ELĪNA VIKMANE

ADVANCING CYBERMUSEOLOGY: DIGITAL INNOVATION DIFFUSION IN LATVIA'S MUSEUM SECTOR

SUMMARY OF THE DOCTORAL THESIS

SCIENTIFIC SUPERVISOR:
DR. SC. SOC. PROF. ANDA LAĶE

SCIENTIFIC REVIEWERS:
DR. PHILOL. SANITA BĒRZIŅA-REINSONE
DR. SC. SOC. ILONA KUNDA
DR. ART. IEVA GINTERE

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ORCID 0000-0001-5266-8529
Latvian Academy of Culture
Riga, Latvia

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ABSTRACT OF THE DOCTORAL THESIS

The doctoral thesis "Advancing cybermuseology: Digital innovation diffusion in Latvia's museum sector" explores the seemingly inbuilt paradox between museums and digital innovation. On the one hand, we perceive museums as time-honoured institutions and guardians of tradition whose function is precisely to resist change. On the other hand, the inevitable digital influx, both institutionally and functionally, opens up rich opportunities to respond to persistent criticism of museums that need to change to serve society better.

Responding to the critical voices calling attention to insufficient discussion in museum theory and lack of representative research, the author aims to examine digital innovation diffusion in the museum sector, focusing on the institutional aspects against the backdrop of the digital divide and on museum attitudes and experiences fulfilling their three core functions, all in an attempt to expand the scope of cybermuseological research field.

The author structures the thesis into six chapters. The first two present the theoretical framework. The third outlines the methodological principles of the empirical study. The fourth and fifth describe the author's empirical study analysing primary quantitative data (representative survey), secondary quantitative data (statistics) and primary qualitative data (21 semi-structured interviews). The sixth chapter wraps up the thesis with conclusions, a consolidated argumentation and the recommendations drawn as implications from the study.

The present study (1) expands the cybermuseological research field, offering broader definition of cybermuseology and pushes its research boundaries, demonstrating how digital innovation research fits into scope of museum theory. The thesis (2) brings a new body of evidence-based empirical knowledge in the context of digital innovation diffusion, explaining the role of varying museum attitudes and experiences fulfilling their core functions whilst experiencing the digital divide in the sector. As the first known representative study of any country's entire museum sector, it adds (3) new arguments to the international and interdisciplinary field of diffusion research, highlighting its specific implications for cultural heritage field.

The doctoral thesis spans 241 pages, excluding appendices. It integrates 9 figures and 43 tables. The study draws from 283 references and has 6 appendices.

Keywords: museology, cybermuseology, diffusion of digital innovation, accredited museums, digital divide, museum core functions, Latvia.

INTRODUCTION

RESEARCH RELEVANCE AND PRIOR STUDIES

The relevance of the study lies in the conflicting love-and-hate relationship between the digital sphere and museums (Landi & Marras, 2021) and the seemingly inbuilt paradox of digital innovation and museum practice. On the one hand, we perceive museums as "time-honoured institutions" and "guardians of tradition whose duty is precisely to resist change" (Dewdney, 2020, 69). There seems to be "incompatibility between the idea of the museum and the idea of the computer" (Parry, 2007, xi), and "each case the evidence suggests this disruption has been difficult for the museums to accommodate" (ibid., 139). Institutionally, museum directors and boards want to maintain the status quo and appear set in the old "we've-always-done-it-this-way" mindset of "the conservative, risk-averse field", where limited resources leave organisations detached from the society they serve (Baldwin & Ackerson, 2017, 162–163).

On the other hand, the museum sector has been affected by digital innovations "more than any other innovation in the last thirty years" (Walhimmer, 2015, 9). The digital age has fundamentally changed both the museums and societal expectations. They need to live up to new hopes and satisfy new needs (Ruttkay & Benyei, 2018). However, in museum theory,

the issues of change in institutions and their functions remain largely ignored, languishing in the academic periphery or "the academic margins" (Tezere, 2008, 206).

Although prior studies of the digital shift in the museum sector are considered insufficient, the issue has become increasingly pressing and started gaining international attention and driving new knowledge production. Two of the world's largest museum organisations – the International Council of Museums (from here on – ICOM), uniting over 45 000 museums in 138 countries, and the Network of European Museum Organisations (from here on – NEMO) connecting museums and organisations representing Europe's museums – have established committees or work groups responding to digital development challenges. In ICOM, it is the International Committee for Audiovisual, New Technologies and Social Media (AVICOM). In NEMO, it is the Digitalisation and Intellectual Property Rights Working Group, renamed in 2023 into the Digital Transformation Working Group. Other factors reinforcing the relevance are the latest international events towards scientific communication within the sector. In the 26th ICOM General Conference discussed museums and new technologies as a fundamental topic. In 2022, the NEMO General Conference included a keynote speech by Michael Peter Edson, a technology strategist who focused on "dangerous creation" and "the new reality of museum practice" (Edson, 2022).

The Covid-19 pandemic catalysed a new boom in research interests. Researcher Anna Maria Marras, an ICOM AVICOM committee member and NEMO

Digital Transformation Working Group member, reviewed around 30 surveys conducted in Italy and internationally by organisations such as ICOM, NEMO and UNESCO, to explore digital innovation development, also touching the diffusion process (Landi & Marras, 2021). Nevertheless, none of these international surveys is representative. In 2023, a handbook was issued on the core principles for digital cataloguing (NEMO, 2023), and NEMO Digital Transformation working group declared the next research focus on defining the digital visitor of museums. The leading methodology in the field is a case study focusing on collection digitalisation and adoption of different new digital practices, products and services.

