Pasaules latviešu zinātnieku kongress
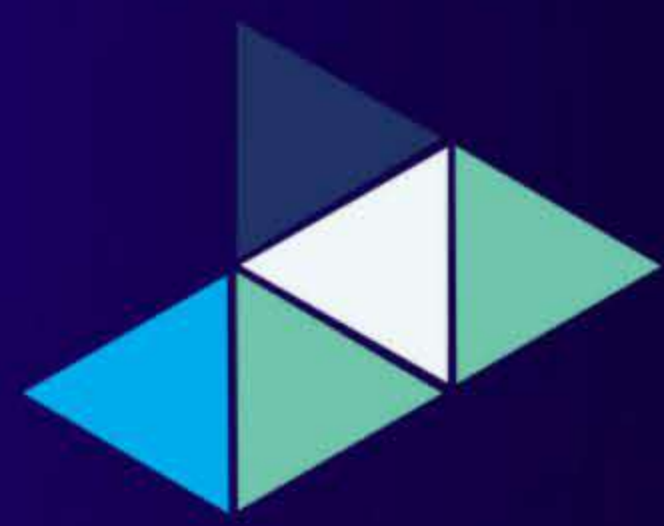
World Congress of Latvian Scientists

STENDA REFERĀTI
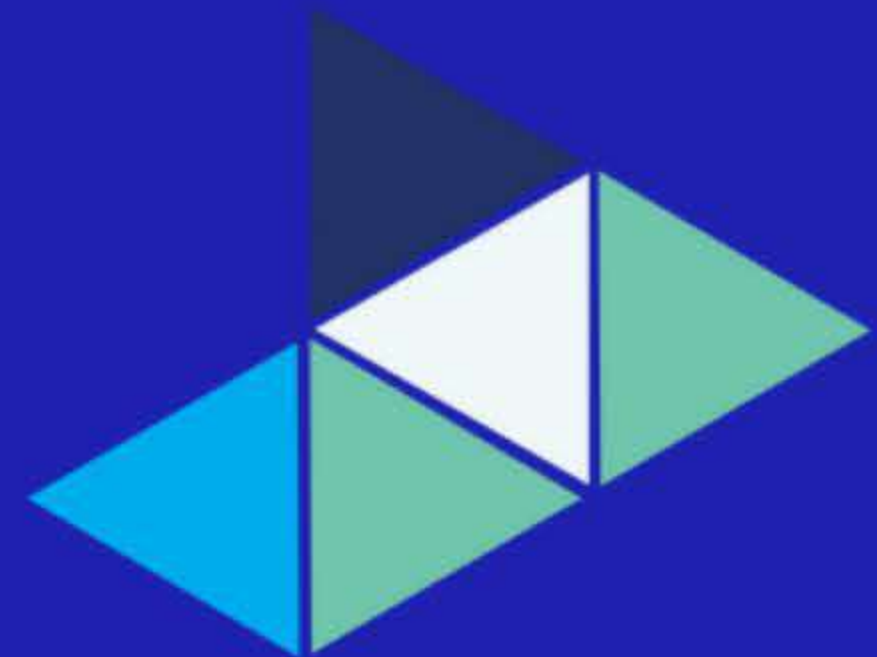# POSTER PRESENTATIONS

ZINĀTNES IETEKME

DIGITĀLĀ TRANSFORMĀCIJA

ZAĻĀ PĀRVEIDE

DIGITĀLĀ TRANSFORMĀCIJA

Korpuss.lv un Tēzaurs.lv pētniecībai un tehnoloģiju izstrādei

**N. Grūzītis, B. Saulīte, R. Darģis, A. Znotiņš, I. Auziņa, L. Pretkalniņa, L. Rituma,
M. Grasmanis, I. Auziņa, P. Paikens, I. Skadiņa, G. Bārzdiņš**

LU Matemātikas un informātikas institūts, Mākslīgā intelekta laboratorija

Ievads

Valodas datu nozīme pētniecībā un jaunu tehnoloģiju izstrādē nevienam vairs nerada šaubas. Datos balstītai pētniecībai un lielo valodas modeļu apmācībai un pielāgošanai nepieciešams daudz reprezentatīvu un kvalitatīvu datu – valodas korpusi, leksiskās datubāzes.

Korpuss.lv

30+ korpusi, 10+ izstrādāji, 3+ mezgli

Korpuss	Relatīvais biežums	Absolūtais biežums	Par korpusu
Pārspriedumi Skolēnu pārspriedumu korpuss	1036	234	Vairāk: korpuss.lv/id/Pārspriedumi Izstrādātāji: LU MII, LiepU, RTA Mezgls: nosketch.korpuss.lv
MuLa2022 Mūsdienu latgaliešu teksti	777	2173	Vairāk: korpuss.lv/id/MuLa2022 Izstrādātāji: RTA, LU MII Mezgls: nosketch.korpuss.lv
Karogs Žurnāls "Karogs" 1940–1995	521	32 401	Vairāk: korpuss.lv/id/Karogs Izstrādātāji: LNB Mezgls: nosketch.lnb.lv
Emuāri Emuāri latviešu valodā	350	2912	Vairāk: korpuss.lv/id/Emuāri Izstrādātāji: LU MII Mezgls: nosketch.korpuss.lv
Tīmeklis2020 Latviešu valodas tīmeklis	331	163 134	Vairāk: korpuss.lv/id/Tīmeklis2020 Izstrādātāji: LU MII Mezgls: nosketch.korpuss.lv
PanDi Pandēmijas dienasgrāmatas	302	214	Vairāk: korpuss.lv/id/PanDi Izstrādātāji: LU LFMI Mezgls: nosketch.lnb.lv
LVK2022 Līdzsvarotais tekstu korpuss	301	36 965	Vairāk: korpuss.lv/id/LVK2022 Izstrādātāji: LU MII Mezgls: nosketch.korpuss.lv
Senie Latviešu valodas senie teksti	270	735	Vairāk: korpuss.lv/id/Senie Izstrādātāji: LU LaVI, LU MII Mezgls: nosketch.korpuss.lv
LRK2013 Līdzsvarotais runas korpuss	252	289	Vairāk: korpuss.lv/id/LRK2013 Izstrādātāji: LU MII, Tilde, LETA
Barometrs Interneta agresivitātes indekss	206	143 710	Vairāk: korpuss.lv/id/Barometrs Izstrādātāji: RSU, LU MII
LiLa Lietuviešu–latviešu paralēlo tekstu korpuss	76	432	Vairāk: korpuss.lv/id/LiLa Izstrādātāji: LU MII, VDU Mezgls: nosketch.korpuss.lv

Tēzaurs.lv

200k+ lietotāju, 1M+ skatījumu (mēnesī)

Latviešu valodas analīzes rīkkopa LV-PIPE

Izmantojot Korpuss.lv un Tēzaurs.lv datus, ir izstrādāti atvērtā pirmkoda modeļi latviešu valodas automātiskai morfoloģiskai, sintaktiskai un semantiskai analīzei. Šie modeļi ir pieejami gan kā atsevišķas komponentes, gan ir savienoti rīkkopā LV-PIPE (nlp.ailab.lv), kas tiek izmantota apjomīgu valodas datu apstrādei dažādās jomās, kā arī valodas tehnoloģiju prasmju apguvei un risinājumu prototipēšanai.

INDEX	FORM	LEMMA	UPOSTAG	XPOSTAG	HEAD	DEPREL
1	Kārtējie	kārtējs	ADJ	afmpnyp	9	amod
2	XXVII	xxvii	X	y	5	punct
3	Vispārējie	vispārējs	ADJ	afmpnyp	9	amod
4	latviešu	latvietis	NOUN	ncmpg2	5	nmod
5	dziesmu	dziesma	NOUN	ncfpg4	9	nmod
6	un	un	CCONJ	cc	8	cc
7	XVII	xvii	NUM	xn	8	amod
8	Deju	deja	NOUN	ncfpg4	5	conj
9	svētki	svētki	NOUN	ncmdn1	10	nsubj
10	notiks	notikt	VERB	vmnifi130an	24	ccomp
...	...	...	...	...	...	...
24	lēma	lemt	VERB	vmnist130an	0	root
25	Ministru	ministrs	NOUN	ncmpg1	26	nmod
26	kabinets	kabinets	NOUN	ncmsn1	24	nsubj

Latviešu valoda CLARIN pētniecības infrastruktūrā – nozīmīgs solis pretī valodu digitālai līdztiesībai

Inguna Skadiņa, Ilze Auziņa, Roberts Darģis, Eduards Lasmanis un Arnis Voitkāns

Latvijas Universitātes Matemātikas un informātikas institūts

Ievads

2018. gadā Eiropas Parlaments pieņēma Rezolūciju par valodu līdztiesību digitālajā laikmetā, sniedzot ieteikumus, kā pārvarēt tehnoloģisko plaisu starp Eiropā plaši lietotām valodām un mazāk lietotām valodām. Lai šo mērķi sasniegtu, ir svarīgi **nodrošināt valodu resursu un rīku pieejamība pētniecībai un valodu tehnoloģiju izveidei.**

CLARIN (*Common Language Resources and Technology Infrastructurure*) ir Vienota valodas resursu un tehnoloģiju **Eiropas pētniecības infrastruktūra (ERIC).**

✓ CLARIN mērķis ir **novērst sadrumstalotību** valodas resursu jomā un **padarīt resursus pieejamus** pētniekiem, studentiem un tehnoloģiju izstrādātājiem.

✓ CLARIN-LV tiek apkopoti un dokumentēti digitālie latviešu, latgaliešu u.c. valodu dati un rīki, ko **veidojuši Latvijas zinātnieki,** kā arī nodrošina **ilgtermiņa piekļuvi** tiem.

✓ CLARIN-LV ir partneris CLARIN zināšanu centrā **morfoloģiski bagātām valodām** SAFMORIL.

CLARIN-LV: FAIR principiem atbilstošs un atvērto zinātni sekmējošs repozitorijs

F – atrodamība (findability*)*: pieejamība pie datu sniedzēja, viegla atrodamība, pastāvīgums, ilgtermiņa saglabāšana

A – pieejamība (accessibility): atvērtie dati / piekļuve

R – atkārtota izmantojamība (reusability): saturs, dokumentācija, versijpārvaldība, skaidra izcelsme, licencēšana

I – savietojamība (interoperability*)*: kopīga terminoloģija, datu modeļi un formāti
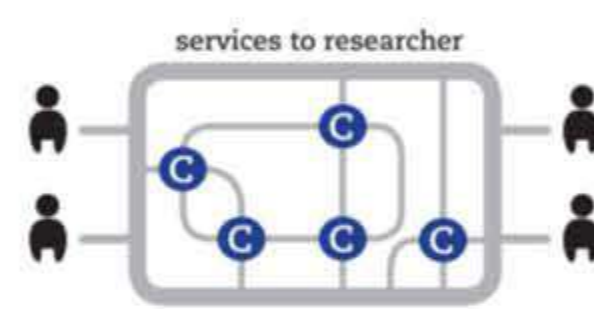
Konsorcijs

Latvijas Universitātes Matemātikas un informātikas institūts

LU LITERATŪRAS, FOLKLORAS UN MĀKSLAS INSTITŪTS

LATVIJAS UNIVERSITĀTE

LIEPĀJAS UNIVERSITĀTE

LATVIJAS NACIONĀLĀ BIBLIOTĒKA

RĪGAS STRADIŅA UNIVERSITĀTE

Telemedicine at the focus of digital transformation
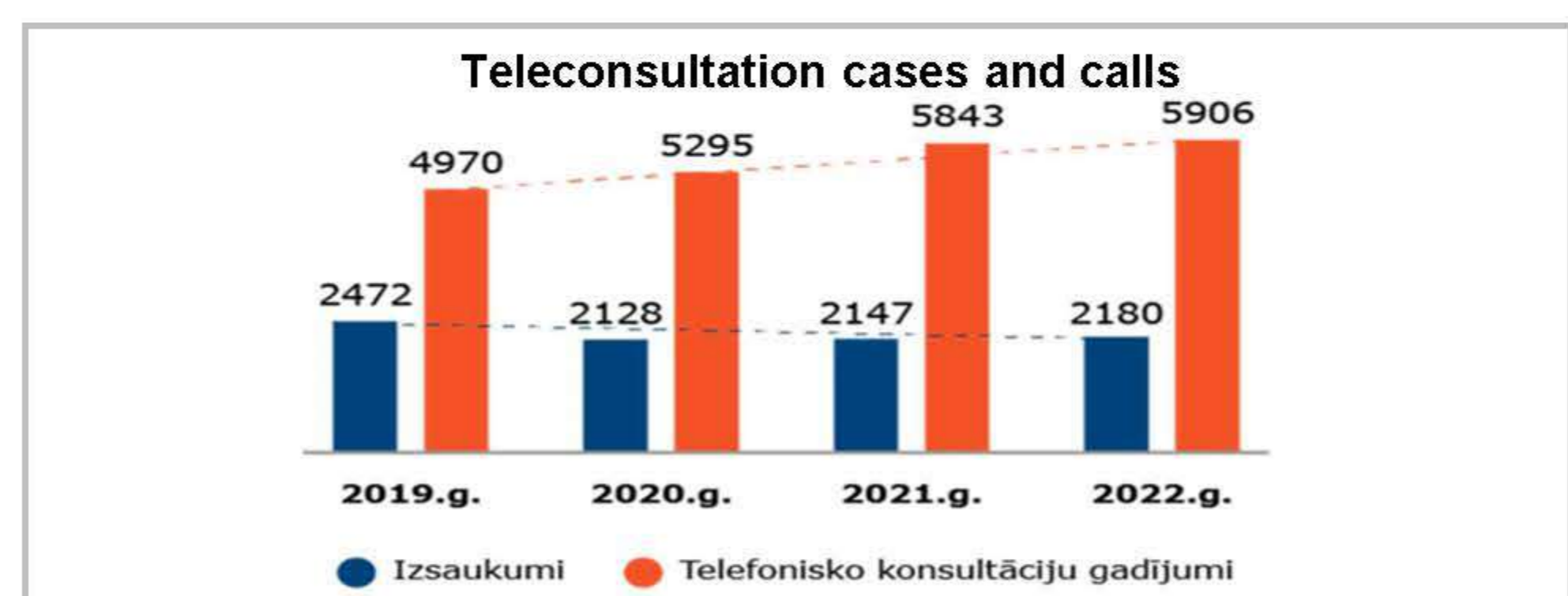
Rafaels Ciekurs

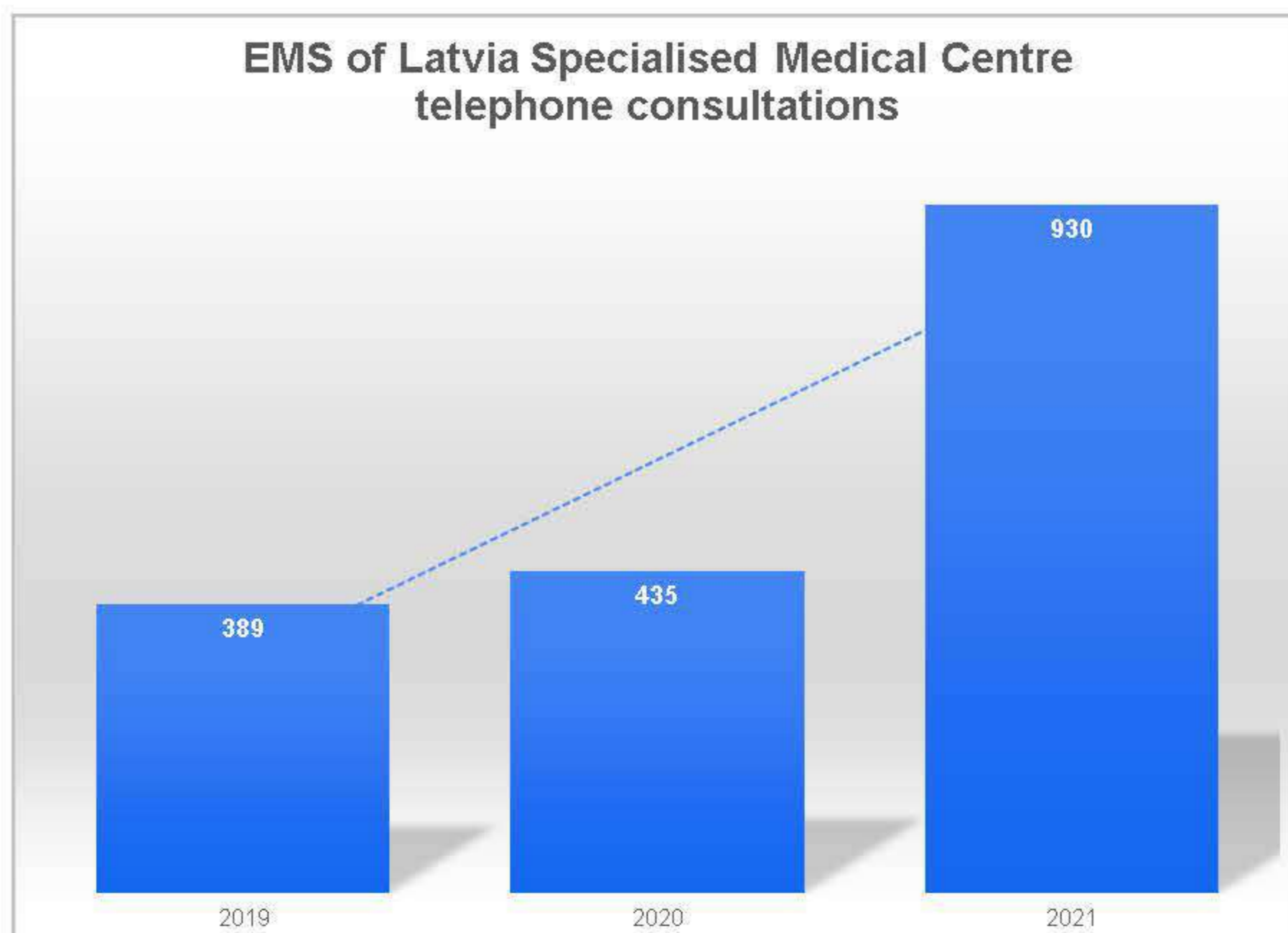State Emergency medicine service of Latvia

Introduction

With the onset of the global pandemic Covid-19, digital transformation in healthcare in Latvia started to develop rapidly. Fundamental transformations of rights were experienced, which allowed for the erosion of individual rights and freedoms as the pandemic unfolded. The epidemiological safety regulation-imposed restrictions on certain healthcare services, despite the patient's right to accessible healthcare, as well as the right to guaranteed health protection and minimum medical assistance, as laid down in Article 111 of the Constitution of the Republic of Latvia. The restrictions created new medical technological solutions through the development of telemedicine.

Research Objective

To analyze the impact of the digital transformation of telemedicine and the opportunities it offers for increasing access to healthcare. Exploring the impact of digital transformation on the patient experience and the opportunities to receive healthcare remotely using information technology devices. Assess the impact of the digital transformation of telemedicine on patient data security and privacy.

Teleconsultation cases and calls

	2019.g.	2020.g.	2021.g.	2022.g.
Izsaukumi	2472	2128	2147	2180
Telefonisko konsultāciju gadījumi	4970	5295	5843	5906

Results & Discussion

EMS of Latvia Specialised Medical Centre telephone consultations

2019	2020	2021
389	435	930

Telemedicine has undergone a digital transformation and has become a new approach to ensuring health rights guaranteed by the Constitution. This differentiation is linked to changes in the technological forms and solutions of telemedicine. Telemedicine became an innovative modern solution in line with technological progress, creating opportunities in the provision of remote healthcare services.

Conclusions

Telemedicine is not only an innovative solution for the treatment process between the patient and the doctor, but it also poses a number of challenges and uncertainties regarding the legal framework, the protection of natural persons' data, data storage, and the proper completion of medical records.
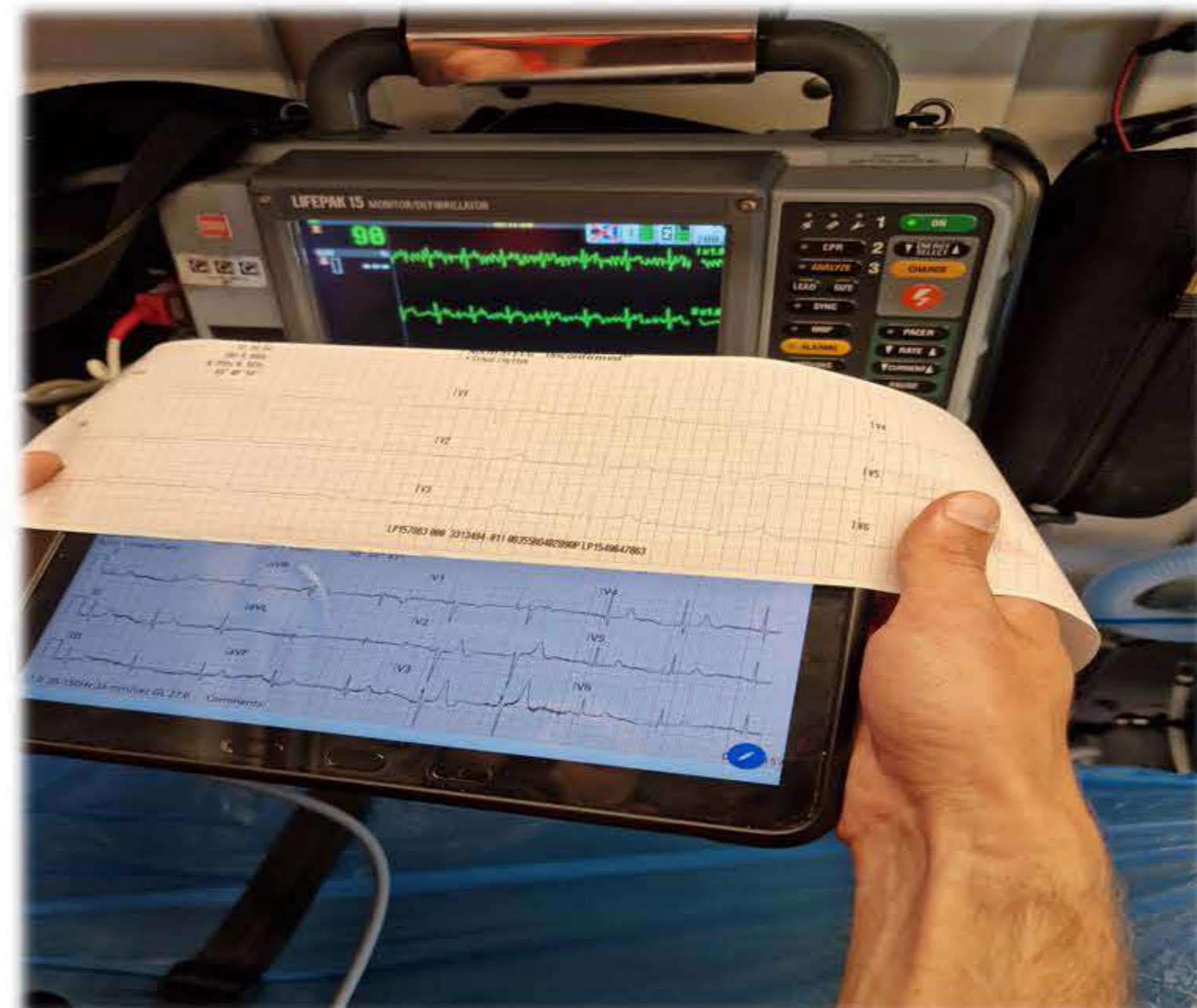
Contact Information

Rafaels Ciekurs rafaels.ciekurs@nmpd.gov.lv

Artificial Intelligence and Latvian Culture: The Impact of AI on Latvian Art, Cultural Understanding, and National Identity

Ph.D Andris Teikmanis

Art Academy of Latvia

Introduction

In today's digital age, artificial intelligence (AI) is a transformative force that is redefining various aspects of society, including culture. This research addresses the impact of AI on Latvian art, cultural understanding and national identity within the evolving Culture 5.0 paradigm. We examine how AI technologies are being incorporated into the fabric of Latvian artistic practices, reshaping existing cultural narratives and creating new ones. In addition, we examine how these changes might affect the expression and perception of Latvian identity. Combining traditional academic research with practice-based artistic research, our approach aims to provide a comprehensive, nuanced understanding of the profound influence of AI on the cultural landscape and the future of identity in Latvia.

Research Objective

Our research aims to examine the complex relationships between AI, Latvian art, culture and national identity. We focus on how AI is being integrated into Latvian art, its role in transforming and creating cultural understanding, and its potential impact on the development of Latvian national identity. We also aim to contribute to broader discussions about Culture 5.0 and the ethical impact of AI on cultural practices.
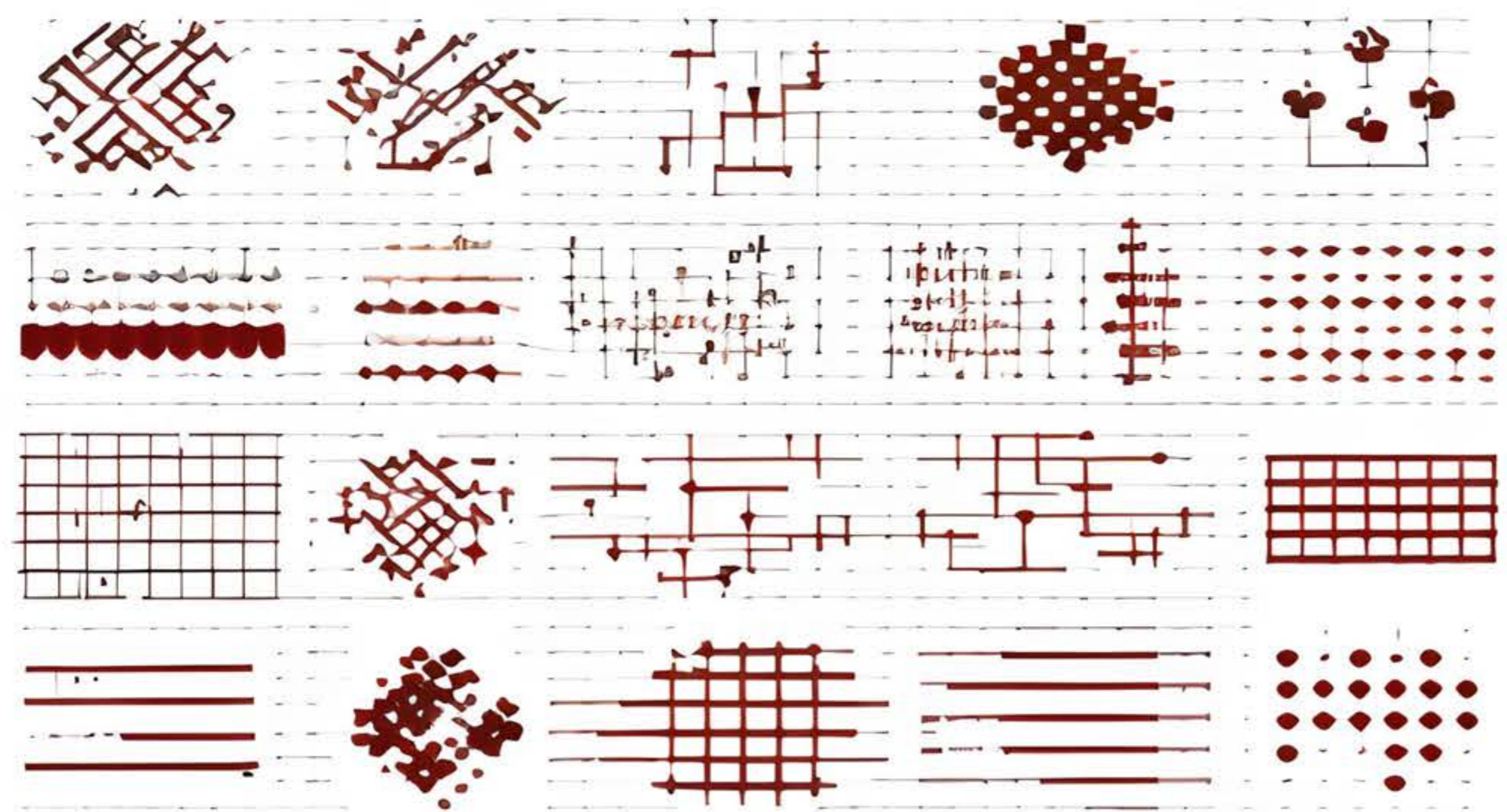
Results & Discussion

Artificial Intelligence has been used to produce imagery of traditional Latvian landscapes, where the models were trained on a dataset of Latvian traditional landscape paintings


From what we've seen so far, AI is doing more than just changing traditional Latvian art and culture; it's sparking entirely new cultural forms. These changes are impacting how Latvians interact with their culture and see their national identity. We're also finding that artistic research, a relatively new form of inquiry, is a valuable tool for understanding and leveraging AI, even contributing to areas like prompt engineering. But these new developments also raise ethical questions about authenticity and representation.

Conclusions

As we continue our research, we're mindful of AI's transformative power and the ethical implications that come with it. AI is both a challenge and an opportunity for the evolution of Latvian art, culture, and identity. Through careful artistic research, we hope to guide the path towards a culturally vibrant and innovative future.
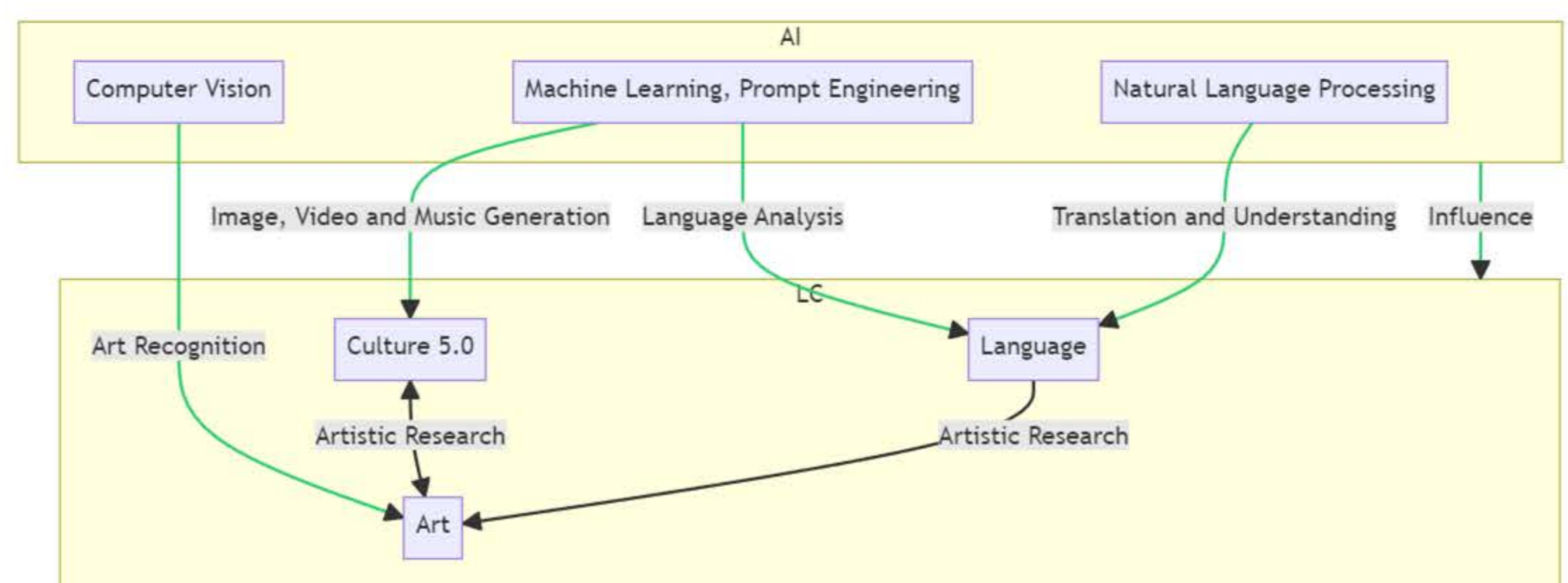
Contact Information

Ph.D Andris Teikmanis +371 29995098 andris.teikmanis@lma.lv Art Academy of Latvia – www.lma.lv

Latvijas Mākslas akadēmija

Why human vision research matters on the way to the inclusive metaverse

Tatjana Pladere

Department of Optometry and Vision Science, Faculty of Physics, Mathematics and Optometry, University of Latvia

Motivation

- Increasing the inclusivity of the metaverse involves addressing the need for a fully accessible experience that extends to individuals with varying visual capabilities.
- This is crucial because the utilization of extended reality (XR) head-mounted displays, which enable complete immersion in the metaverse, relies heavily on the proper functioning of user's eyes and visual system.
- Even users without severe vision problems encounter difficulties when using near-eye displays.
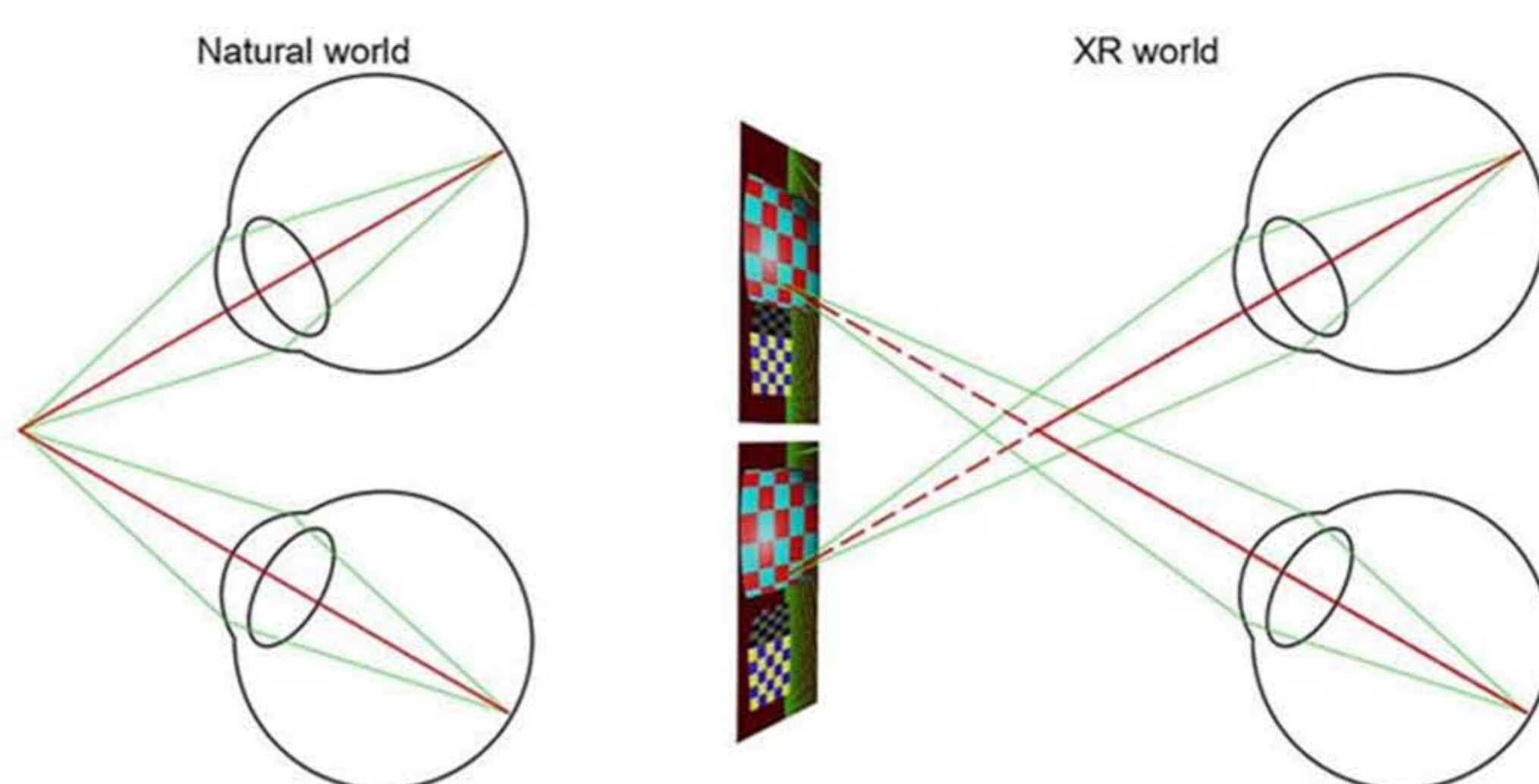
In the natural world, when fixating on a real object, the eyes accommodate and converge appropriately for that object's distance. In XR, the focal distance of all virtual objects is the same as the focal distance of the display irrespective of the objects' distances. When fixating on a virtual object, the eyes need to accommodate at 2 m, while converging appropriately for the virtual object's distance (Pladere et al., 2022).

Aim (2022-2024)

- We aim to develop guidelines for assessing the visual effectiveness and ergonomics of novel displays.
- These guidelines will allow to elucidate how well an innovative display aligns with the visual needs of its intended users, and provide insights for enhancing the technology to better suit human vision.

