
Digital Co-Creation to Support Transformation of Open Public Spaces: Vilnius Living Lab Case

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Received 10 April 2019;
Accepted 03 July 2019;
Publication 09 August 2019

Abstract

This paper presents a case study of public space transformation in Vilnius through community-wide participation employing Information and Communication Technologies (ICT) where the bottom-up community initiatives lead to the conversion of the Post-Soviet factories area into a multifunctional open space. Digital technologies enable collective methods of creativity, such as co-creation, in resolving complex urban problems, but also provide novel opportunities for designing inclusive, attractive and responsive public places. This case study employed the Composite Digital Co-Creation Index methodology which evaluates variety of aspects in the transformation of open spaces to co-creative systems: sociocultural contexts, multi-stakeholder perspective, diversity in needs, incentives for the participation of different groups and cooperation capabilities. The framework was built according to theoretical discussion related to co-creation, urban planning, collective intelligence theories with insights on ICT applications in generating public value. The empirical data were gathered through semi-structured interviews, survey, digital monitoring, and other secondary materials such as reports, etc.

Journal of Industrial Engineering and Management Science, 2019, 1–18.

doi: 10.13052/jiems2446-1822.2019.001

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The framework provides a useful approach to explore initiatives of digital co-creation as it allows to identify potential areas of improvement.

Keywords: Co-creation, digital technologies, public open spaces, urban transformations.

1 Introduction

Depending on historical, cultural, and financial **factors**, urban spaces have been remodelled through time. Hence, they can be **rebuilt**, **reused**, or even destroyed. Previously **overlooked**, **undiscovered** and **unused** factories, churches, schools and other urban spaces appear as contexts for change. In most cases, previously neglected urban spaces start serving the cultural and social needs of communities. Urban transformations are a highly complex and interdisciplinary topic. Ever since Zukin [1], there have been discussions among researchers and specialists on city culture and the identity of place as a representation of the community network. The geographical coverage of the research extends from London and the transformation of an industrial and commercial zone [2], to Manhattan, with a redevelopment of the territory requested by local artists in 1987 [3], including conversion of Bakirkoy Spirits Factory into a cultural center and musical school in Turkey, and the emerging church-loft market in Canada [4]. In this article we will focus on how digital technologies influence the urban transformations and local communities. Using digital technologies offers novel opportunities in creating multifunctional, attractive urban spaces as they enable community-wide involvement. The purpose of this article is to conduct a case study analysis of public space transformation in Aukštamiestis (Vilnius) by referring to the Composite Digital Co-Creation Index. This methodological framework allows a multi-aspect evaluation of co-creative transformation: sociocultural contexts, stakeholder engagement, diverse needs of communities, incentives for participation and cooperation capabilities. This article not only displays perspective of the first exercise in the application and iterative testing of the above-mentioned methodological model, but is also a part of the international project C3PLACES which focuses on developing the strategies and tools to increase the quality of public open spaces through the use of digital tools by positively influencing co-creation and social cohesion effects [5].

2 Digital Technologies and Co-Creation of Public Open Spaces

Before the rise of digital technologies, public spaces were the main sources of information and centres of commercial activities [6]. Digitization of urban planning went through several stages according to Bardersheim and Kersting – in the 1960s it meant acquiring equipment for rapid data processing, in the 1970–80s emerged urban decision support systems, and in the 1990s, the appearance of the breakthrough technology the Web has helped cities in their communication with the public at large [7]. Currently, mobile technologies, social media and cloud technologies enable uninterrupted connectedness and communication. A new digital layer is added on the existing urban planning landscape [6] and the Internet evolved into a new form of public space – information agora [6, 8]. Also, there has been a gradual shift from the obligatory use of public space in industrial society to a different pattern based on consumption and leisure purposes [9, 10].

The public spaces are no longer only physical places. Nowadays, it is a space for interaction between people, places and technology. In a technical sense, a city is a complex system of complex systems where people are surrounded by interlinked social, economic and physical environments. In such digitally-enhanced urban context, public spaces' attractiveness, responsiveness and inclusiveness became important factors of design. Indeed, well-designed places provide multiple benefits – opportunities for diverse groups of people to socialize, sense of ownership and community pride, etc. [11]. No one factor alone can cause the change towards more attractive public places, but rather a combination of drivers operates at different levels. However, most of the current researches on how ICT could be used in enhancing urban life, mostly focuses on technical aspects. Since the tangled problems of urbanization are social, political and organizational, digital innovation strategies must reflect consideration of management and policy, as well as technology [12]. Also, with the focus on innovations and new ICT tools, a limited attention is paid to the citizen and community engagement. All too often digital initiatives come from government-led, top-down innovation that “either fails to capture the public imagination or leads to citizens rejecting the innovations” [12, p.3].