In Latvia, museum related specifics recently have been investigated as applied research with various focuses, such as a quantitative review of museum social roles in different target audiences (LKA, 2018), tourism-related aspects (LKA, 2021a) and musealisation in criteria development (LKA, 2021b). In addition, the Latvian Academy of Culture has been studying cultural consumption for the past seven years, including digital consumption research. The latter began in 2020 in the context of the Covid-19 pandemic and includes digital consumption data focusing on museum holdings, collection, virtual display and digital collection consumption in cyberspace (Latvijas Kultūras akadēmija, SIA "Analītisko pētījumu un stratēģiju laboratorija" and SIA "SKDS", 2020). Fundamental research remains less explored area, nevertheless there are several researchers, focusing, for example, on role of ICT in communication between Latvia's museums and their

visitors (Runnel et al., 2014; Lotina, 2014; Veliverronena & Lepik, 2015; Lotina, 2016) or the role of digitalised museum collections and national digital museum catalogues in the context of memory studies (Spurina, 2021; Spurina, 2022a, 2022b, 2022c).

RESEARCH PROBLEM, SUBJECT AND OBJECT

Lack of awareness of large-scale changes associated with digital innovation diffusion is also reflected in museum practice, of which the Latvian case is no exception, and seems indeed to be tied to insufficient knowledge about how digital inequalities manifesting across the sector relates to museums' ability to perform their core functions and serve the public today when every day's life is affected by digital technologies.

The need for the study stems also from strategic planning documents for Latvia's museum sector and the efforts of policymakers and NGOs to support museums in their progress towards sustainable development goals. There is no cross-sectional data on digital inequality and its specifics in Latvia's museum sector interpreted regarding diffusion of innovation and its imprint on museum functions. Lack of data and its broader interpretation complicates the possibilities of sound and well-argued assessment of museum future perspectives and development of effective toolkit that would include financial and policy instruments to support sectoral development and public awareness of museums' essential role in today's social reality.

Thus, the research subject of the present study is diffusion, focusing on digital innovation diffusion in cybermuseology, operationally defined here across

two dimensions (1) elements of the digital divide and (2) experiences and attitudes surrounding the three core functions of museums (preservation, research and communication). In the present study, diffusion is defined as "a kind of social change, defined as the process by which alteration occurs in the structure and function of a social system" (Rogers, 2003, 6), "a process in which an innovation is communicated over time among the members of a social system" (ibid., 5). Diffusion research is an interdisciplinary field. It has become increasingly relevant with the rapid development of digital technologies, as seen from the large number of innovation diffusion studies related to the spread of communication technologies. In cultural theory, diffusion research exploded with the convergence of the cultural sector and modern technologies, as seen from the new opportunities due to the interplay of cultural content and digital technologies (Filip et al., 2015).

In the present study, the interdisciplinary concept of diffusion is integrated into museology or museum theory. Over the past decades, the museology has gradually interwoven in the broader discourse of cultural theory (Mensch, 2016). In line with the idea that studying museums as institutions and their role, and their connections with global concerns create links between museum studies and cultural studies (Witcomb & Message, 2020) and working from the conclusion that studies at the junction of theory and practice are the most applicable to illuminating the complexity of museums as cultural phenomena (Mason, 2006), the author's research subject has the potential

to both push the boundaries of cybermuseology as theoretical framework and thus contribute to cultural theory development and gain new applied knowledge of the role of the digital divide and its implications on museum experiences and attitudes in the fulfilment of their core functions.

The boundaries of the museum sector in Latvia (and other countries) are difficult to define due to no restrictions on museum concept or usage of the term. It is applied to all manner of heritage institutions and organisations widely different in form and functional focus. The entire sector is also fragmented in terms of their legal status (institutions, structural departments, ngo's, etc.), affiliation (national government-founded, local government-founded, autonomous and private), size, budget, profile, function, etc. On the other hand, unlike many countries where voluntary and collegiate quality standards are set, Latvia has a state-mandated accreditation system drawing a strict line between all the other institutions and accredited museums, which has been defined as the research object of the present study. Standards determine that accredited museums must execute all three core functions, their collections constitute the majority of Latvia's total National Collection under state's protection (Saeima, 2021), and museums annually provide diverse statistics, verified by the Ministry of Culture.

RESEARCH QUESTIONS, ASSUMPTIONS AND ARGUMENTS FOR DEFENCE

The topic of this thesis – systematic research of digital innovation diffusion in the museum sector in the context of the digital divide and experiences and attitudes surrounding museum functions – has developed gradually, along with the author's growing involvement in the work of the Institute for Culture and Arts at the Latvian Academy of Culture. The author has contributed to the Academy's state-funded research programme "Cultural Capital as a Resource for Sustainable Development of Latvia / CARD" and the fundamental applied research project "The Art of Nationalism: Social Solidarity and Exclusion in Contemporary Latvia" (project No. lzp-2020/2-0118). In 2021, the author carried out her study "Digital Innovation Priorities, Diversity and Diffusion towards Sustainable Development of Latvia's Museums in 2020–2021", which won grant from the Latvian Academy of Culture. This study yielded the first quantitative data for the present thesis. In 2022, the author conducted another study, which had also won support from the Academy: "Digital Innovation Diffusion as a Research Framework in the Museum Sector: Champions, Agents of Change and Characteristics of an Innovative Museum". This study yielded the primary qualitative data for the thesis. Participation in broader research