Main findings

- **Visual functions.** Despite individual variations being observed in both vergence and accommodation, XR induced changes in accommodation are more pronounced and consistent compared to vergence.
- **User comfort.** The majority of individuals experience discomfort within 30 minutes of using near-eye displays, regardless of the display and content being viewed. The main issues reported are eye strain, fatigue, and headaches.
- **User performance.** Individuals who struggle to maintain binocular fusion in natural world may face additional challenges when using near-eye displays due to the vergence-accommodation conflict.
- **Methodology. Objective measurements** using video-based eye-tracking, dynamic photosciascopy, and EEG **are more suitable** for studying the impact of different displays on the visual system, as opposed **to subjective measurements** like optometric tests.
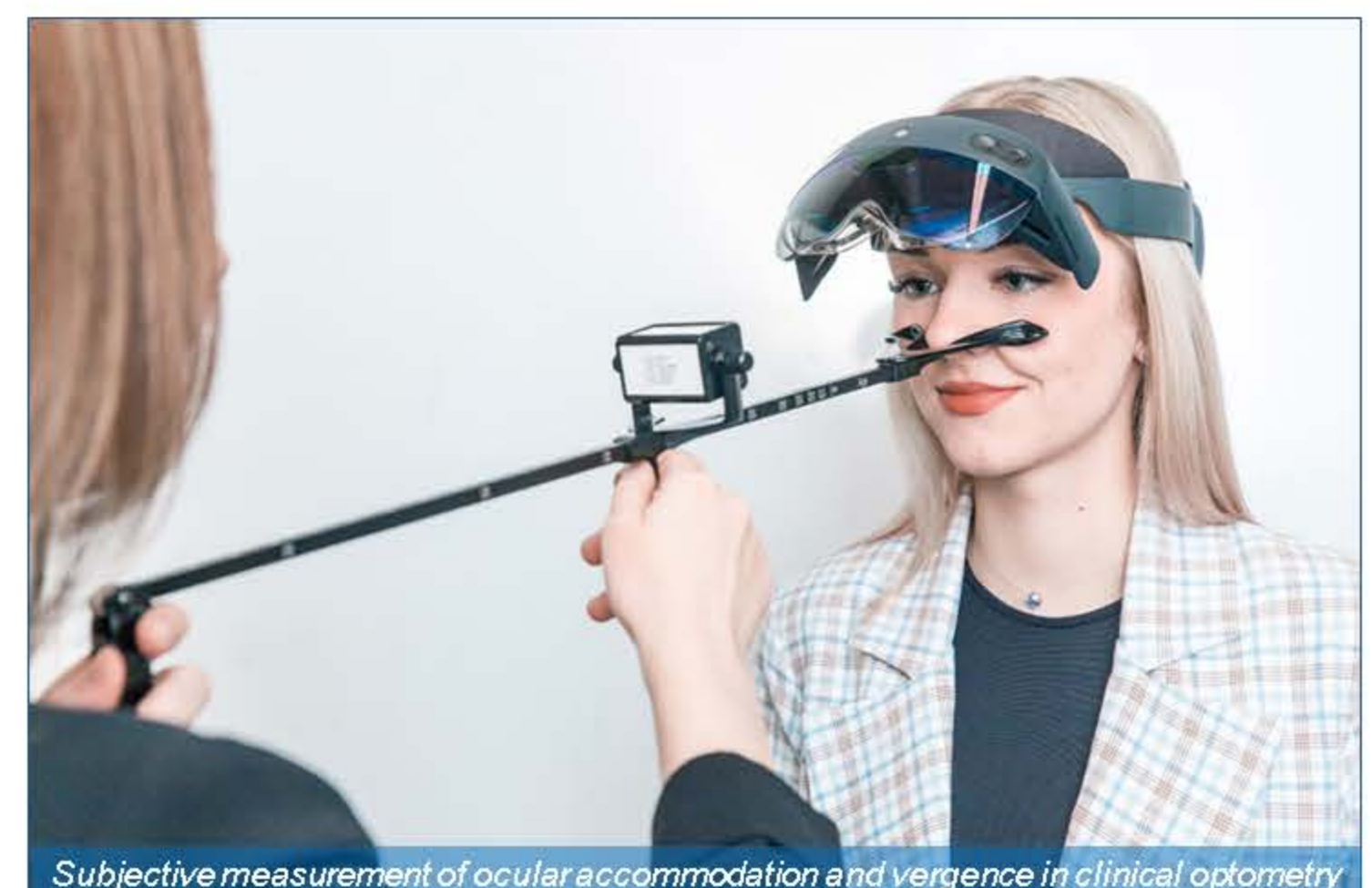
More information
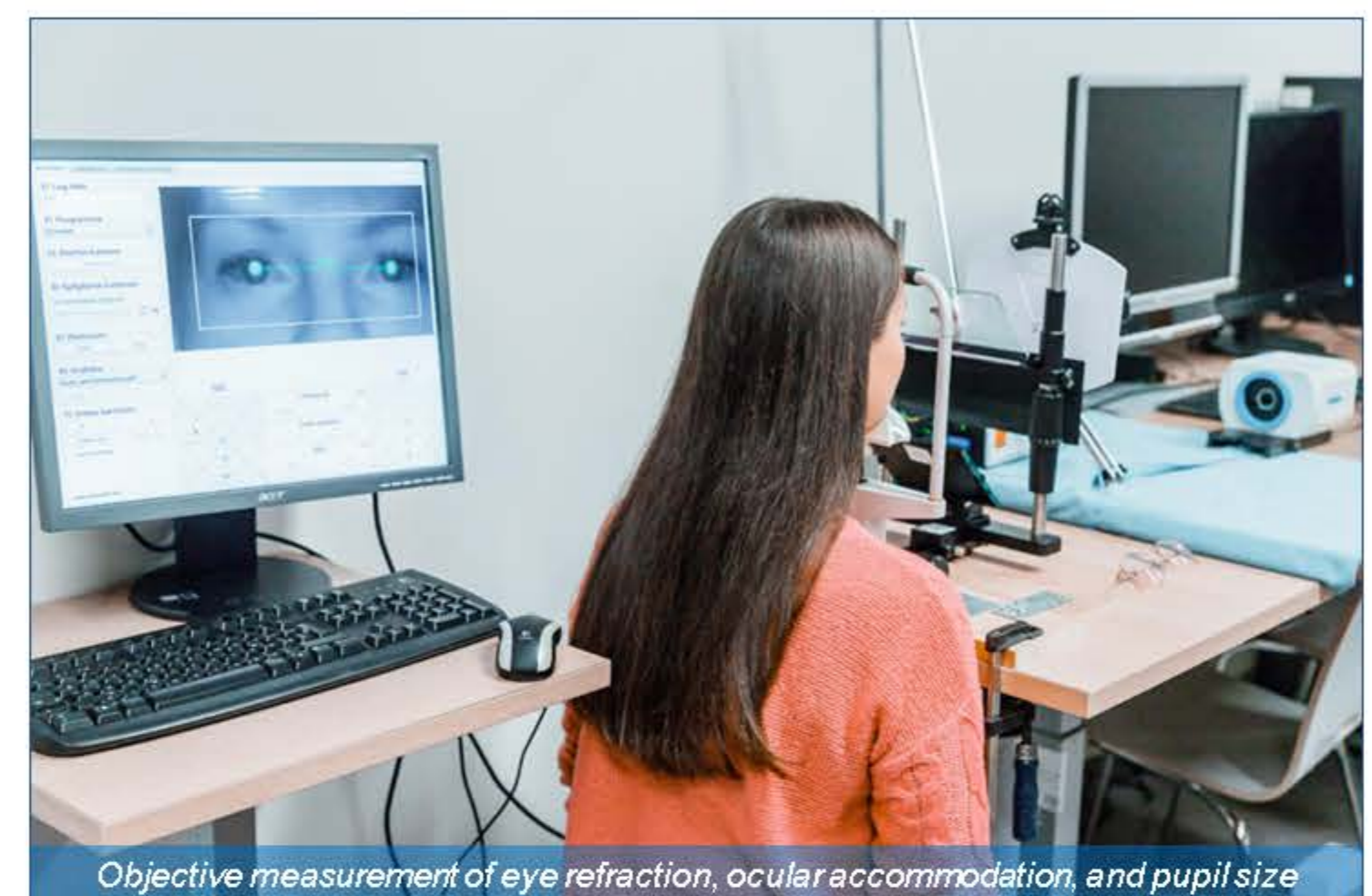
- Reach out: tatjana.pladere@lu.lv

Extended reality-based simulators in higher education and professional training

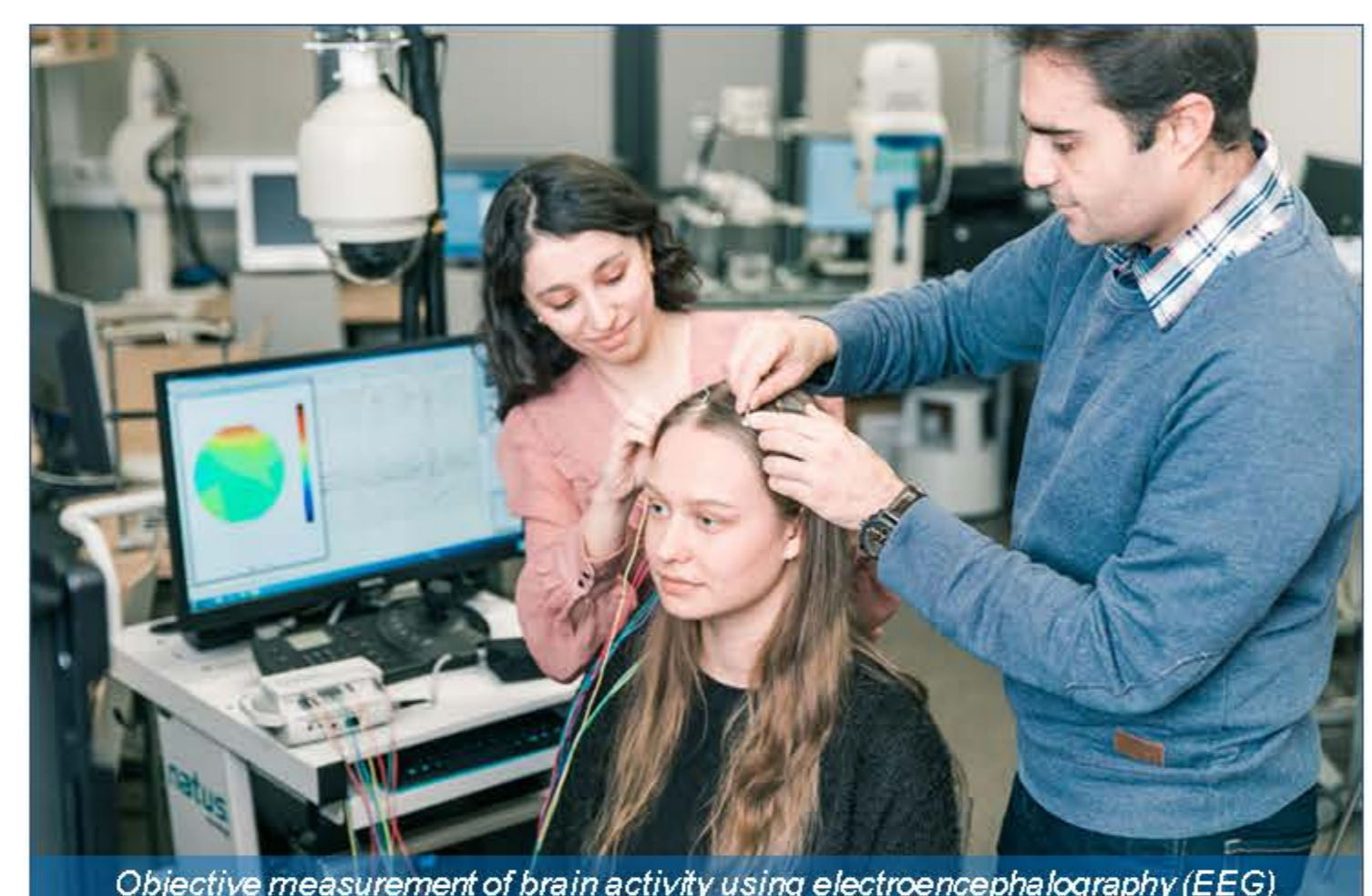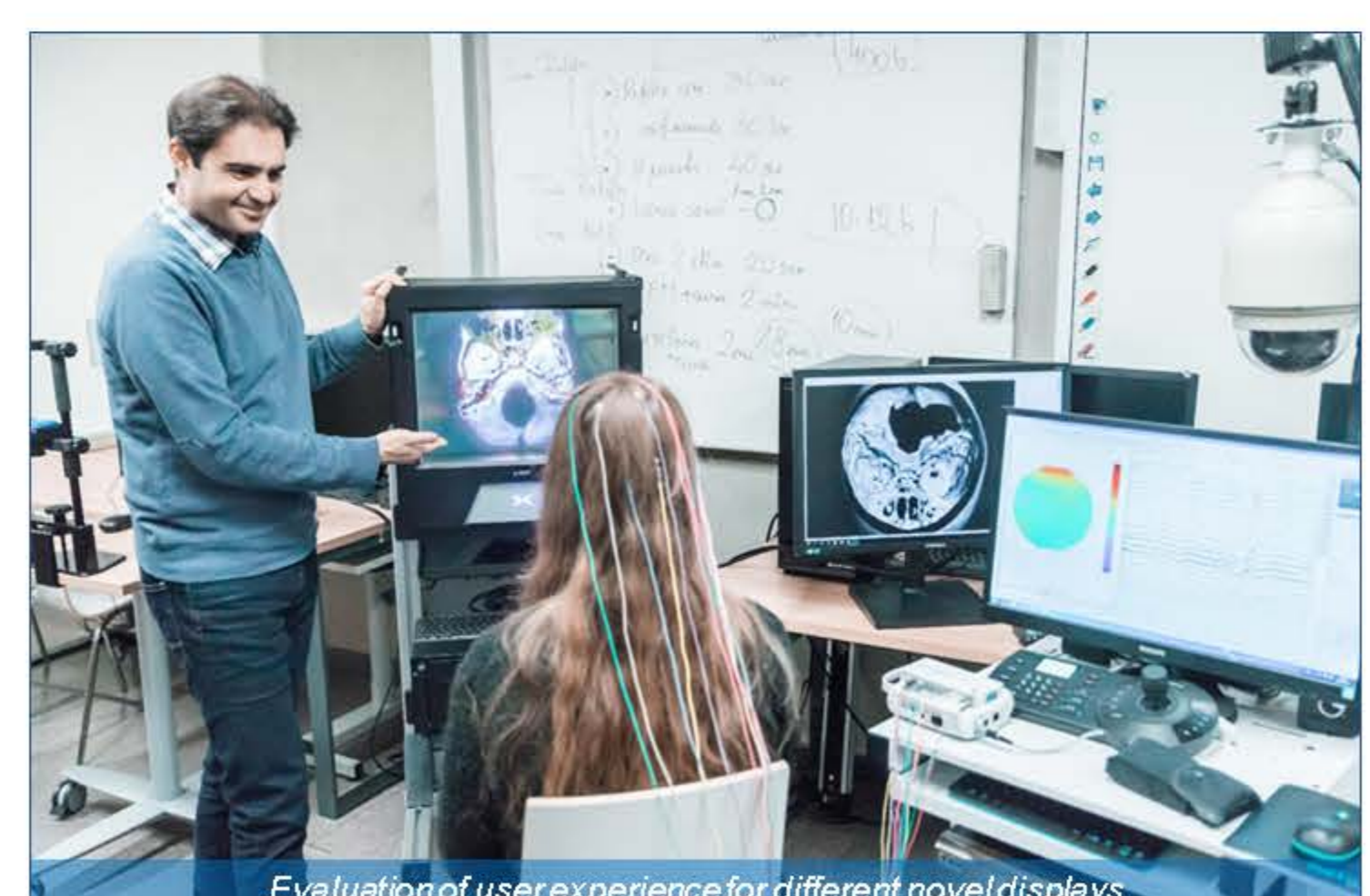Extended reality in everyday environments

Subjective measurement of ocular accommodation and vergence in clinical optometry

Objective measurement of eye refraction, ocular accommodation, and pupil size

Objective measurement of brain activity using electroencephalography (EEG)

Evaluation of user experience for different novel displays

UNIVERSITY OF LATVIA

FLPP FUNDAMENTAL AND APPLIED RESEARCH PROJECTS

DROVIDS: A Platform for Workplace Safety and Employees Well-being

Rūta Pirta-Dreimane, Jānis Grabis, Brigita Dejus, Anatolijs Borodiņecs, Ralfs Matisons, Mārtiņš Strods, Juris Tihomirovs, Roberts Ozols, Juris Laicāns, Rolands Zaharovs

Riga Technical university, Data Technology Group

Introduction

The Covid-19 pandemic has transformed the dynamics of the workforce and the workplace. Being affected by Covid-19, organizations had to mitigate the risks of workplace safety and their negative effects on the health of employees and society. The workplace conditions, such as optimal CO_2 level, humidity, are essential factor to ensure the safety and wellbeing of employees. A safe work environment and the wellbeing of the employees are enterprise productivity and sustainability catalysator and technologies can enable it.

Research Objective

The project aims to create a platform for a safe working environment integrating advanced information and communication technologies and biotechnologies. The platform combines business continuity planning, IoT, big data, computer vision, machine learning and wastewater analytics technologies for comprehensive Covid-19 and other infections risk assessment, mitigation and prevention in workplaces where the nature of work limits remote working options, such as shift-based manufacturing companies.

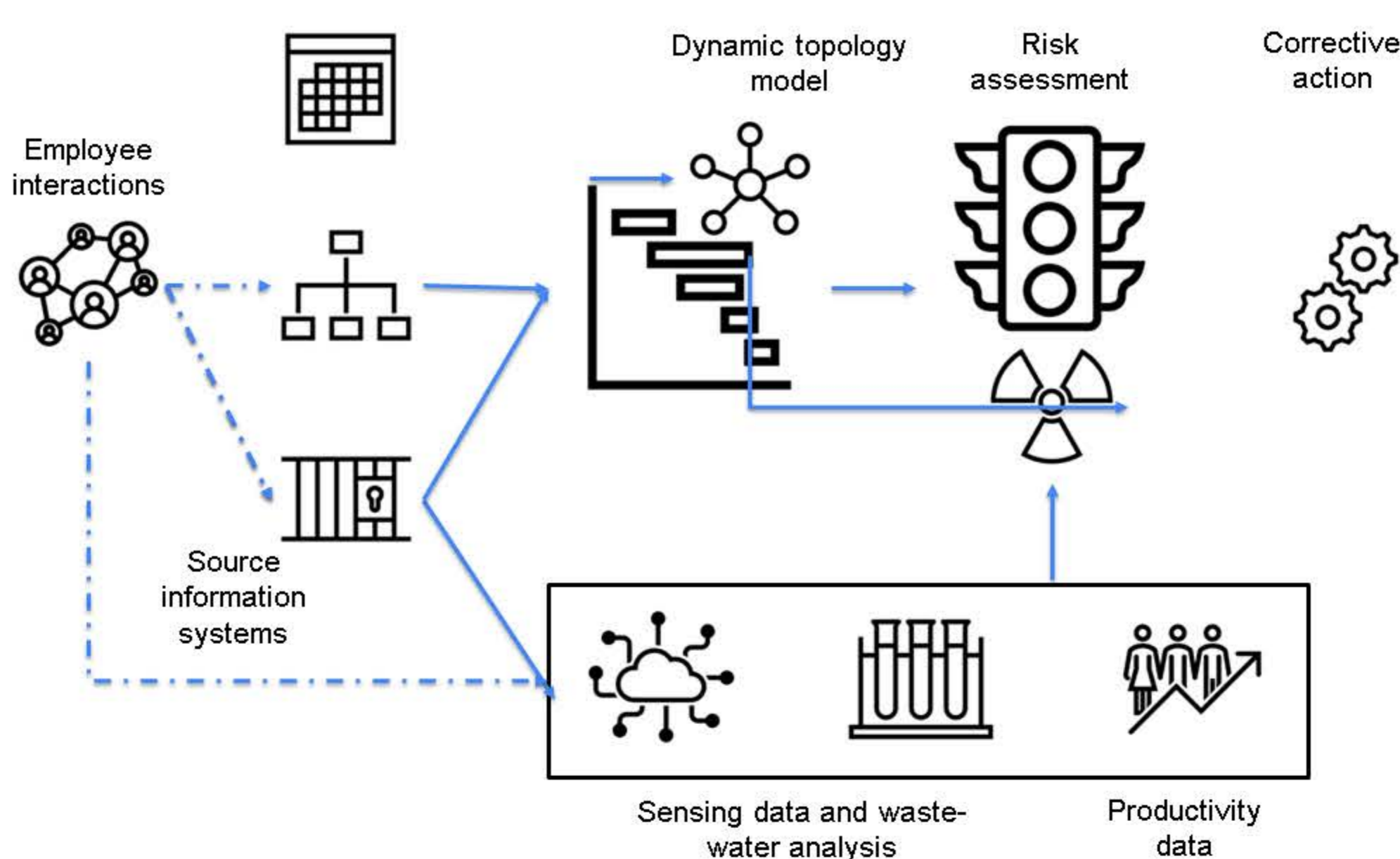Figure 1. Key Challenges

Results & Discussion
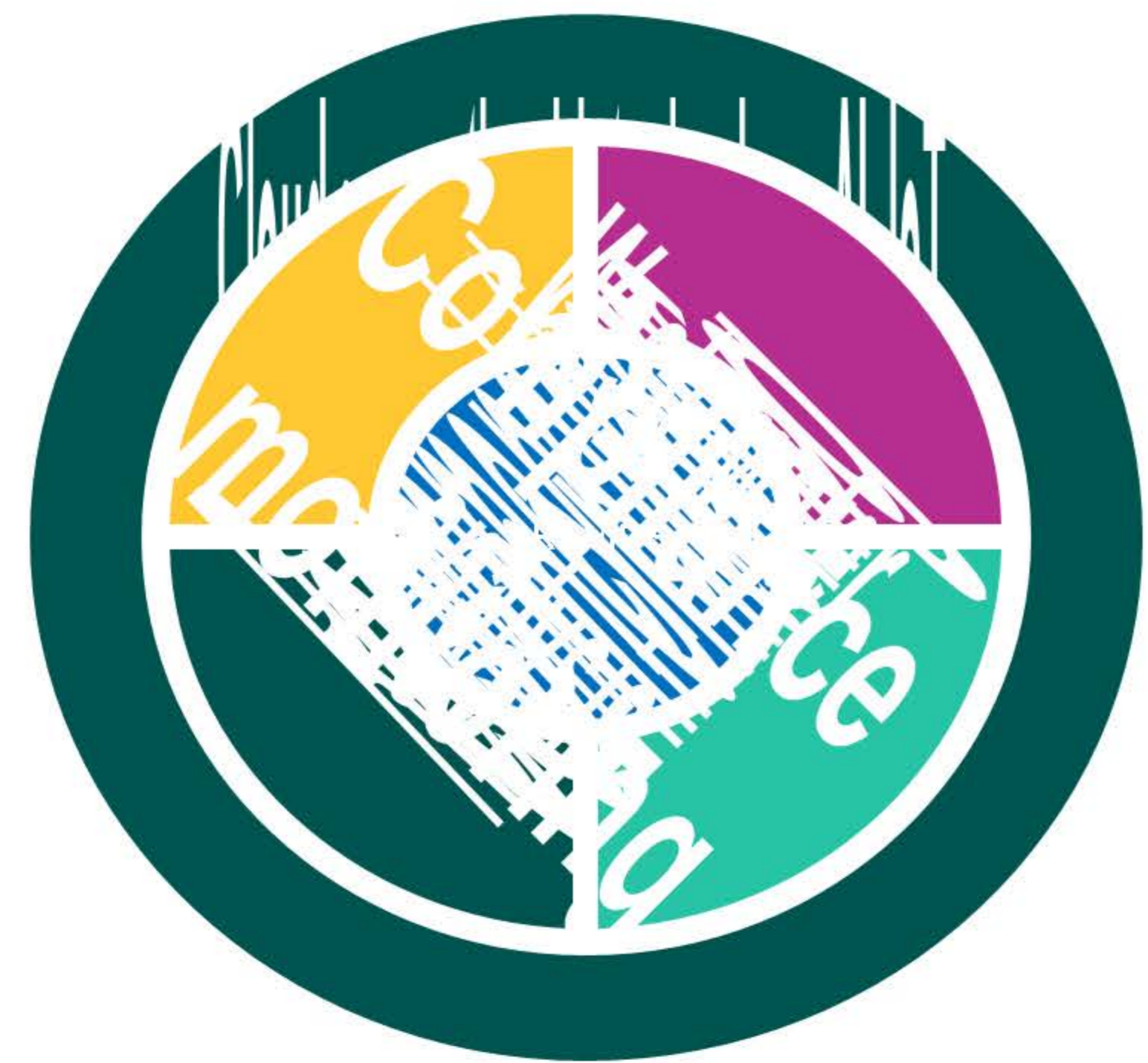

Figure 2. Risk management approach

Figure 3. DROVIDS platform capabilities

As the result a new integrated approach to managing infection risks at organizations have been developed. It uses cross-disciplinary scientific methods to ensure non-intrusive and preventive minimization of infection risks. These sensing technologies provide predictive, preventive and prescriptive capabilities. They are deployed in organizational context to improve tailoring of mitigation measures and to ensure business continuity. The proposed approach allows tailoring of work activities depending on macro and micro monitoring results in a non-intrusive manner.

Conclusion

The proposed approach and platform advance the state of the art by integrating IoT sensing technologies and wastewater analysis to provide capabilities for limiting the spread of infectious diseases. The adjustment recommendations are provided in the organizational context taking into account interactions among employees as determined from organizational information systems. The current research focuses on Covid-19 though the model can be adapted to different infectious diseases.

Contact Information

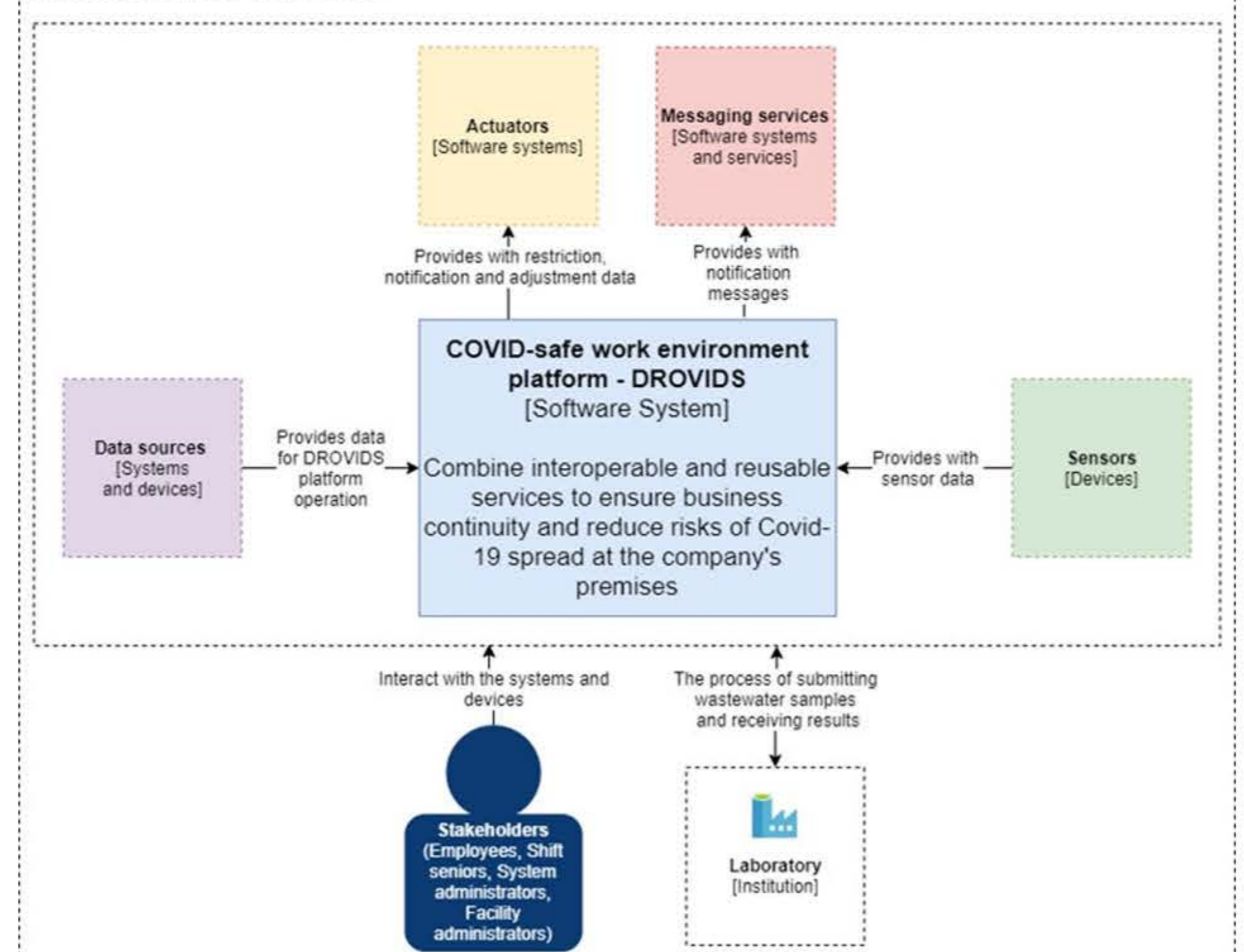Rūta Pirta-Dreimane, RTU Senior Researcher, ruta.pirta-dreimane@rtu.lv, http://iti.rtu.lv/vitk

Figure 4. DROVIDS Technical Architecture

Energy-efficient pulse position modulated fiber optical transmission link

S. Spolitis, D. Prigunovs, S. Migla, D. Ortiz, O. Selis, P. E. Sics, A. Ostrovskis, T. Solovjova, J. Semenjako, A. Aboltins

Institute of Telecommunications, Riga Technical University, Riga, Latvia

Introduction

Latvian fiber optical links typically use on-off keying modulation (OOK) with non-return-to-zero (NRZ) line code. However, pulse position modulation (PPM), popular in free space optical communication (FSO) research, can improve energy efficiency in these systems. Implementing PPM could advance Latvia's technology across fiber optical, wireless, and particularly FSO links, key for space communication and satellite applications. A proof of concept involved data transfer over a 20km fiber optical link, using transmitted-reference PPM pulses lasting 50 ps. Latvian-made event timer Eventech A033-ET together with in-house developed software were employed for the demodulation of high-bandwidth PPM waveform.

Research Objective

The research team demonstrates a high energy-efficient data transfer over a 20 km single-mode fiber optical link using transmitted-reference pulse position modulated (TR-PPM) signals shown in Figure 2. Utilizing position widths of 50, 100, and 200 ps achieved transmission rates of up to 59.5 Mbps. Photodetection challenges were tackled using a high-accuracy event timer, with PPM pulses expanded to 700 ps via a pulse expansion module. This approach paves the way for long-reach, energy-efficient data transmission links. The full setup diagram is shown in Figure 1.
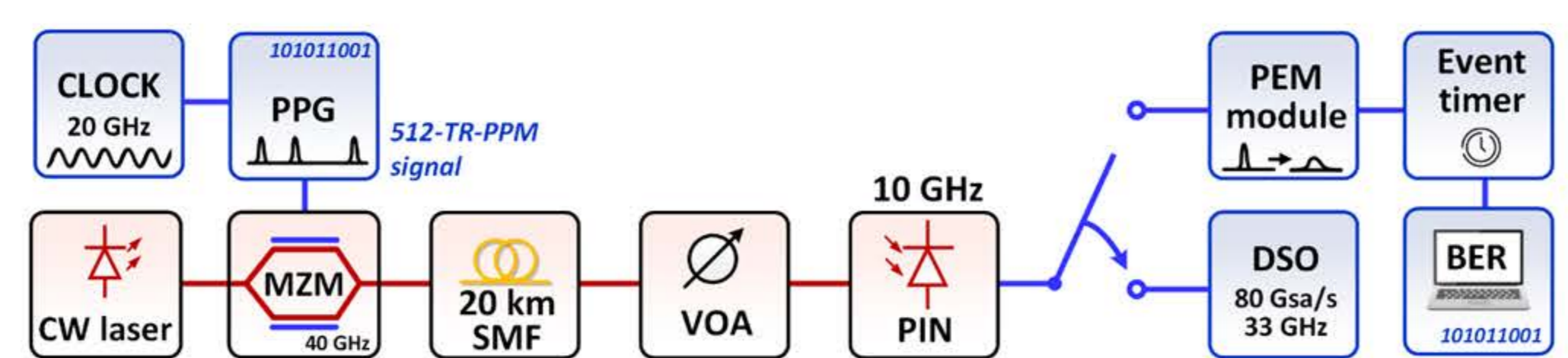

Figure 1. Experimental setup diagram

Results & Discussion

The study evaluates Bit Error Rate (BER) for 512-TR-PPM signals after optical B2B and 20 km SMF transmission, varying pulse and position width durations. A 512-TR-PPM signal with a pulse width of 200 ps demonstrated superior performance, achieving a low BER of 1×10^{-4}. Conversely, a similar signal with a narrower 50 ps position width showed higher BER of 2.5×10^{-2}. Transmission distance did not notably impact BER. The main cause of BER increase is large jitter (50 ps RMS) at the event timer input. Clock signal generator frequency drift affects all intervals in the waveform and can be rectified by receiver software, mitigating the adverse effect on BER.

Figure 2. Otical LAB setup

Figure 3. BER versus average received optical power for 512-TR-PPM signals before and after 20 km of SMF transmission.

Conclusions

The study demonstrated successful transmission of a 512-TR-PPM signal with transmission rates up to 59.5 Mbps, highlighting the significance of position width on BER. Main obstacles included input jitter and analog front-end issues. Introduced signal processing algorithms allowed partially mitigate the clock drift effects. The research affirmed 512-TR-PPM as a promising scheme for energy-efficient long-distance communication.

Figure 4. Event shift from the ideal position for 512-TR-PPM signals after 20 km of SMF transmission with 50 ps position width (a gray area).

Contact Information

http://picoppm.org
Prof. Arturs Aboltins, e-mail: aboltins@rtu.lv

FLPP
FUNDAMENTAL AND APPLIED RESEARCH PROJECTS

1862
RIGA TECHNICAL UNIVERSITY

Balsu talka – ieguldījums atvērtā latviešu valodas runas bankā

Ilze Auziņa[1], Sanita Reinsone[2], Normunds Grūzītis[1], Baiba Saulīte[1], Roberts Darģis[1], Raivis Dejus[3], Pēteris Jurčenko[3], Kitija Balcare[4]

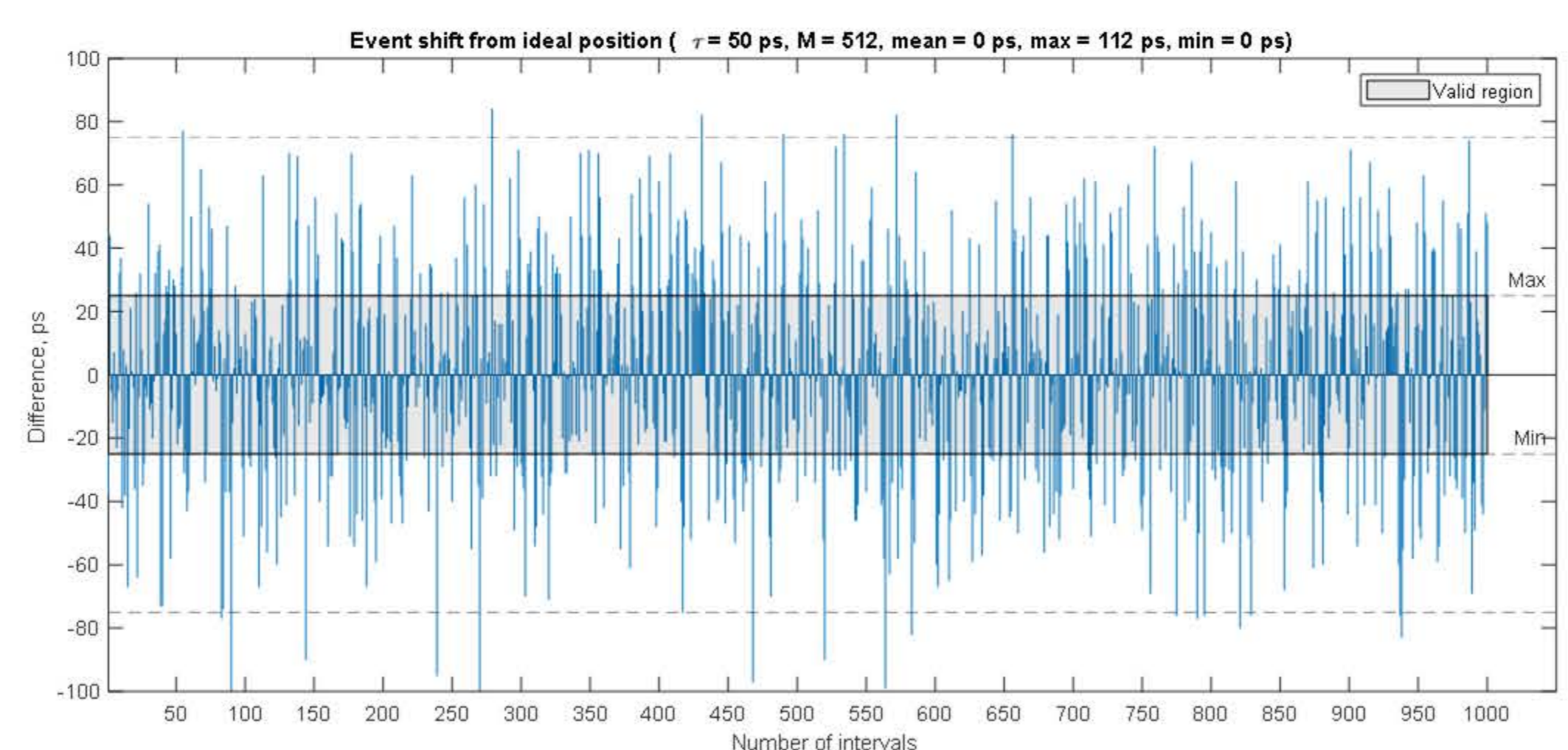LU Matemātikas un informātikas institūts[1], LU Literatūras, folkloras un mākslas institūts[2], LATA[3], UNESCO Latvijas Nacionālā komisija[4]

Ievads

Lielākā daļa latviešu valodas runas datu, ko šobrīd izmanto zinātniskās institūcijas un valodu tehnoloģiju uzņēmumi, nav brīvi pieejami, un tas kavē plašākus pētījumus un inovācijas.

Lai iegūtu pēc iespējas vairāk un daudzveidīgākus runas datus, tiek organizēta "Balsu talka", kurā lūdzam iesaistīties plašu sabiedrību – tūkstošiem dažāda vecuma un tautību cilvēku no Latvijas novadiem un diasporas.

Mērķis

1. Apkopot daudzveidīgus latviešu valodas runas paraugus un to transkripcijas, izveidojot atvērtu un brīvi pieejamu latviešu valodas runas datu banku (runas korpusu) vairāku simtu stundu apjomā.
2. Iegūt nozīmīgu valodas digitālo resursu runas tehnoloģiju izstrādei un lingvistiskiem pētījumiem.
3. Fiksēt un nākamajām paaudzēm saglabāt 21. gs. divdesmitajos gados runāto latviešu valodu.

BALSU TALKA

Sistemātiskai datu vākšanai ir izstrādāta metodika un vadlīnijas. Dati tiek vākti populārajā un runas tehnoloģiju pasaulē plaši izmantotajā atvērtajā *Mozilla Common Voice* platformā.

Balsu talkā tiek ierunāti speciāli atlasīti teikumi, un ir plānota arī spontānas runas ierakstīšana. Talcinieki var ne tikai ierakstīt un iekļaut korpusā savus runas paraugus, bet arī palīdzēt pārbaudīt citu runātāju ierakstus.

Runā

Ziedo savu balsi līdzās tūkstošiem citu! Jo vairāk un daudzveidīgāki būs balsu paraugi, jo ātrāk un veiksmīgāk izdosies attīstīt runas tehnoloģijas latviešu valodā!

Klausies

Palīdzi novērtēt, kā ierunājuši citi! Ierakstu apstiprināšana ir vienlīdz svarīga, lai radītu kvalitatīvus un atvērtus runas datus.
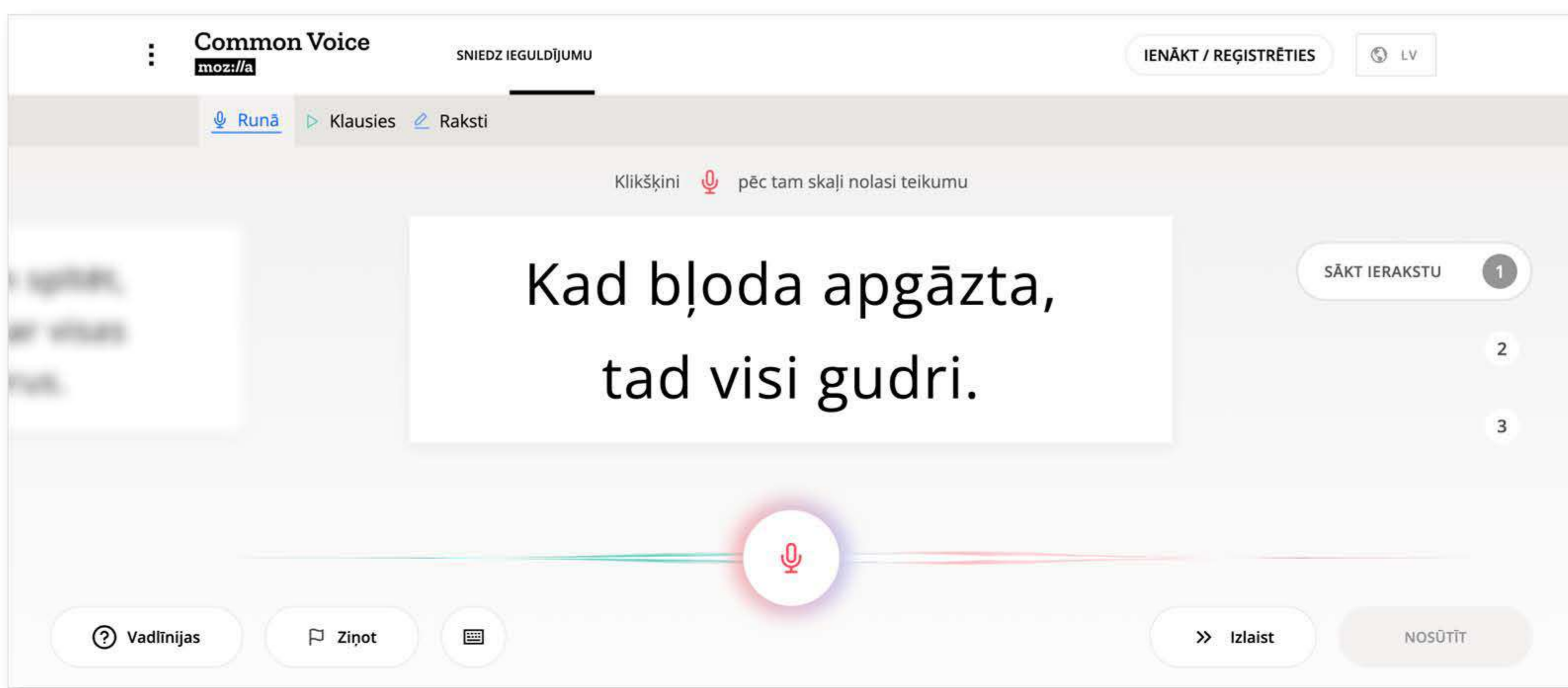
Pašreizējie rezultāti

Latviešu		Lietuviešu		Igauņu		Angļu	
⏱ Ierakstīts	🔊 Runātāji	⏱ Ierakstīts	🔊 Runātāji	⏱ Ierakstīts	🔊 Runātāji	⏱ Ierakstīts	🔊 Runātāji
113h	2393	26h	286	55h	812	3250h	88189
✓ Pārbaudīts	≡ Teikumi	✓ Pārbaudīts	≡ Teikumi	✓ Pārbaudīts	≡ Teikumi	✓ Pārbaudīts	≡ Teikumi
43%	8880	89%	129207	90%	10244	75%	1661373

Talkas organizētāji

Latvijas Universitātes Matemātikas un informātikas institūts

LFMI – LU LITERATŪRAS, FOLKLORAS UN MĀKSLAS INSTITŪTS

LATA

unesco Latvijas Nacionālā komisija

Automatizācijas iespējas Latvijas Civilprocesā

Dr. Aleksandrs Fillers, LL.M.

Rīgas Juridiskā Augstskola

Ievads

Katrā sabiedrībā ir tādi strīdi, ko var izšķirt tikai tiesā. Šī atziņa noteikti attiecas arī uz Latviju. Latvijā tiesas izmanto dažādus tiesu procesus dažādu strīdu izšķiršanai. Liela daļa no strīdiem rodas starp fiziskām un/vai juridiskām personām un tiem bieži ir mantisks raksturs. Šādi strīdi tiek risināti civilprocesa kārtībā.

Visbiežāk civilprocesa kārtībā tiek prasīts piedzīt kādu naudas summu. Šādus prasību bieži pamato ar līgumiskām attiecībām, piemēram, aizdevumu, pirkumu, nomu vai pakalpojumu sniegšanu, utt. Šādus strīdus risina tiesneši, taču pēdējos gados pasaulē aizvien vairāk diskutē, kādā mērā šādu strīdu izšķiršana var tikt savietota, vai pat aizvietota, ar automatizētu strīdu risināšanu. Proti, kādos gadījumos tiesas un tiesneša funkcijas varētu papildināt vai aizvietot mākslīgais intelekts.

Pētījuma mērķis

Pētījuma mērķi:
1) noteikt kritērijus, kas ļautu pamatot automatizācijas iespējamību un tās robežas civilprocesā;
2) identificēt tos civilprocesa elementus, kuri būtu automatizējami;
3) identificēt to civilprocesa, kuros automatizācija būtu iespējama, ar nosacījumu, ka visas strīda puses tai piekrīt.

Pētījuma tvērums ir ierobežots, jo tas attiecas vienīgi uz civilprocesu, tomēr tā secinājumiem var būt nozīme arī citos tiesvedības veidos, piemēram, administratīvā procesā vai kriminālprocesā.

