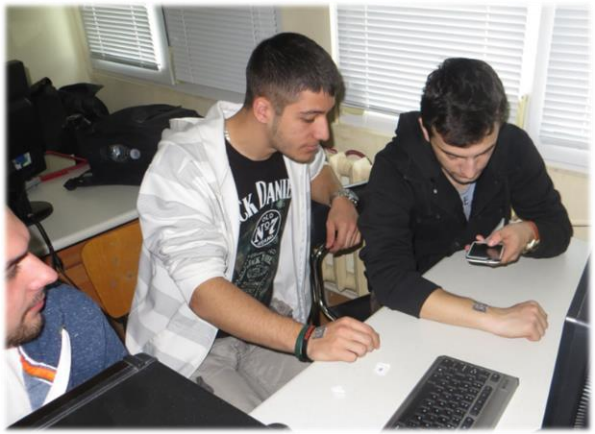
HYBRID SIMULATION IN MIXED REALITIES

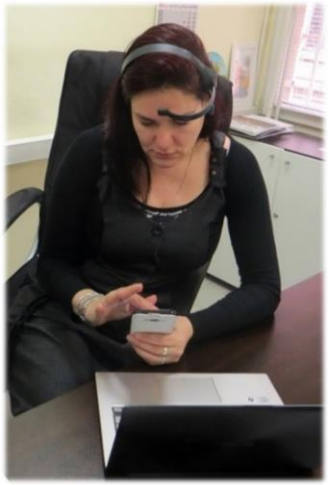
CYREX 2016, CYREX 2017, CYREX 2018,

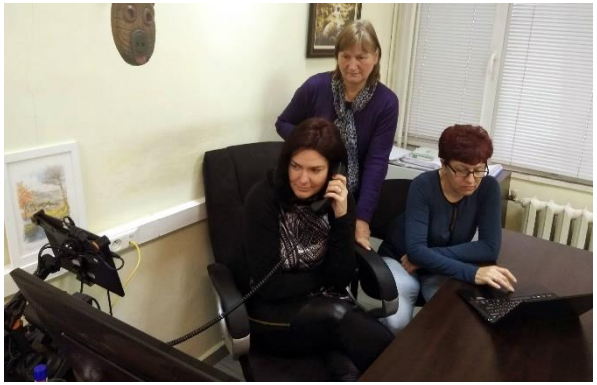


Organizational Architecture

Practical Implementation





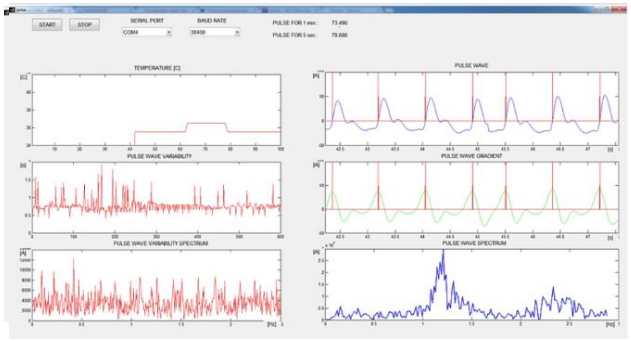


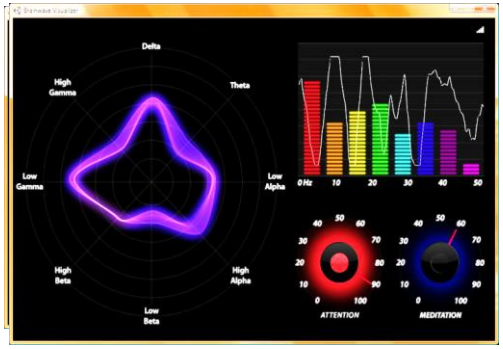
VAIO

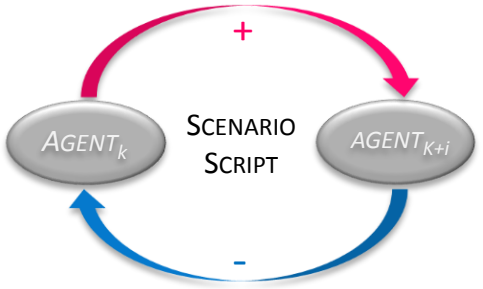
NATO Advanced
Training Course
"Terrorist Use
of Cyberspace"
NATO Advanced Training Course
"Terrorist Use of Cyberspace"