projects has enabled the author to develop and focus the theoretical framework of her thesis and improved her research skills through the approbation of qualitative data analysis methods (Vikmane & Laķe, 2021; Ozolina & Vikmane, 2023) and quantitative data analysis methods (Vikmane & Kristala, 2022; Vikmane & Klāsons, 2023). The data collection of the PhD Thesis has been integrated into a new three-year-long (2023 – 2025) research project, "Striving Towards Participatory Engagement in Museums: Inquiry into Museum Education Practice in Latvia (MEET)", funded by Latvian Research Council through a highly competitive call for Fundamental and Applied Research projects.

Findings from previous studies exposed a clear deficit and inconsistency of scientific knowledge on the topic and justify the need to formulate new research questions, assumptions and arguments to be proved. Responding to the critical voices that call attention to insufficient discussion on the topic in museum theory and lack of representative research in the museum sector analysing diffusion in the context of digital inequality and related museum attitudes and experiences associated with their core functions, the author proposes following research questions and assumptions.

Research Question 1: To what extent does the study of digital innovation diffusion fit into museum theory?

Assumptions:

1 Museum theory accommodates diverse perspectives towards the role, place and research focus of

cybermuseological investigations within the broader structure of the museology.

2 The phenomenon of the digital divide as operationalisation tool might shed light on the patterns by which digital innovation is diffused across various institutional dimensions within museum sector.

3 The core function model of museums serves as a relevant conceptual framework for operationalising the diffusion of digital innovation through museum experiences and attitudes.

Research Question 2: What specific diffusion characteristics, linked to the digital divide, are observable within the museum sector?

Assumptions:

4 The innovativeness-needs paradox in the museum sector is linked to disparities in income among digital innovation adopters.

5 Particular contextual factors within the museum sector restrict the explanatory power of socio-demographic factors in diffusion.

6 Disparities in usage gap across the sector are associated with learning habits and access to technologies within the museum environment.

7 The phenomenon of social desirability serves as a powerful catalyst for diffusion of digital innovation within the museum sector.

Research Question 3: How, if at all, does the diffusion of digital innovation manifests in the experiences and attitudes of museums towards their core functions?

Assumptions:

8 The digitalisation of museum collections within

the preservation function constitutes a prerequisite for the broader diffusion of digital innovation across other museum domains.

9 Diffusion of digital innovation enhances the research function within museums.

10 The diffusion of digital innovation is the most extensive and consistently evident in museum practices associated with their communication function.

Stemming from these research questions and assumptions, the author proposes the following **arguments for defence:**

1

Examination of the diffusion of digital innovation within the museum sector underscores the necessity to expand the boundaries of the cybermuseological research field as it has been theoretically defined thus far, and should encompass opportunity to investigate all institutional facets and the fundamental issues of heritage preservation, research and communication.

2

A systematic exploration of the digital divide, with a pronounced emphasis on its various dimensions, reveals not only the distinctive characteristics of Latvia's museum sector but also the barriers hindering the reduction of digital inequality across the sector.

3

The diffusion of digital innovation in museum sector manifests as differing experiences and attitudes exhibited by the most digitally innovative and the least innovative museums in relation to their core functions of preservation, research and communication.

RESEARCH AIM AND OBJECTIVES

The research questions are formulated in pursuit of the research aim: to explore the process of digital innovation diffusion in the museum sector, encompassing (1) an examination of museums' institutional dimensions within the context of the digital divide and (2) an exploration of museums' attitudes and experiences related to their three core functions, aiming at expanding the definitional boundaries of cybermuseology as a research field. Progressing from the research questions towards achieving the aim, the author has formulated objectives of the study as follows:

(O1) to develop a conceptual framework for cybermuseology as a theoretical foundation for investigating the diffusion of digital innovation in museum sector;

(O2) to assess the relevance and applicability of the d igital divide phenomenon in researching diffusion of digital innovation in museum sector;

(O3) to identify and analyse the challenges associated with the diffusion of digital innovation in the context of the three museum core functions – preservation, research and communication;

(O4) to empirically identify and examine the distinctive characteristics of the digital divide phenomenon within the museum sector in relation to the innovativeness-needs paradox, different socio-demographic factors, the usage gap and social desirability and identify their relations with digital innovation diffusion.

(O5) to empirically identify and thoroughly interpret the attitudes and experience of the most digitally innovative museums and their least innovative counterparts regarding digitalisation dilemmas within the context of their preservations function;

(O6) to empirically investigate and contrast the experiences and attitudes of the most digitally innovative museums and their least innovative counterparts in relation to research function;

(O7) to empirically analyse the critical issues surrounding the experiences and attitudes of the most digitally innovative museums and their least innovative counterparts, focusing on communication function.

SCOPE AND LIMITATIONS OF THE STUDY

Firstly, the author pushes the boundaries of cybermuseology research by emphasising in its definition digital innovation as the focus of cybermuseology, which includes the aspects defined by other scholars in earlier studies – digital technologies, digital heritage and the cyberspace. The author proposes including all and any aspects related to these issues in cybermuseology research. However, this study makes no attempt to determine and classify all digital practices, services or products that have ever been adopted in the museum sector or may be adopted in the future. Nor does it pretend to cover all aspects related to the motivations, challenges and implications of adopting digital innovation. The study focuses on a specific aspect – diffusion analysis of Latvia's accredited museums in the context of the digital divide and museum attitudes and experiences associated with their core functions.