Šī pētījuma ietvaros ar automatizāciju saprot funkciju veikšanu deleģēšanu mākslīgam intelektam vai līdzīgiem tehnoloģiskiem risinājumiem.
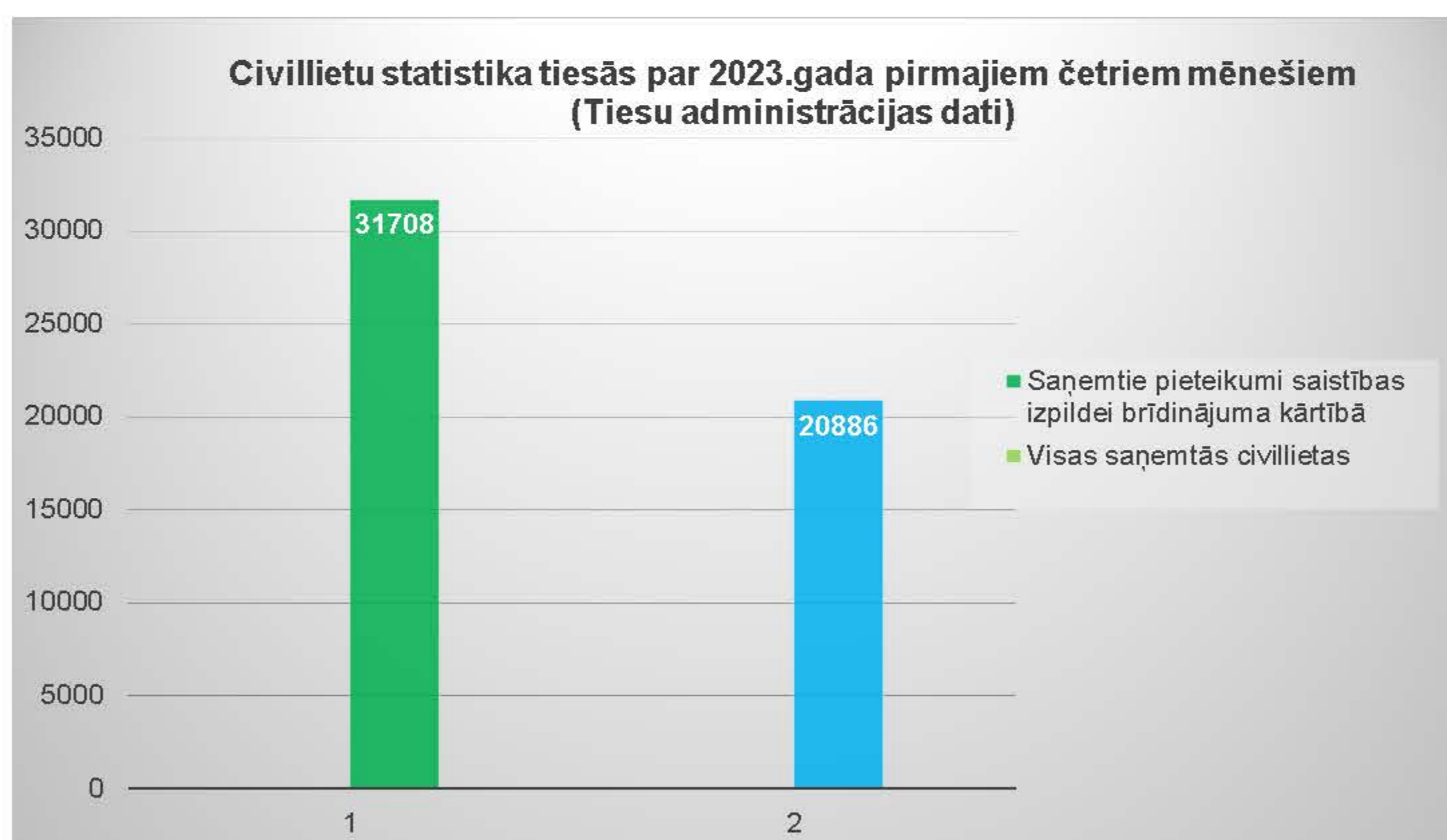
Automatizācijas robežas

Automatizācijas būtu pieļaujama:

A) Tiesas administratīvo funkciju efektivizācijai (piemēram, tiesas pavēstu sagatavošanai)

B) Procesos, kuros tiesas neizlemj strīdu pēc būtības (piemēram, saistību piespiedu izpildīšana brīdinājuma kārtībā);

C) Atsevišķos procesu veidus, kas attiecas uz nelielām naudas prasībām:
  i) ja puses ir piekritušas automatizētai strīda izskatīšanai;
  ii) automatizēto lēmumu ir iespējams pārsūdzēt "tradicionālā" tiesā.

Latvijas tiesvedības stūrakmens ir tiesnesis, kā to paredz Latvijas Republikas Satversmes 82.-83.panti. Tiesnesis ir ne tikai kvalificēta amatpersona, bet arī demokrātiskas iekārtas būtiska sastāvdaļa. Nevelti tiesnešus amatā apstiprina Saeima. Saeima ar savu balsojumu leģitimē tiesnešu varu, radot būtisku saikni starp tiesu un sabiedrību. Tiesnesis pārstāv sabiedrības intereses un vērtības. Vienlaikus pašā civilprocesā ir iestrādāta nepieciešamība pēc cilvēka sprieduma. Civilprocesa likuma 97.panta pirmajā daļā ir nostiprināta atziņa, ka tiesa novērtē pierādījumus, balstoties, cita starpā, dzīves gūtajos novērojumos. Tātad lietā, kuru tiesa izskata lietu pēc būtības, pastāvēs subjektīva vērtējuma elements. Līdz ar to algoritms nevar aizstāt tiesnesi. Tomēr automatizācija būtu pieļaujama tajos tiesvedības aspektos, kuros tiesa nerisina lietu pēc būtības, vai arī tad, ja pusēm tiek dota izvēles iespējas, atrisināt strīdu izmantojot automatizētu. Līdz ar to, automatizācija būtu noteikti ieviešama saistību piespiedu izpildīšana brīdinājuma kārtībā, jo šajā procesā tiesa neskata lietu pēc būtības, bet informē parādnieku par naudas parādu, dodot tam laiku iesniegt jebkādus iebildumus par parāda pamatotību. Šajā procesā tiesa darbojas vienīgi kā starpnieks starp kreditoru un parādnieku. Automatizācijas elementi varētu tikt apsvērti arī citos gadījumos. Piemēram, attiecībā uz vienkāršotās procedūras lietām. Šī lietu kategorija aptver nelielas naudas prasības, kas šobrīd nepārsniedz 2 500 eiro. Parasti šīs lietas raksturo to vienkāršība un nepieciešamība pēc ātras tiesvedības, jo nelielā naudas summa neattaisno ilgu tiesvedību. Šajās prasībās tiesa izlemj lietu pēc būtības, bet būtu atbalstāma iespēja veidot tiešsaistes platformas, kurās strīdu varētu izskatīt automātiski, ja visas iesaistītās puses ir piekritušas šādam risinājumam. Tomēr katrai no pusēm būtu saglabājamas tiesības šādu nolēmumu pārsūdzēt pie tiesneša. Vienlaikus šajā lietu kategorijā automatizācija nevarētu notikt bez pušu piekrišanas, jo šīs lietas tiesa izlemj pēc būtības un katrai pusei ir jābūt tiesībām uzstāt, lai lietu izskata tiesa tādā izpratnē, kādā tā ir nostiprināta Latvijas Satversmē.

Secinājumi

Autora ieskatā civilprocesa stūrakmens ir un paliek tiesneša figūra. Cilvēciskais faktors ir neatņemama civilprocesa daļa, kuru nevar aizvietojama. Tomēr automatizācija var palīdzēt tiesnešiem fokusēt uzmanību uz svarīgām un sarežģītām lietām. Tādēļ automatizācija būtu pieļaujama tajos tiesvedības aspektos, kuros tiesa strīdu nerisina pēc būtības. Primāri varētu automatizēt saistību piespiedu izpildīšanu brīdinājuma kārtībā. Šāda automatizācija būtiski mazinātu slogu uz tiesu sistēmu, jo tikai 2023.gada pirmajos četros mēnešos pieteikumi šajā procesā sastādīja 65% no visām civillietām, ko ir saņēmušas tiesas. Tāpat varētu apsvērt automatizācijas ieviešanu attiecībā uz vienkāršotās procedūras lietām (nelielām naudas prasībām). Lai gan bieži šādās lietās netiek risināt īpaši sarežģīti jautājumi, tomēr tiesa tās risina pēc būtības. Bet tas nozīmē, ka pusēm varētu piedāvāt automatizētu strīda izšķiršanu, bet to tām nevar uzspiest.

Civillietu statistika tiesās par 2023.gada pirmajiem četriem mēnešiem (Tiesu administrācijas dati)

- 1: 31708 — Saņemtie pieteikumi saistības izpildei brīdinājuma kārtībā
- 2: 20886 — Visas saņemtās civillietas

Kontaktinformācija

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Papīra izmantošana digitalizācijas laikmetā - Jelgavas izglītības sistēmas piemērs

Raimonds Kupčs

Latvijas Biozinātņu un tehnoloģiju universitāte

Ievads

Lai sekmētu digitālo pāreju, jāsāk ar ikdienas paradumiem, kas tieši ietekmē gan resursu ilgtspējīgu izmantošanu, gan dabas saglabāšanu.
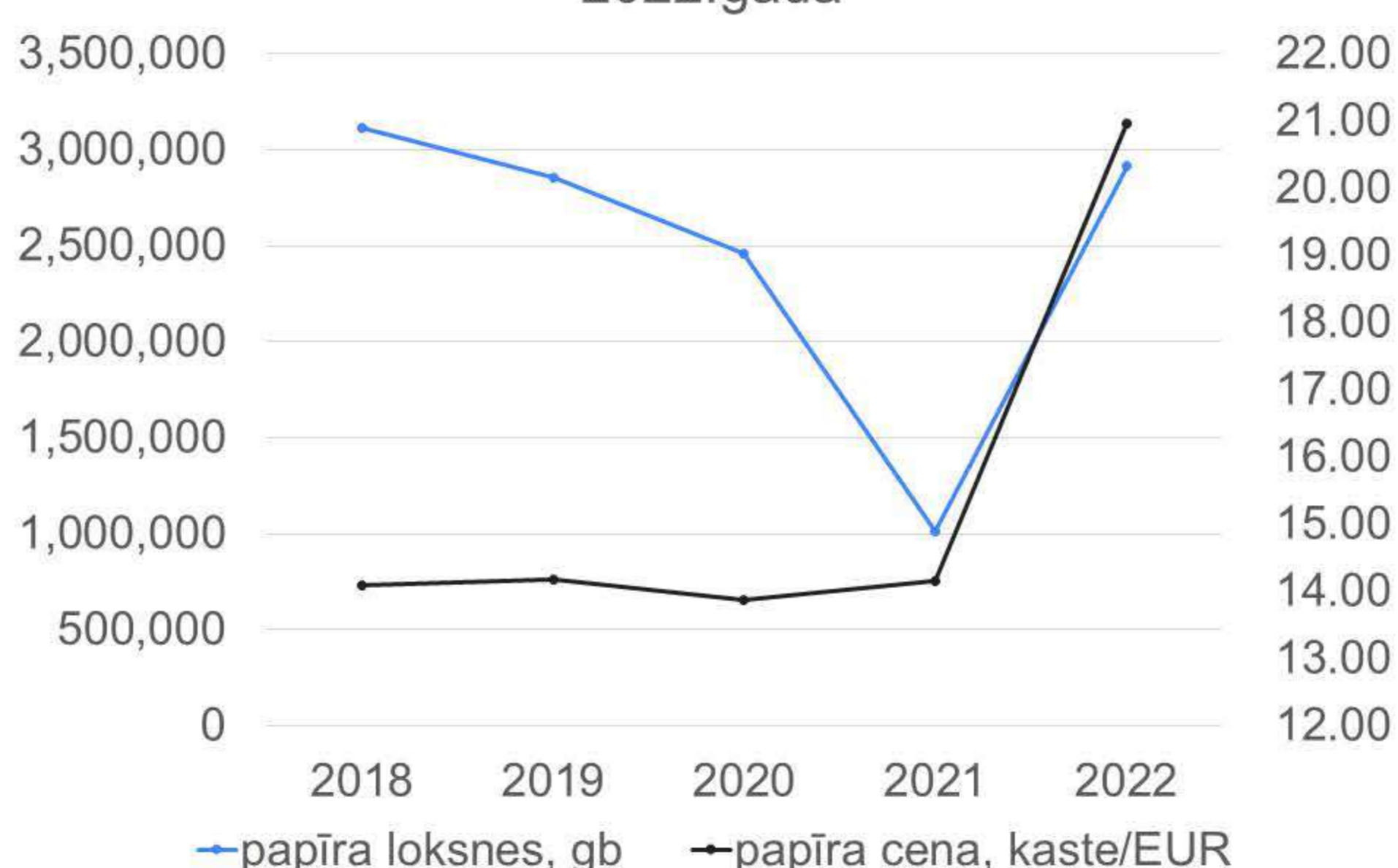
Viena no šādām lietām ir papīra izmantošana.

Covid-19 pandēmija izteikti izcēla digitalizācijas nozīmi un radīja spiedienu pārejai uz digitālo formātu, tai skaitā, arī dokumentu apritē, taču, neskatoties uz to, papīra lietošana ikdienā nesamazinās.

Pēc speciālistu aplēsēm vidēji biroja darbinieks patērē 10 000-12 000 A4 lapu gadā.

Autors uzskata, ka, izglītojot sabiedrību par tās ietekmi uz vidi, mērķēti investējot digitālajās tehnoloģijās un mainot ikdienas paradumus, ir iespējams samazināt papīra izmantošanu un sekmēt digitālo pāreju.

Pētījuma mērķis

Iegūt datus un izpētīt reālo statistiku par papīra izmantošanu 25 Jelgavas izglītības sistēmas iestādēs par laika periodu no 2018. līdz 2022.gadam.

Izanalizēt dažādus rādītāji – pasūtījumu biežums, papīra skaits, cena, ieguldījumi digitālajās tehnoloģijās, darbinieku un izglītojamo skaits, kā arī citus relatīvos rādītājus uz 1 darbinieku vai izglītojamo.

Izglītības iestādes tips	Iestāžu skaits
Pirmsskola	11
Pamatskola (t.sk., sākumskola)	3 (1)
Vidusskola (t.sk., ģimnāzija)	5 (2)
Speciālā	2
Interešu	1
Profesionālā ievirze	1
Profesionālā	1
Pārvalde (administrācija)	1

Rezultāti un diskusija

Papīra izmantošanas apjoms un cena 2018.-2022.gadā

Papīra apjoms un digitālās platformas uz 1 izglītojamo 2018.-2022.gadā
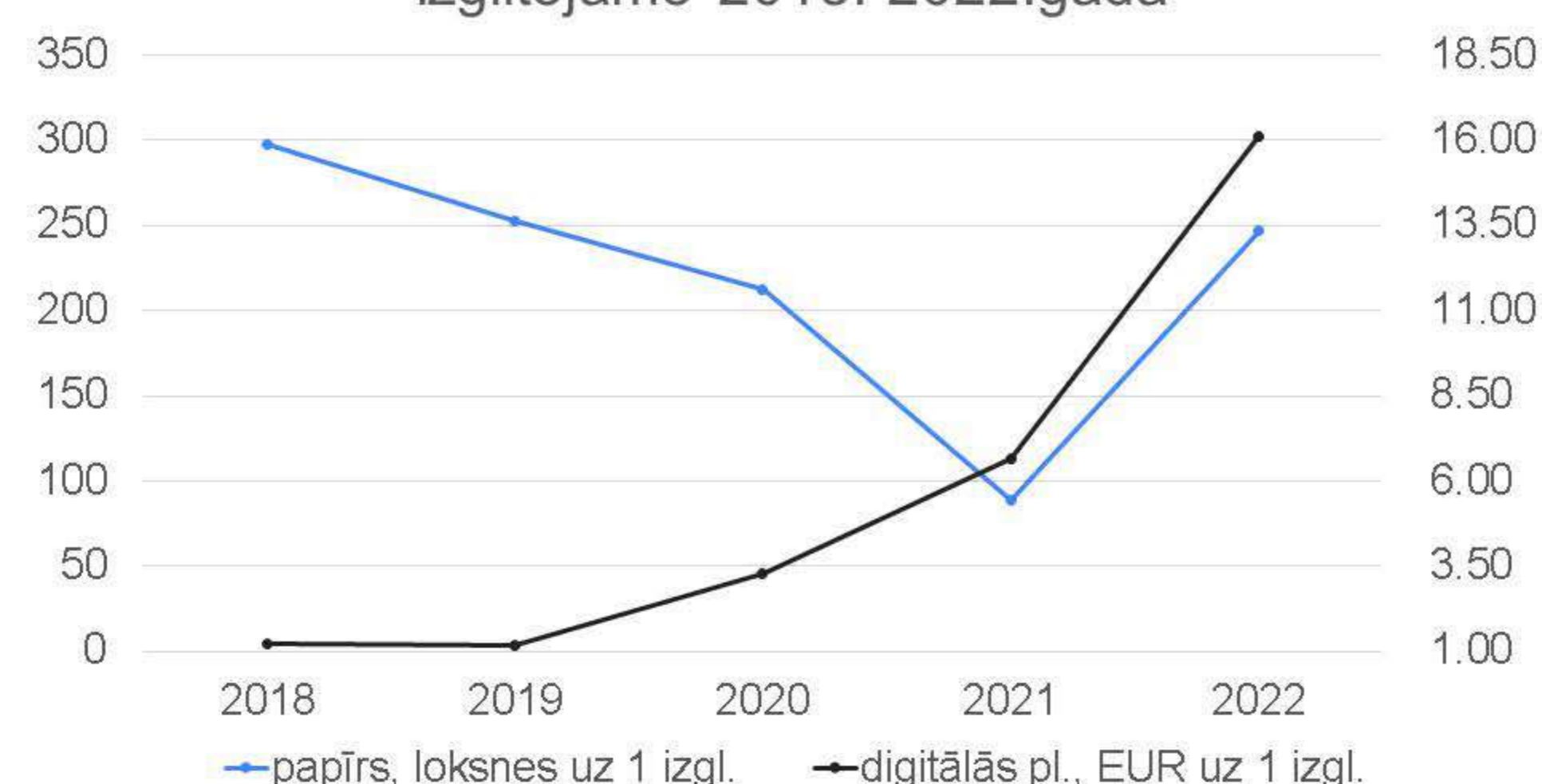
No 2018. līdz 2021.gadam bija tendence samazināties papīra izmantošanai (-67,5%), vienlaikus palielinoties darbinieku (+7,4%) un izglītojamo (+9,4%) skaitam, kā arī ieguldījumiem digitālajās tehnoloģijās (+12,9%).

Tomēr 2022.gada dati parādīja, ka samazinājums bija Covid-19 ierobežošanas pasākumu rezultāts un papīra izmantošana pret 2021.gadu pieauga par 188,2%, sastādot 93,6% no 2018.gada apjomiem.

Vēl lielāku papīra pieaugumu 2022.gadā bremzēja straujās cenu izmaiņas (+48,9%). Regresijas analīze parādīja, ka ieguldījumiem digitālajās tehnoloģijās nepastāv, savukārt izglītojamo un darbinieku skaitam pastāv saikne ar papīra izmantošanas apmēriem.

Secinājumi

Investīcijām tehnoloģijās jābūt mērķētām uz papīra samazināšanu.

Jāveic izglītošanas pasākumi, kuri maina domāšanu un uzvedību papīra izmantošanā, popularizējot un rādot priekšrocības, kuras rada digitālā pāreja.
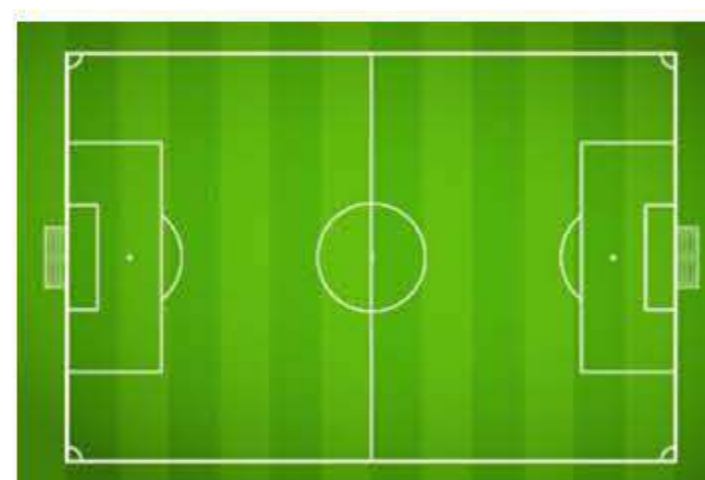
Papīra izmantošanas apmēri sistēmā gadā vizualizēti:

x 15 t

x 20

x 300 gb

Kontaktinformācija

Mg.oec. Raimonds Kupčs / kupcs.raimonds@gmail.com / +371 26118368

Aija Ozola, Kristīne Mārtinsone

Rīgas Stradiņa universitāte,
Veselības psiholoģijas un pedagoģijas katedra

Mūzika, tehnoloģijas, pašpalīdzība: Tīmekļa intervence psihiskajai labizjūtai

Ievads

Pašpalīdzība – iesaistīšanās uzvedībā savas veselības un labizjūtas atbalstam – ir viens no ikvienam indivīdam pieejamiem resursiem, kas var sekmēt psihisko veselību un psiholoģisko noturību (Rancāns u.c., 2021).

Pēdējās desmitgadēs pasaulē vērojams digitālo risinājumu straujš kāpums, tostarp tīmekļa intervenču izstrāde, psihiskās veselības un labizjūtas atbalstam (de Witte et al., 2021). Intervenču nozīmīga sastāvdaļa bieži ir mūzika (Röpke et al., 2020).

Integrēts psiholoģijas, mūzikas terapijas un cilvēka – datora mijiedarbības jomas teoriju skatījums rosinājis ideju par intervenci ar lietotāja aktīvu iesaisti mūzikā balstītās aktivitātēs. Jāatzīst, ka līdz šim Latvijā nav izstrādātas tīmekļa intervences, kas balstītas mūzikā.

Pētījuma mērķis

Pētījuma mērķis bija izstrādāt mūzikā balstītu tīmekļa intervenci pašpalīdzības veicināšanai.

Balstoties uz pašpalīdzības konceptualizāciju Pašpalīdzības stratēģiju aptaujā (Mārtinsone, Perepjolkina un Ruža, 2022, sk. 1. att.) un izmantojot plaši atzīto intervences kartēšanas metodoloģiju (Bartholomew Eldredge et al., 2016), tika izstrādāta, izvērtēta un digitalizēta mūzikā balstīta intervence 14 pašpalīdzības stratēģijām, ko veido ap 120 aktivitāšu.

- Profesionālā attīstība
- Kolēģu atbalsts
- Garīgās reliģiskās prakses
- Personīgās un profesionālās dzīves balanss
- Garīgās nereliģiskās prakses
- Veselības uzvedība
- Rekreācijas pasākumi
- Sociālais atbalsts
- Rūpes par savu labizjūtu
- Laika plānošana
- Iedvesmas smelšanās dabā
- Psiholoģiskā un profesionālā atbalsta saņemšana
- Būšana vienatnē un klusumā
- Izklaide

1. attēls. Pašpalīdzības stratēģiju aptauja (Mārtinsone, Perepjolkina un Ruža, 2022)

Rezultāti un diskusija

MŪZIKA PAŠPALĪDZĪBAI

Intervences kartēšana

4. solis
- Aktivitāšu izklāsts

3. solis
- Uzvedības pārmaiņu metodes
- To praktiskais risinājums

2. solis
- Prognozējamais uzvedības iznākums
- Veiktspējas mērķi
- Veiktspēju noteicošie faktori
- Pārmaiņu mērķi
- Terapeitiskie faktori

1. solis
- Mērķgrupas vajadzības

2. attēls. Mūzikā balstītas tīmekļa intervences pašpalīdzības rosināšanai kartēšana

Pašpalīdzības stratēģija: Laika plānošana		Uzvedības pārmaiņu posms: Apzināšanās		
Vērtēšanas kritēriji		Mdn	IQR	CVI
1. Uzvedības iznākums				
Pašpalīdzības stratēģijas uzvedības iznākuma saskanotība ar intervences sagaidāmo uzvedības iznākumu		2,00	2,00; 2,00	1,00*
2. Veiktspējas mērķi, to noteicošie faktori, pārmaiņu mērķi				
Veiktspējas mērķu atbilstība uzvedības pārmaiņu posmam		2,00	2,00; 2,00	0,86*
Veiktspēju noteicošo faktoru un pārmaiņu mērķu atbilstība uzvedības pārmaiņu posmam		2,00	2,00; 2,00	0,86*
Veiktspējas mērķu, to noteicošo faktoru un pārmaiņu mērķu savstarpējā saskanotība		2,00	2,00; 2,00	0,86*
3. Terapeitiskie faktori				
Terapeitisko faktoru piemērotība lietotāju mērķgrupai		2,00	2,00; 2,00	1,00*
Terapeitisko faktoru piemērotība lietotāja patstāvīgam darbam bez speciālista atbalsta		2,00	2,00; 2,00	1,00*
4. Uzvedības pārmaiņu metodes un to praktiskais risinājums				
Uzvedības pārmaiņu metožu saskanotība ar veiktspējas mērķiem, to noteicošajiem faktoriem un pārmaiņu mērķiem		2,00	2,00; 2,00	1,00*
Uzvedības pārmaiņu metožu piemērotība lietotāju mērķgrupai		2,00	2,00; 2,00	1,00*
Uzvedības pārmaiņu metožu un to praktiskā risinājuma piemērotība lietotāju patstāvīgam darbam bez speciālista atbalsta		2,00	2,00; 2,00	0,86*
Uzvedības pārmaiņu metožu un to praktiskā risinājuma savstarpējā saskanotība		2,00	2,00; 2,00	0,86*
5. Aktivitātes				
Aktivitāšu satura atbilstība uzvedības pārmaiņu posmam		2,00	2,00; 2,00	0,86*
Terapeitisko faktoru identificējamība aktivitātēs		2,00	2,00; 2,00	1,00*
Aktivitāšu satura atbilstība uzvedības pārmaiņu metodēm		2,00	2,00; 2,00	0,86*
Aktivitāšu materiālu izklāsta (teksta un / vai vizuālā risinājuma) vienkāršība, saprotamība un valodas stilistiska atbilstība lietotāju mērķgrupas vajadzībām		2,00	2,00; 2,00	0,86*

Piezīmes. N=7. *CVI ≥ 0,7.
1. tabula. Intervences komponentu izvērtēšana (fragments)

Tika īstenoti intervences kartēšanas soļi: identificētas mērķgrupas vajadzības, izstrādāti un pilnveidoti intervences komponenti (sk. 2. att.). Darba grupa (n = 5) un starpdisciplinārs ekspertu panelis (n = 7) veica intervences komponentu izvērtēšanu katrai pašpalīdzības stratēģijai atbilstoši 14 kritērijiem, un, apkopojot vērtējumus, tika noteikts satura validitātes indekss (CVI, sk. 1. tab.). Lielākā daļa vērtējumu pārsniedza satura validitātes indeksa kritisko robežu (CVI ≥ 0,7), parādot intervences komponentu atbilstību.

Secinājumi

Pētījuma pirmajā posmā identificēti mūzikā balstītas tīmekļa intervences pašpalīdzības veicināšanai komponenti, intervence digitalizēta un sagatavota pētījumam pieaugušo izlasē.
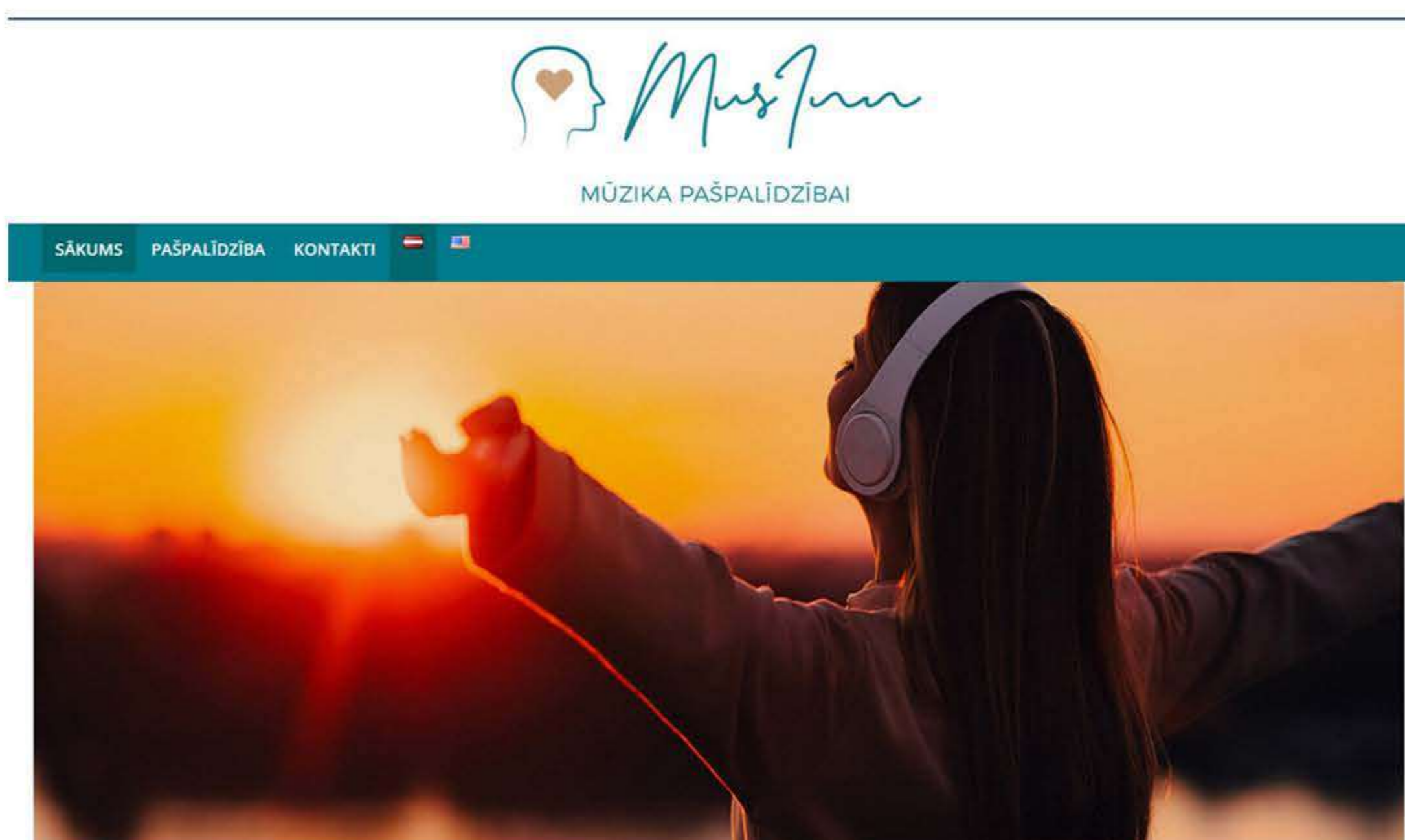
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MŪZIKA PAŠPALĪDZĪBAI

SĀKUMS   PAŠPALĪDZĪBA   KONTAKTI

Kontaktinformācija

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RĪGAS STRADIŅA UNIVERSITĀTE

STUDENTU PĒTNIECĪBAS UN INOVĀCIJU GRANTI

VIP VERTIKĀLI INTEGRĒTI PROJEKTI

Concept of "Your Classroom" - modern learning space and openeness to diversity

Ilga Šuplinska (Dr.philol., Rēzekne Academy of Technology),
Reinis Znotiņš (Latvian Blockchain Association (LBAA), Master's student of BA School of Business and Finance)),
Daira Morusa (MA, Linguistics, European School of Varese (Italy))
Diāna Bravacka (Mg. philol. Riebiņi Secondary School)

Introduction

In March 2020, in response to the pandemic caused by COVID-19, the video content creation and TV broadcasting platform "Tava klase" was created within two weeks. From April 2020 until the end of the school year, "Your Class" offered 20-minute video lessons in general subjects and also in elective education for grades 1-6, as well as for students in grades 9 and 12, to help them prepare for exams. The created videos were broadcast on two TV channels - "ReTV" and "Sportacentrs.com TV," and they were also viewable on the website www.tavaklase.lv. More than 100 active teachers from all over Latvia were involved in the creation of video content in the spring and created a total of more than 1,200 video lessons, which is more than in the next two seasons combined.
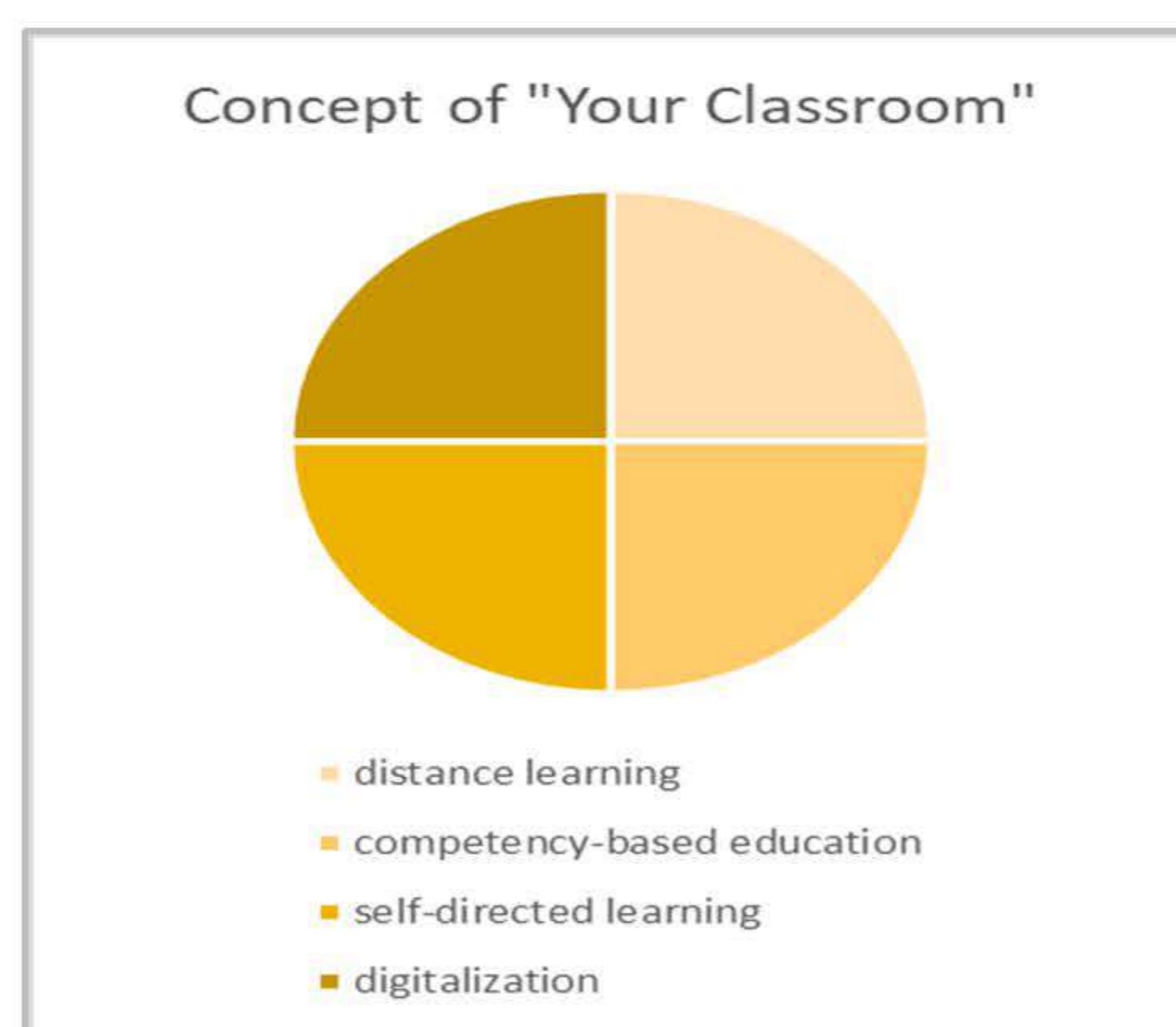
The platform "Tava klase" was internationally recognized as a success story of the Latvian education system. For the first time in the history of Latvia, general education students have had the opportunity to learn the Latgalian and Livionian languages, strengthening their local identity. Furthermore, interactive learning materials for minority languages - Estonian, Lithuanian, Polish and Belarusian have been offered. Because of the English, German and French language lessons, it has been viewed in at least 60 countries.
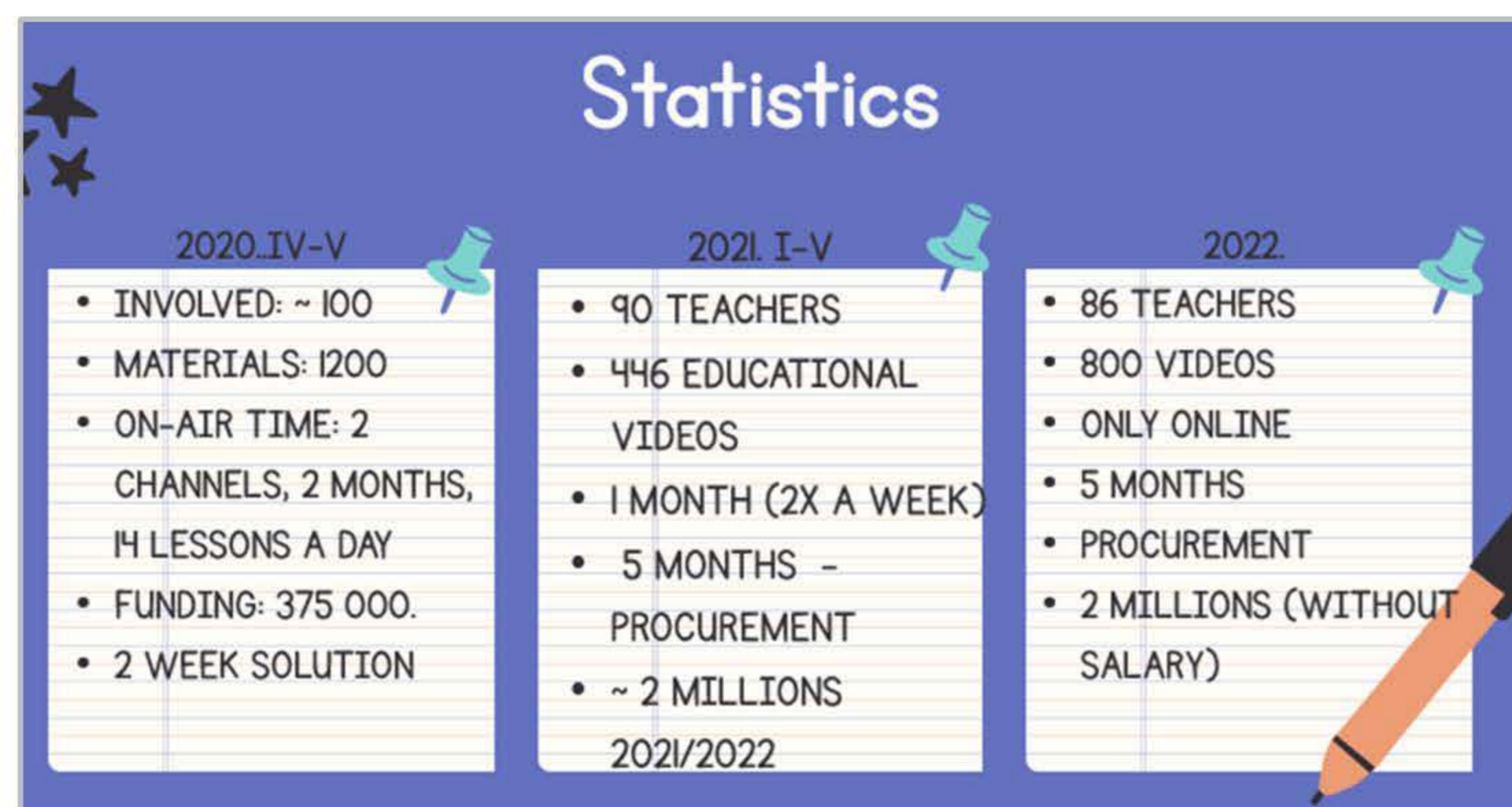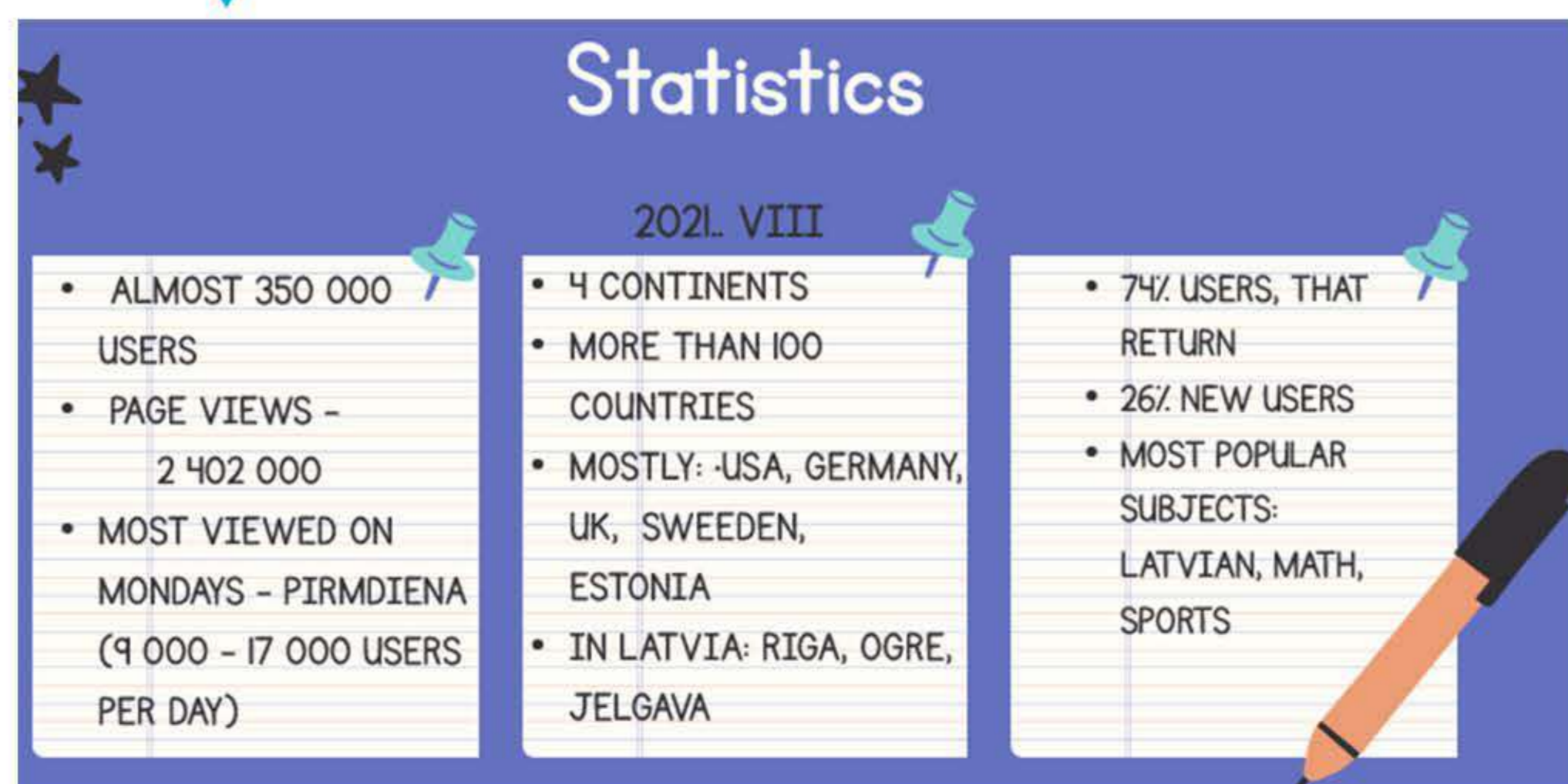
Research Objective

Demonstrate that the developed material and its environment are productive in the educational process for different ages, nationalities and social groups with the potential to accelerate and facilitate digital transformation.