GATHERING & TAILORING PARTICIPANTS RESPONSES

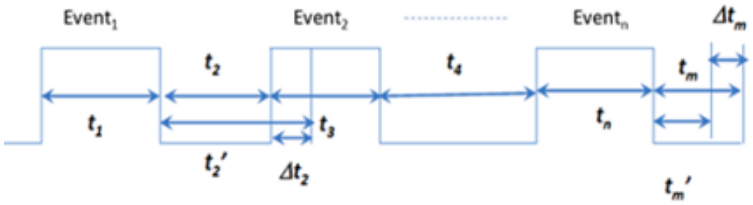
IOT DATA MONITORING





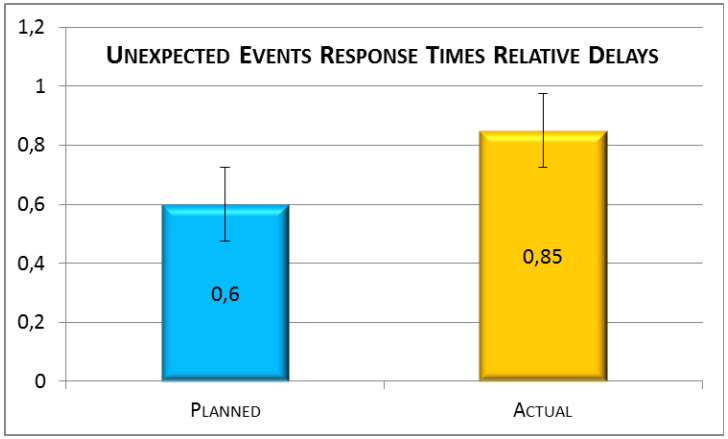