Secondly, the author emphasises that her representative survey of the museum sector was conducted in a separate research project, so for this study, she employs selected survey data that enables her to focus on diffusion analysis in the context of the digital divide and the performance of museum functions.

Thirdly, the author acknowledges that terminological diversity and vagueness both in literature

and in museum practices can raise questions about terminological consistency. The author accepts this criticism whilst stressing that she makes a distinction between her usage and that of other authors or informants. Another challenge that complicates the analysis is the fact that most studies in museum field make almost no mention of the terminology associated with digital innovation diffusion, even in cases where it is the focus of the study.

Finally, to anonymise the informants in a comparatively narrow and fragmented sector that has only 111 accredited museums with easily recognisable profiles (branch, location, size, innovativeness, etc.), the author has made a conscious decision to refrain from describing the informants or the museums they represent when quoting their interview fragments. Another argument to support this decision was the author's concern of labelling some members of the system negatively as "non-laggards have a strong pro-innovation bias" (Rogers, 2003, 285). Some informants reveal sensitive information about their working conditions or express criticism of their founders or co-workers. The choice to reinforce anonymity is not to be seen as a research barrier as the author sought to establish tendencies in two distinct groups – the most digitally innovative museums and their least innovative counterparts – and identify shared and different tendencies between the two in the context of digital divide, attitudes and experiences.

SCIENTIFIC NOVELTY OF THE THESIS

This study (1) pushes the boundaries of cybermuseology research by substantiating how digital innovation diffusion fits into theoretical museology and offering a broader and more inclusive definition of cybermuseology as a research field.

In addition, the study (2) brings a new body of empirical knowledge about Latvia's museum sector in the context of digital innovation diffusion, explaining the role of varying museum experiences and attitudes in how they perform their core functions whilst experiencing the digital divide. Exploration of the multilevel elements of the digital divide exposes the specific nature of digital inequality in Latvia's museum sector and gives new evidence of how digital divide can manifest in the broader heritage sector. The author's findings disprove some of the arguments found in earlier studies by other scholars and identify a more nuanced argumentation, bringing new knowledge on the implications of the digital divide for digital innovation diffusion and the barriers to reducing digital inequality.

To the author's knowledge, her thesis is the first-ever attempt at a representative study of innovation diffusion in a country's museum sector. As such, it adds (3) a new voice to the current interdisciplinary debate

in the so called diffusionist community, emphasising its specific implications for cultural heritage field.

The thesis also contributes to development of terminology in Latvian language – the State Language Centre has supported the author's suggestion and ruled that "heritage-driven innovation" officially translates as "*mantojumvirzīta inovācija*".

APPROBATION OF THE THESIS

At the final stage of the PhD development process, it was approbated internationally in following ways.

Firstly, in 2023, the author submitted her proposal to the USA-based Association of Advancement of Baltic Studies (AABS) fellowship programme's competition. It was assessed by an international expert committee featuring Kaarel Piirimae (PhD, University of Cambridge), Dovile Budrute (PhD, Old Dominion University) and Daunis Auers (PhD, University College London) and won the 2023 Aina Birnitis Dissertation-Completion Fellowship in the Humanities for Latvia 2023. Secondly, on 21 June 2023, the thesis summary was presented at the Association of Arts Management and Culture (AIMAC) HEC Montréal Symposium in Montreal University, Canada. The symposium aims to provide reviews by experienced researchers to PhD candidates before their official defence procedure, along with recommendations for improvement and valuable discussion time. The author's thesis was reviewed by UNESCO Chair in Cultural Management, founder and editor-in-chief of the International Journal of Arts Management, editorial board member of "City, Culture and Society", Queen Elisabeth II Diamond Jubilee Medal recipient, professor François Colbert, who can look back on a 35-year-long professional

background in cultural studies.

The principal ideas, methodology and findings of the thesis were approbated in six scientific publications. Four of these are indexed by Scopus or Web of Science. Thus, the author's research ideas and key themes from the findings were approbated as two Scopus publications: as a chapter in "The Future of Heritage Science and Technologies: ICT and Digital Heritage" by Springer Publishing and a paper in the Baltic Journal of Modern Computing (respectively – Vikmane & Kristāla, 2022; Vikmane & Klāsons, 2023). Two papers are published by the global think-tank ICOM International Committee for Museology (ICOFOM): Taboos in Museology: Difficult issues for museum theory (Vikmane, 2022a) and ICOFOM Study Series (Vikmane, 2023a). The author has developed her qualitative content analysis skills in a paper published in the Web of Science journal "European Integration Studies" (Vikmane & Lake, 2021). Meanwhile, the author's thematic analysis skills were approbated in the British journal "Nations and Nationalism" (Ozoliņa & Vikmane, 2023), indexed by Scopus. The author appreciates every instance of cooperation with other researchers and every review she received, gratefully acknowledging that the reviewers' comments have supported her academic growth and added value to the submitted papers but also (and more importantly) to the PhD thesis.