Stewart-Weeks suggests that “citizens are increasingly willing and able to translate their day-to-day experience into ideas, preferences, and insights that can become powerful resources for innovation” [14, p.83]. Researchers

suggest that the inclusion of citizens, especially the underrepresented, into urban planning processes is crucial if the cities seek next-generation solutions and more connected communities [15]. The co-creation approach here offers new opportunities by moving the urban planning domain away from specialists to a domain shared with citizens and other stakeholders. Rather than asking citizen review on already existing initiatives, collaborative techniques encompass city population as agents of positive change, giving communities tools for direct involvement in outlining their needs and priorities, collaboratively finding solutions, influencing decisions and achieving better outcomes. The co-creative processes enable the integration of a range of ICT-mediated and offline participatory methods and processes. However, the multiple studies on co-creation [16–20], digital tools [21–24] and their applications in developing public open spaces (POS) as separate subject require a holistic perspective. We argue that co-creation can be used in urban planning by treating citizens as active, creative, decision-making equals and offer an unified approach in evaluating digital co-creation.

3 Research Design and Composite Digital Co-Creation Index

The Composite Digital Co-Creation Index (DCCI) was employed to evaluate the co-creative potential of Aukštamiestis transformation [25]. Literature review revealed that research on the methodological facilitation of co-creation and users feedbacks regarding open public spaces is still scarce. Hence, the proposed evaluation framework combines the studies of related fields such as Collective Intelligence Potential Index [26], Quality of Experience framework [27], Social Networking Adoption Model [28] and Dimensions of Space framework [29] were incorporated into further works (refer to [25] for an in-depth review of relevant literature). The work of C3PLACES research group has permitted the creation of a pilot DCCI model, and a system of indicators of digital co-creation – in future, it will be necessary to carry out new measures, case studies and comparative analyzes. Nevertheless, the Index provides a useful framework to evaluate digital co-creation initiatives aimed at transforming public spaces, and to identify cases that can be potentially transformed into co-creative systems. The following sections provide an insight of the Index composition and case study evaluation process.

3.1 Composition of Digital Co-Creation Index

The Digital Co-Creation Index is a numerical value that expresses the summation of three Indices – POS Quality Index, Digital Inclusiveness Index and Social Responsiveness Index. At the current stage of the research, we assume that all these 3 indexes are equally significant. The Digital Co-Creation Index follows the formula:

$$DCCI = \frac{POS\ QI + DII + SRI}{3}$$

POS (Public Open Space) Quality Index (POS QI) connects the factors enhancing the social integration and communities’ satisfaction with the public place, an action made possible through the use of digital technologies. The local communities using existing urban structures can actively shape the meaning of a place and the socio-spatial context [30]. The index has 14 variables divided in 4 categories, which are used to define the attractiveness of the public space. Here again, we assume these categories are equally significant based on our theoretical insights, and all variables used in these categories have equal weight. POS QI is calculated by applying the formula for categories indicated in Table 1 below.

Digital Inclusiveness Index (DII) has 7 exogenic variables, divided into 5 categories. We assume that categories are equally significant based on our theoretical insights, and all variables used in these categories have equal

Table 1 Structure of POS QI

| $POS\ QI = \frac{AL + CI + UA + S}{4}$ | | | |
|--|------------------------------|------------------------|------------------------|
| AL = Access & linkages | CI = Comfort & image | UA = Uses & activities | S = Sociability |
| Level of readability, orientation, way-finding for all | Level of captivation | Level of equipment | Level of welcoming |
| Level of convenience for movement | Level of comfort & cleanness | Level of activities | Level of publicness |
| Interlinking level | Level of safety | Variety of activities | Level of interactivity |
| Level of accessibility | | | Level of diversity |

Source: developed by C3PLACES, 2019.