RESPONSE TIMES MONITORING

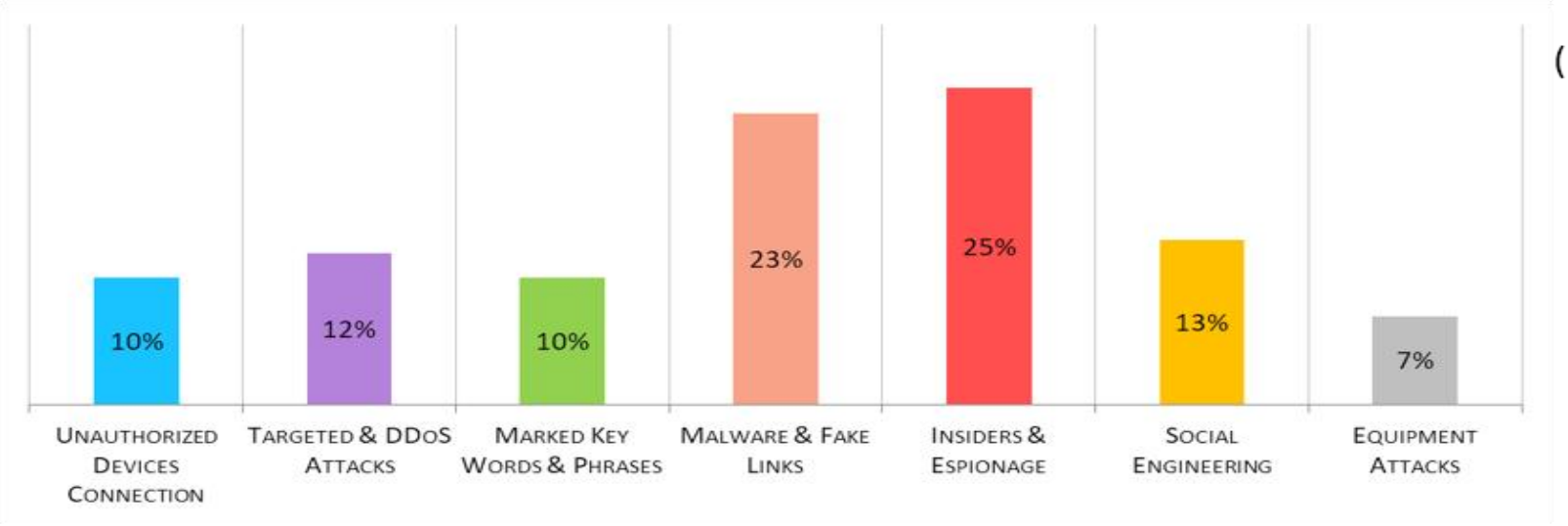


Δ

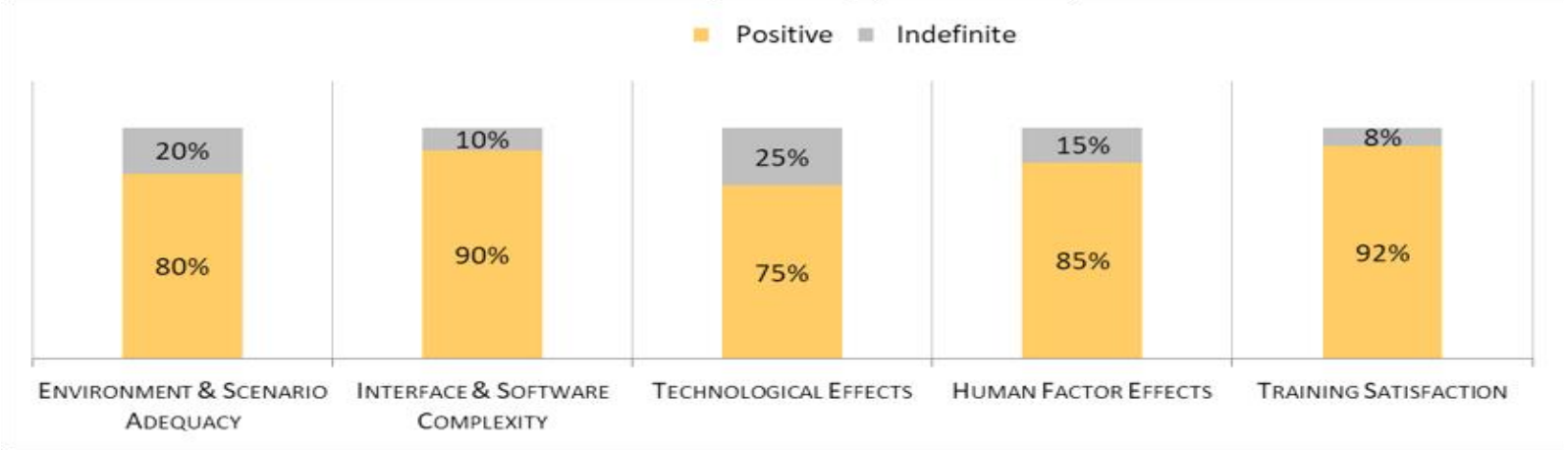
Δ



...GIVING SOME AGGREGATED RESULTS ILLUSTRATION