The principal ideas and findings of the thesis were also presented in 14 international conferences in Latvia, Italy, Canada, Germany, Belgium, Lithuania, Portugal and Czechia. The author's approbation efforts can be

divided into three directions. The first is presentations at the international conferences organised by the two most important global organisations promoting advances in museum theory – the ICOM International Committee for Museology Symposium, the ICOM AVICOM committee session and the global conference by the Inclusive Museum Research Network, where the author's submission earned The Emerging Scholar Award 2021. These conferences enabled the author to receive questions and valuable recommendations from leading theorists in the field. The second route in approbation was international conferences by academic institutions, which brought much-appreciated comments about the research process and methodology. The third route was museographical conferences, valuable for their attempts to bridge the theory-practice gap, build mutual trust and cooperation and help the author reflect on the applicability of her study and relevance for the museum sector.

The author's academic work enables her to integrate the theory, ideas, methods and findings from the study in her teaching and pass them down to her students. Since 2020, she has been running "Cultural Heritage Governance and Communication", an academic master's study programme at the Latvian Academy of Culture (with a brief hiatus in 2023 to finish the thesis), supervising bachelor's and master's theses on museums sector relevant issues and teaching three study courses, "Current Discussions in Museum Theory", "Topical Discussion in Cultural Heritage Field, Academic Writing and Participating in Conferences",

and "Research Design" for master students. In 2023, the author has prepared a new course on "Digitalisation in Culture".

Moreover, the author is a member of the board of the Latvian Museum Association and as such is a part of knowledge transfer among the board and members. Occasionally, she also produces publications on the latest trends and developments in the museum sector (Lejnieks & Vikmane, 2020; Vikmane, 2022b; Vikmane, 2023b), adding to the knowledge exchange in the broader professional field and general public.

STRUCTURE OF THE THESIS

THEORETICAL FRAMEWORK

According to the first research objective, the author performs an in-depth analysis of the **genesis of cybermuseology** within the museology as "critical and theoretical examination of the museal field" (Desvallees & Mairesse, 2010, 19), that can be considered a part of the broader discourse of cultural theory (Mensch, 2016), nevertheless, "still fighting to take its place in the 'hall' of contemporary sciences" (Brulon Soares, 2019a, 17). Prior efforts by museologists to develop and define cybermuseology as a theoretical framework, illuminate the trends and developments in where scholars place it in the broader framework of associated concepts and concept groups (initially, under applied museology, later under special museology and finally on a par with general museology) and point out characteristic features distinguishing it from other museologies.

In the present study, the author identifies three focal aspects in prior research efforts to define cybermuseology: (1) a new environment beyond the museum's physical location, called a web portal, Internet or web (Dietz, 1999; Langlais, 2005) and discussed by the author in the thesis as the cyberspace across its different forms of expression, from the Internet to the metaverse, (2) a new – digitally born – type of heritage (Parry, 2007; Cameron &

Kenderd, 2007; Langlois, 2015; Cameron, 2021) and (3) museum-related ICTs and digital technologies (Langlais, 2005; Leshchenko, 2015 and 2019; Mairesse, 2023). Through critical analysis the author identifies and links all three aspects in a framework where cyberspace and digitally born heritage can be considered a digital innovation and argues that the digital innovation concept in the humanities and in cultural theory opens a broader and more substantial research field than the digital technologies applied to create innovation. From this, the author concludes digital innovation to be appropriate and legitimate research interest in museology.

Consequently, the author proposes expanding the field of cybermuseology research to include all three above-mentioned aspects and accepting digital innovation as their shared and dominant focus. Thus, according to the author, cybermuseology includes (1) the new space, formulated by the author with an umbrella term of cyberspace and considered the greatest innovation of the past few decades, (2) the concept of digital innovation that require digital technologies to emerge but remain substantially different from the latter in their research focus on change analysis and the cultural and social context, and (3) the digital heritage concept, interpreted as a digital innovation because acknowledged as a new, previously unknown heritage type.

By way of analogy with the most inclusive and all-encompassing definition of museology, "comprising all the efforts at theorisation and critical thinking about the museal field" (Desvallees & Mairesse, 2010, 56),

where the museal sector encompasses "not only creation, development and operation of the museum institution but also reflections on its foundations and issues" (ibid., 48) and its research field can examine both "history and organisation" and "cultural, economic, political, and social roles in society and studies their functions and how they operate" (Mairesse, 2023, 377), the author suggests this definition:

cybermuseological research field encompasses the theoretical exploration and critical analysis of the role of digital innovation within the museal field.

In the context of the present study, this includes both the institutional or organisational framework of museums and the issues surrounding their efforts towards heritage preservation, research and communication. Because theory can determine or at least strongly affect where a research project could start and even where it might end, whilst vocabulary can "help us to articulate our subject with greater clarity and differentiation" (Parry, 2005, 334), the author's definition: (1) outlines the shared and dominant orientation of cybermuseological research on digital innovation, (2) points out its place in the broader museology structure under general museology and (3) explains that the research field refers to the entire museal field encompassing both the development and changes in a museum institution and on the alterations in its operational essence and open to broad exploration of issues associated with preservation, research and communication of heritage.

Next, the author describes the genesis of the **interdisciplinary research field of digital innovation diffusion**, emphasising its contribution to studying cultural and social change stimulated by the easy access to technologies and growing demand for "global connectivity" (Wejnert, 2002, 315), which has marked the digital era. In the context of globalisation and technological progress, cultural research plays an increasingly meaningful role and is considered significant to innovation adoption and diffusion (Rohlfer & Zhang, 2016) in the broadest sense of the term – to analyse a specific set of values, behaviours and attitudes (Tian et al., 2018). Researchers have used the framework of innovation diffusion to study the worldwide acceptance and spread of the most diverse ideas and practices (Srivastava & Moreland, 2012), analysing how new ideas spread over time in a distinct social system.