Demonstrate how to redesign the organisation of learning work in a permanent and flexible way in all year groups, using face-to-face, blended and distance learning models.

Concept of "Your Classroom"

- distance learning
- competency-based education
- self-directed learning
- digitalization

Results

Statistics

2021. VIII

- ALMOST 350 000 USERS
- PAGE VIEWS – 2 402 000
- MOST VIEWED ON MONDAYS – PIRMDIENA (9 000 - 17 000 USERS PER DAY)

- 4 CONTINENTS
- MORE THAN 100 COUNTRIES
- MOSTLY: USA, GERMANY, UK, SWEEDEN, ESTONIA
- IN LATVIA: RIGA, OGRE, JELGAVA

- 74% USERS, THAT RETURN
- 26% NEW USERS
- MOST POPULAR SUBJECTS: LATVIAN, MATH, SPORTS

Statistics

2020.IV-V	2021. I-V	2022.
• INVOLVED: ~ 100	• 90 TEACHERS	• 86 TEACHERS
• MATERIALS: 1200	• 446 EDUCATIONAL VIDEOS	• 800 VIDEOS
• ON-AIR TIME: 2 CHANNELS, 2 MONTHS, 14 LESSONS A DAY	• 1 MONTH (2X A WEEK)	• ONLY ONLINE
• FUNDING: 375 000.	• 5 MONTHS – PROCUREMENT	• 5 MONTHS PROCUREMENT
• 2 WEEK SOLUTION	• ~ 2 MILLIONS 2021/2022	• 2 MILLIONS (WITHOUT SALARY)

The "Tava klase" platform has accumulated three seasons, each of them offering its own emphasis on the preparation of learning material (in the 1st season - ensuring a wholistic learning process, in the 2nd season - career education, in the 3rd season - learning material for strengthening a competency-based approach). Its user is both a student who is looking for explanatory, creative material for learning or understanding a subject, as well as teachers and parents, who can become involved in a student's education and support their child, especially in strengthening transversal skills.

Conclusions (user perspective)

The development of such material is critical for the running of the school year, for the implementation of the competences approach and for the continuation of the pervasive competences (self-directed learning, digital, problem-solving, critical thinking). This is demonstrated by: 1) the interest and use of the material by users: 2022/2023 1 208 583 logins, 488 560 unique users, 8000-8500 users on an average weekday, 60% returning users (according to School 2030), 2) the opportunity for the teacher to focus more on understanding and reinforcing the topic, 3) the possibility for the student to study the material 24 hours a day, to choose the pace and the time that suits him/her, 4) the possibility for parents to be involved in the process of learning and supporting the student.

Tavaklase.lv

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World Congress of Latvian Scientists

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Cognitive principles for promoting well-being in the distance education process

Introduction

The pandemic crisis forced distance, communication-enabled training. In addition to positive results, there were also additional unwanted phenomena - the student-teacher feedback is lost in the lessons, as a result of which the lessons are not very cognitive and poorly supported by the audience.

Despite significant problems, remote learning is a result of the progress of the technological era and its application in education is inevitable. Therefore, the improvement and implementation of the methodology of remote classes is an important task of modern training.
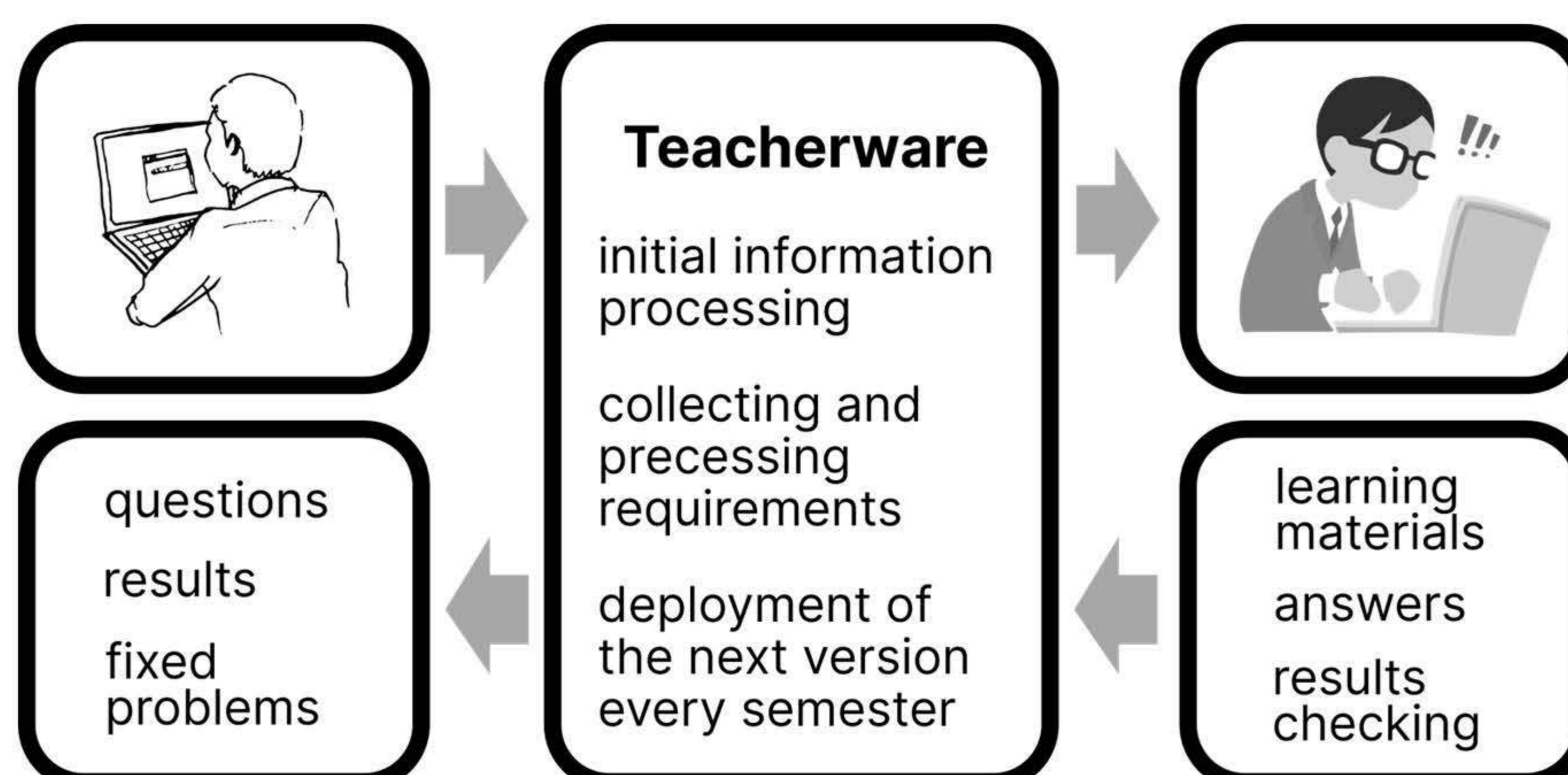
Research Objective

The general goal of the work is to develop a cognitive remote, communication-supported training methodology that ensures the well-being of the participants.
The direct aim of the work is
- create expensive, universal training courses, oriented to several educational institutions, in several countries;
- promote the inclusion of Ukrainian refugee children in the educational process and society in Latvia, also using remote courses in the Ukrainian language;
- promote the rapprochement of education and science systems of Latvia and Ukraine

Results & Discussion

Teacherware

initial information processing

collecting and precessing requirements

deployment of the next version every semester

questions
results
fixed problems

learning materials
answers
results checking

The cognitive effect of distance learning is determined by the learner's ability to solve the problem himself and quickly find the necessary fragment in the learning material. The approach is implemented as follows:
- the learning material is designed electronically using Microsoft 365 and is divided into small portions containing texts, images and voice recordings.
- when solving the tasks, the learner quickly moves to the necessary fragment of the material, using the "handout" type selection.
- if necessary, the student communicates with the teaching force. A feedback loop is formed, which continuously provides the teaching force with data for improving the teaching material. In this way, the learning material is constantly evolving.
The simultaneous solution of issues in Latvia and Ukraine forms the cooperation of international knowledge workers, which brings Ukraine closer to the EU education and science space.

Conclusions

Cognitive, remote technology-enabled learning is in demand. Training courses have been created that largely provide feedback from the learner's learning power to the learner-led learning process.
The approach promotes the involvement of Ukrainian refugee children in the education system in Latvia and can contribute to Ukraine's inclusion in the EU educational science space.

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Unified Approach for Simulation-based Digital Twins

Elīna Lidere

Riga Technical University

Introduction

« A digital twin is a virtual real-time replica of a physical asset or process to monitor, analyze data and simulate different development scenarios. It enables the optimization and improvement of these physical assets and processes, facilitating the development and faster implementation of innovative solutions.

Both at the level of the European Union (EU) and NATO, various digital twin projects are currently being developed, and standardization is being sought so that this approach can be used as widely as possible. For example, the EU is developing planet Earth, human and city digital twin projects to promote competitiveness and sustainable development. Various digital twin projects have been started and planned in Latvia as well.

Research Objective

« The development of a unified approach to simulation-based digital twins is necessary in order to efficiently scale the development, implementation and maintenance of digital twins. Instead of developing its own individual digital twin method for each application, a unified approach would allow more efficient development of digital twins and promote their availability and reusability with less development and maintenance resources.

Conceptual model of Digital Twin

Results & Discussion

Nvidia Digital Twin of Earth

Unified Digital Twin approach
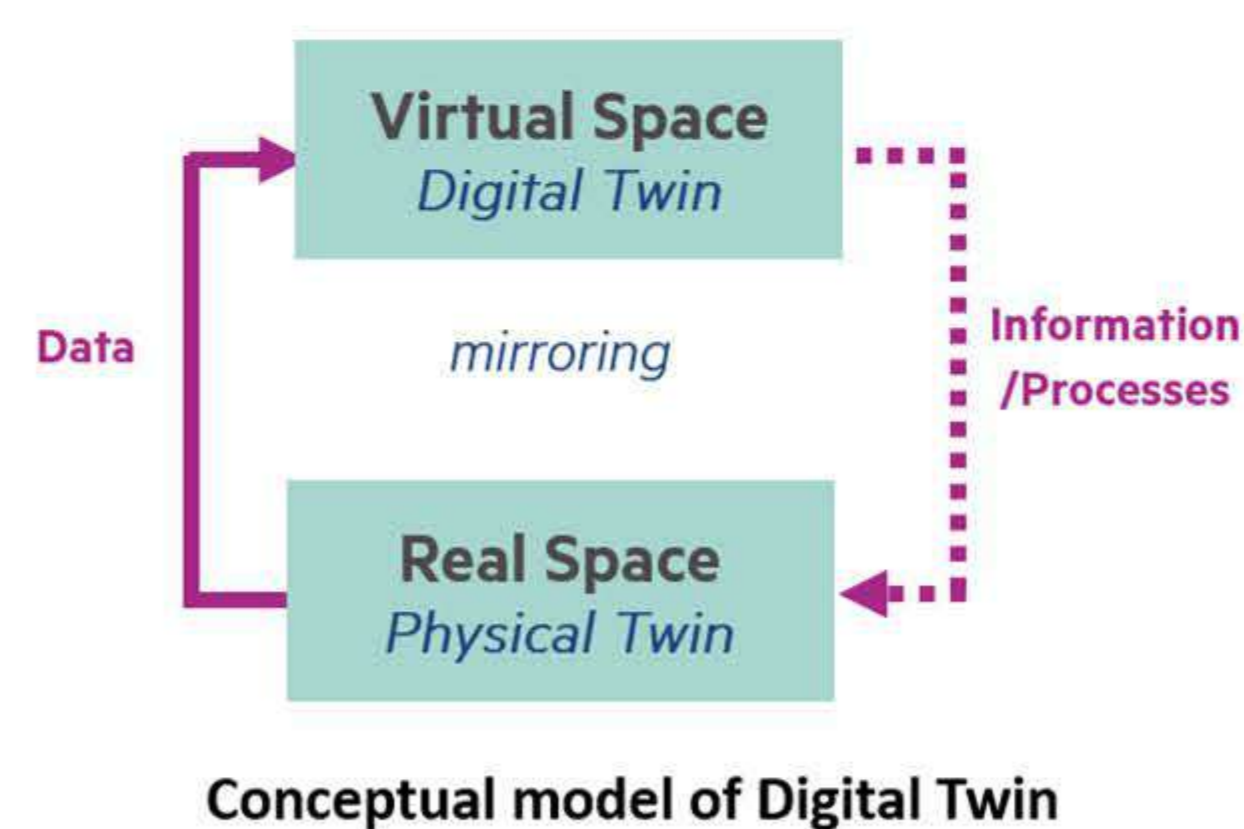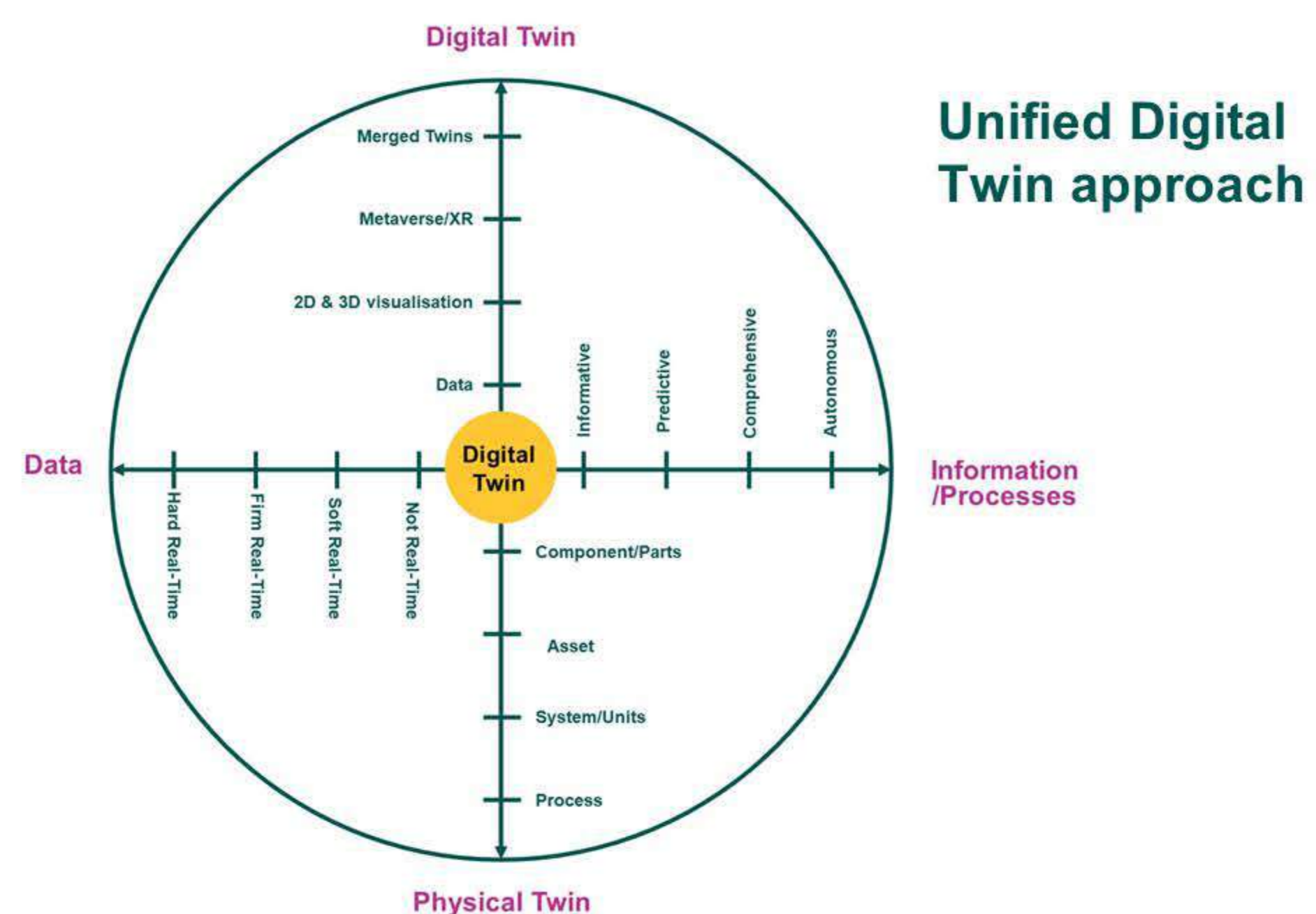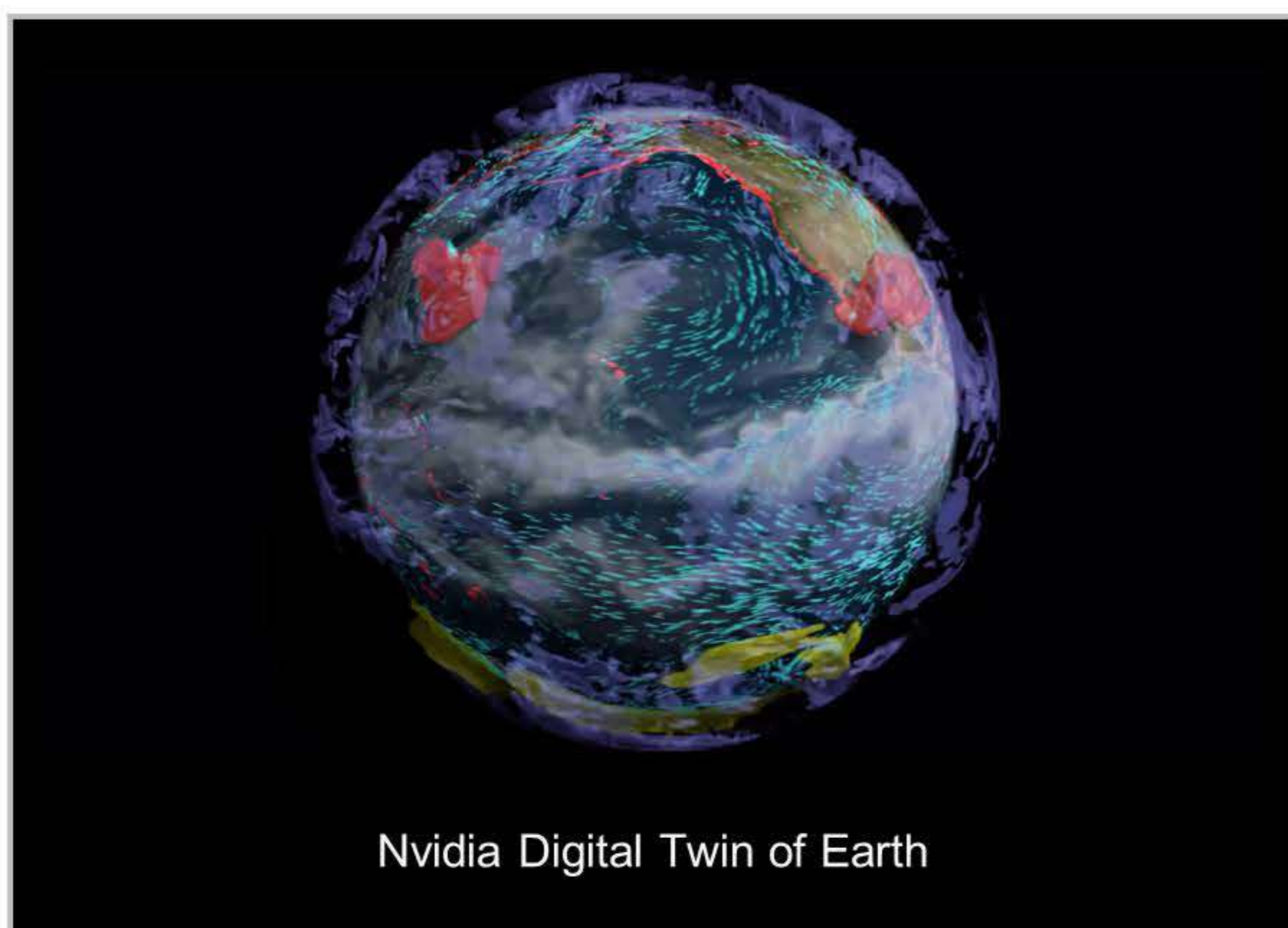
« With the rapid development of sensor and visualization technologies in the digital environment, the number and scope of various digital twin research and development projects is also increasing. Currently, scientists are working on such digital twin models as the digital twin of the Earth, the twin of the human immune system, the twin of the heart, etc. A unified digital twin model would be the basis for a more detailed standardization that would allow for wider deployment and will help to connect different digital twin models. It would also promote a common understanding of the digital twin technology, which is currently being interpreted very differently by both academic and industry sector.

Conclusions

« A unified approach of the digital twin allows more efficient integration of information from different data layers and ensures the development of wider cross-border applications. More detailed standardization of the digital twin model is needed for data acquisition and visualization, simulation and modeling methods, as well as digital twin platforms.

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Towards to Sustainable Business: The Fight With Unfair Commercial Practice in Digital Market

Dr. oec. Santa Bormane[1], Dr. iur. Marta Urbāne[2]
Rīga Stradiņš University

Introduction

With digital marketing playing an increasing role in economy, it is important for legislators to work towards eliminating legal uncertainties in this domain to ensure sustainable development. It matters not only nationally but also internationally in light of the development of technologies, international trade, and border-free services.

In the European Union, one of the policy areas where changes should be made to stimulate transition to sustainable development is trade as a global facilitator of sustainable development. Given the rapid development of technologies, a key role in this context is also played by the fair management of digital marketing.

Specifically, the new technologies implemented by enterprises in the digital environment increasingly affect both the choice of business models and online activities (incl. selling).

Research Objective

The aim of the study is to highlight the risks that affect unfair commercial practices in the digital market.

The study implements a cross-disciplinary approach by incorporating research methods characteristic of law, economics and management sciences in the methodology.

Results & Discussion

Overall, the risk factors associated with minor data processing and use for promotional purposes without parents' consent and the free-market economy where an uncontrolled cross-border transfer and use of consumer data can take place as having the biggest impact on the materialisation of unfair commercial practice and data protection risks. Although some countries have a regulatory framework in place, it is local. For global (incl. international) business activities, the regulatory framework varies.

In respect of unfair commercial practice risk, the authors single out the absence (incl. disproportionality) of effective penal sanctions where the requirements of the Data Protection Regulation are not met in business or the regulatory framework preventing unfair commercial practices as regards publishing inappropriate content, spam etc. is violated. In such cases, lack of anonymity, conduct after establishing violation (incl. actions and process) are mentioned as a major problem.

Although the Latvian regulatory framework envisages consequences for such violations, there are still no clear regulations regarding the enforcement of consumer rights, or the procedural framework of rights protection.

Unfair commercial practices within the digital market are subject to distinct regulatory frameworks in the United States and the European Union. Despite their shared objective of safeguarding consumers against unfair practices, discrepancies arise in terms of legal structures, enforcement mechanisms, and approaches to obtaining consent.

Conclusions

Consequently, this research offers valuable insights to policymakers, businesses, and scholars, underscoring the significance of comprehending and manoeuvring through the diverse regulatory environments to foster equitable and transparent digital commerce. Through the promotion of international collaboration and the exchange of knowledge, stakeholders can strive toward harmonized strategies to counteract unfair practices, thereby establishing an equitable business environment and safeguarding consumer interests within the digital marketplace.

Unfair commercial practice regulation varies among EU member states despite harmonization efforts. Differences are observed in scope, enforcement, provisions, penalties, remedies, and cultural factors. Businesses in the EU must navigate these variations for compliance and fair practices. Policymakers can use this knowledge for harmonization, considering cultural and linguistic factors. Further research is needed to monitor and promote a fair and transparent single market in the European Union.

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RĪGA STRADIŅŠ UNIVERSITY

THE DIVERSITY OF LANDSCAPES IN LATVIA

Ilze Stokmane, Daiga Skujāne, Aija Ziemeļniece, Kristīne Vugule, Una Īle, Natalija Ņitavska, Madara Markova, Aiga Spāģe, Iveta Lāčauniece
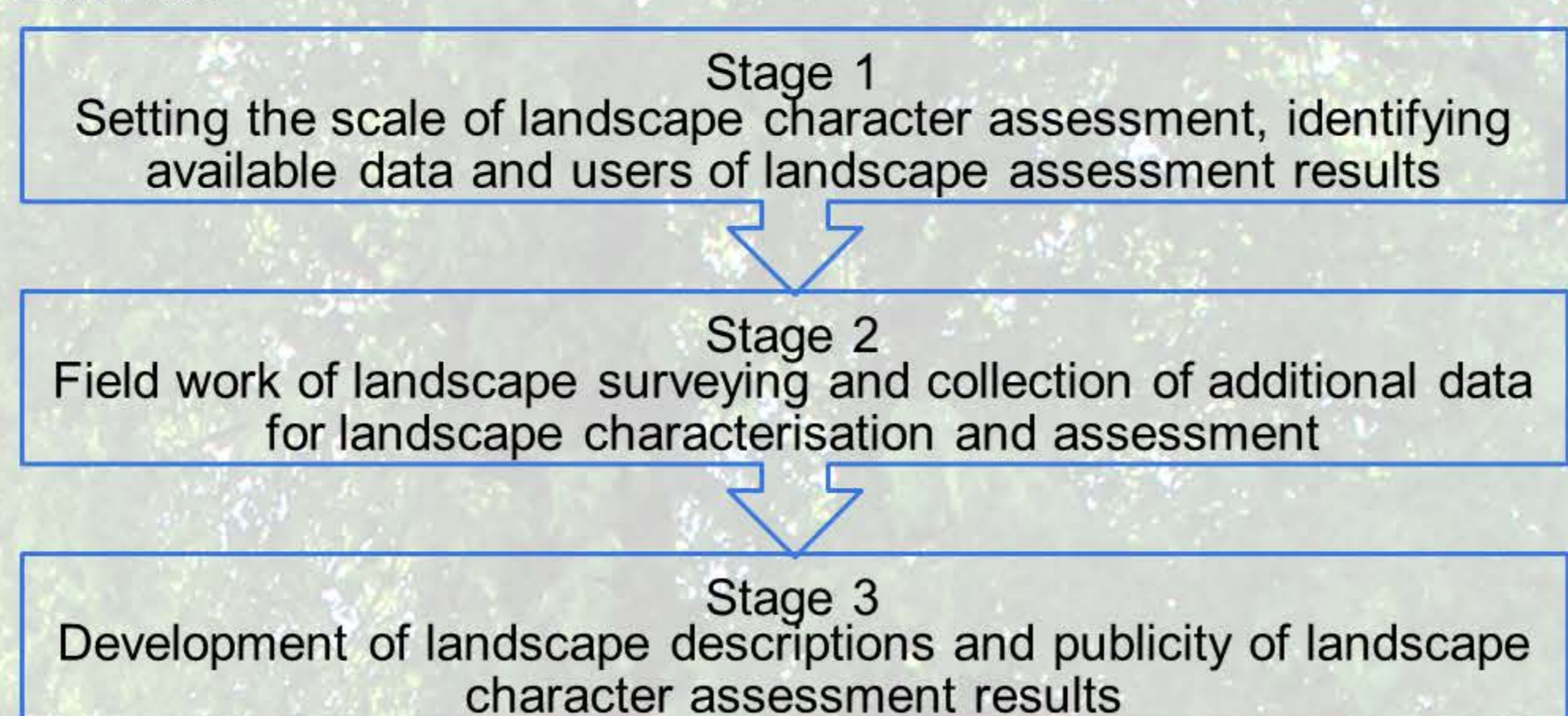Latvia University of Life Sciences and Technologies

Introduction

« Landscape is a constant value of Latvia, which is included in the Latvian cultural canon as the newest section. Landscape management is considered one of the key themes of environmental and territorial sustainability policy: in fact, it relates to environmental, cultural, social and economic issues and also directly affects the population as it reflects the way they perceive their living environment.

Typical Latvian landscapes shape local identity and people's associations with their homeland, thus fostering a sense of belonging to their country. It is therefore particularly important to preserve this value for the next generations in the period of climate change and rapid industrial growth, which directly affects not only the wealth of natural resources, but also the intangible and cultural values of the nation.

Research Objective

« The aim of the research was to identify the experience of European countries in landscape character assessment, to learn about different approaches and methods for landscape identification and characterization, and, based on the knowledge gained, to carry out a landscape inventory in Latvia, implementing the basic provisions of the ratified European Landscape Convention and creating a digital landscape atlas of Latvia.

Stage 1
Setting the scale of landscape character assessment, identifying available data and users of landscape assessment results

Stage 2
Field work of landscape surveying and collection of additional data for landscape characterisation and assessment

Stage 3
Development of landscape descriptions and publicity of landscape character assessment results

Results & Discussion

Legend:
- Lake landscape
- Dune landscape
- Plain agro landscape
- Plain mosaic agro landscape
- Plain forest landscape
- Plain mosaic forest landscape
- Bog landscape
- River landscape
- Urban landscape
- Wavy plain agro landscape
- Wavy plain mosaic agro landscape
- Wavy plain forest landscape
- Wavy plain mosaic forest landscape
- Hilllands mosaic agro landscape
- Hilllands forst landscape
- Hilllands mosaic forest landscape
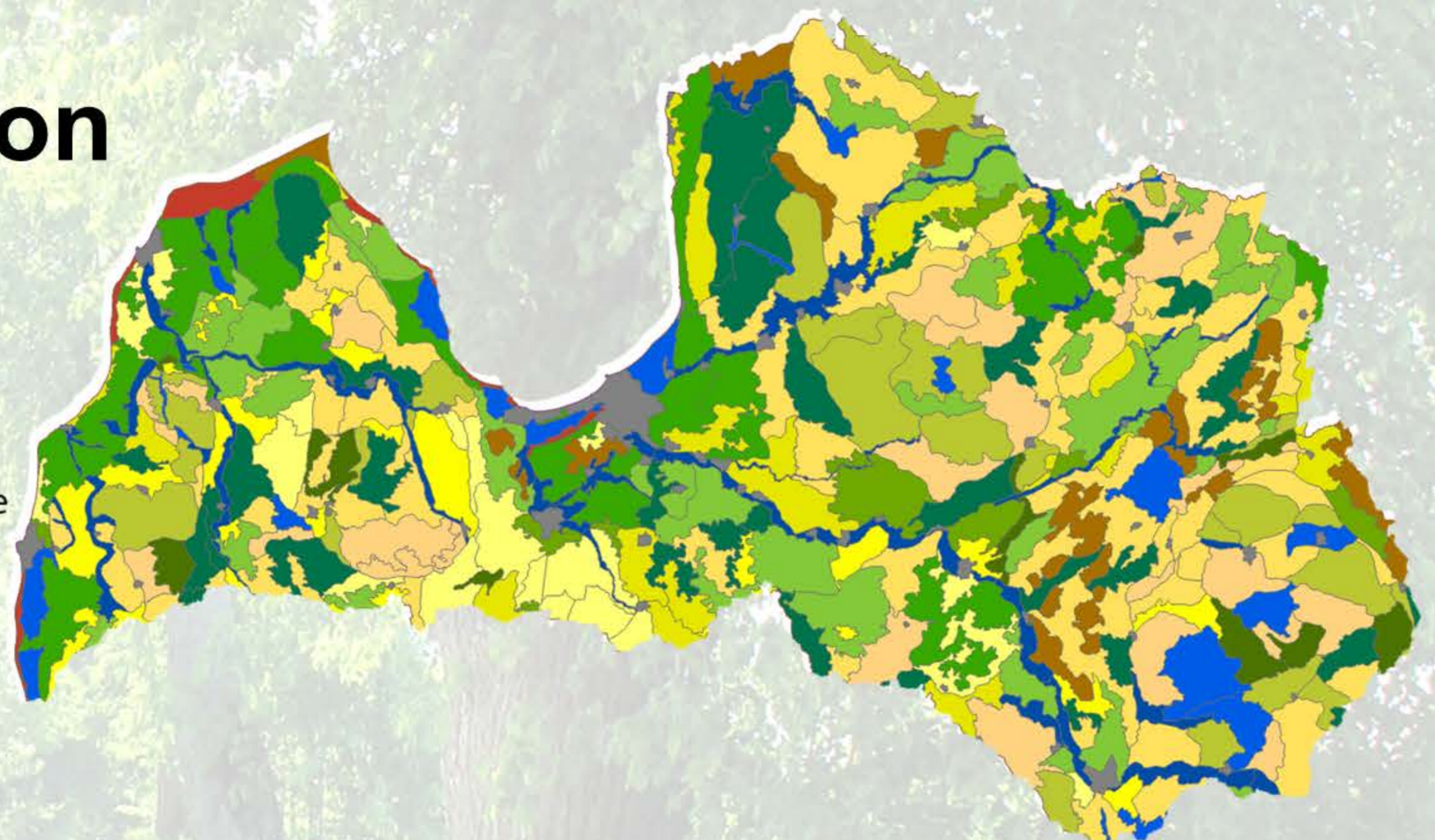
« Assessing the character of Latvia's landscapes, based on comprehensive data analysis and landscape surveys across the country, is an important process for identifying landscape diversity and has several benefits: identifying the potential of landscape as a multi-faceted resource for use at different levels of governance; promoting the country/region/place; facilitating interaction between stakeholders and individuals (including non-specialists) on landscape issues.

The results of the research, which was carried out between 2021 and 2022 to identify landscape character, landscape diversity and to produce cartographic material on Latvian landscapes, are included in a digital landscape atlas, produced for the first time in Latvia. The new landscape atlas includes information on all Latvian landscapes, their values and development potential.

Conclusions

« The approach to assessing the landscape as a holistic structure encompasses a wide range of criteria, including the visual and aesthetic perception of the landscape, the history of the site, the architecture in relation to geo-ecological aspects and the spatial structure of the landscape. Digital Landscape Atlas of Latvia can be used as a complementary tool for landscape planning, management and protection.

Contact Information

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Latvia University of Life Sciences and Technologies

Andrejs Vilks

Rīgas Stradiņa univdersitāte

Digitālās tiesību aizsardzības sistēmas (DTAS) attīstības perspektīvas un problēmas

Ievads

Digitalizācija ir neatņemams mūsdienu sabiedrības visu jomu ilgtspējīgas attīstības pamatvirziens. Digitalizācijas process, tai skaitā tiesību aizsardzības jomas ietvarā, ir saistīts ar normatīvā regulējuma pilnveidošanu, institucionālās sistēmas transformāciju un jauniem operacionāli tehnoloģiskiem risinājumiem (1.zīm). 2020. 2.12. Eiropas Komisija pieņēma nozīmīgu paziņojumu par Tieslietu sistēmas digitalizāciju Eiropas savienībā, kurā tiek atzīts, ka Eiropa tiecas uz augstākiem mērķiem, izmantojot digitālā laikmeta sniegtās iespējas drošuma un ētiskuma robežās. ES politiskās plānošanas dokumentos tiek apstiprināts, ka tiesiskajā sistēmā ir nepieciešams pilnvērtīgi izmantot digitālo tehnoloģiju sniegtās iespējas. Digitālie rīki var palīdzēt labāk optimizēt tiesvedību, to automatizēt un paātrināt standartizētu un vienveidīgu uzdevumu veikšanu, tādējādi palielinot tiesvedības efektivitāti un lietderību. Latvijā ir akceptētas Digitālās transformācijas pamatnostādnes 2021. – 2027. gadam, kuras ietver arī sadali par sabiedriskā drošību, kārtību un tieslietām.
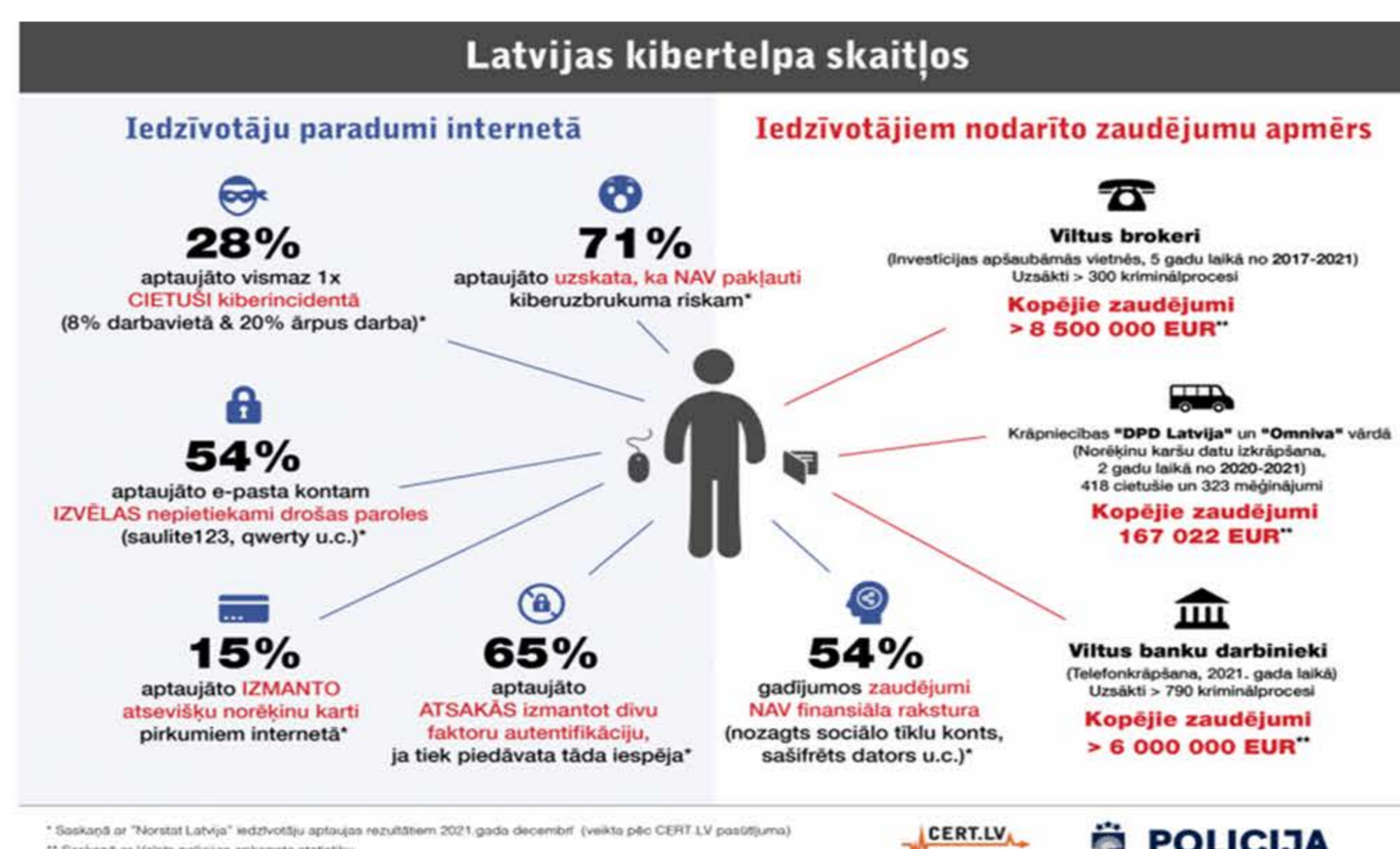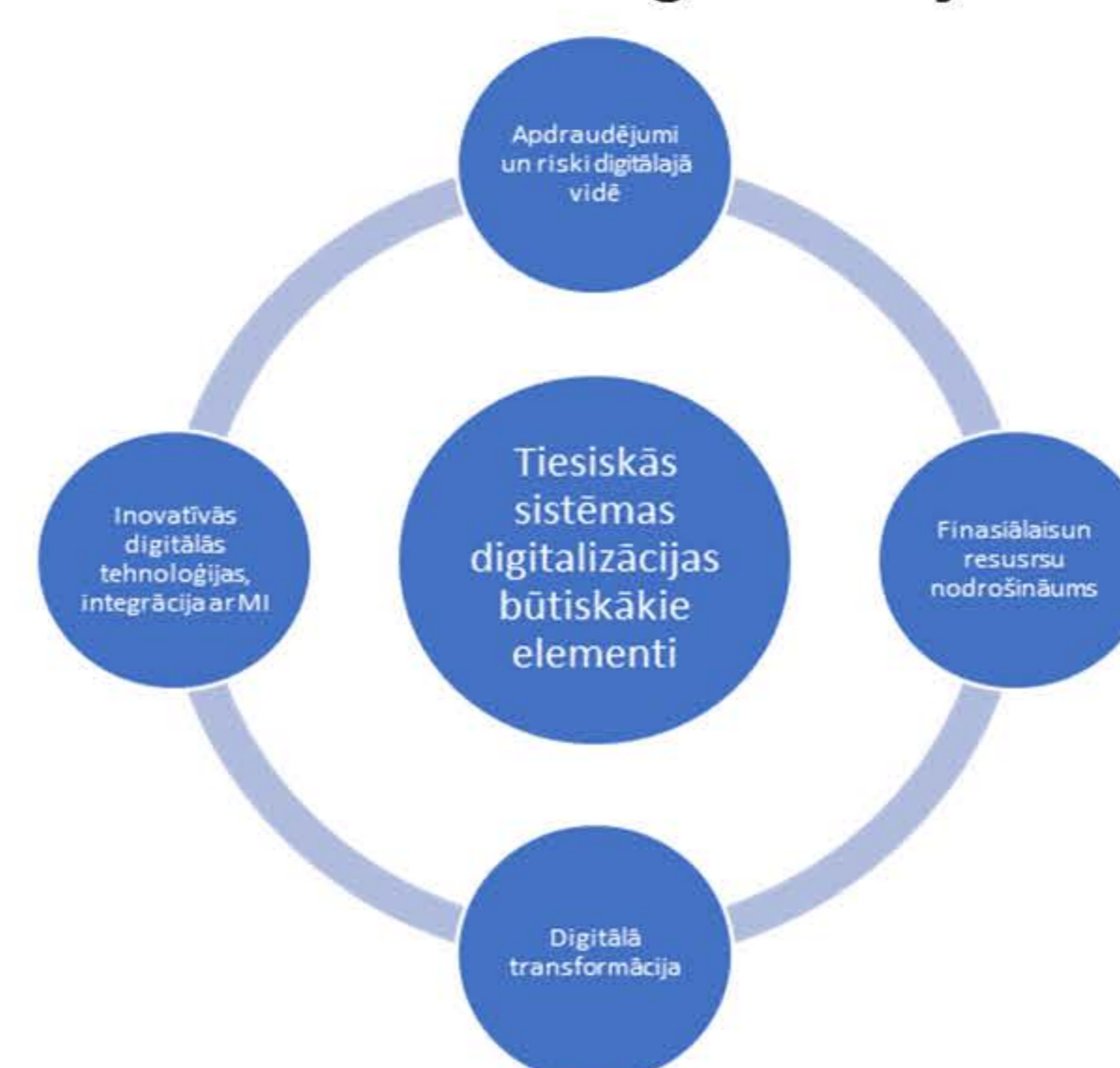
Pētījuma mērķis

« Digitalizācija tiesiskajā sistēmā atrodas intensīvā evolūcijas procesā, kas ietver visdažādākās jomas ar daudzveidīgu starptautisku un nacionālu kontekstu. Būtiski ir apzināt šo procesu sasniegumus, problēmas un perspektīvas. Ziņojums mērķis ir sniegt ieskatu digitalizācijas tiesību aizsardzības sistēmā stāvokli nacionālā un transnacionālās , tai skaitā Eiropas Savienībā līmenī, apzināt tās teorētiskos un praktiskos aspektus postmodernās sabiedrības apstākļos, iezīmēt šīs jomas perspektīvos attīstības virzienus un paredzēt tās tiesiskā regulējuma un institucionālās pilnveidošanas iespējas, tādējādi veicinot valsts un digitālo drošību.