Table 2 Structure of DII

$$DII = \frac{RRI + ERT + SVT + PT + AT}{5}$$

| | |
|--|---|
| RRI = Risk-related technologies | Security and privacy assurance technologies |
| ERT = Expansion-related technologies | External and internal networking – provision |
| SVT = Social value creating technologies | Data collection & data access technologies |
| | Sharing/creating knowledge technologies |
| | Decision-making technologies |
| PT = Pervasiveness of ICT | Pervasiveness of digital technologies |
| AT = Appropriateness of ICT | Appropriateness of ICT regarding target group |

Source: developed by C3PLACES, 2019.

Table 3 The structure of social responsiveness index

$$SRI = \frac{DOF + T + DS + SI + GPV}{5}$$

| | |
|---|---|
| DOF = Dynamism, openness and flexibility | Degree of interaction and engagement |
| | Degree of adequate supply of critical mass (“swarm effect”) |
| T = Transparency | Degree of diversity in the spatial interaction |
| | Degree of development of transparent structure and culture |
| | Degree of independence |
| DS = Decentralization and self-organization | Degree of decentralization and self-organization |
| SI = Social impact and engagement | Degree of social impact |
| | Degree of social motivation |
| | Degree of social orientation |
| GPV = Generated public value | Efficiency of problem-solving |
| | New qualities in form of ideas, structured opinions, competencies, etc. |

Source: developed by C3PLACES, 2019.

weight. DII is calculated by applying the formula and categories indicated in Table 2.

Social Responsiveness Index (SRI) has 11 exogenic variables. The assumption is made that identified categories are equally significant based on our theoretical insights. Thus, the SRI value is determined applying the formula in Table 3.

The estimates of weighted coefficients of categories for POS QI, DII and SRI are estimated by expert assessment. The values of the indicators are of a qualitative nature; therefore, indicators underwent a qualitative evaluation and are ascribed numeric values corresponding to their quantitative weight: 0; 0.5 or 1. The values of answers were transformed into a numeric scale in accordance with the following procedure (keeping the property of monotonicity of function and according to the intuitive reasoning): Yes = 1; No = 0. Other categorical variables were transformed into a numeric scale applying the same approach: High = 1; Medium = 0, 5; Low = 0. To improve user perception, the obtained values of the composite indexes were transformed into a more reader-friendly scale by multiplying the obtained values by 100.

3.2 Case Study Evaluation Process

The innovative nature of this research provides all the necessary explanations regarding this approach. Qualitative in nature, the case study research allows to study objects in their real life settings, especially when the connections between a phenomenon and its context are not clearly evident [31]. The applied research strategy highlighted the theoretical aspects in researched situation [32] and revealed the elements of co-creation process through application of DCCI. The evaluation process was conducted through 3 inter-related steps. First, the selection of methods for data collection, and its description for evaluation of *DCCI* components. Second, the collection of data in Aukštamiestis Living Lab in Vilnius took place. Finally, the conducted data analysis, consisting of the examination, categorization, testing and recombination of quantitative and qualitative findings. The researchers subjectively estimated the levels of DCCI elements. Case study approach often requires to employ multiple data collection methods [31]. A combination of qualitative and quantitative methods was used to collect data for evaluation:

1. *Stakeholder interviews*: 5 semi-structured interviews were conducted with the stakeholders. Semi-structured interviews are effective listening tools in which part of the questions and topics are pre-defined, including other questions that came up during the process. The research team used a guide based on DCCI to pose open-ended questions and probe topics as they arose. The interviews were aimed at engaging the stakeholders in a dialogue about the issues and concerns relevant to the Aukštamiestis transformation. Expert sampling was employed in the study (P1 – Strategic manager at Art Factory Loftas, initiator

and manager for Aukštamiestis community; P2 – Head of Naujamiestis Seniors club, active participant in Aukštamiestis Living Lab events; P3 – Active senior participant in Aukštamiestis Living Lab events, member of club “Life is beautiful”; P4 – Architect, participant of the workshops for renewing Aukštamiestis; P5 – Urban planner, participant of the workshops for renewing Aukštamiestis). Stakeholders with widely differing perspectives were deliberately sought, and during the interviews they had the opportunity to fully express their views and provide a narrative of their experiences in the transformation of the district. Hence, the validity and significance of the results are based more on to the richness of the collected data, the selected samples and the competencies of the researchers to analyze them rather than on the size of the sample (Patton, 2002). Interviews were conducted in the period of May–August, 2018. Data were transcribed and coded to match the index dimensions.