The theoretical framework for diffusion of innovation has several characteristics. The dominant view of diffusionists is that social change is caused by inventions, the process by which new ideas are discovered or created, and that diffusion is a gradual process unfolding over time (Rogers, 2003, 43). At the start of the previous century, Gabriel Tarde already put forward the idea that the diffusion of innovation into a social system is not equally rapid in time but can be represented as an S-shaped curve, where the innovation starts diffusing slowly, followed by a solid and increasing rate of growth, which then slows down and stops in the final stages of diffusion (Tarde, 1903). Rogers confirmed this empirically, including

and developing the idea in his innovation diffusion studies. The second diffusion component is the speed of adoption, denoting the relative speed with which a given member is willing to introduce new ideas sooner than other participants in a system (Rogers, 2003, 267). Innovativeness associated with diffusion has been defined by multiple authors (Wang & Ahmed, 2004; Hult et al., 2004; Menguc & Auh, 2006 and many more) as a positive attitude towards innovation and the changes it might bring, the benefits for organisational development and openness as part of organisational culture (summarised by Zawawi et al., 2016, 88–89).

Digital innovation diffusion in cultural studies expanded with the convergence of the cultural sector and modern technologies. The latter stemmed from new opportunities opened by creative content and modern digital technologies, which diversified the scholarly views on the definition and meaning of innovations in culture and creative industries (Wijngaarden et al., 2016). Cyberspace development has changed cultural and creative industries studies, not least regarding innovation adoption and diffusion (Chandrasekaran & Tellis, 2007). However, their role has not been adequately understood, and innovation studies in these spheres have been surprisingly scarce (Miles & Green, 2008). The changes brought by innovative technologies have been understudied in these disciplines, almost neglecting their impact (Benghozi et al., 2018). Lately, studies on diffusion or broader dissemination of creative industries products in different target groups have become increasingly topical, along with the research on conscious rejection

or disengagement (Chandrasekaran et al., 2022).

In the cultural heritage field, growing interest in cybermuseology studies stems from the growing problem of preserving, researching and communicating digitally born heritage and digitalised heritage. Studies on diffusion of digital innovation also become increasingly numerous. For instance, there have been studies on the diffusion of digital preservation metadata (Alemneh et al., 2002) and digital preservation solutions (Alemneh & Hastings, 2010), open data and crowdsourcing in heritage institutions (Estermann, 2014), museum communication ideas (Canadelli, 2016), gaming apps and their impact on museum visitor engagement (Nelson et al., 2020) and many more.

However, relevant terminology on diffusion of digital innovation is rarely used in the studies, which complicates the attempts to identify the field. Sometimes studies can be identified only by their references because diffusion terminology is not used in the text when discussing how technologies used to create digital art become obsolete (Lloyd-Baynes, 2020) or when performing a systematic analysis of theoretical writings on learning in museum settings over the past twenty years and assuming that learning-inspired change in museums is facilitated by new technology development (Pavlovic, 2022). In the latter example the author explores new digital museum practices, but they are never called digital innovation, and their diffusion across time and space, causing changes in the system, is never called the diffusion. These issues suggest that the new knowledge from the author's study might add valuable insights to

the international and interdisciplinary diffusionist debate in the heritage field and beyond.

In her study, the author **operationalizes diffusion** in the museum sector across two dimensions: (1) the digital divide (Cullen, 2001; Dijk, 2006; Scheerder et al., 2017; Mihelj et al., 2019; Dijk, 2020; Helsper, 2021) and (2) the core museum functions, also known as the triologie indissociable (Desvalees, 1989; Mensch, 1992; ICOM, 2022) or the interconnected input-output model of preservation, research and communication in the context of museum attitudes and experiences (Figure 1).

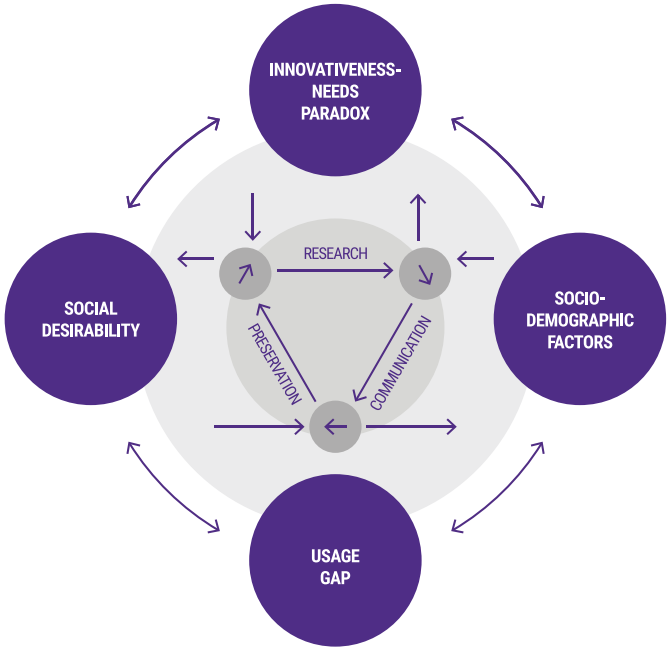

Figure 1. The structure of empirical research dimensions in the cybermuseology research field, structured by the author based on the input-output model by Peter van Mensch