1. zīm. Tiesiskās sistēmas digitalizācijas būtiskākie elementi

Rezultāti un diskusija

2. zīm., Latvijas digitālās tiesību aizsardzības sistēmas

- Tiesu informācijas sistēma (TIS)
- Prokuratūras informācijas sistēma (ProIS)
- Valsts probācijas dienesta informācijas sistēma (PLUS)
- Ieslodzījuma vietu pārvaldes Ieslodzīto informācijas sistēma (IIS)
- Iekšlietu ministrijas informācijas sistēmas (IeM IC)

Digitālā tiesību aizsardzības sistēmas (DTAS) attīstības perspektīvas un problēmas ir attiecināmas uz nacionālo un starptautisko dimensiju. Latvijas DTAS (2. zīm.) 'būtiskākie problēmaspekti ir saistīti ar to, ka valsts tiesībsargājošās iestādes ir izveidojušas resoriskās IT platformas (Valsts policijā, prokuratūras iestādēs), kuras ne vienmēr ir saderīgas. Var atzīt, ka attālināta saziņa var apdraudēt sensitīvo datu drošību (procesu dalībnieku datus, elektroniskos pierādījumus) . Vienotā ES Tieslietu sistēmu digitalizācija (e-codex platforma un projekti) ir būtisks instruments, kas ļauj dalībvalstu iestādēm izveidot reālu partnerību cīņā pret noziedzīgām darbībām (teroristiskiem aktiem, transnacionālu nelikumīgi iegūtu līdzekļu legalizēšanu, starptautisko korupciju, cilvēku tirdzniecību, kūdīšanu uz naida runu un vardarbību.), kuras nopietni apdraud Eiropas telpu. Eiropas Komisijas e-CODEX platforma piedāvā tehniskus risinājumus droši tiešsaistes pārrobežu saziņai tieslietu jomā EXEC projekts (e-pierādījumu elektroniskā apmaiņa) nodrošina izveidots un darbojas tīkls pilnībā elektroniskai Eiropas izmeklēšanas rīkojumu (EIR) un saistīto e-pierādījumu apmaiņai starp dalībvalstīm. Digitālajā vidē veidojas krimināla rakstura rīki un programmas (Dark Net, Telegramm, EncroChat u.c.). Būtiska ir digitālās kriminālistikas tehnoloģiju un metodiku izmantošana kibernoziegumu, finansiāli ekonomisko nodarījumu fiksācijā, atbilstošu objektu izpētē, pierādījumu vākšanā un izmeklēšanā.

Secinājumi

Digitālo sistēmu attīstība tiesību aizsardzības iestādēs ir saistīta ar jaunu tehnoloģiju izstrādi un to efektīvu pielietošanu, to pilnvērtīgu integrāciju starptautiskajās informācijas sistēmās, minētās jomas juridiskā regulējuma pilnveidošanu, kā arī amatpersonu kvalitatīvu digitālo prasmju un iemaņu apgūšana, kas nosaka nepieciešamību atbilstošu aktivitāšu finansēšanā (4. zīm.). Tiesību aizsardzības iestādēs plašāk ir jāizmanto mākslīgais intelekts procesuālo darbību veikšanā.

4. zīm. Atsevišķu pamatnostādņu jomu īstenošanas finansējums 2021-2027

- Pakalpojumu platformas attīstība (8 352 000 EUR)
- Digitālās drošības un uzticamības nodrošināšana (16 760 240 EUR)
- Sabiedriskā drošība, kārtība un tieslietu sistēmas attīstība (45 959 789 EUR)

Kontaktinformācija

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World Congress of Latvian Scientists

Digital Transformation of Healthcare in the Baltic States: Why So Different Results?

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Introduction

Digital transformation today determines the efficiency and sustainability of the health system.

Despite the fact that the Baltic states started moving towards digital transformation by implementing e-Health at the same time (early 2000s), today we see significant country-by-country differences in the level of digitization of the health sector.
According to the Digital Economy and Society Index 2021 (DESI) the progress of e-Health is assessed with
93.2 points in Estonia;
79.7 points in Lithuania;
68.1 points in Latvia.

Research Objective

The aim of the study: to compare the governance of eHealth in 3 Baltic states to draw similarities and differences in the policy and governance principles applied, and conclude on the factors determining digital tramsformation success.
Study method: descriptive research using interpretive and comparative policy and document analysis based on the framework developed by the authors.

A framework for assessing the governance of eHealth

Responsible institutions → Stakeholders' involvement → Operating principles → Tasks → Funding principles
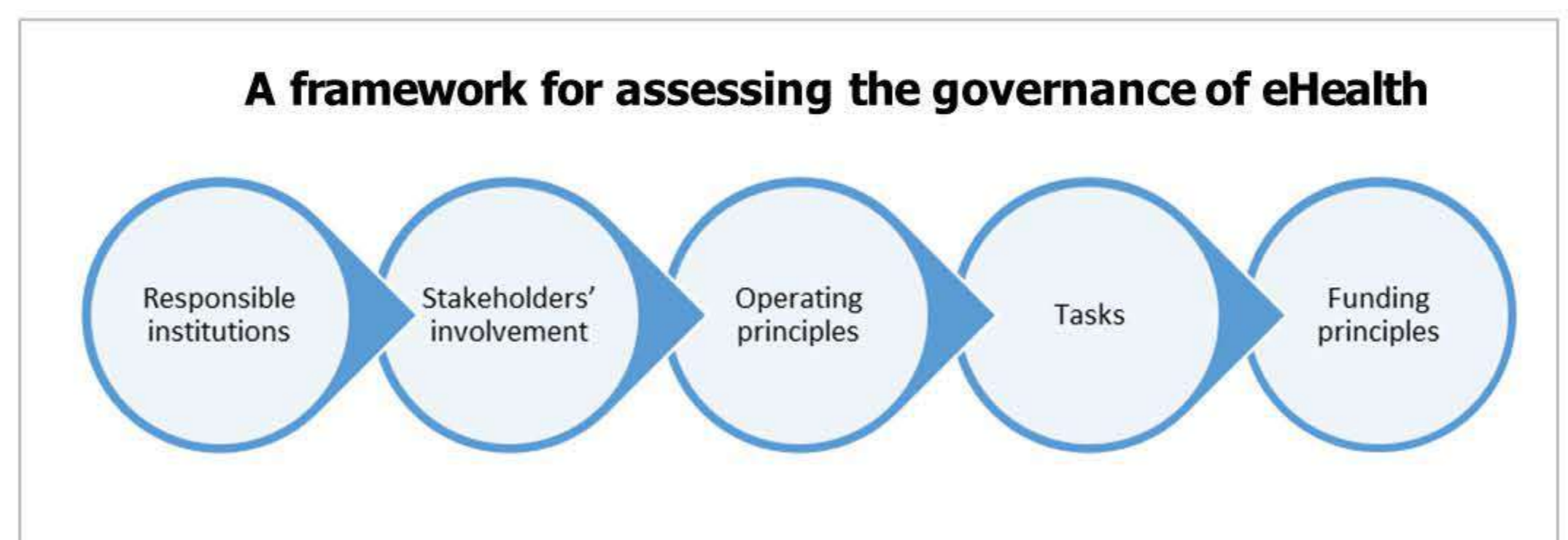
Results & Discussion

eHealth Estonia (EST)
- Common e-State ecosystem
- e-ID card since 2002;
- data exchange platform X-road since 2001
- Nation wide Health Information System (EHIS) since 2008
- Unified medical information standardization, classification and data processing rules

eHealth LATVIA (LV)
- 1st round – individual projects, weak coordination
- Insufficient project management
- Insufficient stakeholder involvement
- Unified EHR system not available
- Several stand alone IT solutions
- New Digital Health Strategy 2023-2029 is under development

eHealth LITHUANIA (LT)
- 1st round – individual projects, weak coordination
- Insufficient project management
- Insufficient stakeholder involvement
- Limited use: not all HC providers submit data to ESPBI IS
- Renewed eHealth System Development Program for 2017-2025

Estonia has been more successful in the initial implementation of full-fledged and interoperable e-Health solutions. The main factors playing a decisive role in the success can be attributed to nation wide strategy, its unified governance principles and framework, unified e-Health policy and instruments for the public and private sectors, synergies in social and health sectors (EST; LT), unified and timely standardization of processes and technological solutions, early stakeholder involvement and cooperation with universities in knowledge transfer (EST). Regarding management principles and tasks, the top-down approach (LV, LT) has not justified itself. Digital transformation activities implemented in the form of individual projects have led to poor coherence and insufficient interoperability (LV, LT). Weak coordination, delayed standardization and disjoined digital initiatives characterize current backwardness of e-Health in Latvia.

Conclusions

The factors determining successful governance of digital transformation can be attributed to 2 levels - national and health sector. Digital transformation of health sector largely relates to the overall nation wide digital policy and common data processing and exchange solutions, and e-Health as it's integrative component. The second level factors relate to the sustainability of the overall digital transformation strategy of the sector and the ability to implement digital changes, including a complete framework for governance and timely decisions on the necessary technological requirements and standards. Lithuania has successfully restarted the implementation of e-Health, but in Latvia the renewal of the digital strategy is underway, where there are opportunities to use the experience of Estonia in the successful digital transformation of the health sector.

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eduaim

Digitālā laikmeta izglītības modelis nākotnes izglītībai

Liepājas Universitāte, Daugavpils Universitāte, Rēzeknes Tehnoloģiju akadēmija, RTU Latvijas Jūras akadēmija, Vidzemes Augstskola

Atis Kapenieks, Anita Jansone, Lāsma Ulmane-Ozoliņa, Guna Jākobsone - Šņepste, Jānis Kapenieks jun., Žanis Timšāns, Iveta Daugule, Didier Luzarraga, Artis Teilāns, Edmunds Jansons, Anžela Jurāne-Brēmane, Maija Burima, Sandra Zariņa, Inese Barbare

Ievads

Augstskolām jau šodien jādara tas, kas būs svarīgs pēc 20 gadiem. Jāzina, kā var mācīties vismaz 10 reižu ātrāk. Jārada zināšanu kopums, kas dotu produktivitātes pieaugumu virs EU vidējā. Jāievēro atziņa, ka sarežģītāku produktu ražošana dod straujāk paātrinātu izaugsmi. Jāatgādina arvien biežāk, ka ar labu izglītību var izvairīties no vidējo ienākumu slazda. Jānovērš barjeras, lai ikviens piekļūtu pasaules labākajam e-mācību saturam un e-mācību metodēm. Tehnoloģijai jābūt mērogojamai, lai tā labi iekļautos Latvijas tradicionālajā kultūrā.

Rezultāti un diskusija

- Zināšanu uztveres monitorings
- Virtuālā un papildinātā realitāte
- Studentu noskaņojuma atpazīšanas tehnoloģija
- Teksta mērogošanas tehnoloģija

Atbildot izaicinājumam, 5 Latvijas augstskolas apvieno savu iepriekšējo 20-gadu pieredzi un īsteno ambiciozu digitālās izglītības projektu EduAim. Rīgas Tehniskās universitātes Tālmācibas studiju centrā radīto zināšanu uztveres monitoringa tehnoloģiju papildina ar Vidzemes Augstskolas virtuālās un papildinātās realitātes tehnoloģiju, Rēzeknes Tehnoloģiju akadēmija – studentu noskaņojuma atpazīšanas tehnoloģiju, Liepājas Universitāte - personalizēto teksta mērogošanas tehnoloģiju, Daugavpils Universitāte – izglītošanas metodiku, RTU Latvijas Jūras akadēmija - redzējums par modernu izglītību jebkuros apstākļos. EduAim projektā sadarbojamies ar pasaules līderiem e-studijās - Coursera un EdX.

Secinājumi

Ko tālāk?

- Skaidrāku redzējumu par digitālo laikmetu!
- Kas ir digitālā laikmeta augstskola?
- Kuri zinātniskie pētījumi un paredzējumi to iezīmē?
- Skaidrāku redzējumu par jaunajiem darba veidiem!
- Saredzēt jaunās zināšanu ekosistēmas!
- Lietot šodienas atziņas!
- Samazināt birokrātiskās procedūras, kas "apēd" attīstībai vajadzīgos resursus!

Kontaktinformācija

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Pētījuma mērķis

Piecas Latvijas augstskolas veido jaunu digitālā laikmeta izglītības modeli EduAim. EduAim izmanto visus mācība procesa datus un to vizualizācijas, lai noteiktu jaunā satura atbilstību izglītojamā sagatavotībai un vajadzības gadījuma veiktu savlaicīgas izmaiņas mācību saturā.

➖ Trūkumi pazīstamajās e-studiju vidēs

- Lietotāju dati dažādās datu bāzēs
- Lietotāju dati vizualizējami tehniski, taču grūti interpretējami (bieži tie nav pieejami)
- Tradicionālajā praksē tos lieto reti, skolotājiem tas prasītu pārāk daudz laika
- Lietotāju dati ir sarežģītā formātā, tie raksturo lietotāju aktivitāti un vērtējumus (ne zināšanas), bet neinterpretē tos
- Lietotāju dati neraksturo izaugsmi vizuāli ērti uztveramā veidā
- Nav vizuāli ērti uztveramu datu par e-kursa atbilstību mācību grupai eStudiju satura pilnveidošana notiek intuitīvi – trūkst ērti lietojami indikatori

➕ EduAim risinājums

- Lietotāju dati vizualizēti ērti saprotamā un lietojamā formātā
- Vizualizētie dati raksturo lietotāju progresu
- Vizualizētie dati parāda satura un mācību metožu atbilstību dalībnieku grupai vai dalībniekam
- Vizualizētie dati parāda, kuras e-kursa satura daļas jāpilnveido
- Risinājums monitorē lietotāja izaugsmi kursā, radot iespēju personalizācijai
- EduAim tehnoloģiju būs ērti ieviest praksē

Mācību notikumi (Gaņjē)[1] un EduAim piedāvātie risinājumi

- Pievērst uzmanību
- Komunicēt sasniedzamos rezultātus
- Aktivizēt iepriekšējās zināšanas
- Piedāvāt jauno informāciju
- Virzīt un atbalstīt mācīšanos
- Dot iespēju lietot jauno informāciju
- Sniegt atgriezenisko saiti
- Novērtēt sniegumu
- Sekmēt pārnesi, vispārināšanu

- Pasniedzēja mudinājums pieslēgties kursam
- Kursa ievadā sagatavota informācija
- Ievirzes jautājums
- Oriģināli veidots vai pielāgots mācību saturs
- Pašpārbaudes jautājums
- Atsauksmes par atbildēm uz ievirzes un pašpārbaudes jautājumiem
- Zināšanu pārbaude
- Studentu noskaņojuma atpazīšana
- Teksta mērogošana

[1] Gagne, R. M., & Briggs, L. J. (1974). Principles of instructional design. Holt, Rinehart & Winston, p.190

EduAim tehnoloģijas priekšrocības

- **Studenta mācību panākumu izsekojamība reālā laikā**
  (līdzīgi kā klātienes nodarbībā – pasniedzējam ir iespēja sekot līdzi skolēnu/studentu aktivitātēm. Uzdodot ievirzes jautājumu, pasniedzējs, vēl pirms tēmas uzsākšanas, var gūt priekšstatu par grupas kopējo zināšanu līmeni, savukārt pašpārbaudes jautājums ļauj sekot līdzi progresam)

- **Informācija par kursa satura piemērotību studentu grupai vai individuālam studentam**
  (atšķirībā no klātienes nodarbības, pasniedzējs grafiskā, viegli nolasāmā veidā saņem atsauksmi no visiem grupā esošajiem studentiem, un var pieņemt lēmumu par tālākā satura pielāgošanu grupas vajadzībām un spējām)

- **Ievirzes un pašpārbaudes jautājumi veido pamatu mācīšanās datu statistiskai analīzei un interpretācijai, tajā pašā laikā jāuzsver, ka šis ir kvalitatīvs novērtējums**
  (pētījuma gaitā tiks vērtēti piemērotākie šo jautājumu sagatavošanas un pielietošanas paņēmieni, lai panāktu iespējami augstu sniegto rezultātu precizitāti)
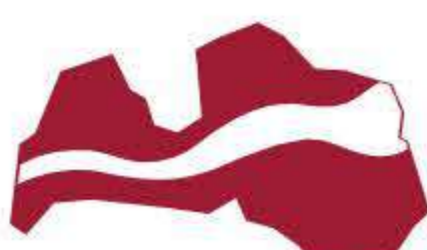
LIEPĀJAS UNIVERSITĀTE — RTA RĒZEKNES TEHNOLOĢIJU AKADĒMIJA — DAUGAVPILS UNIVERSITĀTE — RTU LATVIJAS JŪRAS AKADĒMIJA — VIDZEMES AUGSTSKOLA

Innovative *in silico*-based approach to drug dissolution prediction

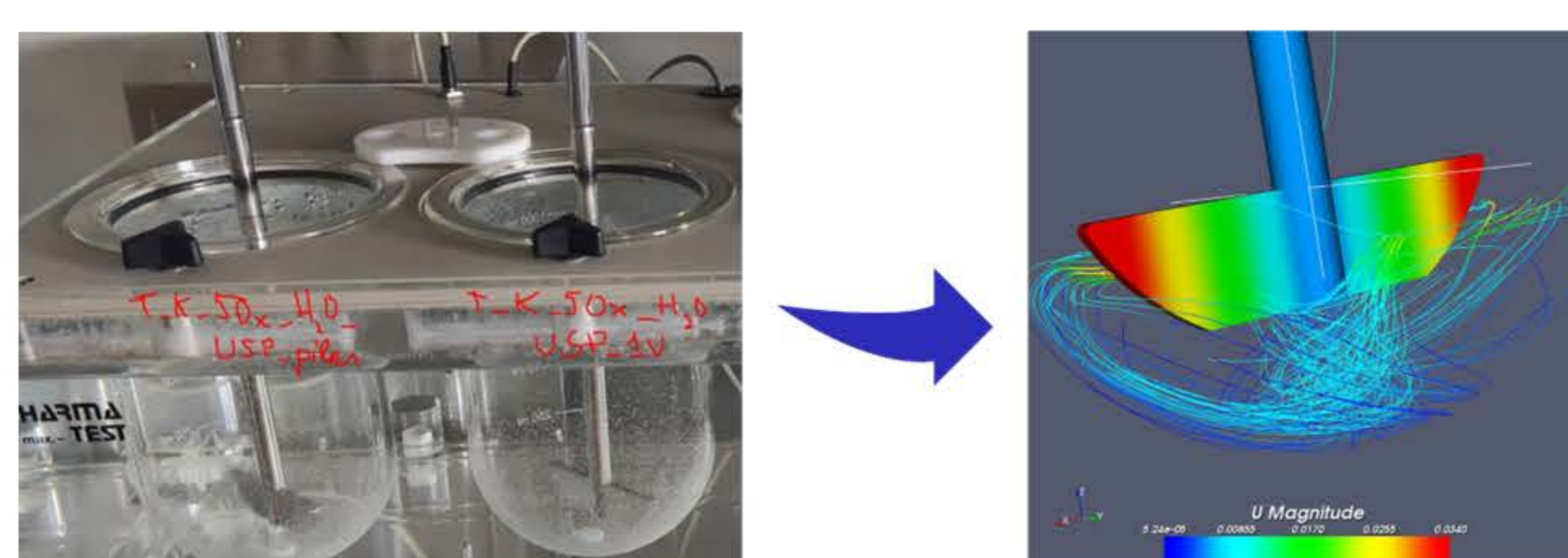## Normunds Jēkabsons[1], Agnese Brangule[2], Sabīne Upnere[3]

[1]University of Latvia, [2]Baltic Biomaterials Centre of Excellence & Riga Stradiņš University, [3]Riga Technical University

Introduction

About 84% of the top-selling pharmaceutical products are administered orally. **Oral solid dosage forms** are basically obtained using conventional production technologies. However, since the first 3D-printed drug was approved, interest in the application of printed tablet production has increased significantly. Drug printing makes it possible to produce small batches of tablets containing several drugs with a specific dose and release for the treatment of a particular disease. The main challenge is choosing the composition of API and fillers so the tablet dissolves at the specified time. Traditionally, the *in vivo* process is simulated by *in vitro* dissolution tests, such as USP methods, which are well standardized but have significant limitations: the process is time-consuming, labour-intensive, and often unreproducible.

Research Objective

The overall objective of the research is to develop a **drug dissolution model** by combining computational fluid dynamics (CFD), drug release/disintegration kinetics and surrogate modelling approaches.
Development of **CFD models** and **experimental validation** of a laboratory-controlled system using pure drug (IUPAC N-(4 hydroxyphenyl), paracetamol) dissolution in water as the first step are the main objectives of this study.


Results & Discussion

Velocity in USP2

Relative concentration of dissolved paracetamol
Bottom up view
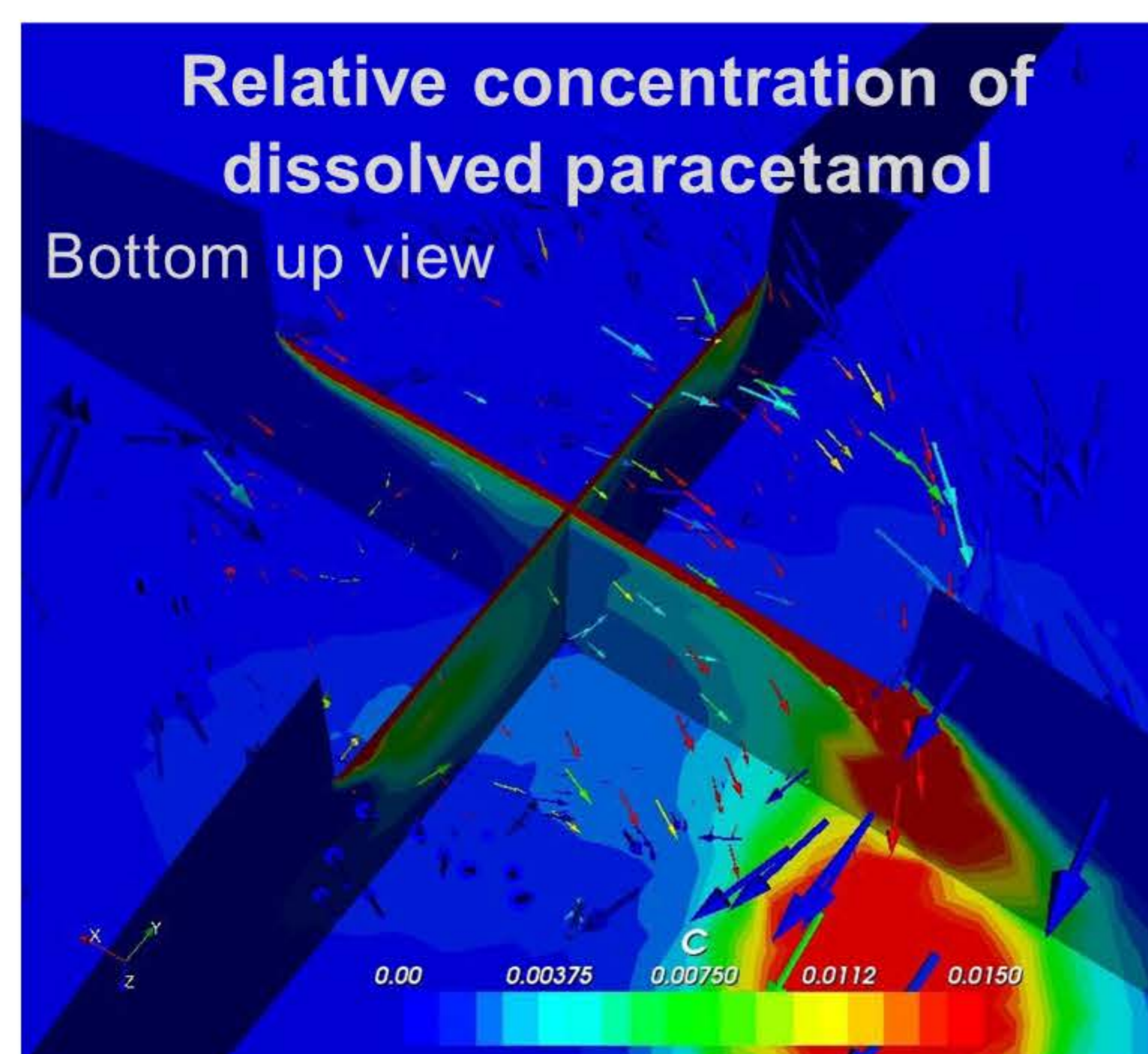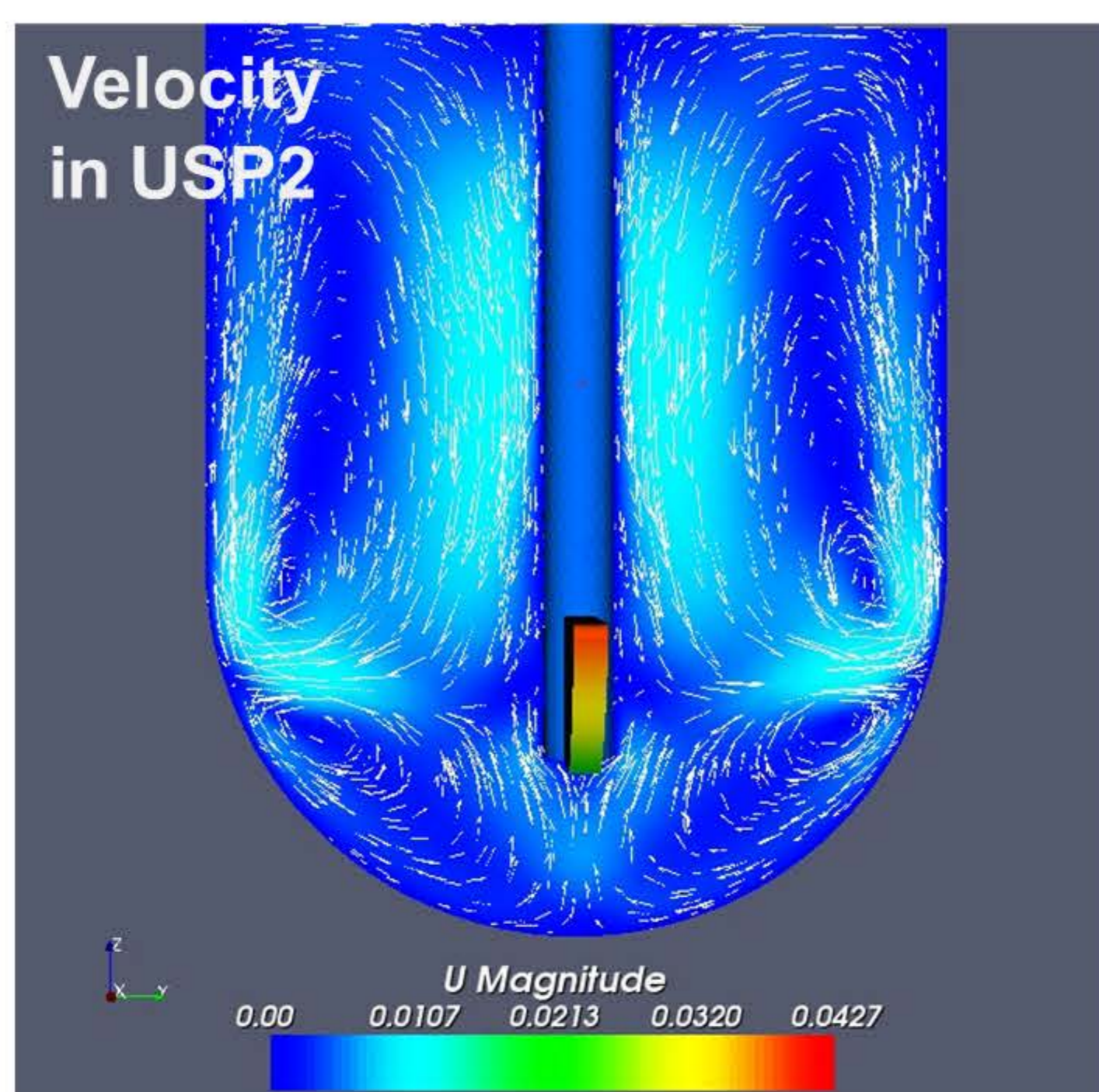
Devoted CFD solver *reactorDCFoam* acting on rotating mesh with concentration field addition was developed using CFD toolkit OpenFOAM and tested with the basic cases from literature. Turbulence was modelled with **Large Eddy Simulations**. The main numerical challenge for CFD modelling of the analysed system is the very small diffusion value of paracetamol in water (6×10^{-10} m^2/s). To ensure an acceptable CFD results, it was necessary to fine-tune the region mesh and to introduce special boundary conditions for the relative concentration. Validation of experiments was carried out with USP2 apparatus.

Conclusions

Due to the small diffusion value of paracetamol in water, a very small cell size is required near the tablet surface, which results in very small integration time steps due to the Courant number limitation. Even with high-performance computing resources, it took several weeks to obtain results. The validation shows that the **general trends** in the solution kinetics **are captured by the CFD models**.
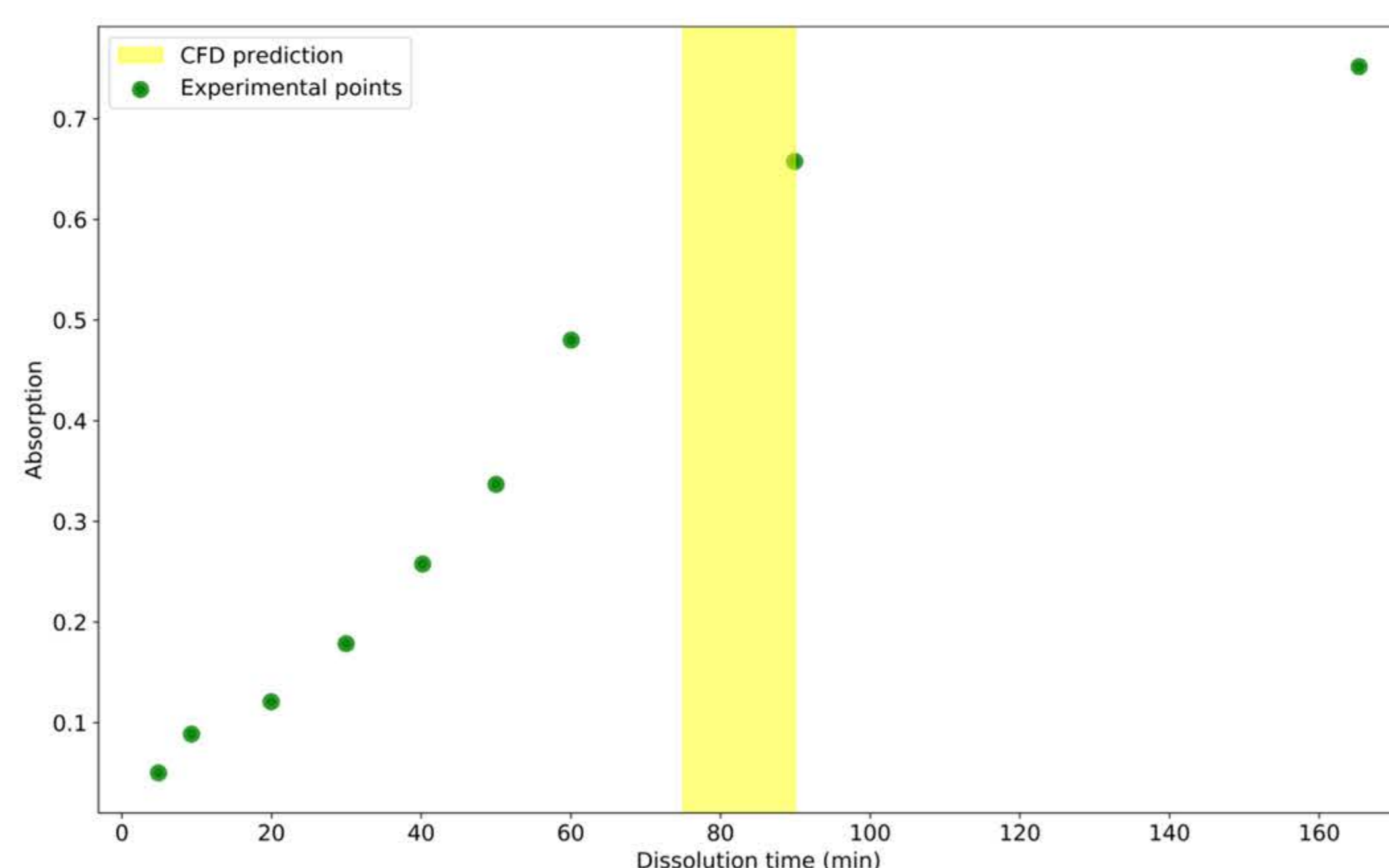
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RĪGA STRADIŅŠ UNIVERSITY

RIGA TECHNICAL UNIVERSITY 1862

LATVIJAS UNIVERSITĀTE

Lab Automation for High-Throughput Protein Production

Edgars Laķis, PhD

Introduction

Protein production is a critical process for biomedical research and drug discovery. However, traditional protein production methods are laborious and error-prone. Difficult target protein landscape requires exploration of various:
- DNA constructs - tags, markers, cleavage sites
- Expression hosts – expression systems, cells
- Conditions – timing, media, buffers, additives.

Automation of protein production involves scripting and the use of laboratory robotics to automate tasks such as cell culturing, purification, and quality analysis.

Research Objective

➢ Minimise the number of scouting cycles (parallel evaluation)
➢ Enable broad assessment and keep timelines short

DBTL cycle: Design 1 → Build 2 → Test 3 → Learn 4
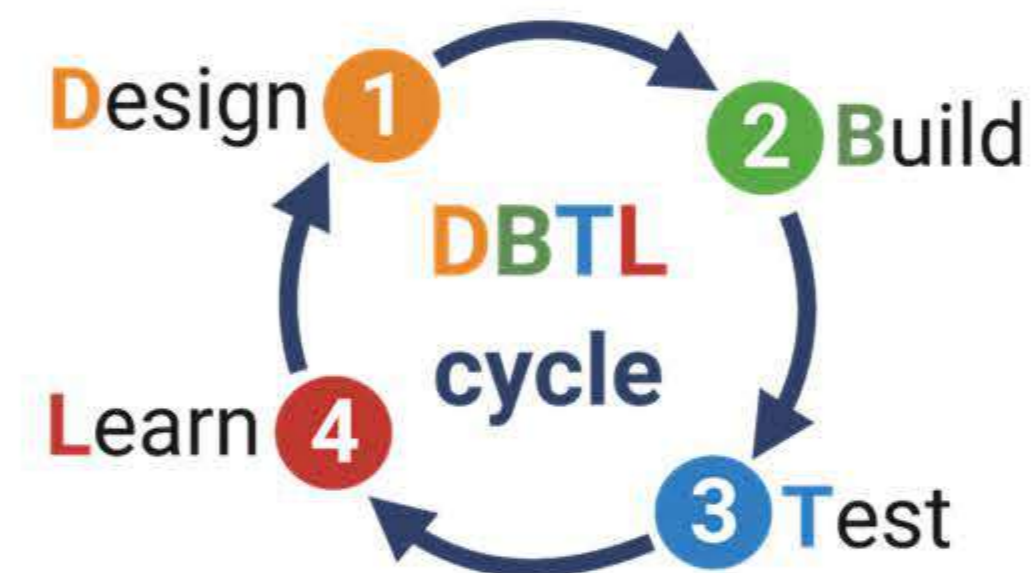
Workflow automation with appropriate throughput
- Generate library of human proteins (~2700 genes)

Semi-automated workflow

DNA construct design
Gene synthesis

DNA

Transient transfection

cell culture

2 weeks

Purification

purified protein

Quality control
1. RP-HPLC - autointegration
2. Gel electrophoresis – band detection, MW estimation

Characterised and registered of proteins

Challenges:

Sample handling
Registration

Enable different cell lines
Consistent incubation times

Complex and long scripts
Flexibility in resin, buffer choice

Data handling in Python, Excel
QC review

day -1 → split cells | day 0 → mix DNA / Opti-MEM → mix Opti-MEM / ExpiFectamine → combine DNA/ ExpiFectamine → add mix to cells | day 4 → harvest

HEK293 CHO

transient transfection script

24x 2.5mL cell culture | 24x 2.5mL cell culture | 48x 1.3µg DNA (10µL)

VOYAGER - 300µL - 8CH
300µL sterile GripTips | 24 Well plate | 24 Well plate | 96 Well plate | 440µL ExpiFectamine Reservoir 10mL | 20mL Opti-MEM Reservoir 25mL

Filtration → **Purification**

2.5mL → 2mL → 100µL

resin equilibration → sample binding → wash 2x → on-column cleavage → protease removal → acidic elution

purified protein | uncleaved protein

Results

Tested four construct designs:
- N- vs. C-terminal tag (cleaved off during purification)
- Co-transfection vs. long-chain fusion (to combine two chains of the tag).

Achieved throughput of 384 samples in two weeks.
Several examples of rescued proteins ("failed" in literature) e.g., CD72; CCL22; TSLP.
Two stage quality control to validate "borderline" constructs e.g., FGF, WNT, CXCL10, MET.

Conclusions

Automated protein production allow for more precise control over the workflow, leading to higher quality proteins and fewer batch failures.
Construct design impacts protein yield

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Linked in

Edgars studied Biochemistry and received the Spark Award 2022 for the most promising invention at ETH Zurich, Switzerland. He is a passionate scientist with industry experience in laboratory automation.

Edgars have proven skills in protein chemistry, FAIR data handling and programming environments (Python, C, VBA).

The Impact of e-Governance on the Latvian Parliament During the Time of the COVID-19 Crisis

PhD 1st Year Student, Mg.sc.pol. **Romāns Gagunovs**
Prof. em., Dr. hist. **Ilga Kreituse**
Department of Political Science, Rīga Stradiņš University
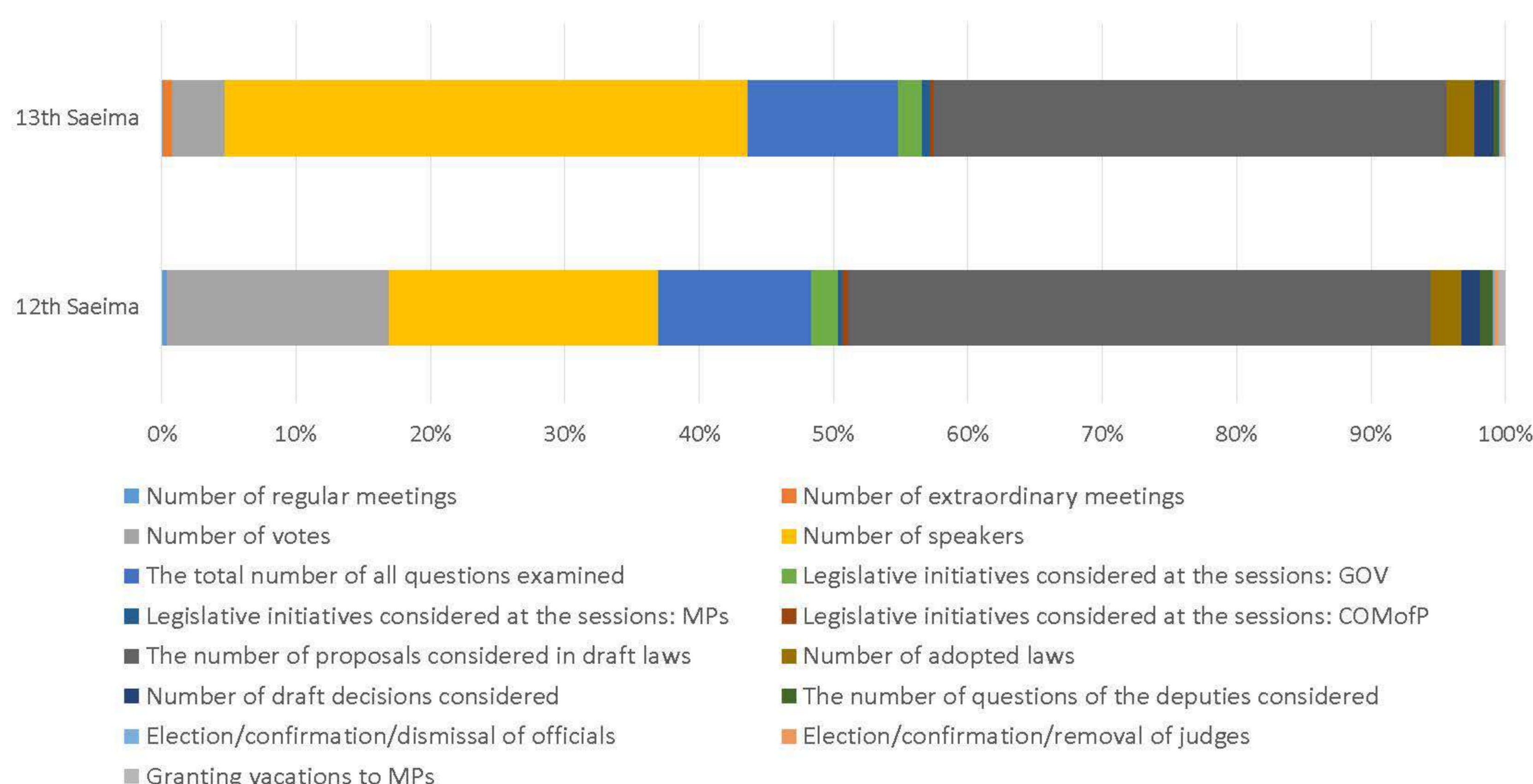
Introduction

To ensure the continuity of its functions in the conditions of the Covid19 pandemic, the Parliament of Latvia (Saeima) sought and implemented e-solutions in its work, implementing digitalization and digital transformation.