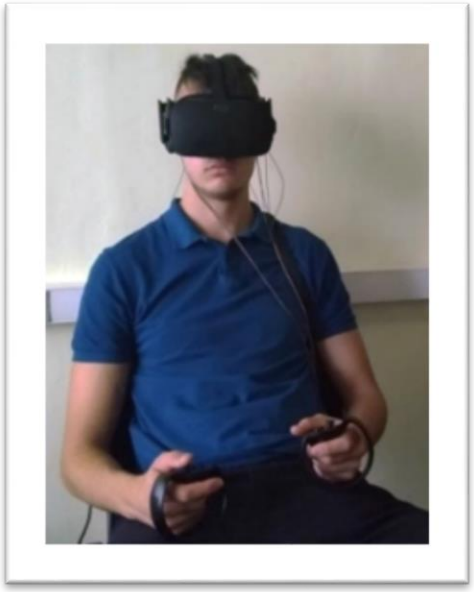


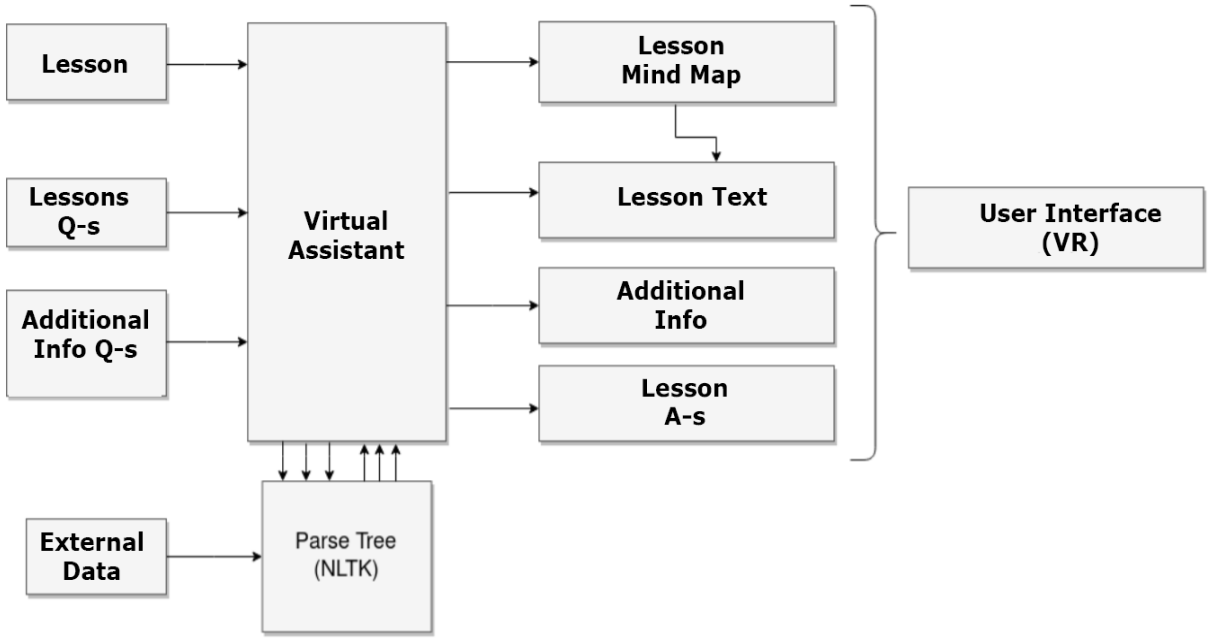
(a)



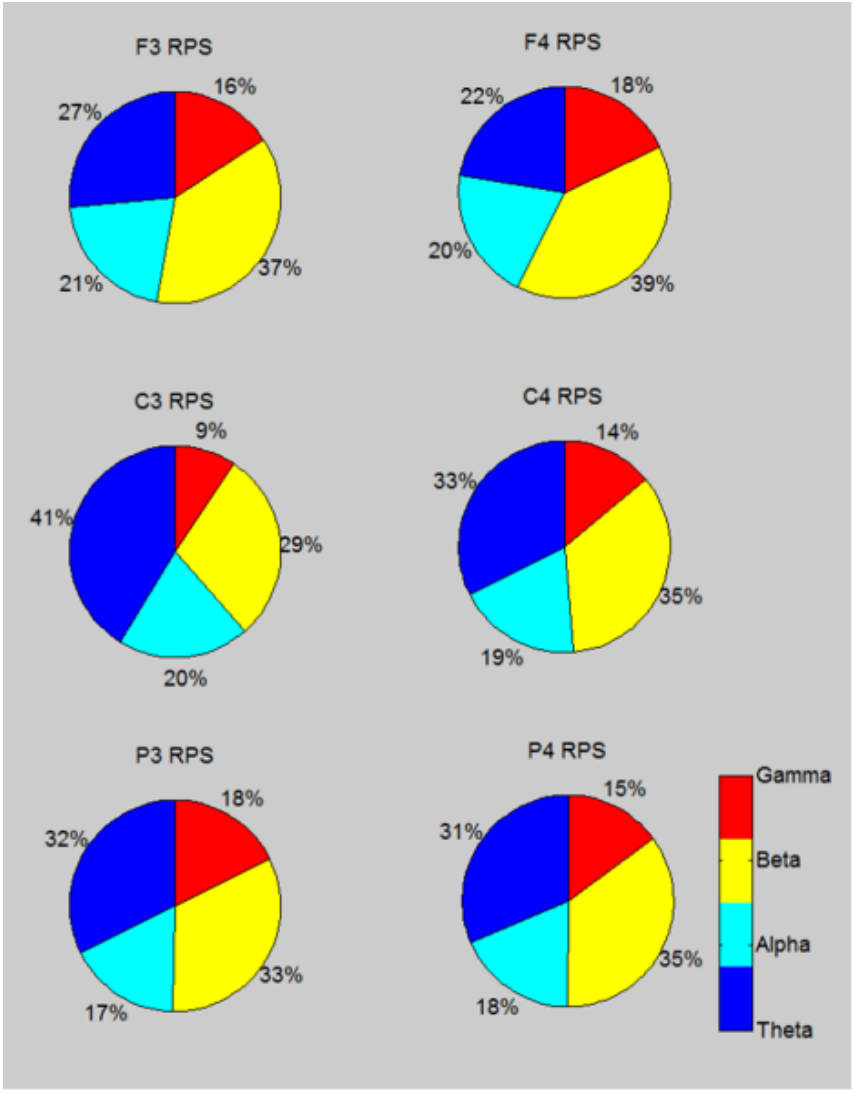
(b)