2. *Survey*: The questionnaire survey of senior citizen who participated in Loftas event has been conducted in the period April–June (2018). The study participants were selected based on their participation in Aukštamiestis community events. 47 of them responded and filled out the questionnaire by answering 22 questions. The data were processed using SPSS. Statistics for each table are based on all the cases with valid data in the specified range(s) for all variables in each table.
3. *Digital monitoring*: Non-formal and non-participatory approach was applied in collecting online data (Web, mobile, social media, and other digital channels) on the research object. The sheer volume of content generated on a daily basis in the social media realm makes it difficult to weed out informative, relevant, and actionable content. Hence, the data collection template based on the DCCI dimensions was developed by to make the process uniform and focused on turning information into actionable insights. Social media activity, search results and changes of the website content were monitored in the period of May 2018–August 2018 by the C3PLACES research group in Vilnius.
4. *Analysis of available secondary data*: An in-depth examination of the publically available data on the district of Naujamiestis was conducted. It allowed to identify the municipality planning perspectives, stakeholders involved, inclusion goals, mechanisms for achieving those goals.

The proposed research design poses several limitations. The application of DCCI on case study analysis is purely exploratory. The article presents and discusses a new perspective and suggests implications for research and

practice. The case study approach also has limitations, mostly because it introduces layers of subjectivity during the implementation, evaluation and presentation of the results. Since the empirical results are based on one case, the possibility for generalizations is limited. Further validation of the DCCI evaluation framework in a variety of urban settings enhanced by digital technologies is needed, using field-based methods such as participants' observation and interviews.

4 Case Study Results

4.1 Aukštamiestis Living Lab

Research studies on novel and complex concepts like digital co-creation need to define the context of the examination object [33]. To minimize the risk of misinterpretation regarding collected data, this section provides the background information for the selected case. The case study of public space transformation is the Aukštamiestis area, located in the district of Naujamiestis in Vilnius. The district has approx. 24,000 inhabitants [34] and occupies a central location with bus and train stations. The Naujamiestis district was established during the 19th century and zoned for industrial use. Currently, the area hosts residential buildings, business centres, public and governmental institutions, university departments, cultural and leisure spots. Due to its former industrial function, green spaces and open public places are limited in number in the area. The main problem of the area are the wide, uninhabited areas and abandoned inner yards previously used for industrial purposes (loading, unloading, storage, technical equipment, etc.). The economic, political and social changes in Vilnius have led to the necessity to transform industrialized objects for daily use. In addition, this research object was chosen because the transformation of the district is conducted through bottom-up initiatives driven by creative communities living in the area. The area in question is inhabited by strongly bounded, creative communities of artists, musicians and people alike. The common characteristic of these communities, that is to say the willingness and ability to cooperate and achieve solutions, is extremely important concerning the success of local initiatives. The key institution of the district is the art factory Loftas. This space is a community-wide experiment, hosting a variety of events, concerts, art initiatives namely Family weekends, Youth Weekend, Seniors Sundays, Aukštamiestis creative workshop, Open Gallery, etc. [35]. The Aukštamiestis community employs collaborative digital tools. The social

web makes it possible for the community leaders to reach out in new ways, and to tap public opinion in real time in supporting local transformations. The transformative power of social media means providing new ways to connect, collaborate, communicate and innovate.

4.2 Results of Case Study Evaluation

The DCCI methodology allows to identify and analyze the conditions leading to digital co-creation. The framework provides a useful approach to explore initiatives of digital co-creation as it allows to identify potential areas of improvement for urban planners, project initiators and local communities. As no numeric data have been generated until the present experiment, there is no possibilities to carrying out statistical research and identify statistical significance of each indicator necessary to construct the indexes. Figure 1 shows three significant scales on which the Aukštamiestis Living Lab DCCI evaluation results are based on, and followed by the discussion and several recommendations which should contribute to enhancing the co-creative potential.