Research Objective

Comparative data analysis and chi-square method are used as a research method in the work. The data gave an opportunity to compare how the work of the Saeima has changed under the conditions of the Covid19 pandemic, using technological solutions, compared to the previous convocation of the Parliament, when the work took place in person.

Results & Discussion

Comparison of the 12th and 13th Saeima

Legend:
- Number of regular meetings
- Number of extraordinary meetings
- Number of votes
- Number of speakers
- The total number of all questions examined
- Legislative initiatives considered at the sessions: GOV
- Legislative initiatives considered at the sessions: MPs
- Legislative initiatives considered at the sessions: COMofP
- The number of proposals considered in draft laws
- Number of adopted laws
- Number of draft decisions considered
- The number of questions of the deputies considered
- Election/confirmation/dismissal of officials
- Election/confirmation/removal of judges
- Granting vacations to MPs

Source: author's own elaboration

The conducted research, using the chi-square method, shows that there are significant differences between the work of the 12th and 13th Saeima. Research data show that compared to the pre-crisis period, for example, the number of votes in plenary sessions has decreased (12th Saeima – 5277; 13th Saeima – 1295); while the number of debaters has increased (12th Saeima – 6401; 13th Saeima – 12789). At the same time, it gives rise to assumptions that MPs feel safer speaking in the e-environment than debating in person. The available resources, technical support, as well as the digital skills of MPs and employees contributed to the possibility of implementing digitalization and introducing new solutions. On the one hand, the legislative process worsened when MPs performed their duties in the e-environment, but on the other hand, the result cannot be evaluated as negative.

Conclusions

The "e-Saeima" platform ensured the most important procedures and could be used in the future if the country were hit by Covid19 or another crisis that would interfere with the possibility of gathering in person. At the same time, such a platform should also be applicable in the work of commissions, thus ensuring: 1) secure authentication of MPs, employees, and guests; 2) the opportunity to debate and view documents; 3) secure and transparent voting.
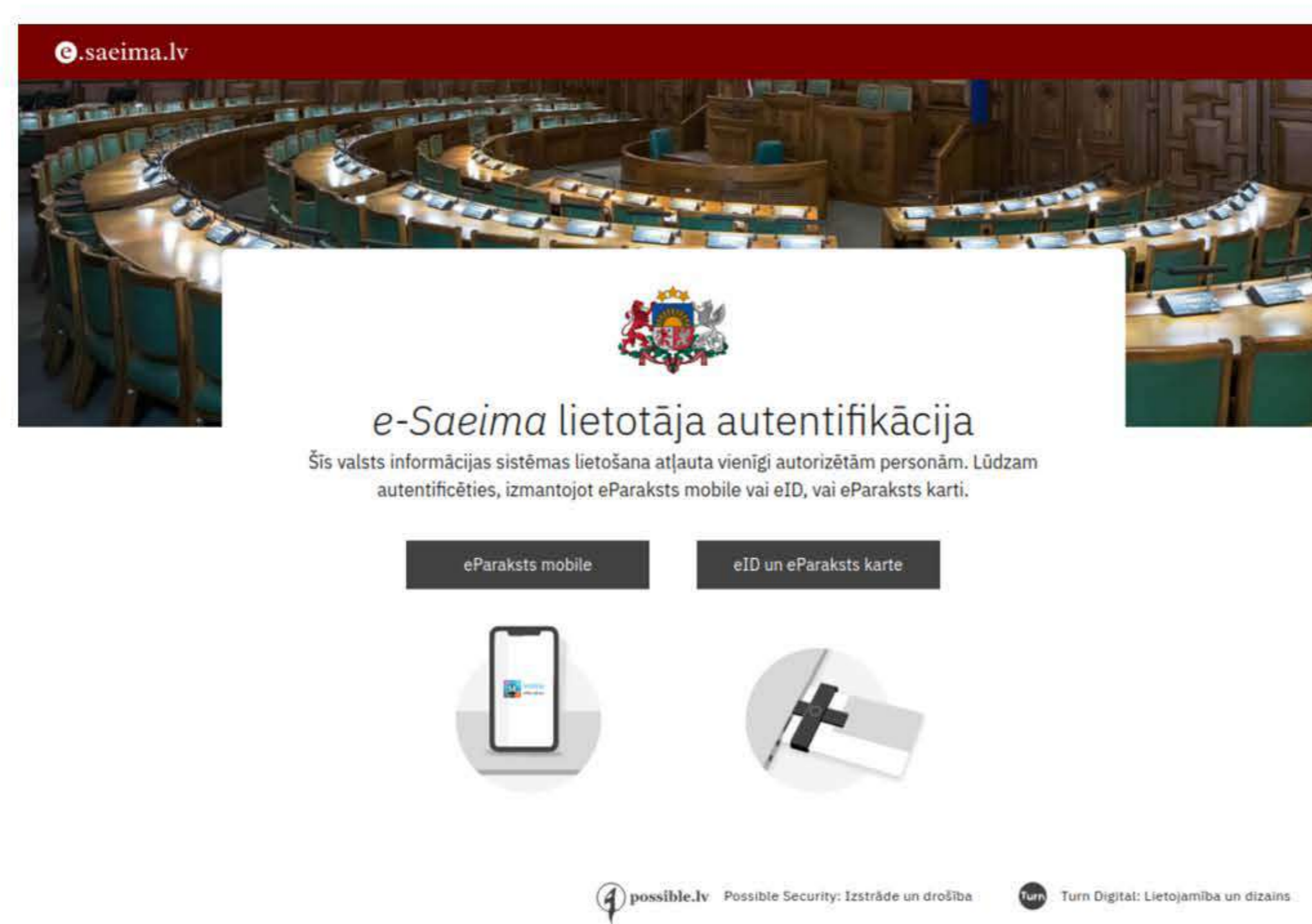
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RĪGAS STRADIŅA UNIVERSITĀTE

World Congress of Latvian Scientists

Inga Jēkabsone, PhD, LLM, MBA

Magnetic Professional, Ltd.

Digital Transformation of Adult Education for More Sustainable Development of Latvia

Introduction

The Covid-19 pandemic has left significant consequences at every level of education, including adult education. In order to adapt to the restrictions caused by the pandemic, adult education institutions all around the world were forced to transform the way how the educational process was organized. By introducing various web-related technologies, the physical place of teaching and learning processes has become a less significant factor, thereby, potentially, contributing to the inclusiveness of education and, as a result, to sustainable development.

Within the research, the following research methods are used: a scientific literature review to investigate the concepts of sustainable development and online adult education as well as their potential correlation, a survey of adult education institutions in Latvia, as well as statistical data analysis of adult education indicators.

Research Objective

The research aims at analyzing how the recent transformation of adult education caused by the pandemic between 2020 and 2022 contributed to the sustainable development of Latvia.

Table 1

Types of Online Learning and Their Application in Adult Education in Latvia

The proportion of content delivered online, %	Type of course	Description	Situation in Latvia before the pandemic, share of adult education institutions, %	Situation in Latvia during the pandemic, share of adult education institutions, %
0	Traditional	Traditional face-to-face learning with no significant use of web-based technologies	20	0
1-19	Web-facilitated	The course uses web-based technology to facilitate what is essentially a face-to-face course	82	12
20-79	Blended or hybrid	The course blends online and face-to-face delivery	8	30
80-100	Fully online	A course in which most or all of the content is delivered online	2	92

*60 adult education institutions were surveyed in May-June 2021; multi-select multiple choice question

** Author's created table using (Allen and Seaman, 2009) and survey results

Results & Discussion

Figure 1

Main Technology-Related Challenges of Adult Education Institutions in Latvia during the Pandemic

*n=43, research period May-June 2021;

"1" corresponds to not important at all and "5" corresponds to an extremely important challenge
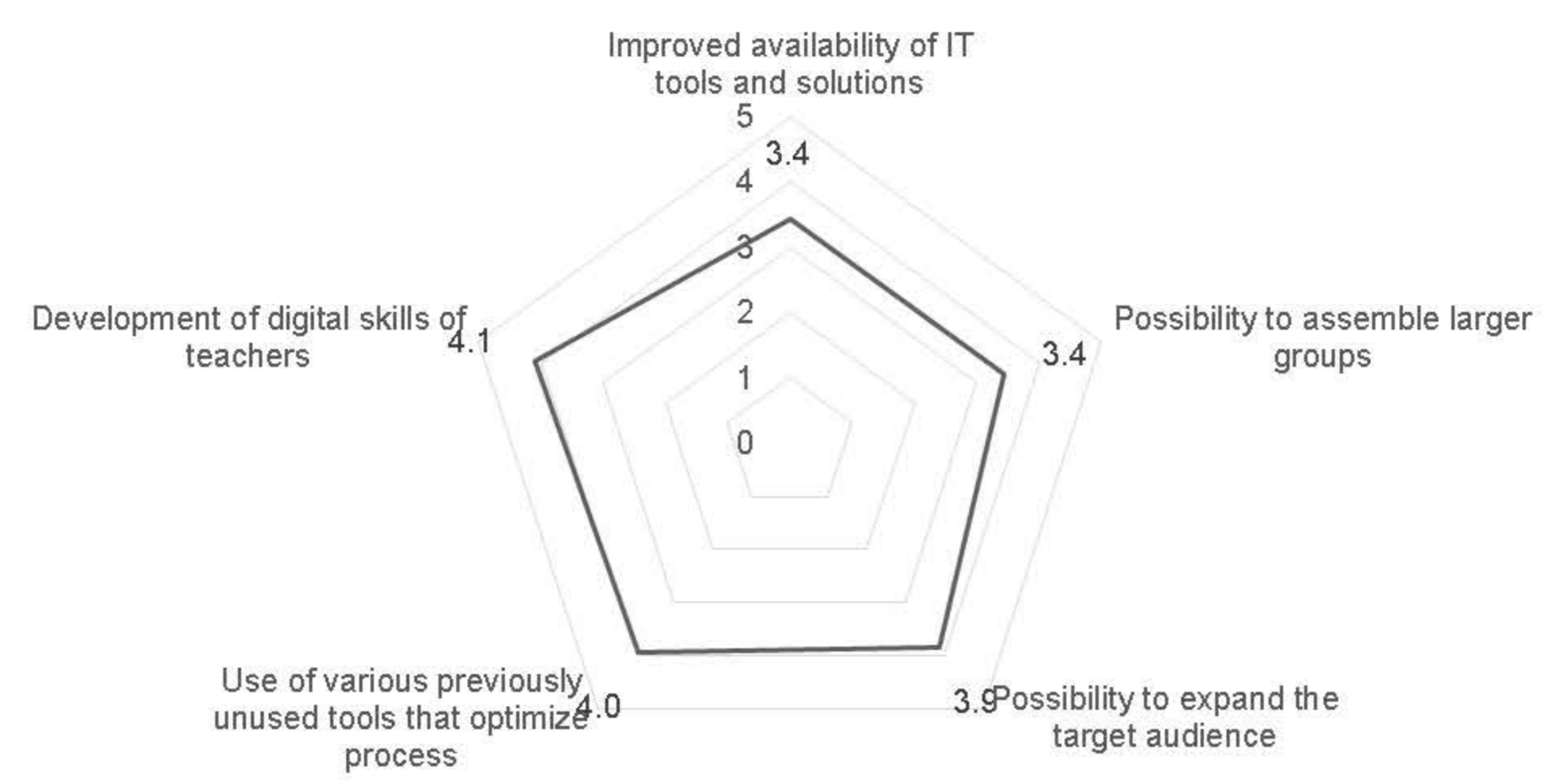
Figure 2

Main Technology-Related Benefits of Adult Education Institutions in Latvia during the Pandemic

*n=43, research period May-June 2021;

"1" corresponds to not important at all and "5" corresponds to an extremely important benefit

The results of the survey of Latvian adult education institutions clearly demonstrate the rapid digitalization of the adult education sector during the pandemic. While analyzing the technology-related challenges and benefits during the pandemic, the author concluded that all involved parties, including teachers, improved their digital skills by using various tools and techniques in teaching and learning processes during the digitalisation process. In addition, by introducing online programs, adult education centers were able to attract more learners and expand their target audience (e.g., from rural territories, different regions or from abroad). All these aspects lead to Latvia's unprecedented high participation rate in adult education. However, there is not enough data to support the assumption that online adult education correlates to sustainable development since various aspects of sustainability (e.g., quality) must be considered.

In light of how online adult education may support sustainable development, an analysis of Latvia's long- and medium-term policy planning documents has revealed that both concepts are interconnected and that this is emphasized through inclusivity, equitable quality, lifelong learning, and collaboration with various stakeholders. Since the mid-term policy planning documents were created during the pandemic, the digitization of adult education was designated as a horizontal priority, paying particular attention to teachers' digital skills, pedagogical digital competence, and technology-enabled learning techniques.

Conclusions

The research showed that the adult education sector, including Latvia, experienced rapid digitalization from 2020 until 2022.

However, a broader quantitative and qualitative study should be conducted including other EU countries to analyze whether the pandemic has contributed to higher participation rates in adult education, thereby supporting the hypothesis that online adult education promotes sustainable development through a more inclusive educational process. At the same time, in the research, the practices of quality assurance systems in online adult education programs need to be examined.
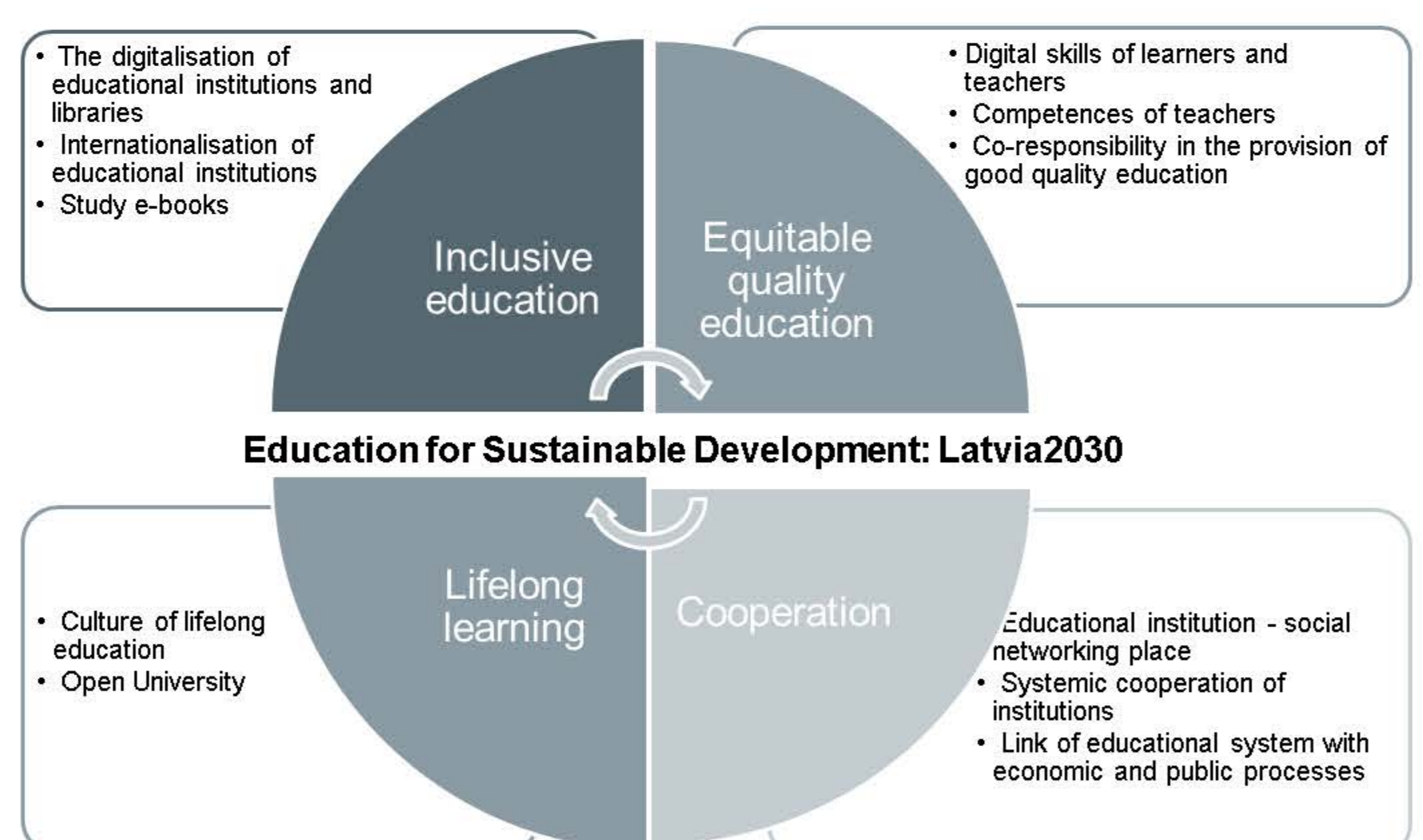

Figure 3

Incorporation of the Concepts of Sustainable Development and Education in the Sustainable Development Strategy of Latvia until 2030

Source: Author's created Figure using State Chancellery (2010).

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Geographic Information Systems and Crisis Management Organization

Celms Armands, Ratkevičs Aivars, Puķīte Vivita, Celmiņa Vita Brinkmanis-Brimanis Miks

Latvian University of Life Sciences and Technologies

Introduction

When the threat of a crisis formed, it transforms into the development of the crisis and when it moves into the phases of escalation, the spatial situation of the specific event area should be considered as an important influencing factor. Impact of the spatial situation is very individual for area of crisis development. Using the knowledge's of a specific spatial situation, the crisis management staff prepares and makes decisions for predicting crises, limiting their development and escalation, as well as for the organization of coping processes. In the last centuries, the best-known documents of territorial knowledge were the cartographic material's as plans and topographic maps. As digital technologies integrate with mapping technologies, to use Geographic information systems technologies terrain situation models transformed began to improve and expand significantly, offering new opportunities for crisis management.

Research Objective

Geo-support and prepared cartographic/geospatial products, including different 3D models for crisis management :
- ▶ allow to make smarter and better decisions;
- ▶ save resources and reduce costs;
- ▶ and better - in a crisis situation would save lives!!

Results & Discussion

Web pages and free datasets - online

Relief model of area

Digital terrain model (DTM)

Digital surface model (DSM)
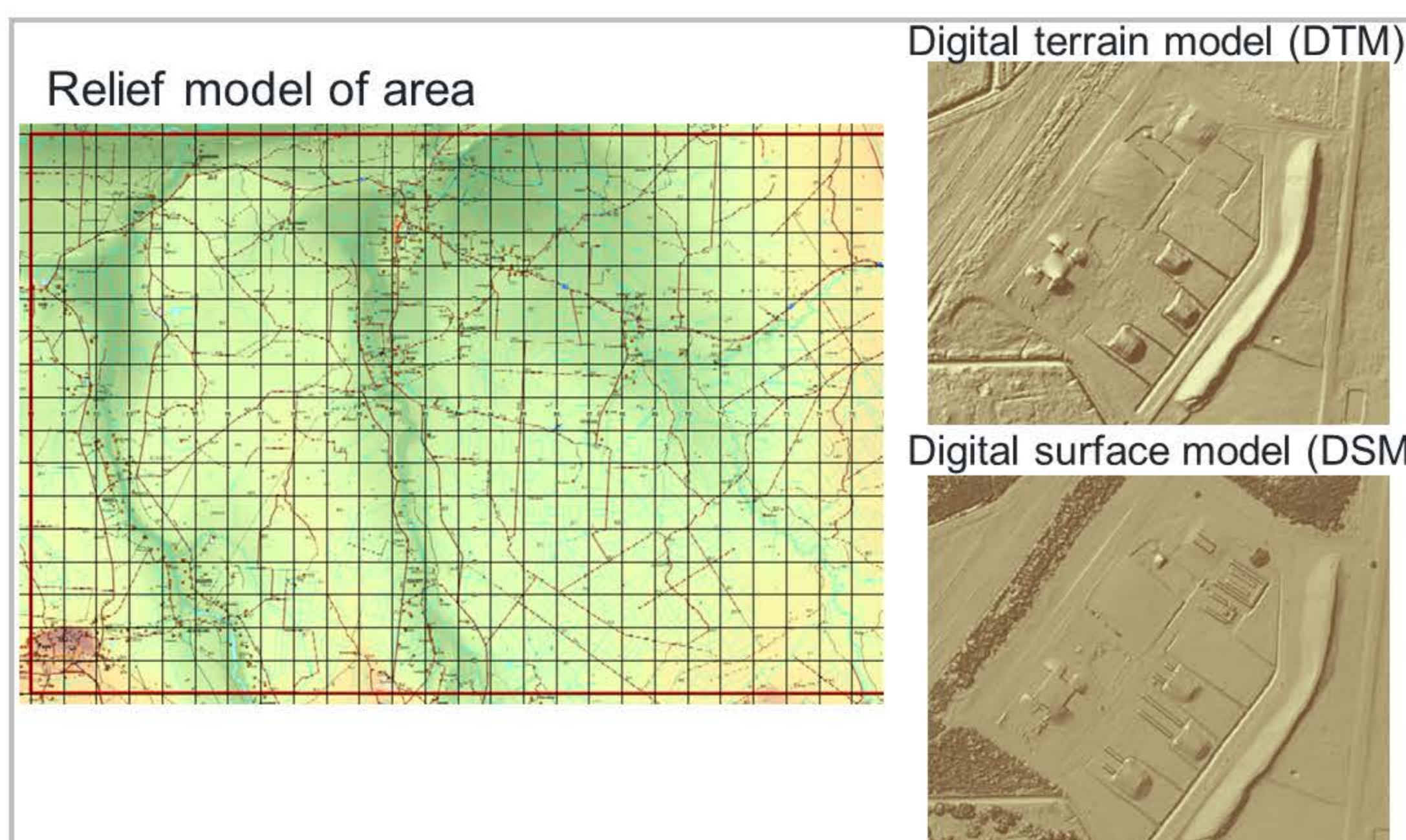
The significant problems have arisen with a noticeable lag in real use from the currently achieved opportunity potential in the geoinformation segment. Firstly, they are related to a justified conservative approach to the use of new technologies in crisis management, where demands are made for safe and proven technologies. Secondly, the new technological possibilities develop at a very fast pace - which limits the possibilities of organizing and conducting tests of their use in sufficiently stable conditions with a sufficiently safe testing base.Thirdly, in this specific field, there is an acute number of theoretically and practically prepared and available specialists, who would be able to know and work with the whole spectrum of new technical possibilities, which limits the possibilities of developing new usage offers and implementing the necessary ones/independent security tests.

Conclusions

Use GIS of the spatial situation of the earth's surface is rapidly increasing in the development of solutions to crisis situations and the realization of their overcoming. Possibilities of developing and already achieved use GIS of the earth's surface territories are currently significantly ahead of the practice of their use in the crisis management sector and use is directly related to the impact of the development of technical and technological solutions on land surveying technologies as they transform/move to the IT digital environment

ArcGIS Earth – Offline Map Browser solution

Contact Information

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Implementation of weakly structured systems as organizational regulation process

Vladislav V. Fomin **Kalle Lyytinen** **Stefan Haefliger** **François-Xavier de Vaujanay**

Vilnius University   Case Western Reserve University   Bayes Business School   Université Paris-Dauphine

Introduction

Implementation is about episodic introduction of information technology (IT) systems that makes them fit the organization's *modus operandi*. Traditionally, information technology (IT) implementation has been portrayed as a sequence of stages, viewed as instrumental in putting in place *ex ante* known system functions and in ensuring that users' behaviors will be aligned with those dictated by the system. This perspective treats implemented IS as to convey organizational rules governing how activities, such as payroll, ordering, or hiring, should be defined, structured, and connected. We call systems embedding families of such rules highly structured systems (HSS) because they structure and glue together organizations' activities by conveying rules. Implementation of HSSs 'moves' the centrally- and *ex ante*-defined rules devised and agreed by central authority to local practices.

Many commonly used ISs in organizations differ significantly from the purposes and functions of HSS. Applications such as AI-based learning system or e-learning environments support voluntary, weakly- or non-structured organizational tasks encompassing spontaneous communications, knowledge sharing, learning, and so on. What are the functions of such systems and how they can be meaningfully implemented in organizational practices is often not known in *ex ante.* We call such systems weakly structured systems (WSS) because their use is not dependent or conditioned by centrally provided organizational rules.

Results & Discussion

The void of initial rules on 'what' to use and 'how' to use digital objects is gradually filled with shared rules as users discover features and functionality of IT as individual affordances, and then discuss IT uses experiences with other users, as to refine 'best practice', and finally define rules governing 'legitimate' and 'unwanted' ways of how the WSS is to be used. Some rules are established through organizational mandates externally to the IT system, while other become materialized in the IT system as scripts and workflows. As the 'regulatory belt' for the WSS is being gradually built, the system acquires characteristics of highly structured system.

While recognizing the analytical power of 'trifecta of organizational regulation' (see Fig. 1) to study IT implementations, this research is motivated by realization that trifecta model cannot be readily applied in studies of WSS implementation. Using the lexicon established in previous research, analytic inferences and illustrative examples, we demonstrate how organizational regulatory system surrounding the WSS use is gradually formed through bottom-up and top-down regulatory interventions by system users and organizational administration. Our research thus expands the lexicon and extends the analytic scope of the trifecta model to enable/accommodate analysis of implementations of weakly structured systems as joint regulation process.

Research Objective

A well-established stream of research has investigated in the past how HSS are effectively implemented and how implementation expresses a movement from centralized rules to practices. implementing a WSS, as a movement from practices to newly discovered rules, has received less theoretical and empirical attention. Understanding the regulatory metamorphosis from the individual system use to the organizational level affordances has not been examined in detail and forms an critical step in theorizing WSS implementation as an organizational- not individual level-assimilation process. Such theorizing requires articulating how WSS implementation evolves organizationally by identifying, negotiating, maintaining, and enforcing WSS uses expressed in organizationally shared rules.

Our study theorizes implementation of WSS as emergent organizational regulation where individually discovered affordances become expressed in shared and enforced rules as a joint regulation. Specifically, we 1) elaborate a theoretical framework and 2) related lexicon conducive for analyzing WSS implementation as joint regulation, as well as 3) identify mechanisms that transform during implementation individual uses of WSS (affordances) to collectively regulated WSS uses.
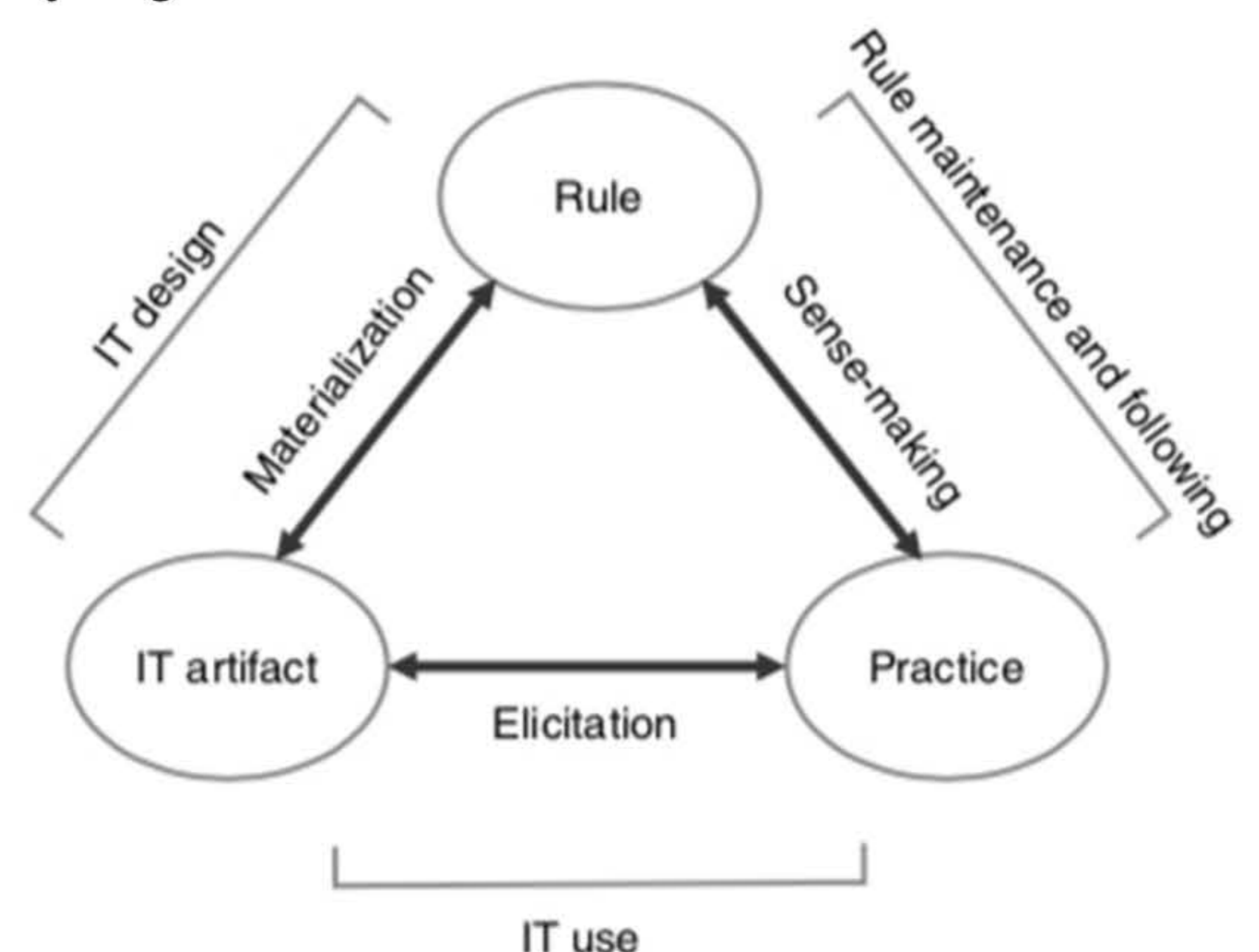

Fig. 1. 'Trifecta of organizational regulation'.
Source: de Vaujany et al., (2018). Rules, Practices, and Information Technology: A Trifecta of Organizational Regulation. ISR. https://doi.org/10.1287/isre.2017.0771.

Conclusions

We posit that WSS implementation forms a new family of IT systems which are being increasingly adopted by organizations including AI-based systems, e-learning platforms, knowledge management systems, etc. Often such systems are sought as vehicles for the digital transformation (DT) of enterprise. In this light, our work establishes a foundation for further theorizing a number of issues related to digitization efforts. Our work lays bare some critical concepts to advance to theorizing of such systems and their use by articulating mechanisms which enable WSS implementation as a movement from user experimentation to formulating and enforcing shared organizational rules for system use.

Contact Information

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Challenges of digital transformation faced by IT enterprises in Latvia
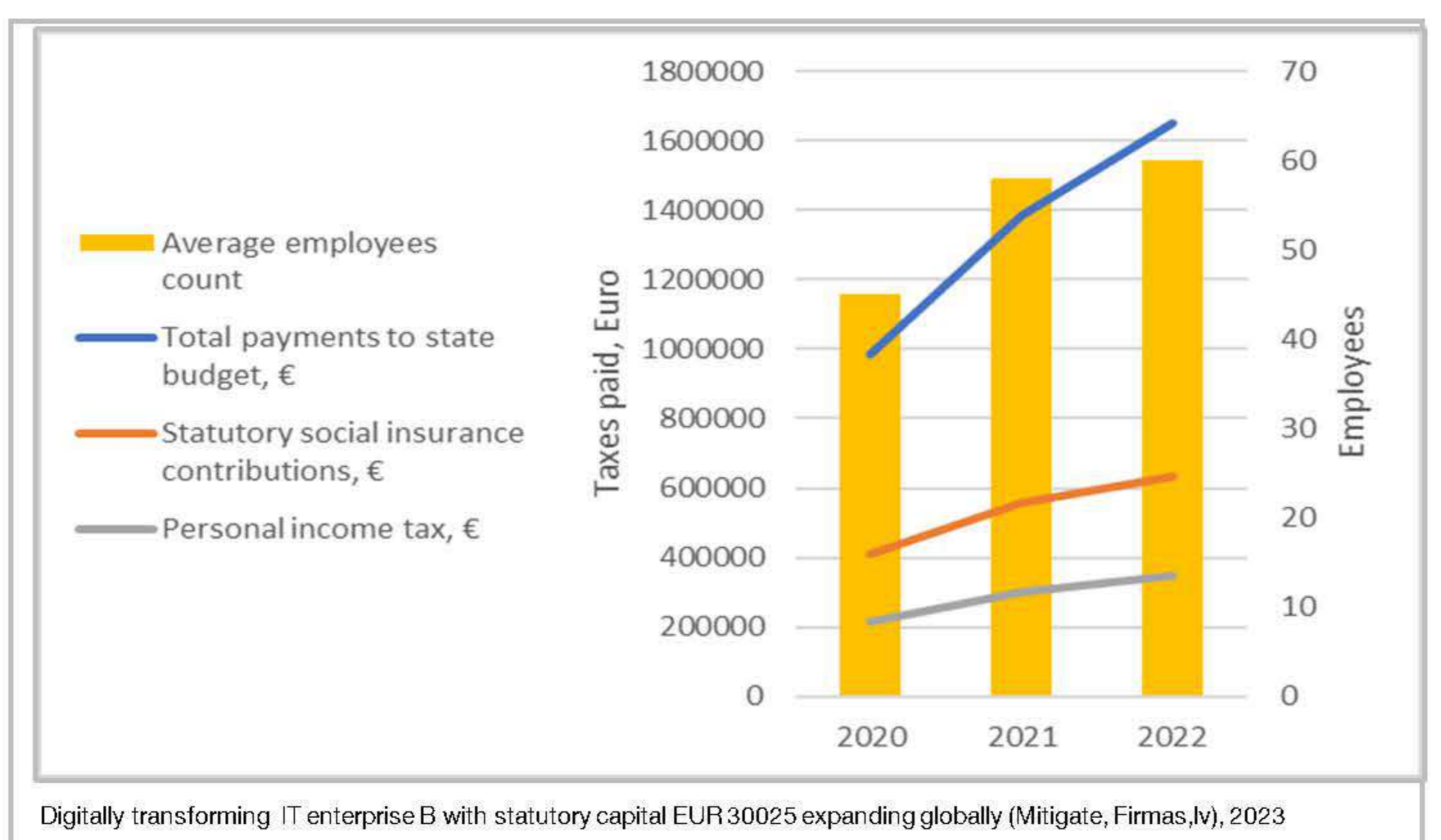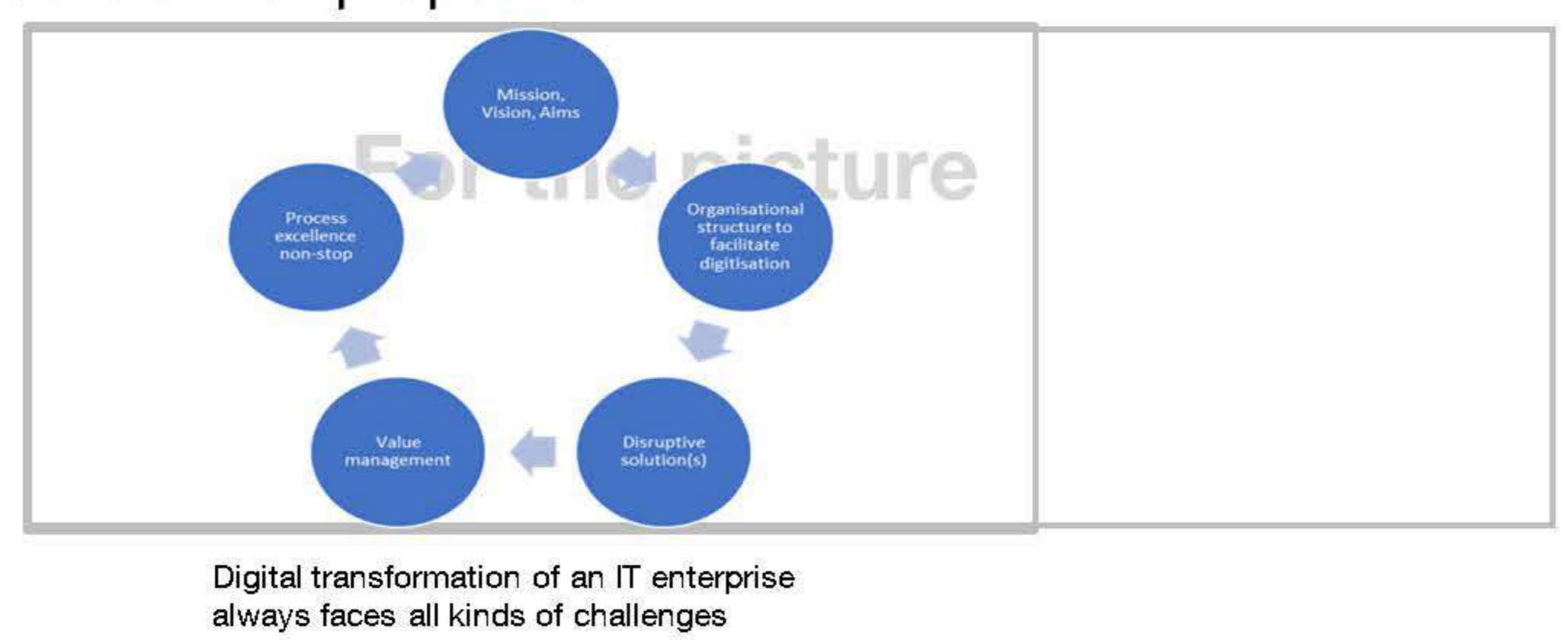
Andrejs Limanskis

RISEBA

Introduction

Digital transformation is a critical driver of innovation and growth in Information Technologies (IT) companies worldwide. However, its implementation poses various challenges amplified in Latvia. Latvia is below the average EU level in many DESI indicators. Some Latvian IT companies tend to run to alternative tax residencies like Ireland, UK, Estonia when globally investments in the IT in 2021, according to CBS Insights exceeded $132 billion and top 250 FinTech startups and "unicorns" attract above $74 billion per year. Evidently, digital transformation brings risks, from shortage of skilled labour and up-to-date managers to loss of inherent competitiveness. Private business is carrying the digital transformation expecting cooperation with the state institutions that fail, like in the case of the 2023 Open letter of 119 accusing the Central Finance and Contracting Agency CFLA in inability to implement innovation and digital transformation programmes. It all means the research is topical.
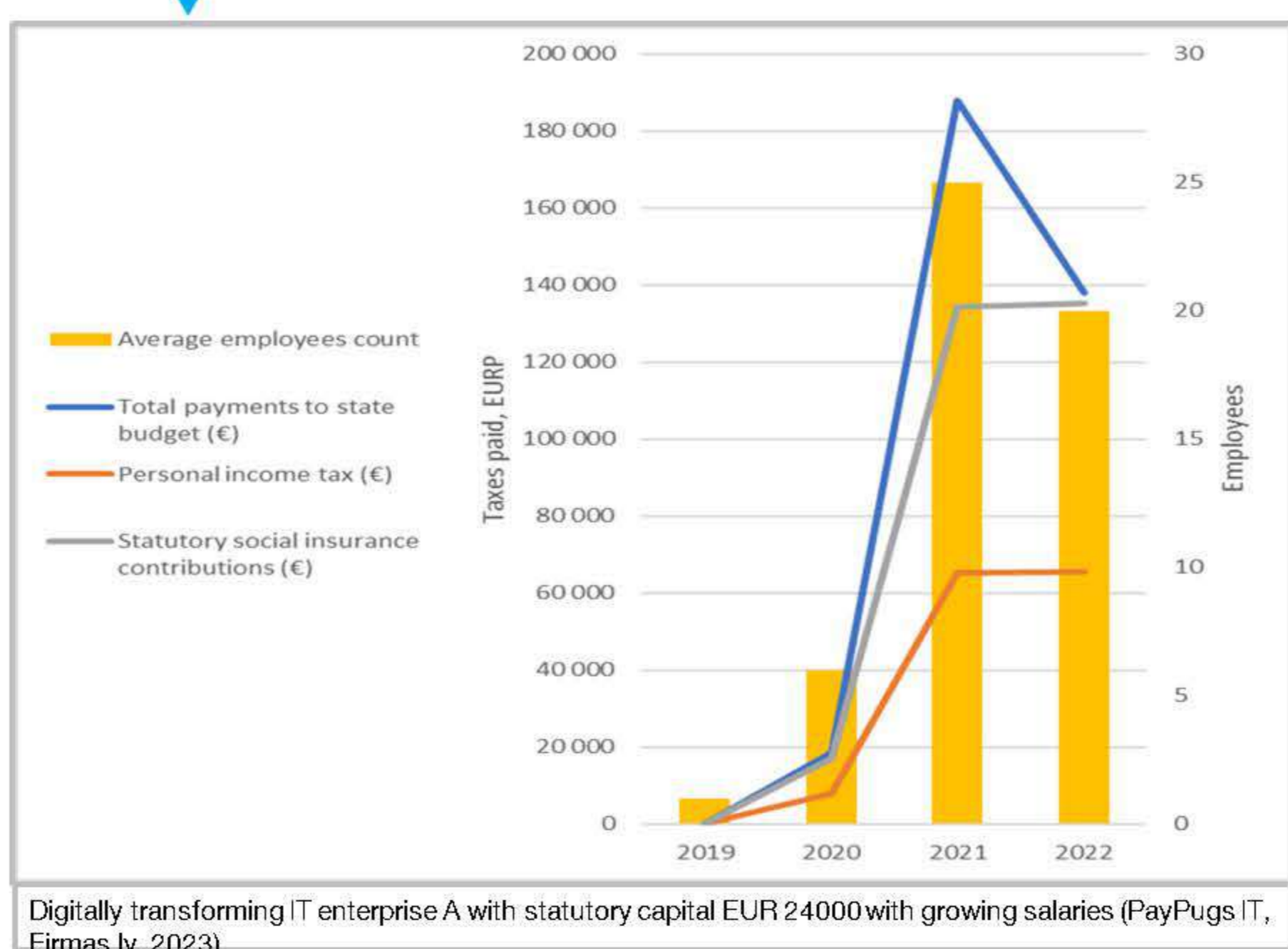
Research Objective

This study aims to identify and analyze the challenges of digital transformation in IT companies operating in Latvia. The research is based on a mixed-methods approach, including a literature review, interviews, financial analysis and a case study analysis of IT companies under digital transformation in Latvia. Research questions: What are the main challenges of digital transformation facing IT companies in Latvia? What strategies and solutions prove effective in overcoming these challenges? What new solutions can be proposed?