New VR Prospective





Engagement EEG Assessment



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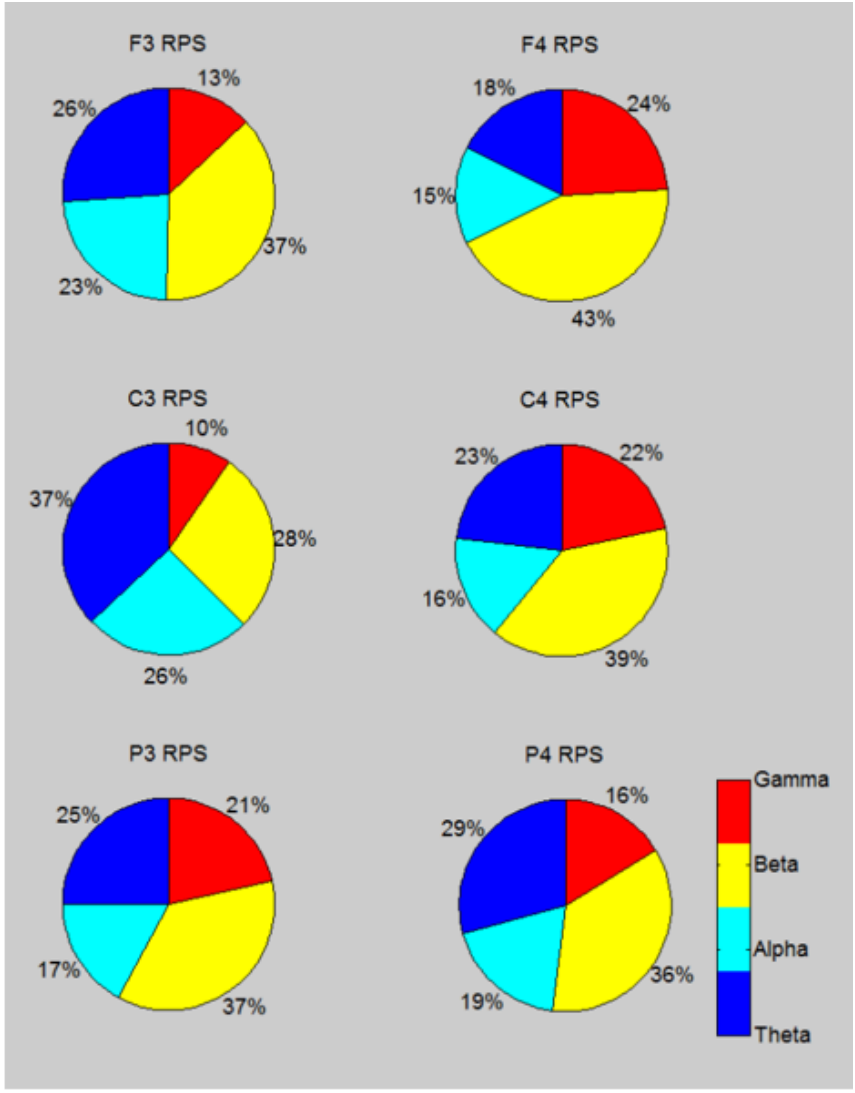
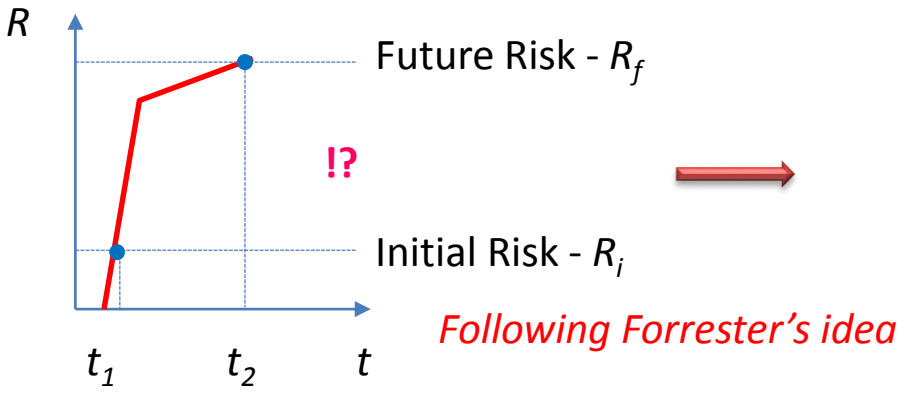
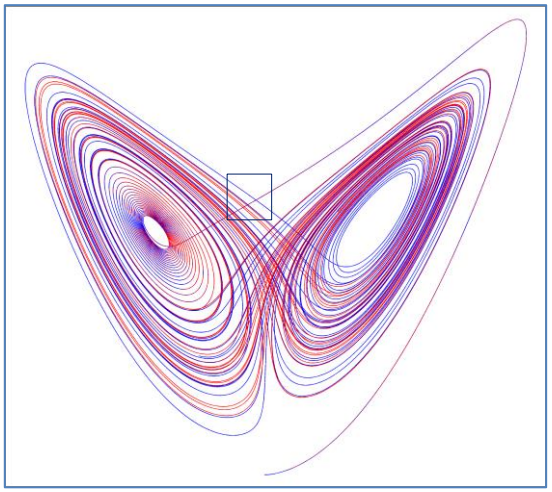