To explore the first dimension, the author chose the digital divide as the most contemporary and applicable phenomenon to operationalize diffusion of digital innovation. Such decision is due to the earlier critique on diffusion studies tending to overgeneralise and the need for more nuanced instrument to explore the complex multidimensional phenomenon. “Museums trying to show a model of the world have become a model of the world themselves which makes them a good model to examine its changes” (Widrich 2018, 55). Therefore, the digital divide offers more detailed, topical and relevant arguments for studying the institutional dimension of museums, starting from the initial argument about (1) the availability of technology or the innovativeness-needs paradox, (2) continuing with the role of other socio-demographic factors followed by (3) the role of digital knowledge, learning and skills and associated usage gap, and concluding with (4) the social desirability of digitalisation outcomes.

To explore the second dimension, the author focuses on diffusion of digital innovation as knowledge or change (Crossan & Apaydin, 2010) stemming from the complex process of diffusion research. It is assumed that in this sense, diffusion is related to specific features that “integrates a part of the national culture” (Vejlgaard, 2018, 6) and integrates various characteristics, intangible resources (Tian et al., 2018) and cultural behaviours (Vejgaard, 2018) that generate varying attitudes and experiences. Therefore, the author analyses the attitudes and experiences of the museum sector as altered by diffusion of digital innovation in the core museum functions of

preservation, research and communication.

Here, the author does not attempt to identify all innovative practices, products or services but rather focuses on the diffusion process and associated alterations in museum attitudes and experiences. For example, regarding the preservation function, the author points out the dilemmas of collection digitalisation and the preservation of digitally born heritage because digitalisation of museum collections is seen as an indicator of further innovation diffusion (Borowiecky & Navarette, 2017). Regarding the research function, the author addresses the changes in how museums study their collections, adopted innovations and visitor research, as well as changes in dissemination of the research findings. Regarding the communication function, the author critically analyses the challenges associated with the practices of exhibiting, educational work and their digital communication.

RESEARCH DESIGN OF THE EMPIRICAL STUDY

The empirical study rests on a mixed design typical for complex multidimensional studies, which demand a broader methodology arsenal (Brannen, 2005) to make up for the shortcomings of each quantitative and qualitative method (Bryman, 2006 and 2007). The author rejects the criticism of a paradigm conflict, emphasising the need to apply methodology fit to answer the research questions. Studying diffusion of digital innovation in the context of the digital divide and taking a more nuanced look at the experiences and attitudes of the most and least digitally innovative players in the museum sector are equally important because both illuminate different yet equally significant aspects of the phenomenon. The study follows sequential explanatory mixed design principles – following quantitative data with a qualitative dataset and integrating the two at the interpretation stage. Some subchapters of the thesis use triangulation elements to reinforce the significance of the new knowledge if the findings coincide or to explain inconsistencies (Mārtinsone et al., 2021, 254).

Digital innovation diffusion is operationalized in the present study according to two dimensions (1) elements of the digital divide and (2) museum experiences with and attitudes to their three

core functions (of preservation, research and communication). The author identifies four categories to analyse the digital divide and three categories for museum functions, further operationalizing each category according to more detailed subcategories. The entire analysis covers twenty diffusion-related subcategories (Figure 2).

THE DIGITAL DIVIDE				CORE MUSEUM FUNCTIONS		
INNOVATIVE-NESS-NEEDS PARADOX	SOCIO-DEMOGRAPHIC FACTORS	THE USAGE GAP	SOCIAL DESIRABILITY	PRESERVATION	RESEARCH	COMMUNI-CATION
Technological availability gap in the museum sector	The regional gap	Formal education duration	Museums' digital ambitions in strategic planning	Digitalisation of museum collections	New directions for collection research, reinterpretation	Digital display
Technological maintenance possibilities at the museum	Staff age and employment duration	Life long learning, new knowledge and skills	The digital innovation champion phenomenon	Preservation of digitally born heritage	Digital dissemination of research data and findings	Educational work
Museum income and its diversification	Gender equality in the museum sector	The global Covid-19 pandemic intervention			Applied research on digitally innovative products and services	Digital communication
					Digitally researching museum audiences	

Figure 2. Digital innovation diffusion in the museum sector: Operationalisation matrix created by the author of dimensions, categories and subcategories

Operationalizing diffusion to answer the research questions and reach the research aim demands quantitative and qualitative data collection and analysis.

The primary quantitative data was collected via a representative survey. The author opted for total population sampling as the most appropriate approach, with a total sample size of 111 units (Latvia's state-accredited museums as legal entities, including their structural units, branches and departments). At a 99% confidence level and allowing for 5% margin of error, the required sample size was determined to be 95 museums. The author's survey reached 97 museums, the sample is representative of the total population, effectively reaching all museum types classified according to their founding body, size and geographic dispersion.

The annual museum records – statistics submitted by museums and verified by Ministry of Culture are applied as secondary quantitative data. Together with survey data, they make for a rich dataset for systematic quantitative analysis with descriptive statistics and correlation analysis methods using IBM SPSS 28.0.1.1.(14) software. Quantitative data enabled the author to identify three groups according to the amount and earliness of adoption (Group A, Group B, Group C), as well as the most digitally innovative museums and their least innovative counterparts for the further qualitative analysis.