Digital transformation of an IT enterprise always faces all kinds of challenges

Results & Discussion

Digitally transforming IT enterprise A with statutory capital EUR 24000 with growing salaries (PayPugs IT, Firmas.lv, 2023)

Digitally transforming IT enterprise B with statutory capital EUR 30025 expanding globally (Mitigate, Firmas,lv), 2023

Main challenges: Lack of digital culture, Lagging state regulations, Skills shortage in dealing with Artificial Intelligence (AI), Indecisive sales innovation, Resistance to change, Limited financial resources. The study contributes into insights to guide entrepreneurs and policymakers in developing effective strategies for digital transformation. Case of IT company with negative equity and plummeting debts getting foreign owner is opposing the case of a globally expanding one that hires new employees. Case of a one-employee IT company in conflict with the State Revenue Service (VID) combines with the case of the long awaited accession of a giant Telia Latvija to the Tet group. Number of challenges gives birth to innovations. In general, Latvian IT companies start leveraging cost-effective solutions (cloud computing, open source software, software as a service, virtualisation, process automation, agile development,
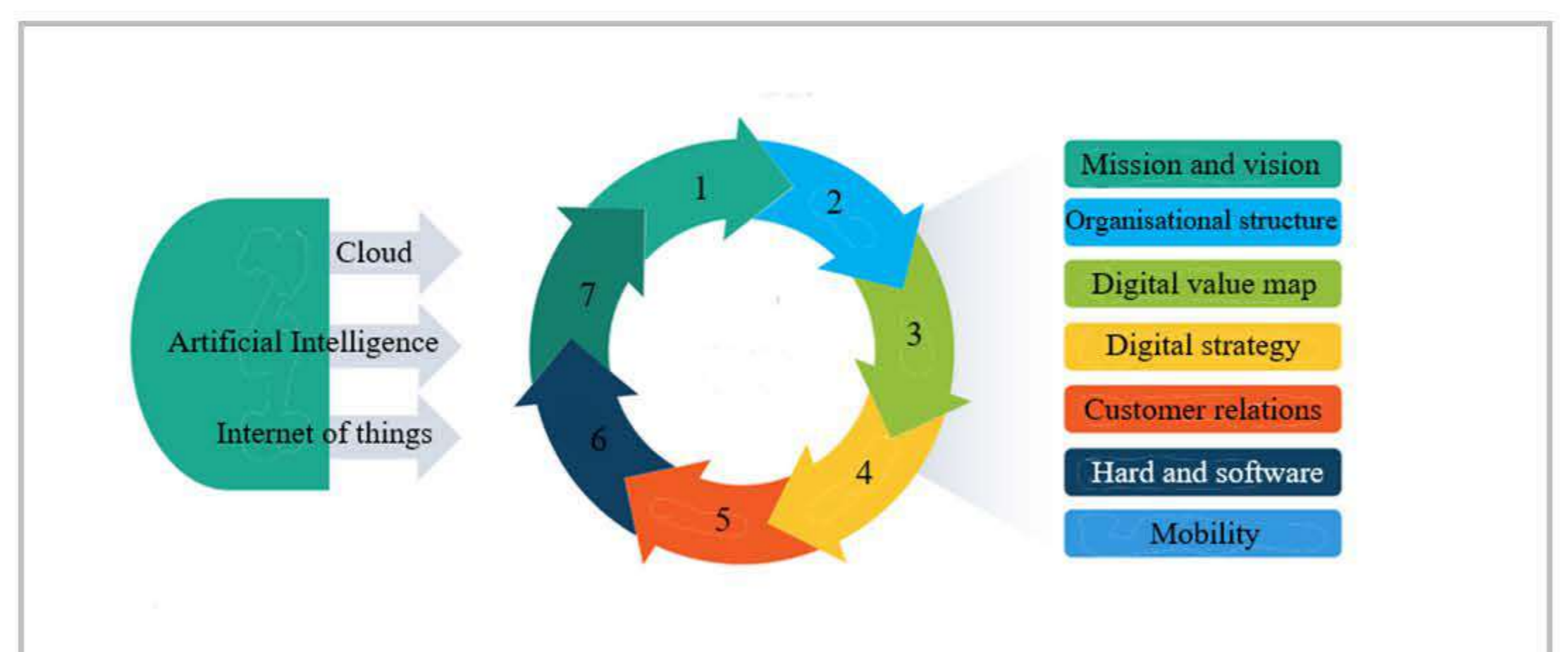
Conclusions

Successful digital transformation in IT companies in Latvia requires a comprehensive approach that addresses interdependent challenges and prioritizes investment in digital skills development, interaction with AI, and changing management strategies.

Call to action: Highlight monitoring of troubles faced by IT companies in Latvia to support their digital transformation efforts and spread solutions.

Digital transformation of IT enterprise

Contact Information

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Psiholoģiskā izpēte ar datorizēto Latvijas Klīnisko personības testu psihiskās veselības aprūpes vidē

Jeļena Koļesņikova, Viktorija Perepjolkina, Kristīne Mārtinsone, Ainārs Stepens

Rīgas Stradiņa universitāte

Ievads

Veselības aprūpē strauji pieaug psihisko slimību slogs, tāpēc efektīva finanšu un cilvēkresursu izmantošana psihiskās veselības jomā ir īpaši aktuāla. Lai nodrošinātu kvalitatīvu, multiprofesionālu, integrētu un pacientcentrētu aprūpi, ir svarīgi ieviest mūsdienīgus digitālos risinājumus, vienlaikus nodrošinot šo tehnoloģiju ērtu lietošanu gan veselības aprūpē iesaistītajiem speciālistiem, gan pacientiem.

Psiholoģiskās izpētes instruments LKPT un tā datorizētā versija ir izstrādāti Rīgas Stradiņa universitātē. Latvijā LKPT tiek izmantots veselības aprūpē psihiskās veselības traucējumu novērtēšanai un citās nozarēs, kad nepieciešama personības klīniska novērtēšana, piemēram, speciālo dienestu personālam un tiesu ekspertīzēs.

Pētījuma mērķis

Šī pētījuma mērķis ir sistematizēt un izvērtēt Latvijas Klīniskā personības testa (turpmāk LKPT) izmantošanas praksi, efektivitāti un priekšrocības, lai sekmētu šī datorizētā instrumenta plašāku lietošanu ārstniecībā, rehabilitācijā un citās jomās, kad nepieciešama personības klīniska novērtēšana.
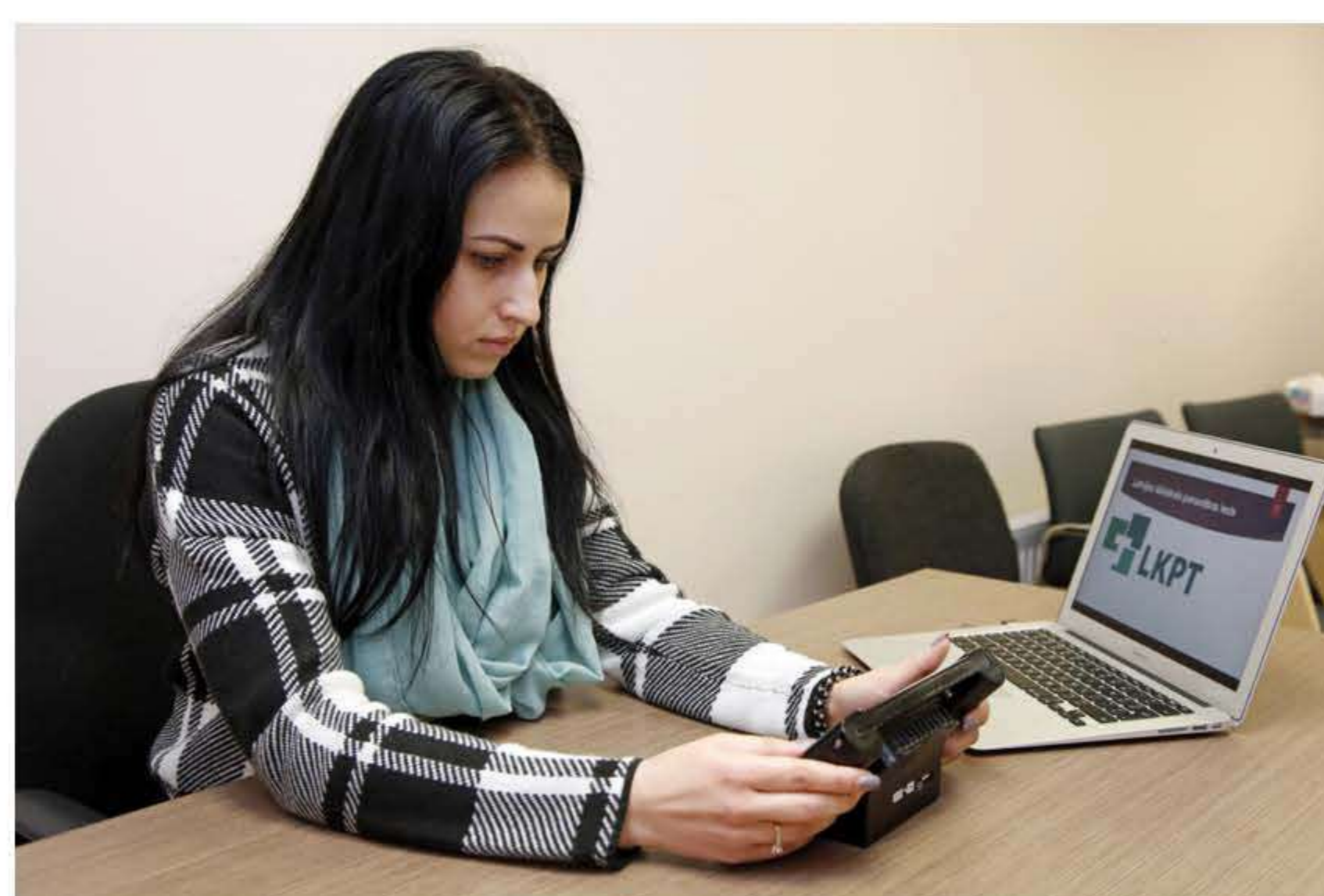
Rezultāti un diskusija
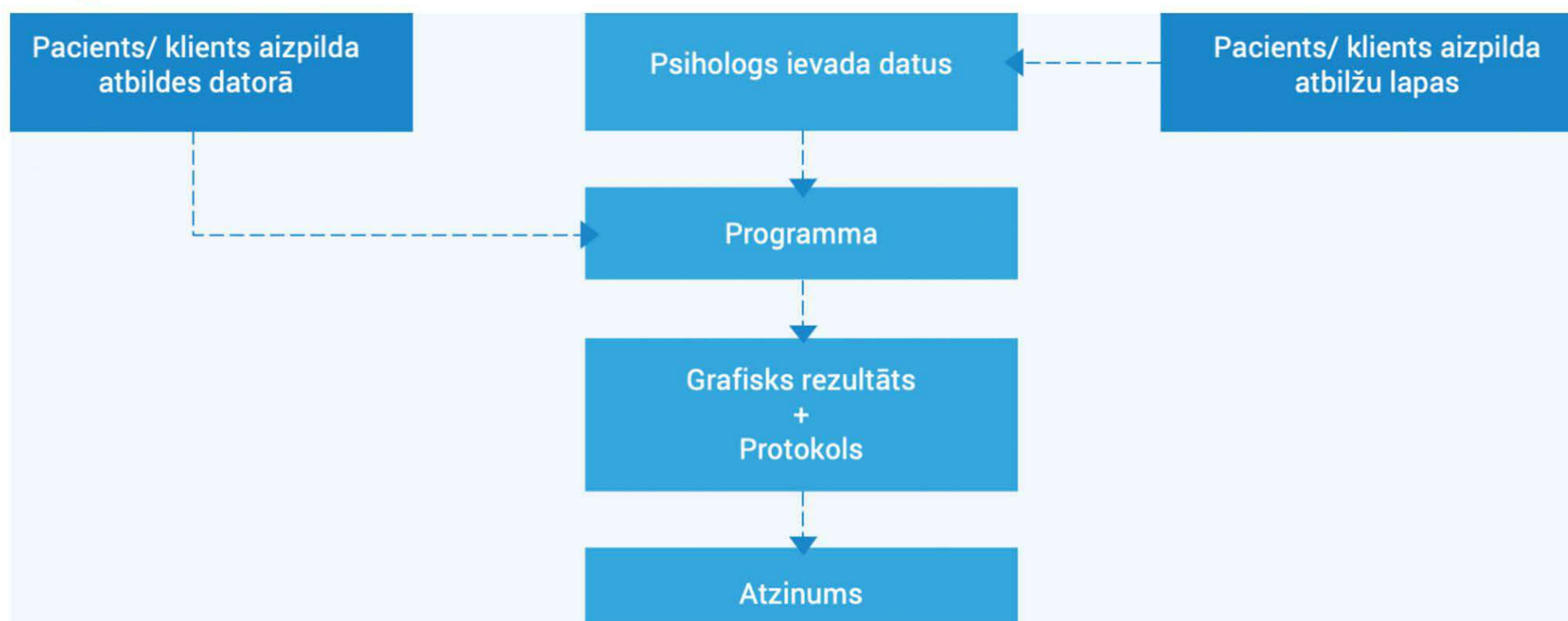
LKPT priekšrocības: datorizēta LKPT lietošana efektīvi samazina psiholoģiskai novērtēšanai nepieciešamo cilvēkresursu patēriņu, jo būtiski samazina speciālista laiku, ko tas patērē datu apstrādei. Veicot aprēķinus, tiek izslēgta cilvēciskas kļūdas iespēja un automātiski ģenerētais protokols ir vizuāli saprotams un viegli uztverams, palīdzot psihologam sagatavot argumentētus ieteikumus ārstēšanas plāna vai rehabilitācijas programmas izstrādei.

Secinājumi

Datorizētais LKPT ir efektīvs un finansiāli izdevīgs risinājums, kas ļauj ērti un kvalitatīvi novērtēt pacienta psihiskās veselības riska faktorus, palīdz sagatavot piemērotas psiholoģiskās intervences, stiprina psihiskās veselības pakalpojuma starpdisciplinaritāti un samazina veselības aprūpes speciālistu noslodzi.

LKPT rezultātu izdrukas piemērs, izmantojot exploro.lv platformu

Kontaktinformācija

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Ivars Vanadziņš

Riga Stradins University

Application of FAIR principles in occupational health

Introduction

Riga Stradiņš University's Institute for Safety and Environmental Health collects data in two areas:
- first, since 2006 there have been surveys on job safety for employers, employees and safety professionals
- secondly, annual collecting measurement data on concentrations of substances and other parameters in the workplace - about 4000 businesses have participated over the years

Given that the volume of data is significant and covers a variety of issues that would be relevant for a number of areas, we would like to ensure that data is available to Latvian and European scientists by applying FAIR principles in practice – that is, ensuring the quality and availability of data also outside RSU.

The project was funded by cascading grant agreement No 101017536 from the Horizon Europe project "EOSC-Future".

Research Objective

Prepare and publish rich research data in the field of Safety and Health at Work (DDV), ensuring their availability at RSU, Latvian and European DDV Communities and researchers from other disciplines.

Similarly, at the end of the project, we will develop supportive guidelines in Latvian for researchers on how to ensure the management of research data in such a way that it both supports the research process and enables more effective use of resources in the future by applying FAIR principles (see below).

Findable Accessible Interoperable Reusable

Source: https://www.fosteropenscience.eu/content/what-open-science-introduction
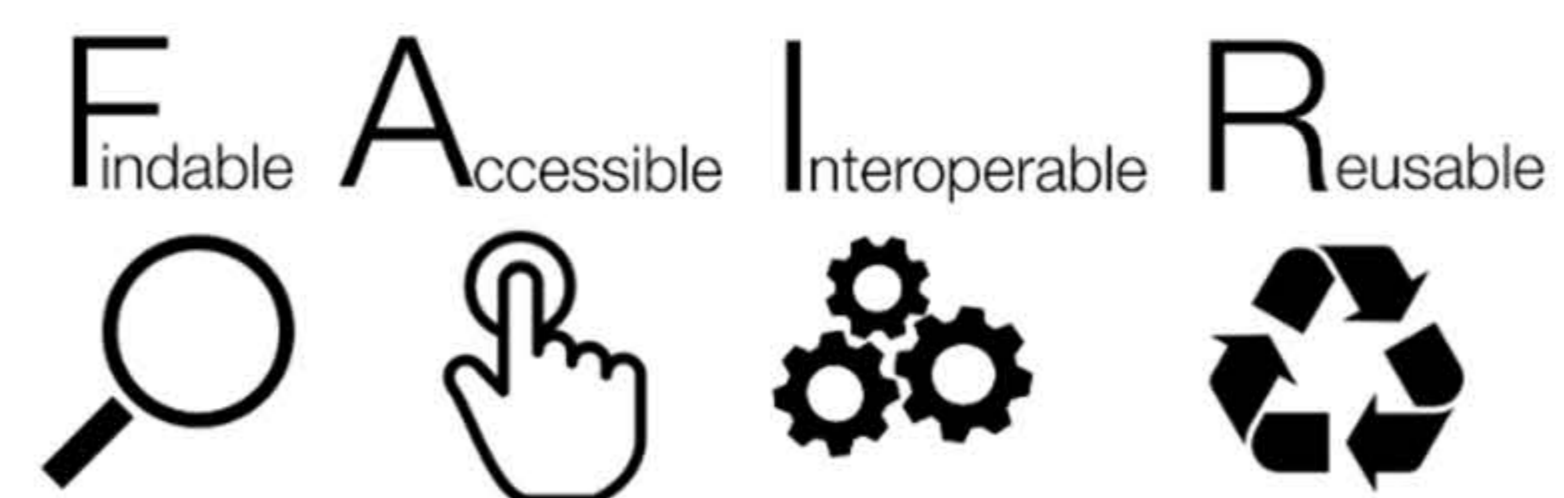
Results & Discussion
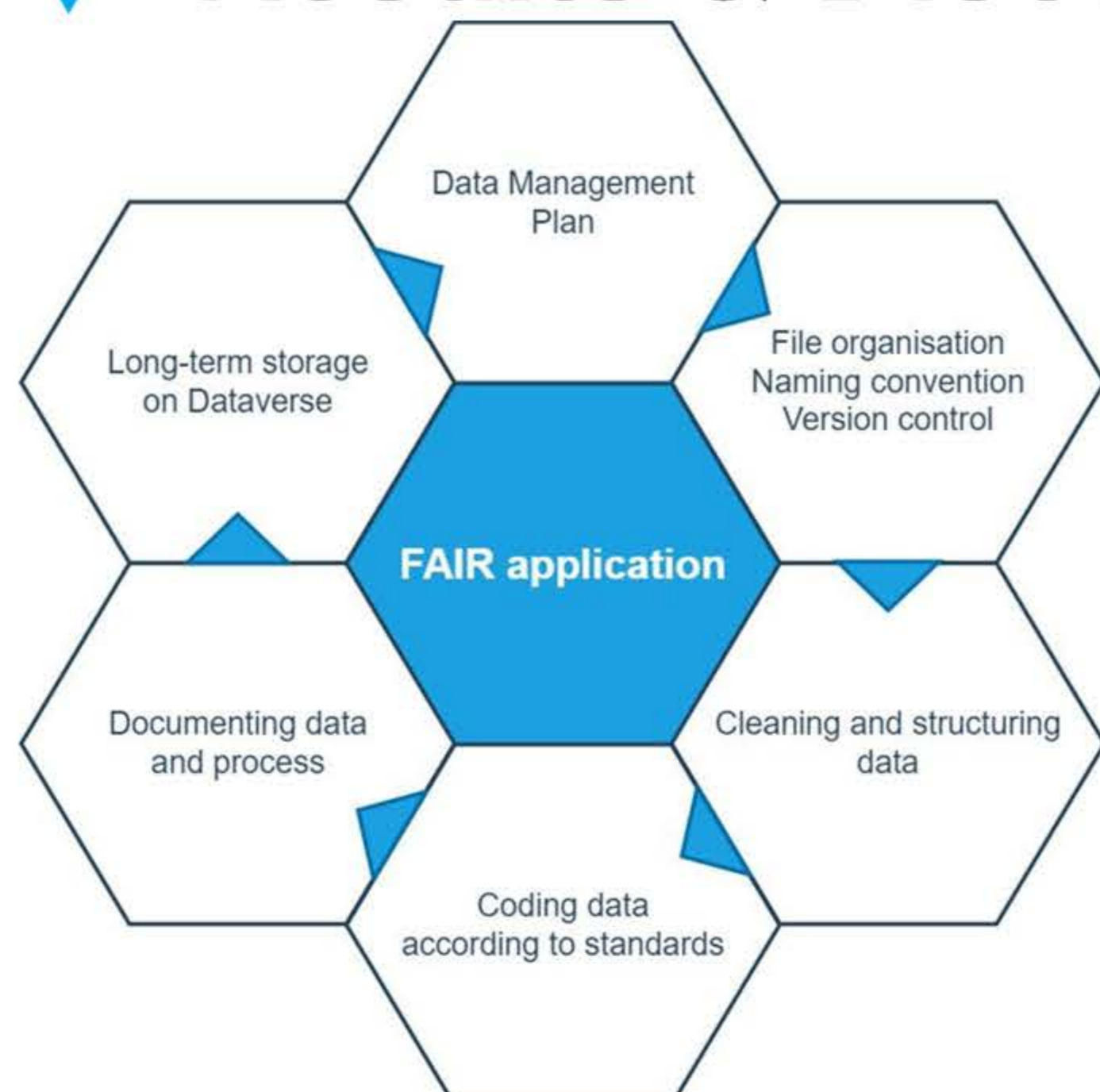
During the project, several improvements in the process of data collection and processing have been identified. In order to ensure successful planning and data processing, several guidelines and recommendations published by the Research Data Alliance (RDA) working groups as well as a number of projects associated with the European Open Science Cloud (EOSC) were used. Data sets created by the project will be stored in the RSU Dataverse Repository, which is registered in the leading global and European resource aggregation platforms (Re3Data, EOSC Portal, OpenAire), so that metadata can be harvested elsewhere. In collaboration with DataCite DOI unique identifiers will be assigned to ensure findability and citations. You can see the process of planning and implementing data processing in the chart «FAIR application».

Conclusions

As Latvia is currently implementing the Open Science Strategy, scientific institutions should implement a research data management system, and plan work with data even during the research project writing stage. If research data is collected and processed in line with good practice at the beginning, at later stages the amount of work is expected to decrease significantly, and there are additional opportunities to promote your work, seek new collaborations and use your data sets in large-scale studies, such as using machine learning algorithms.
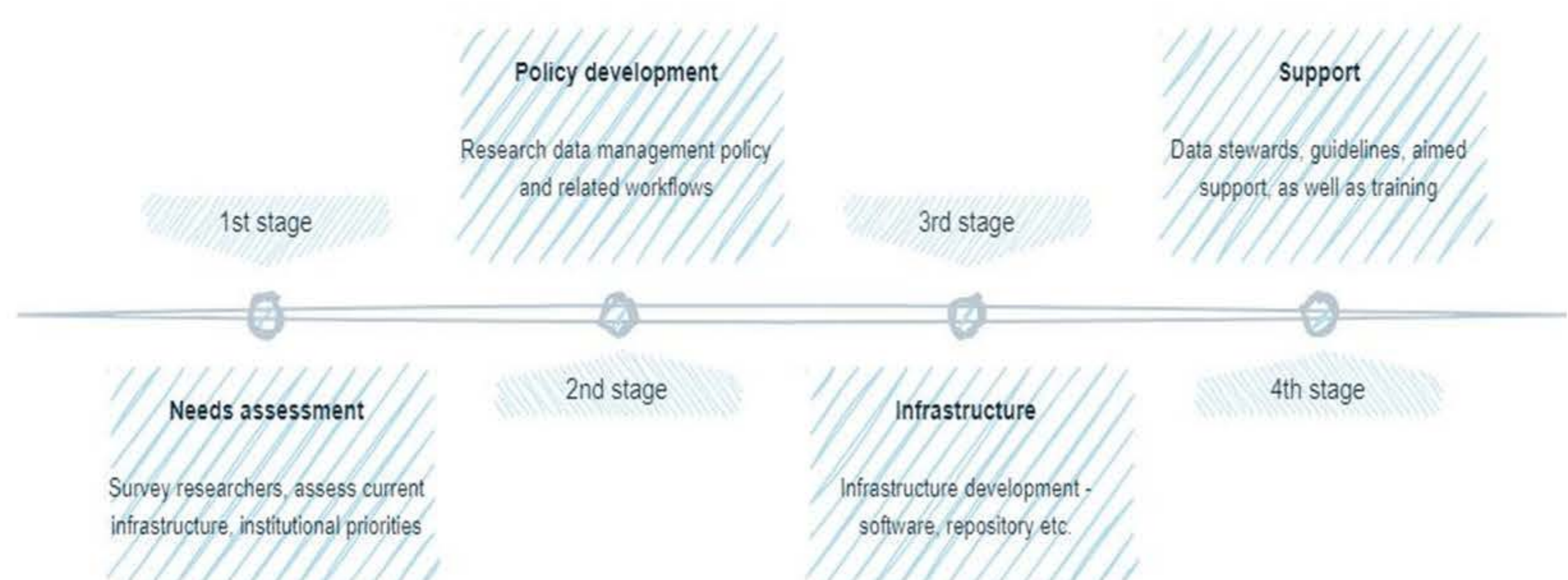
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Microstrip Low-Pass Filter Based Picosecond Pulse Expansion for PPM Demodulation

Janis Semenjako[1], Tatjana Solovjova[1], Janis Eidaks[1], Sandis Spolitis[2], Arturs Aboltins[1]

[1]Institute of Microwave Engineering and Electronics, Riga Technical University, Latvia
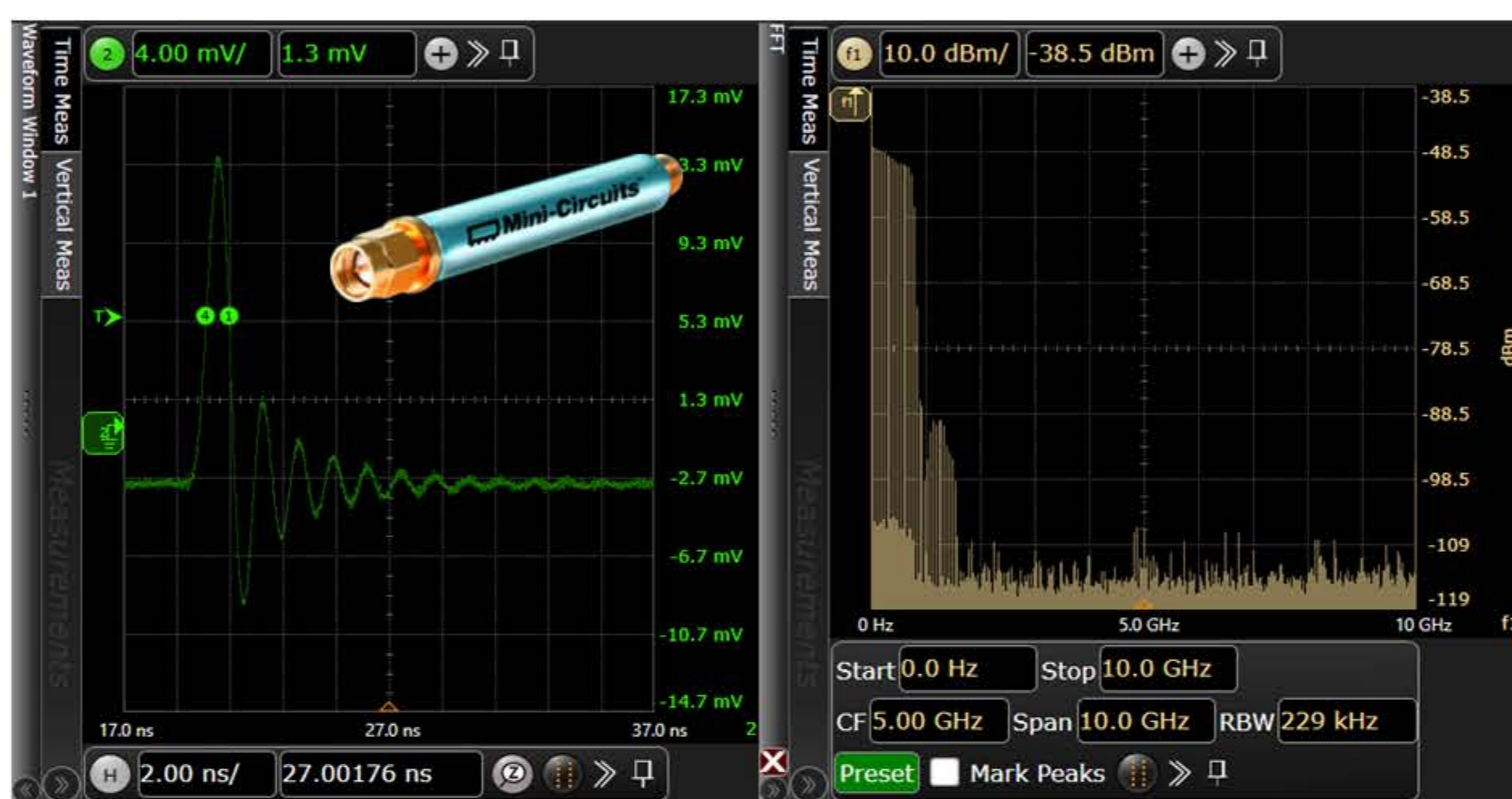[2]Institute of Telecommunications, Riga Technical University, Latvia

Introduction

Pulse position modulation (PPM) is a widely used ultra-wideband (UWB) modulation technique which allows saving energy by the employment of very short pulses. Demodulation of PPM signal by event timer requires a certain pulse duration, and in case of a few tens of picoseconds long pulses, expansion is necessary. A low-pass filter (LPF) can be used to extend the pulses at the input of the event timer. However, such a simple approach does not ensure the safe operation of the timer because it is also important that the rising edge of the pulse must be sufficiently steep, and the pulse must have a ripple small enough so that the timer would not react on the overshoots. Insufficient rising edge slope at timer threshold level will amplify noise which will lead to large jitter and low bit error rate. It is very important that the attenuation of the filter does not grow very rapidly at the beginning of the delay band, otherwise the filter will cause unwanted oscillations.

Results & Discussion

As expected, the fabricated filter provided sufficient attenuation up to about 3.5-4 GHz. However, at higher frequencies, the attenuation was different from theoretically calculated and even insufficient in some frequency bands – in the time domain, it creates unwanted oscillations. To ensure sufficient attenuation at frequencies above 3.5-4 GHz, a commercial filter was connected in cascade with the designed filter. It has led to acceptable shape and duration of the expanded pulse.

Research Objective

As a result of theoretical considerations, a Bessel-type filter was chosen as the filter to be used in study because this kind of filter has a maximally flat group delay. Further research has shown that a Bessel-type third-order filter with a cutoff frequency (3 dB level) between 450 and 500 MHz is most suitable for 50 ps pulses employed in PPM system. The low-pass (LP) Π filter circuit has been chosen. The values of reactive elements were calculated for Bessel type filters of third order with cut-off frequency $f_c = 500$ MHz at 3 dB level. The filter were fabricated on the FR-4 substrate with a dielectric constant of 4.2 or 4.7 (calculated value) with a thickness of 1.6 mm.

Conclusions

To achieve required pulse shape, a cascade connection of custom LPF with additional off-the-shelf LPF can be used.
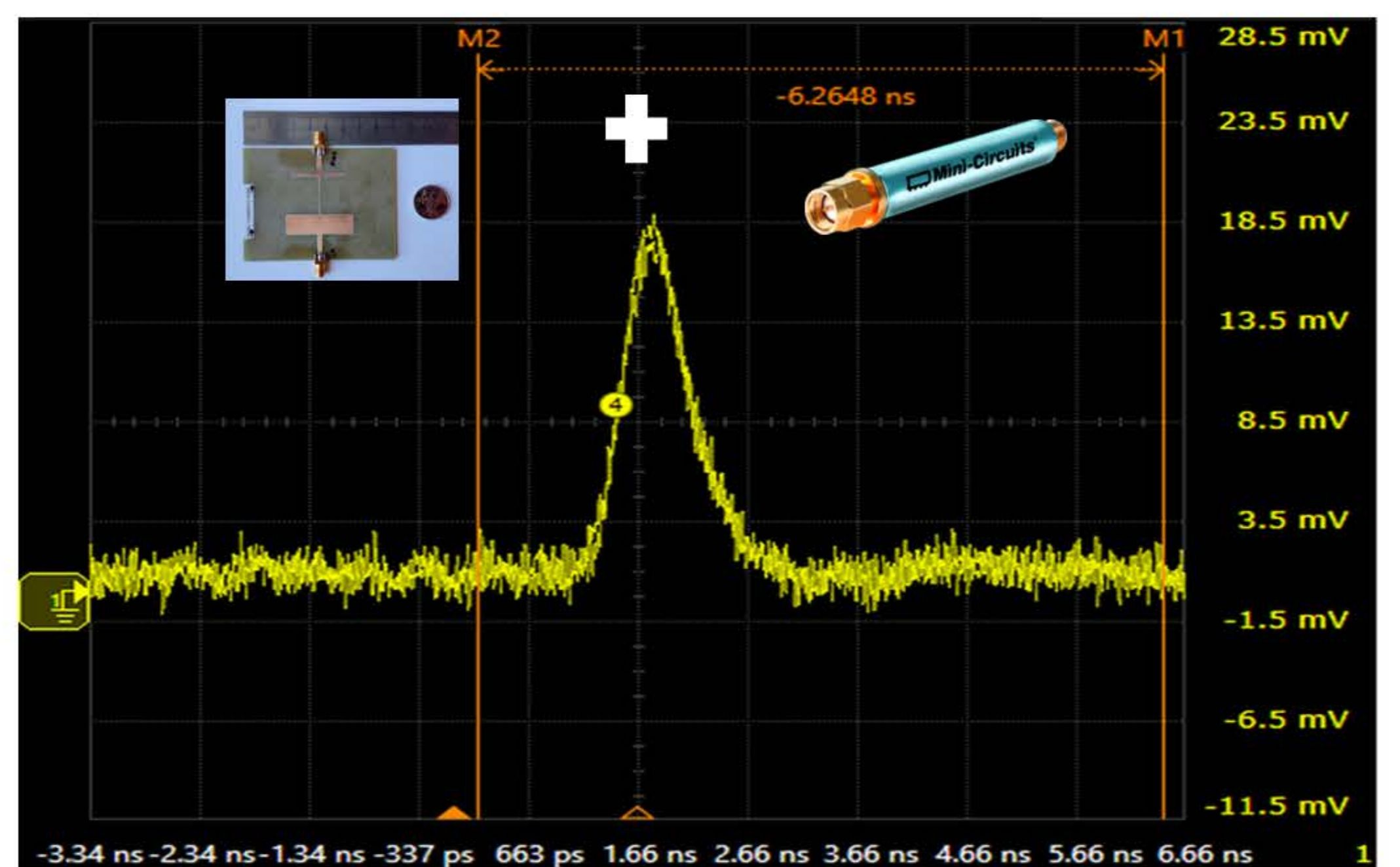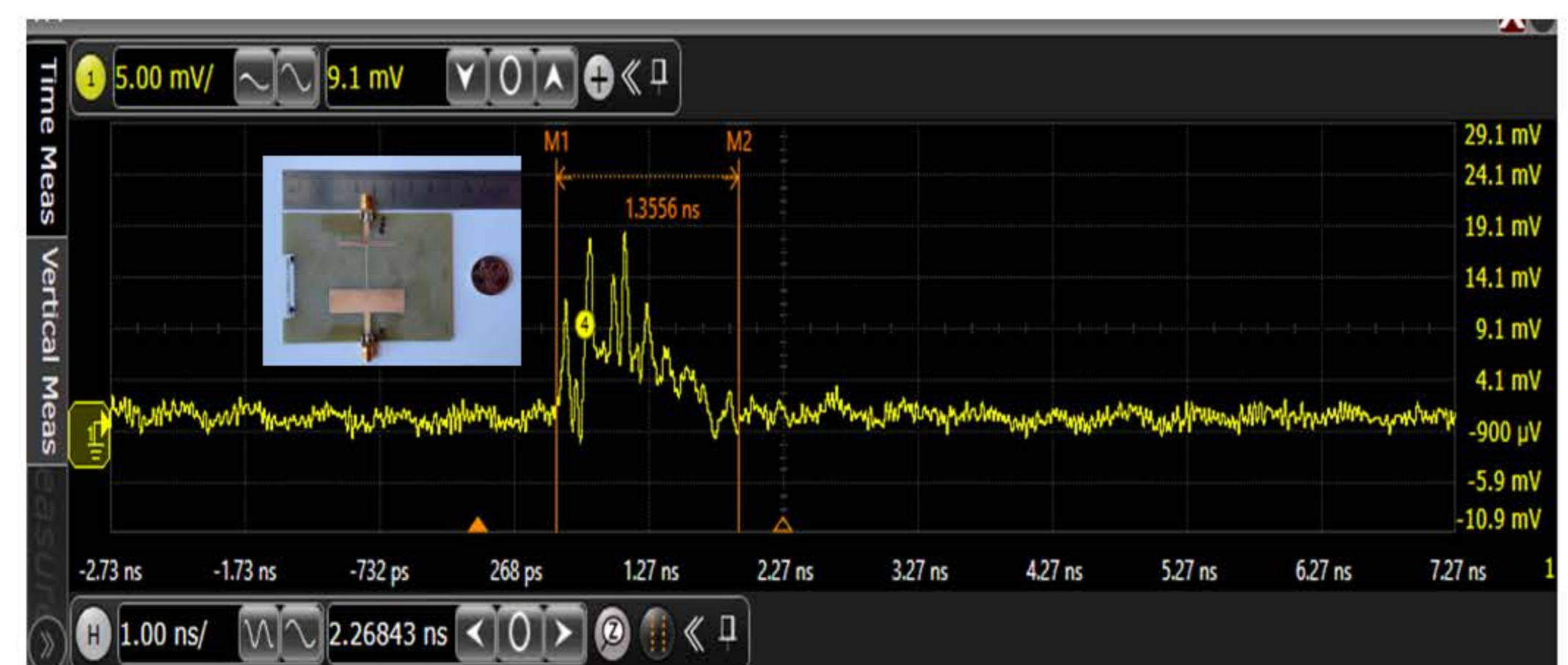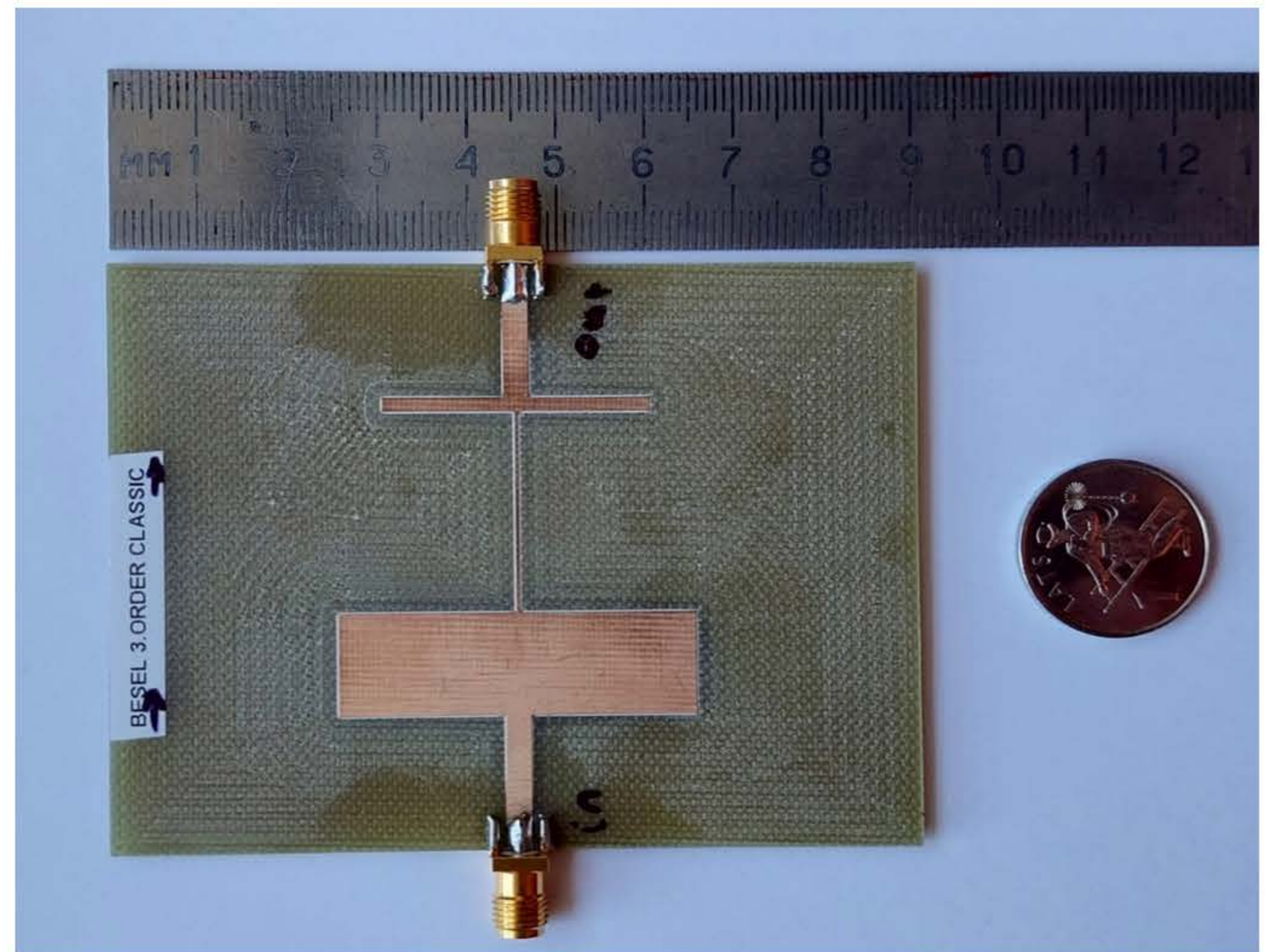
Contact Information

http://picoppm.org
Prof. Arturs Aboltins, e-mail: aboltins@rtu.lv

FLPP FUNDAMENTAL AND APPLIED RESEARCH PROJECTS

1862 RIGA TECHNICAL UNIVERSITY

Virtuālās un jauktās realitātes studiju kurss un laboratorija kā komponente nākotnes hibrīdajām studijām

Mg.sc.ing. Andrejs Paura, Dr.sc.ing. Gatis Vītols

Latvijas Biozinātņu un tehnoloģiju universitāte, Informācijas tehnoloģiju fakultāte

Ievads

Hibrīdās studijas būs neatņemama studiju forma nākotnes izglītībā. Ar hibrīdajām studijām tiek saprasta forma, kad studentu grupas nodarbību laikā tiek veidotas gan no studentiem, kuri atrodas telpā, gan studentiem, kuri atrodas attālināti.