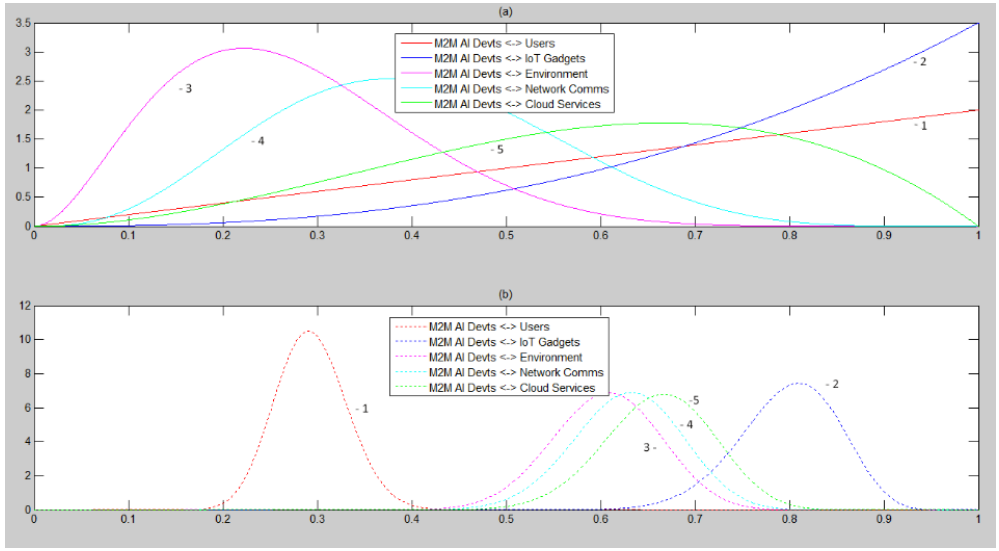
(d)