The *POS quality index* provides the context for digital co-creation of public value, considering that urban public spaces provide a framework for life. Once

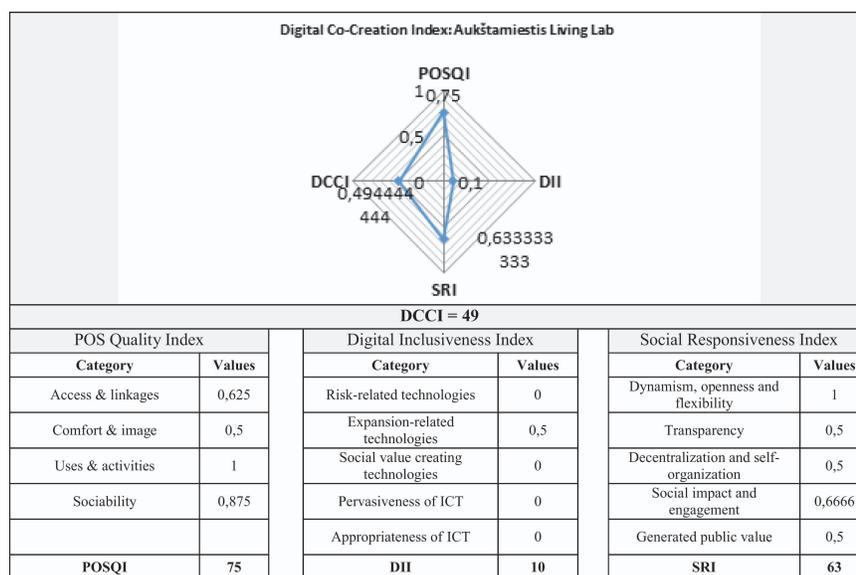


Figure 1 Results of case study evaluation.

Source: Developed by authors, 2019

applied to Aukštamiestis Living Lab case, the index calculation (85 points in total) revealed a high co-creative potential of the place. Evaluation of access & linkages presented a dual-view of the inclusiveness of the space. The community leaders claim that district is inviting people from different areas and backgrounds. However, stakeholder interviews and surveys revealed that it is perceived as a place for youth only. Comfort and image dimension suggests that a place cannot be reduced to its objects, but must also include definition of the atmosphere felt. The evaluation suggests possible improvements in making the area feel more safe and welcoming for diverse stakeholders. The variety of available activities in public place can benefit the social life and community well-being by improving interpersonal relationships between different stakeholder groups. The openness of Aukštamiestis Lab to novel initiatives, emphasised by the interview participants and survey respondents, resulted in a high-ranking position for the area. Public space has both physical and social features. Sociability means that individuals shape and interact with a public space through the value it has for them. The sociability dimension had one of the highest ranks in the evaluation, which is not surprising, considering that Aukštamiestis Living Lab is a unique space of social diversity in Vilnius hosting vibrant cultural spots, lofts, senior population, businesses, etc. Through a variety of events the Living Lab offers reason for different people to visit. Diverse users and uses can participate in the transformation of public space by contributing commercial, social or political uniqueness in the neighbourhood.

Digital Inclusiveness Index focuses on digital premises of the co-creative potential. The Aukštamiestis community mostly employs social media tools to facilitate collaboration. The network of local social media adds a new dimension to urban transformations by creating a sense of place, and proved to be effective in initializing transformation processes and community-building. Such approach allows larger group of people to be involved because a sense of place is no longer something that comes with simply spending time or living in a place. The calculation of the DII (10 points in total) is very low throughout the Living Lab system. The current digital aspects of the initiative are quite basic at the moment – a Facebook profile-based system is designed to announce various activities of the community. Thus complicating the evaluation of risk, social pervasiveness and appropriateness aspects complicated. The evaluation results suggest that the community needs to find novel and innovative ways to employ digital technologies. Although the Living Lab activities are implemented via the concept of networked community, a local sense of place does not come from nowhere, unless it is facilitated through an active commitment.

The stakeholder interviews revealed the lack of a pervasive digital strategy and shortage of appropriate ways to share information with community members. The interviews also showed that the low technological orientation is directly linked with a shortage of human and financial resources not available within the community.