Pašlaik izglītības sistēma spēj pielāgoties izaicinājumiem tika daļēji, un tiek atklāti vairāki trūkumi, kurus nāksies risināt, ņemot vērā to, ka nākotnes pandēmiju, ģeopolitisko ierobežojumu, cilvēku pārvietošanās ekoloģisko nospiedumu un citu faktoru ietekme kļūst aizvien aktuālāka.

Kā risinājums tiek piedāvāts iekļaut studijās virtuālās un jauktās realitātes studiju saturu. Šāds saturs tiek veidots, tomēr pietrūkst speciālistu, kuri varētu veidot lietojumus un studiju saturu virtuālai un jauktās realitātes videi.

Pētījuma mērķis

Informācijas tehnoloģiju fakultātē tika izvirzīts mērķis izveidot virtuālās un jauktās realitātes laboratoriju, kā arī izstrādāt un realizēt studiju kursus, lai apmācītu turpmākos virtuālās un jauktās realitātes vides lietojumu lietotājus un veidotājus.

Kā pirmais pilotprojekta studiju kurss tika izstrādāts kurss "Virtuālās vides dizains un programmēšana" profesionālās bakalaura studiju programmas "Informācijas tehnoloģijas ilgtspējīgai attīstībai" 3. kursa studentiem.

Rezultāti un diskusija

LBTU Informācijas tehnoloģiju fakultātē 2022. gadā ar Zemkopības ministrijas atbalstu tika izveidota Virtuālās un jauktās realitātes laboratorija, kas turpmāk ļaus studentiem praktiski pārbaudīt dažādus virtuālās un jauktās realitātes risinājumus. Laboratorija iekārtota, kā datorklase ar septiņām darba vietām, katra darba vieta aprīkota ar augstas veiktspējas datoru un nokomplektēta ar virtuālas realitātes briļļu HTC VIVE Pro Eye komplektu, laboratorijā ir arī pieejams rokas 3D skeneris (EinScan PRO HD), 3D printeris un papildinātās realitātes brilles Microsoft HoloLens 2.

Secinājumi

LBTU Informācijas tehnoloģiju fakultātes specializētajā laboratorijā katru gadu tiek realizēts kurss vairāk nekā 15 studentiem. Studentu anonīmie kursa vērtējumi liecina par augstu apmierinātību ar saturu un izpildi.

Ierobežojumi virtuālās un jauktās realitātes ieviešanai izglītībā var būt aprīkojuma izmaksas un lietošanai gatavu lietojumprogrammu trūkums, kas var mainīties līdz ar vairāk jauktas realitātes uzņēmumu un izstrādātāju ienākšanu tirgū.

Kontaktinformācija

LBTU Informācijas tehnoloģiju fakultātes dekāns Gatis Vītols, gatis.vitols@lbtu.lv

Latvijas Biozinātņu un tehnoloģiju universitāte

Integration of innovative plant phenotyping tools in spring wheat breeding in Latvia

Zaiga Jansone, Māra Bleidere, Andris Lapāns, Valentīna Fetere

Institute of Agricultural Resources and Economics

Introduction

The greatest challenge in any crop breeding research in the 21st century is the ability to predict yield that is as close as possible to the genetic potential of a new variety. The use of High-Throughput plant phenotyping (HTPP) tools in wheat breeding programme has a potential to identify superior genotypes quickly and efficiently.

Research Objective

The aim of research is to evaluate the dispersion of spectral reflectance indices for spring wheat genotypes in the different stages of plant development to find out the correlative relationships with grain yield.

Materials and methods

- Field trials with 300 spring wheat (*Triticum aestivum* L.) genotypes were established at the AREI Stende Research Centre in 2021 and 2022. Plot size 5 m² in 2 replications.
- Traits phenotyped by breeder: plant phenology, plant height, grain yield, grain quality attributes.
- Two digital phenotyping platforms were used to obtain wheat plant canopy spectral images: (1) unmanned aerial vehicle (UAV) Phantom 4Pro with a multi-spectral camera (20 m height), ones a week from plant emergence to maturity; (2) **ground-based vehicle (GBV)** with RGB Canon EOS 1300D camera (2 m height) in three plant growing stages - tillering begins (GS 21), flowering halfway (GS65) and early milk (GS73).

Results & Discussion

Multispectral indices		HTPP	Equition/Description	Function
NDVI	Red normalized difference Vegetation index	UAV	(NIR-RED)/(NIR+RED)	N content, biomass
GA	Green area	GBV	Yellow to bluish-green color values	Green biomass
GGA	Greener area	GBV	Excluding the yellowish-green color values	The active photosyntetic area
CSI	Crop Senescence index	GBV	(GA − GGA)/GA × 100	Plant senescence

Grain yield (g kg⁻¹) and vegetation indices variation in GS73 growth stage, n=300, 2021; 2022

Trait	Year	Average	Min	Max	P
Grain yield	2021	503.73	249.48	689.79	<0.001
	2022	623.04	324.29	920.15	<0.001
NDVI	2021	0.7562	0.5912	0.8585	<0.001
	2022	0.771	0.5729	0.8752	<0.001
GA	2021	0.3863	0.109	0.7143	<0.001
	2022	0.6683	0.1833	0.9137	<0.001
GGA	2021	0.2345	0.0286	0.5682	<0.001
	2022	0.3653	0.0246	0.8086	<0.001
CSI	2021	41.474	17.354	80.224	<0.001
	2022	47.7225	11.4992	86.5619	<0.001

Correlation between grain yield and vegetation indices at different growth stages, 2021 and 2022
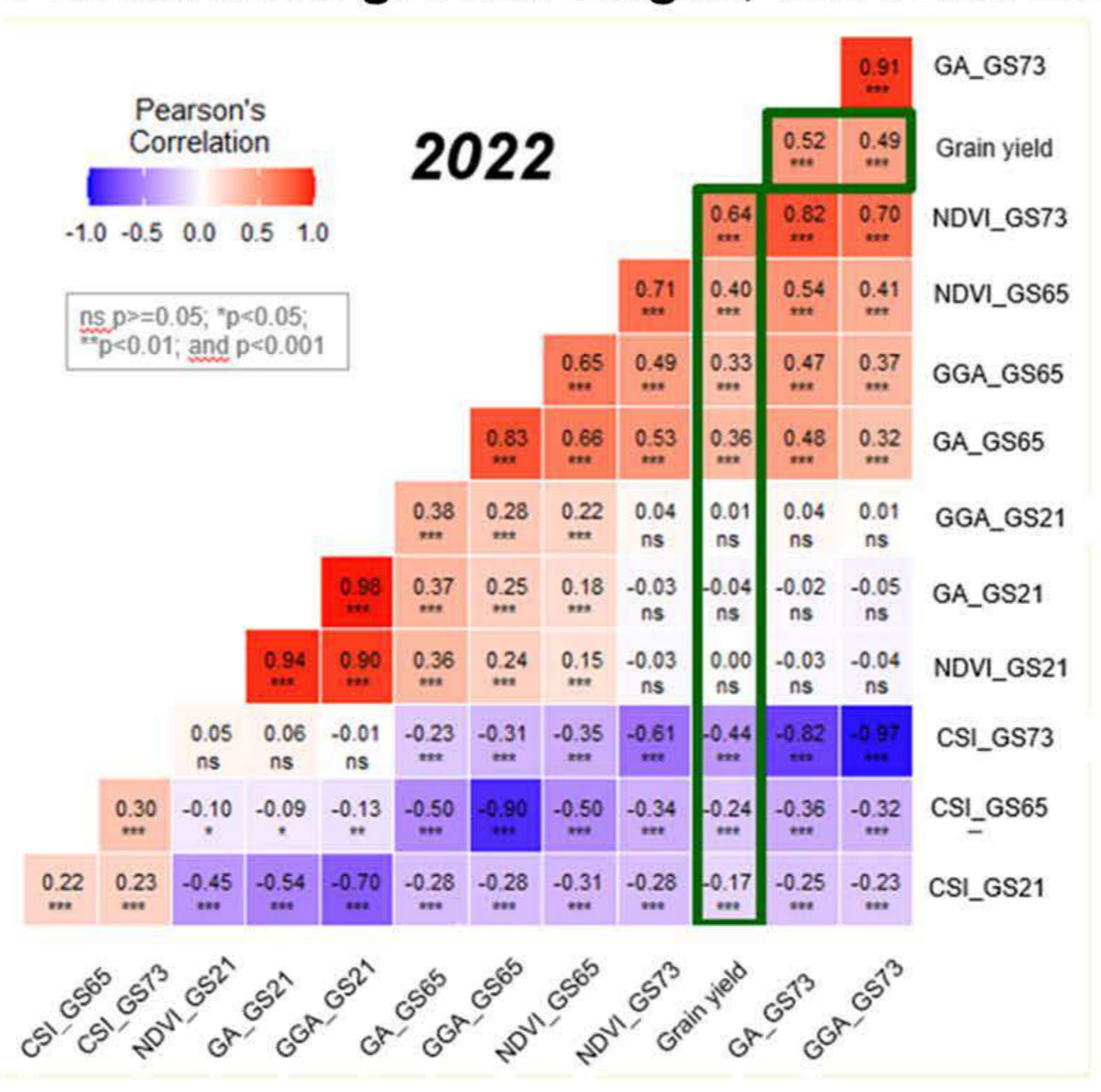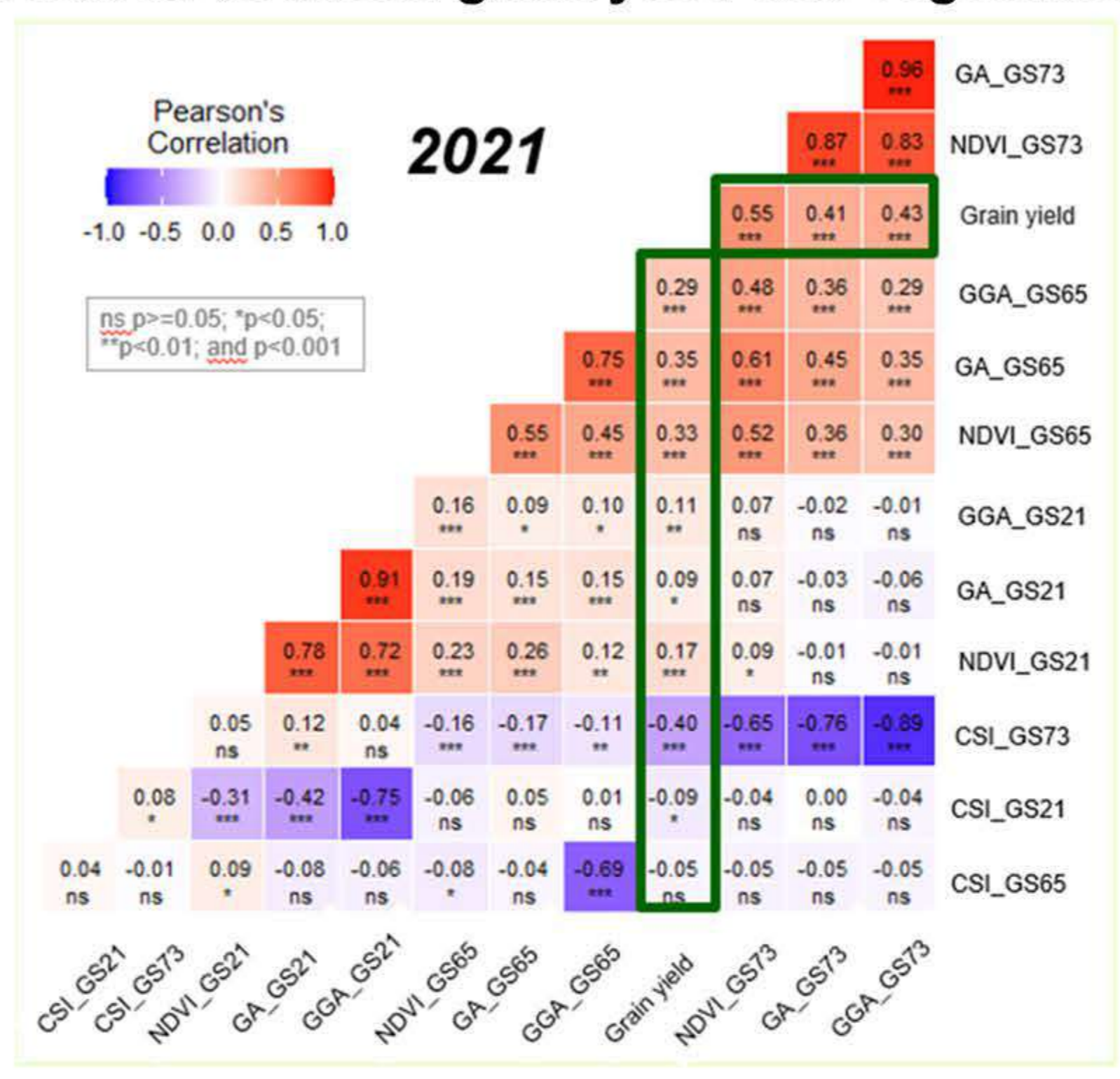
Conclusions

- Statistically significant variation between different genotypes was found for all calculated vegetation indices.
- In this study vegetation indices in the early milk stage determined by both phenotyping tools showed the highest correlation with wheat yield.

Contact Information

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Programmable Delay Line Based High-speed PPM Modulator with 50 ps Time Resolution

P. E. Sics, O. Selis, S. Migla, M. Zeltins, S. Spolitis, V. Kurtenoks, and A. Aboltins

Institute of Microwave Engineering and Electronics, Riga Technical University

Introduction

Pulse position modulation (PPM), which uses time intervals among pulses to encode the transmitted data, provides unlimited energy-saving opportunities at the cost of spectrum occupancy. PPM is gaining attention as a candidate waveform for the next generation of long-distance and space communications, where energy efficiency and peak signal-to-noise ratio are the key factors. Research on this topic is ongoing in Latvia. It provides an opportunity for technological development in space communications, wireless sensor networks, and many more areas and opens cooperation opportunities with European Space Agency.

Research Objective

Our research team has implemented and evaluated a high-speed PPM modulator board that employs a digital-to-time converter based on high-accuracy programmable delay line integrated circuits. The developed prototype can generate high-order PPM signals with up to 256 pulse positions, having a time resolution of 160 ps. Using step recovery diodes at the frontend of the modulator allows for achieving a pulse duration of about 250 ps. The PPM modulator prototype was evaluated using high accuracy (up to 3 ps RMS) event timer "Eventech A033-ET", which is designed and manufactured in Latvia.

Results & Discussion

A pseudo-random bit sequence (PRBS) was used to estimate the BER. A total of 10 sequences, every 200 frames long, was used for evaluating each set of parameters, for a total length of 16000 bits. The results indicate no significant difference between TR-PPM and PPM modulation types for the sequence length of 200 frames. A bit error rate of $1.62 \cdot 10^{-2}$ was achieved during testing using position width of 160 ps and position count 256.

Conclusions

Laboratory testing and evaluation of the developed PPM modulator prototype have shown excellent results, which proves the viability of high-order PPM for data communication.

Contact Information

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Prof. Arturs Aboltins, e-mail: aboltins@rtu.lv

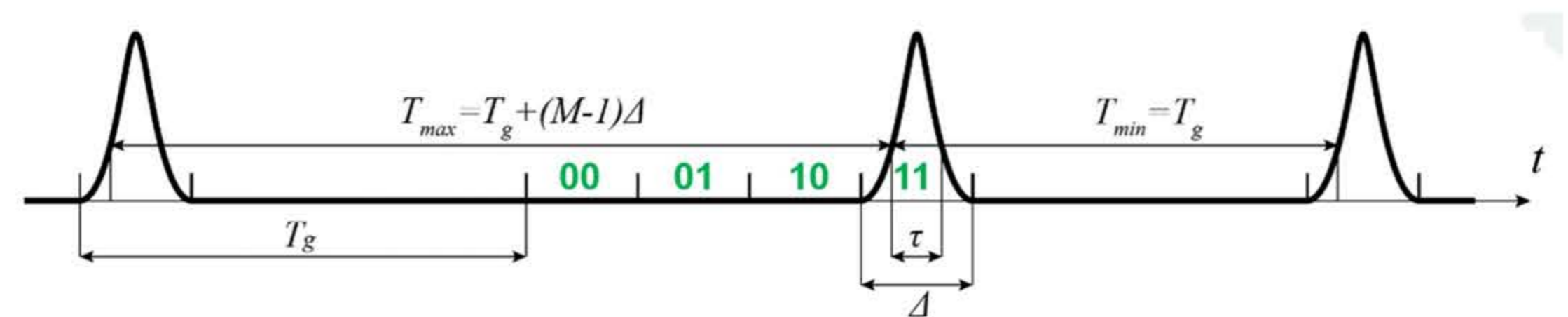Figure 1. Illustration of FSO communication link.

Figure 2. Structure of the TR-PPM signal.

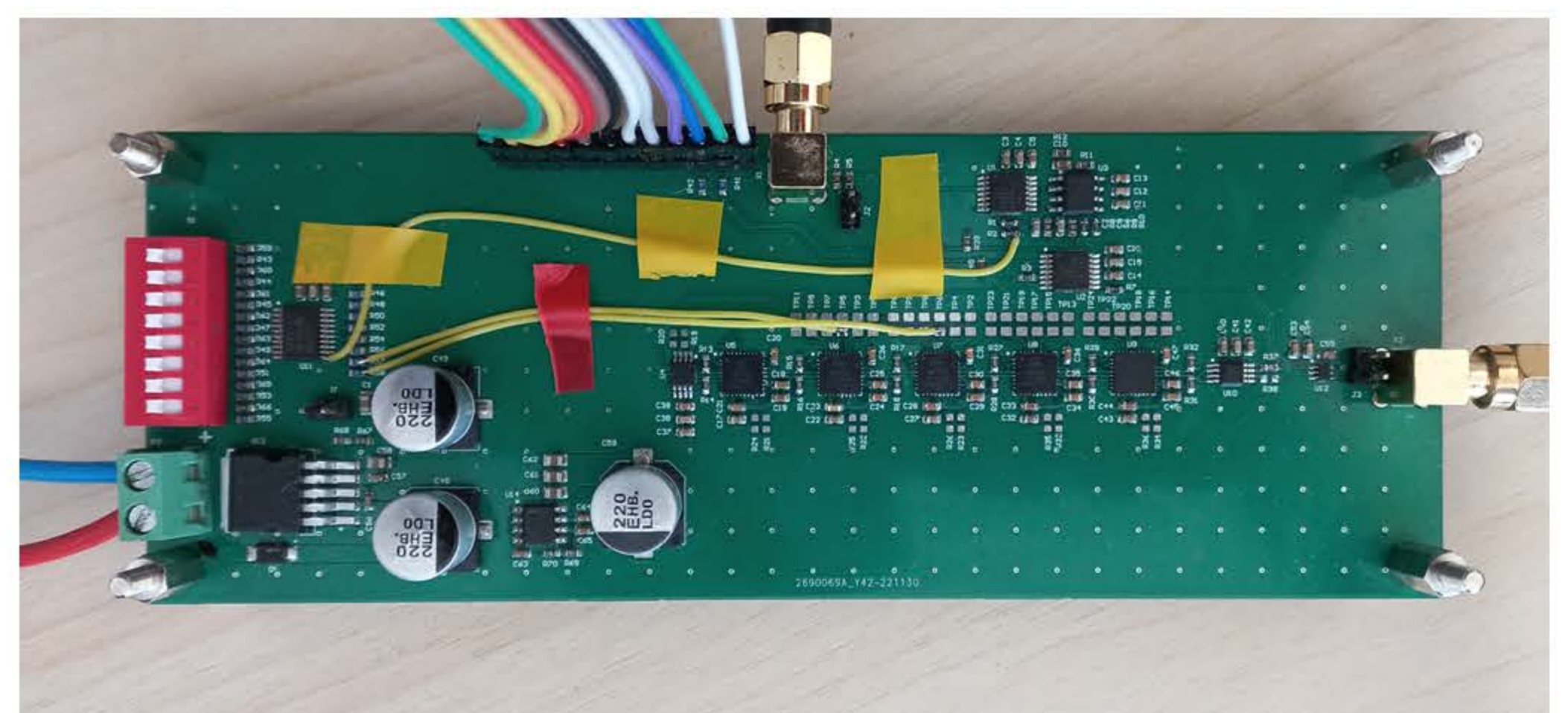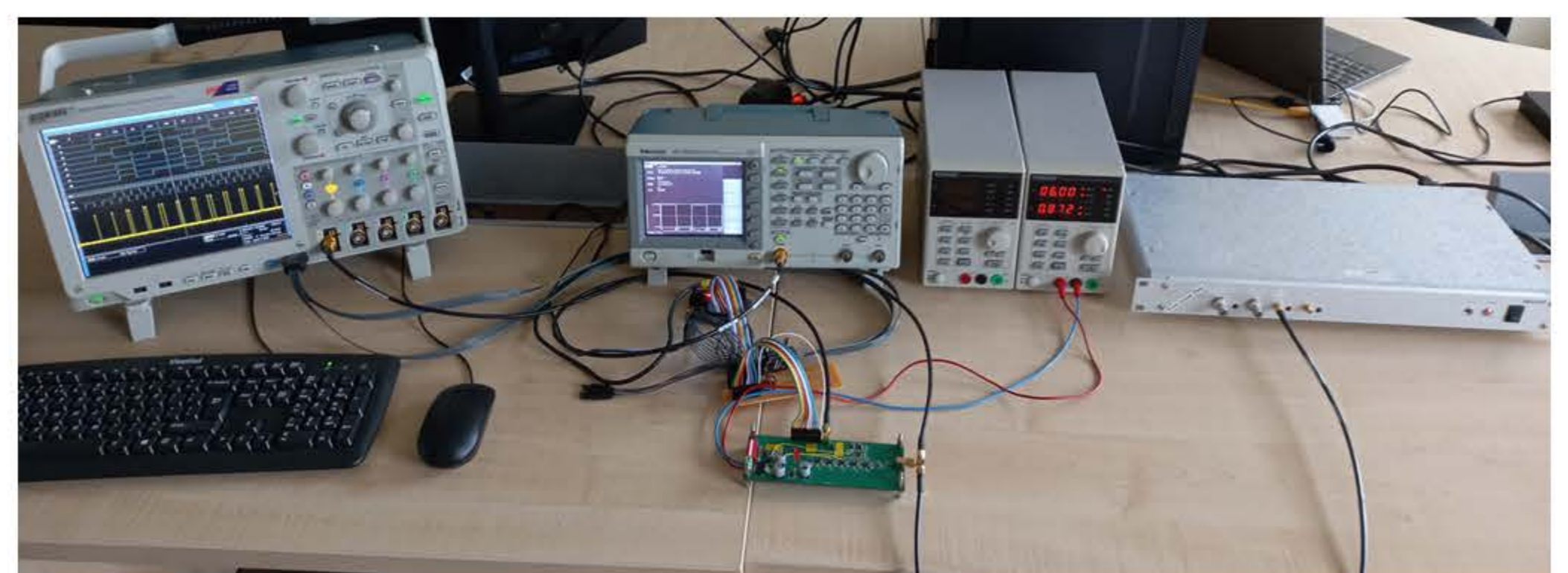
Figure 3. Modulator PCB.

Figure 4. Experiment test setup.

(a)   (b)
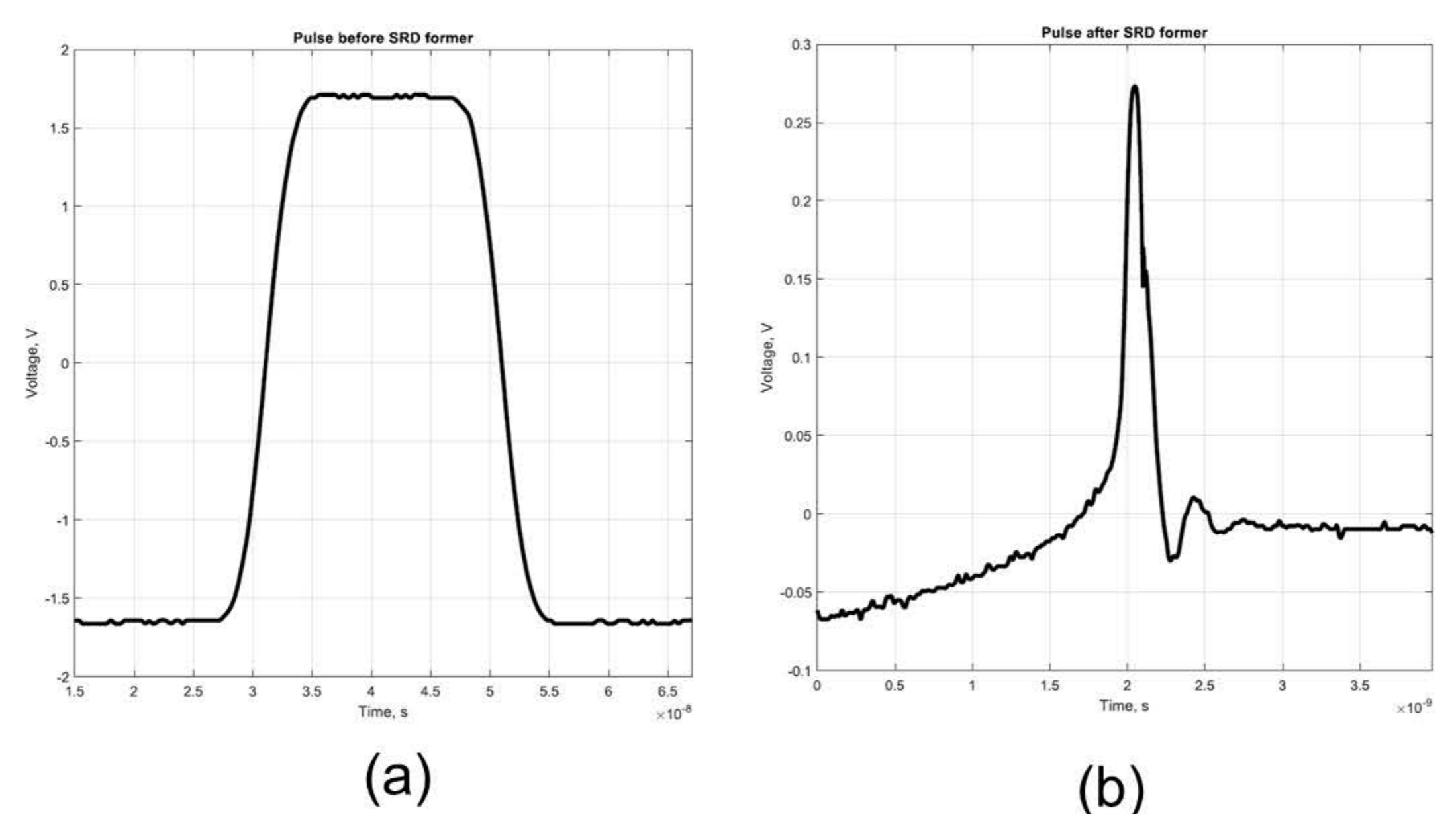
Figure 5. Pulse before SRD-based shaper (a) and after (b).

FLPP FUNDAMENTAL AND APPLIED RESEARCH PROJECTS

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Remote photoplethysmography and automated capillary refill time technique for microcirculation assessment in septic shock patients

Authors: M. Klibus [1,2], Z.Marcinkevics [3], U. Rubins [3], A.Grabovskis [3], I. Vanags [1,2], O. Sabelnikovs [1,2]

Riga Stradins University [1,2], Pauls Stradins Clinical University hospital [1,2]. University of Latvia, Riga, Latvia [3]

Introduction

Introduction: Assessment of microcirculation during fluid resuscitation of septic shock patients mainly relay on the serum lactate level and routine clinical bed-side tests (as CRT). New techniques for evaluation of tissue perfusion have been developed -remote photoplethysmography (rPPG) and automated objective capillary refill time measurement technique (aCRT).

Research Objective

The Goal of Study: Was to assess changes in peripheral perfusion during fluid resuscitation using remote photoplethysmography and automated capillary refill time in ICU patients with bacterial septic shock and severe Covid-19 patients.

Materials and Methods: Patients with positive passive leg raising test (PLRT) were initially resuscitated with crystalloids (10ml/kg over 60min).Hemodynamic variables, manual capillary refill time (mCRT) and aCRT parameters (T90 –time when 90% of capillary refill is over, Tst –time when capillary refill is fully over), peripheral perfusion index (PPI) detected using rPPG were collected before and after PLRT and after volume expansion (VE)

Passive leg raising test T1- before PLRT, T2-During PLRT, T3-afterPLRT, T4- after fluid expansion.

Results & Discussion

Table - 1
Baseline characteristics of study patients

|	COVID-19 (n=18)	Bacterial septic shock (n=16)	p-value
Age, years	60 (29-80)	66 (82-22)	0.34
Men, n (%)	13 (72)	13 (81)	0.61
Height, cm	176 (150 - 190)	180 (150 - 180)	0.76
Weight, kg	85 (61 - 130)	76 (50 - 140)	0.36
SOFA, points	6.00 (2.0 – 8.0)	6.50 (2.0 – 6.0)	0.22
Noradrenaline mcg/kg/min	0.1 (0.1)	0.19 (0.4)	**0.004**
Midazolam, mcg/kg/min	1.1 (0.29)	0.88 (0.37)	**0.019**
Fentanyl, mcg/kg/min	0.22 (0.07)	0.015 (0.06)	**0.003**
Propofol, mcg/kg/min	19.7 (13.3) (n=12)	24.2 (n=1)	
Pneumonia, n (%)	18 (100%)	10 (62.5)	
Peritonitis, n (%)		3 (18.75)	
Pancreatitis, n (%)		2 (12.5)	
Urosepsis n (%)		1 (6.25)	
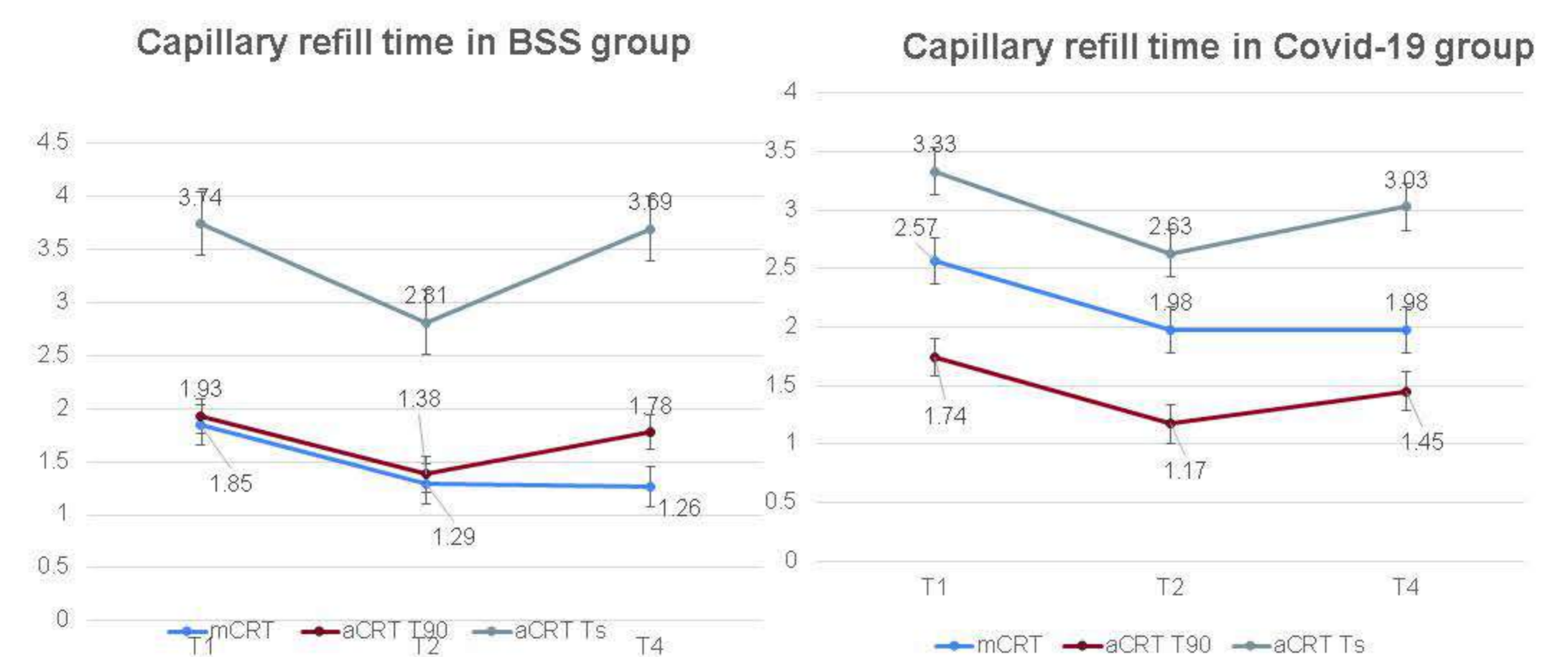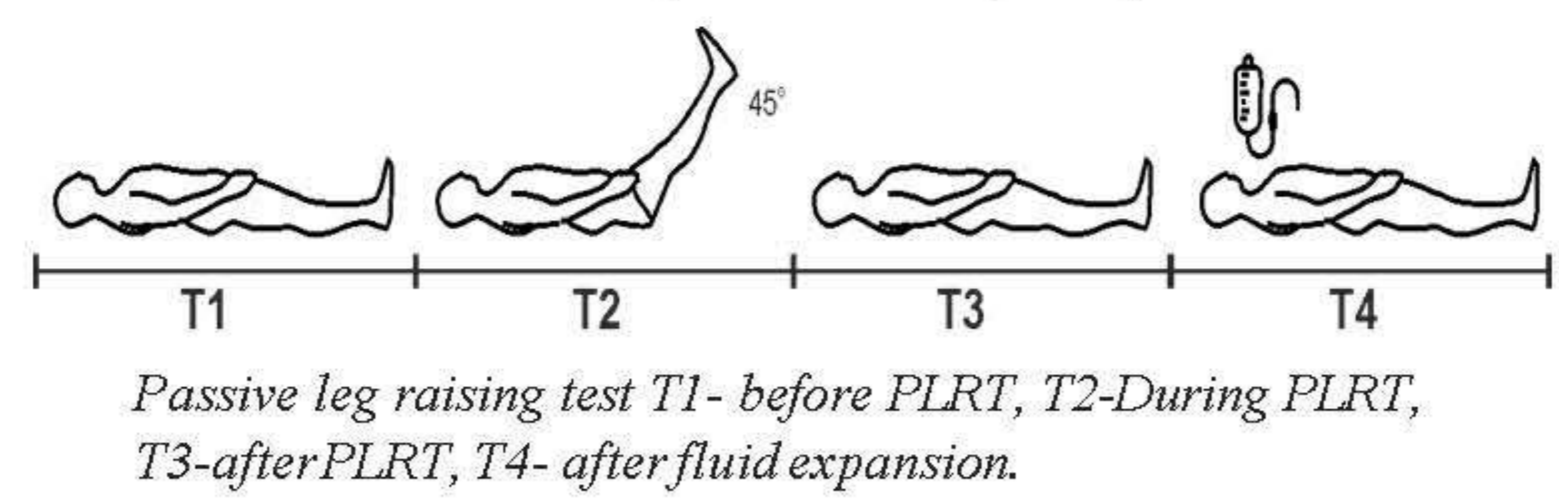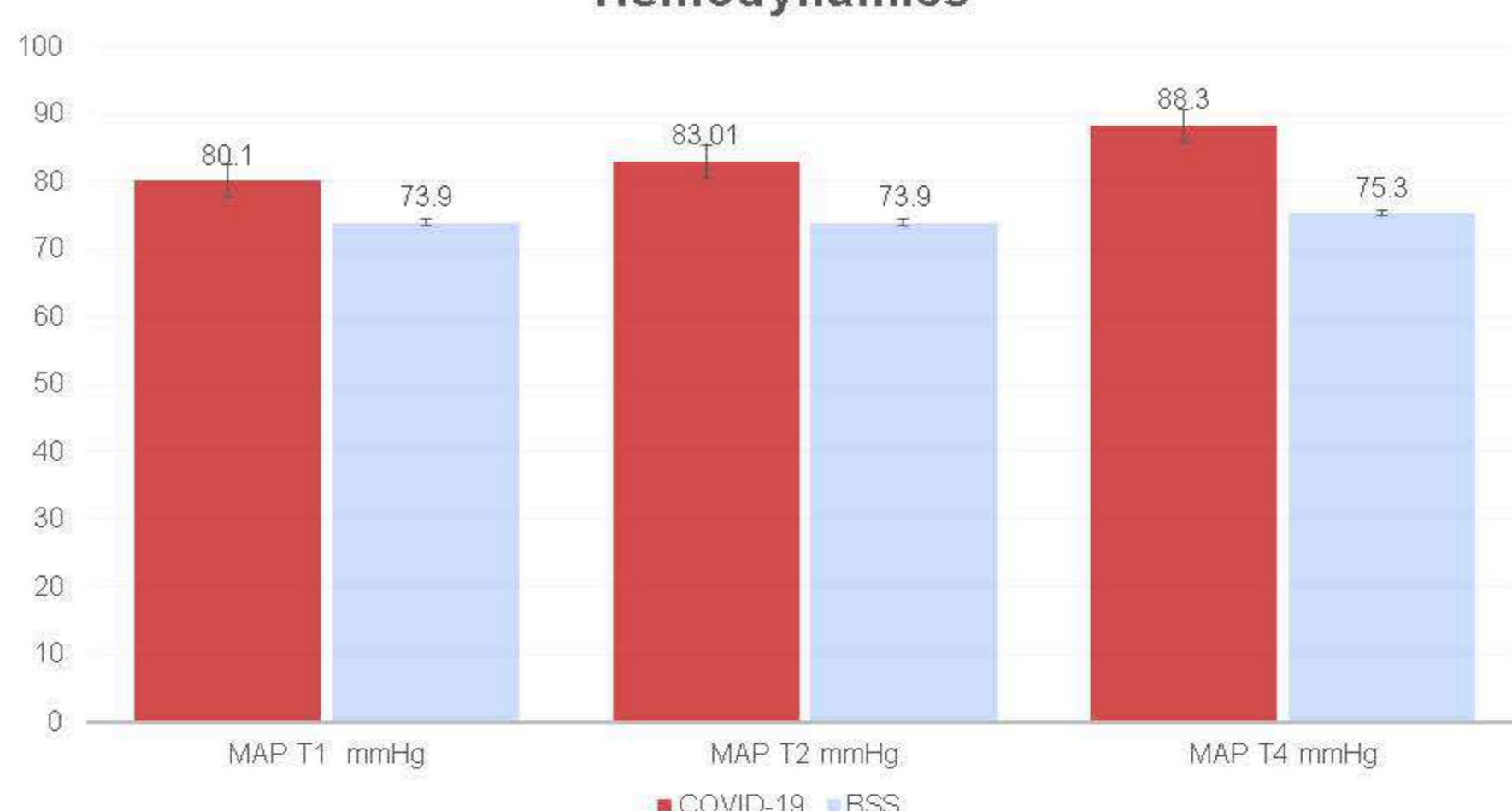
Mean BP in COVID-19 group increased by 3% during PLRT and by 10% after VE. In septic shock group mean BP increased after VE by 3%

In septic shock group decreased by31% during PLRT ,by 32% after VE, aCRT decreased by 41% during PLRT, by 8% after VE. Tst decreased by 25% during PLRT, by 2% after VE

Mean mCRT in COVID-19 decreased by 22% during PLRT,by 22% after VE. aCRT T90 in decreased by 32% during PLRT,by 17% after VE. Mean Tst decreased by 21% during PLRT,by 10% after VE
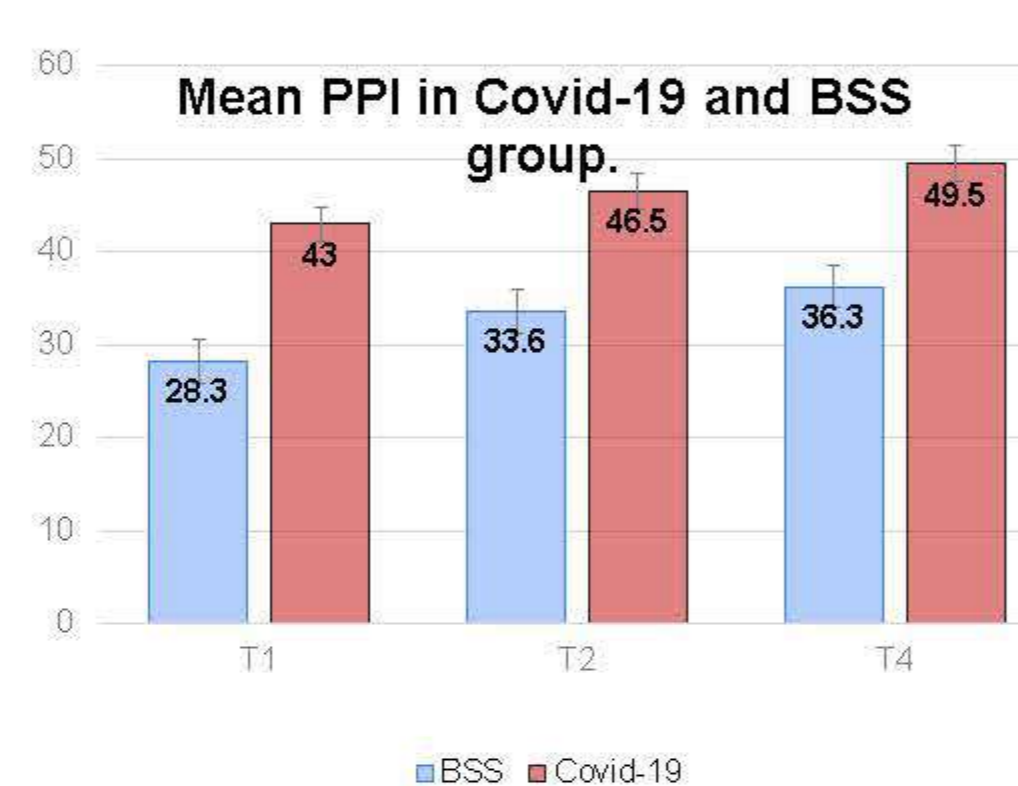
In COVID-19 mean PPI increased during PLRT by 7%, by 15% after VE while in septic shock PPI increased during PLRT by 18%by 28% after VE

Conclusions

Conclusion: rPPG and aCRT are techniques potentially applicable to assess microcirculation during fluid resuscitation in critically ill patients.

Contact Information

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