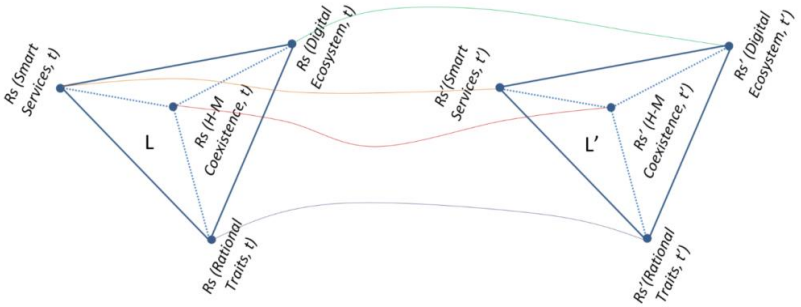
Results Validation & Verification



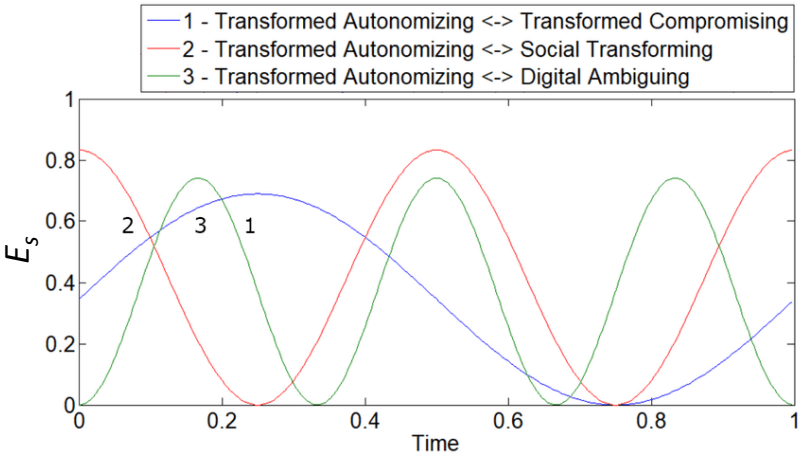
Following Forrester's idea



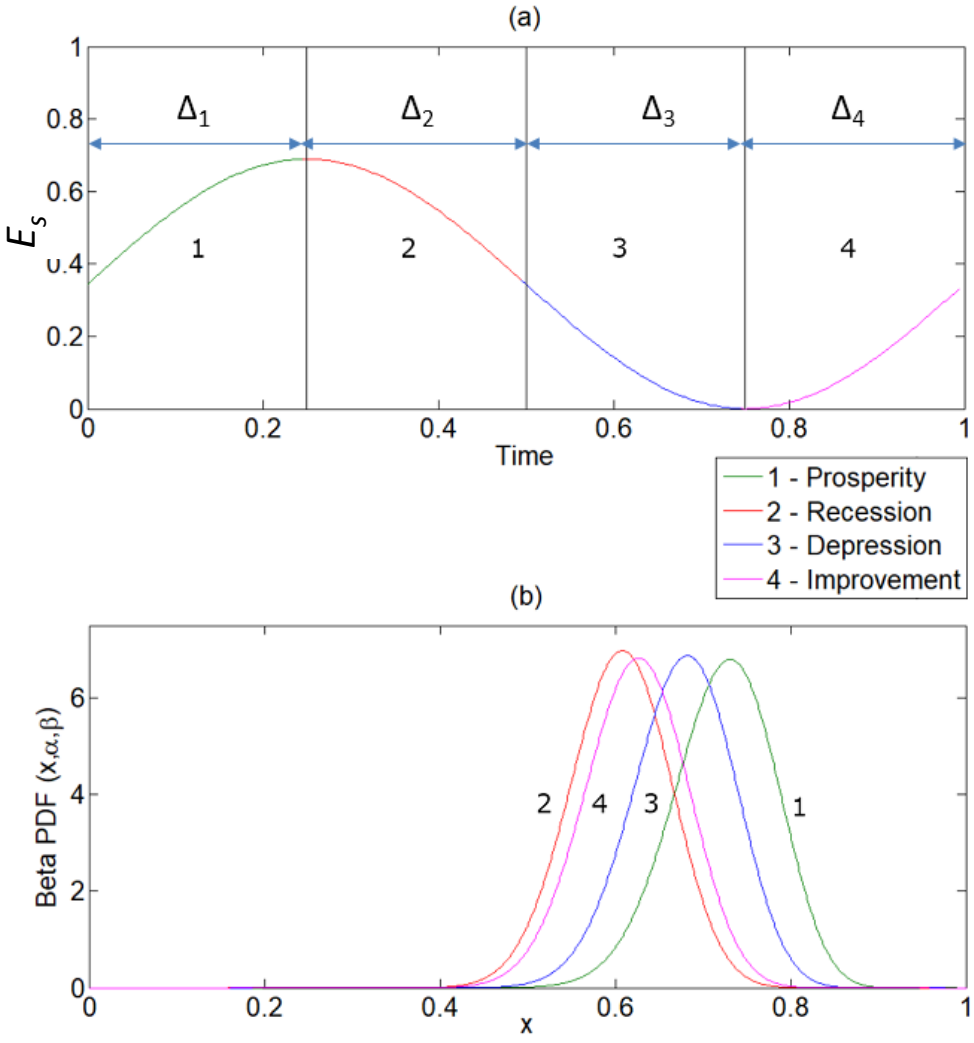




Entities Interaction Cyclic Interpretation



Cyclic stochastic approximation with Effectiveness transition analysis



New Digital Society 5.0 Live Verification

VR
(mixing the reality)

Robots
(soft agents)

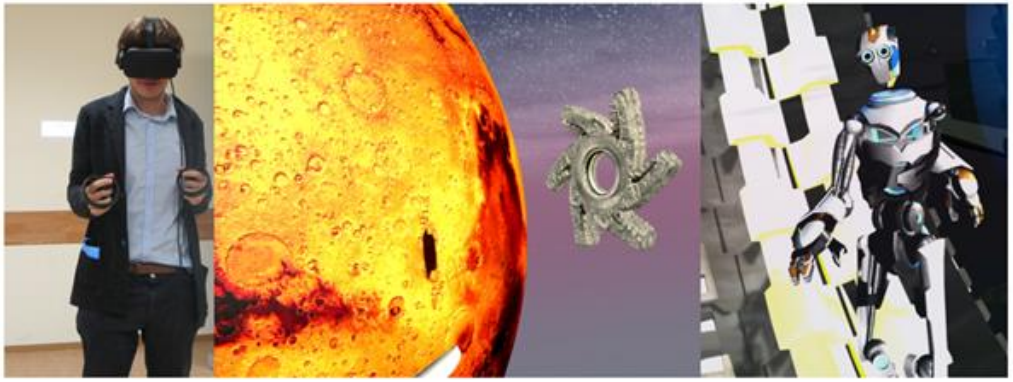
Smart
Interface

...

IoT (the sensors part)

AI (the smart part)

Humans



SECURE DIGITAL FUTURE 21

HOME NEWS PARTNERS CONTACTS

Search

Securing Digital Future 21 initiative has been established in celebration of 10 Years' Anniversary of Joint Training Simulation & Analysis Center, Institute of ICT, Bulgarian Academy of Sciences. Being at the rise of the fourth technological and social revolutionary transformations the idea is combining both – research & educational efforts in a sustainable knowledge capacity throughout a proven expert community with valuable partner support.

http://securedfuture21.org

Discussion

Future reality of digital co-existence is dynamically transforming and thus changing the way of human-machine-environment interaction, producing new challenges to future education & training, being somewhat more personalized, flexible, inclusive and engaging. The AI implementation in this process is opening an extremely transformational & complex field of work, addressing the upcoming threats, risks, gaps, opportunities and divides.

Exploring this phenomenon from the security perspective in future education & training requires implementing both human factor beliefs and real responses, noting the technological growing significance in the new, transcending digital age.

Thank you for the attention!

Questions?