Social Responsiveness Index focuses on the readiness and maturity of co-creation stakeholders. It is important to note that multi-stakeholder collaborations involve trials, tests, errors and re-dos with inserted digital features. Hence, it should be regarded as a process, and not as an end-product. The Aukštamiestis Living Lab is developed through projects, initiatives and workshops involving community members, architects, urbanists, students, municipality and other interested parties. Involved stakeholder groups and individuals thus became the sources of creativity, insights and initiatives in the ever changing district. Development of the public space is not limited to one person – the Aukštamiestis initiative mainly relates three groups of stakeholders: residents and their communities; owners of business and cultural spots; municipality entities. Art factory Loftas serves as a strong, autonomous community partner organization, hosting most of the community gatherings and workshops. The researchers evaluated the index dimensions by observing its development, with a specific focus on the changing nature of public space and the collaborations between different groups of people and perspectives. Index calculation (63) shows that current settings of the Living Lab are open to diversity of social groups and problems. However, a lack of transparency and structural approach towards management appears. The pooling of community resources, as well as a more structured approach to local problem identification, can provide a springboard to effective action in number of areas. Given the complexity of community life, there is no single solution, so it is imperative to ensure that communities establish their own agendas rather than receiving universal instructions.

5 Conclusions

Public spaces are an important element of the urban environment, serving as frameworks for public life. The transformation of unused, open space into attractive public places is crucial in this regard. The literature review demonstrates both the relevance and complexity of the transformation and re-use issues of urban spaces. Hence, the intent of this research has been to test a theoretically-derived framework for evaluating co-creative transformations. To this end, this study has expanded on previous works on collective

intelligence, co-creation, urban planning and use of digital technologies. The Composite Digital Co-Creation Index provided a holistic measure for evaluation of Aukštamiestis Living Lab by incorporating multiple dimensions of digital co-creation, which leads to better understanding of the managerial, design and digital areas that need to be improved.

The application of the index calculation methodology in the analysis of Aukštamiestis Living Lab was the first exercise in the iterative revision and model testing. The research presented in this paper not only allowed to evaluate the transformation of the district, but also provided the researchers with the insights on how to improve the evaluation processes. Definition of complex socio-technical systems, such as digital co-creation, is unavoidably biased, context-specific and temporary. The evaluation framework needs a clearer view on what the necessary and desirable aspects of a functioning co-creation space are (i.e. providing benchmarking guidelines on how physical spaces could enable real-time participation). A priority in future research will be to empirically test the model on a diversified set of case studies, and to develop a robust tool case comparison and co-creative initiatives' maturity measurement.

Acknowledgements

The C3PLACES Project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 693443.

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Biographies



Monika Mačiulienė is an associate professor at Mykolas Romeris and Vilnius Gediminas Technical universities and senior researcher at Social Technologies LAB (MRU). She received her PhD in Management from Mykolas Romeris University. Her research examines co-creation of value in various contexts. In Dr. Mačiulienė's research view, customer is considered not only as a receiver of end-product, but also as a source innovative solutions and as active

collaborator bringing meaningful insights into design and use of products in businesses, NGOs and public institutions. M. Mačiulienė is part of several international research projects EU-Citizen. Science (H2020), C3PLACES (H2020), APPLY COST Action. Individually and together with the colleagues, she prepared over 40 academic publications.



Aelita Skaržauskienė is the Senior researcher at VGTU and Head of the Social Technologies LAB at Mykolas Romeris University. The main research interests of the professor are digital co-creation, collective intelligence, blockchain technologies and decentralized Web and governance. Together with her research team, she has developed a Collective Intelligence Monitoring Technique for evaluation of networked platforms. She is a member of scientific committees of different scientific conferences and journals, a part of PhD Students Society, and a guest lecturer at international PhD schools. Prof. A. Skaržauskienė has developed her scientific competencies during her internships in the advanced universities around the world including MIT and Washington University in USA, universities in South Korea, Malaysia, Thailand, Italy and etc. At IESE Business School in Barcelona, she received a diploma for Cluster Facilitator. At present, she is leading an international interdisciplinary ERA-NET project “C3PLACES-using ICT for developing inclusive public spaces”, also is representing Lithuania in two COST networks. As a Social Technologies advisor, the professor was engaged in building up the platform Tenzorum, for enabling a decentralized access to the Blockchain products. At the moment professor is implementing the research project on business models in decentralised Web in collaboration with bitfwd community, Blockchain centre Vilnius, UNSW in Sydney and VGTU in Vilnius.



Gintarė Žemaitienė represents Institute of Communication at Mykolas Romeris university, she is also a researcher at Social Technologies LAB (MRU). Her research and teaching interests include application of new technologies in different fields of society life: education, e-government, electronic human resource management. Her recent researchers and projects concentrates on development of internal communication within organizations applying ICT.