The primary qualitative data were obtained in 2023 through semi-structured in-depth interviews with museum representatives and experts. The primary quantitative data enabled the author to identify the five most innovative museums from the group A – the earliest adopters with the greatest number of innovative practices, services and products that stood

out significantly across these parameters.

The first informants were directors or relevant highest-level managers, and the author carefully identified their range of professional duties, responsibilities and awareness. Depending on whether the first cohort of informants performed multiple functions at their museum as well as judging by their institution's focus, staff numbers and functional boundaries and overlapping being drawn between the employees, the author decided whether and what number of additional informants should be interviewed to analyse museum attitudes and experiences with their three interrelated core functions – preservation, research and communications.

The second cohort of informants from the least digitally innovative institutions among Latvia's accredited museums was selected according to the quantitative dataset on the adopted innovations. Since the number of museums in Group C (i.e. those who adopted 1 to 20% of different innovative practices) was 30, the author set an extra criterion and narrowed it down to museums with the least number of digital innovations before, during and after the pandemic (according to the institution's most conservative estimate of their future plans). She also considered the museums with a sound hypothetical potential for digital innovating (such as being located in the national capital but reporting the adoption of few digital innovations) according to relevant theoretical writings. For this reason, the cohort ended up being made of six rather than five museums, although the total number of informants is smaller because most

of museum directors combine their managerial duties with other functions.

The qualitative data were analysed with the hybrid thematic analysis method (Swain, 2018), regarded as a contemporary approach due to integrating two philosophical opposites – the deductive qualitative content analysis (Elo & Kyngas, 2008; Mārtinsone et al., 2021) and thematic analysis relying on an inductive approach to data coding. In primary coding, the author used NVivo 1.7.1. qualitative data analysis software.

Quantitative and qualitative data were integrated at the interpretation stage. The study demanded both a representative quantitative analysis of the sector and a more nuanced qualitative analysis of distinct players in the field, with varying methodological priority given according to the relevance towards each of assumptions.

CONCLUSIONS

The conclusions of the thesis is structured in three sets according to three main research questions and assumptions. The first research question addresses the cybermuseological framework and associated developments in cultural theory. The second and third link empirical study to the theoretical framework.

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RQ1: To what extent does the study of digital innovation diffusion fit into museum theory?

The first set of conclusions sums up analytical insights about a prior theoretical framework for cybermuseology and adds to it the interdisciplinary frame of digital innovation diffusion studies operationalized by the author through the digital divide phenomenon and the tripartite structural model for museum functions, also known as *triologie indissociable*. This answers the first research question: To what extent does the study of digital innovation diffusion fit into museum theory?

Assumption 1
Museum theory accommodates diverse perspectives towards the role, place and research focus of cybermuseological investigations within the broader structure of the museology.

- The latest efforts to define museology are moving away from applied towards theoretical exploration, even a separate discipline, defining the subject as a five-parted structure seen as the bedrock of museological movements and a theoretical framework for sub-movements and relevant studies.
- Cybermuseology was first defined in 2005 under applied museology, whilst some scholars theorised about its potential place under special museology. These debates gradually evolved into theorising about the broad and massive impact of cyberspace, also referred to as the digital space, and the associated need to critically analyse change processes and expose unethical or ineffective actions and outcomes, problems and challenges in the museum sector and its interactions with the public. All of the above enabled reframing cybermuseology as an offshoot or movement of general museology.
- The scientific community accommodates various views on the focus of cybermuseology, broadly categorised across three interrelated focal points: (1) a new kind of setting – the internet, the web portal, etc., distinct from the physical museum location, widely regarded as one of the most impactful innovations of the past few decades and broadly defined and analysed by the author as the cyberspace; (2) the interactive potential of digital or information and communication technologies in museal field. This focal aspect is especially vague and diverse in terminology, as different authors blur the line between 'digital technologies' or 'information and communication technologies' and 'digital innovation'

characterising innovative ideas, practices, products and services in museal field. The reason why the author prefers the term 'digital innovation' is its interdisciplinary nature and emphasis on researching change processes and the cultural and social context; (3) digital heritage exploding with new heritage categories, including digitally born heritage as a whole new type of heritage of our time.
- A critical analysis of theoretical writings exposes terminological inconsistencies. Scholars use different concepts and terms, mostly derivatives from 'cyber' and 'digital' and predominantly without due explanation or definition. The author attempts to categorise this diversity across the three above-mentioned focal points for cybermuseology.

A critical analysis of prior scientific advances relevant to the topic enables the author to conclude that museum theory accommodates different views on the place of cybermuseology research in museology. By way of analogy with the most inclusive and all-encompassing definition of museology, covering a wide field "comprising all the efforts at theorisation and critical thinking about the museal field" (Desvallees & Mairesse, 2010, 56), where the museal sector encompasses "not only creation, development and operation of the museum institution but also reflections on its foundations and issues" (ibid., 48) and its research field can examine both "history and organisation" and "cultural, economic, political, and social roles in society and studies their functions and how they operate" (Mairesse, 2023, 377), the author

suggests this definition: **cybermuseological research field encompasses the theoretical exploration and critical analysis of the role of digital innovation within the museal field**. The author's definition: (1) outlines the digital innovation as a shared and dominant orientation of cybermuseology research, (2) points out its place in the broader museology structure under general museology, and (3) broadens research field to all issues around digital innovation pertaining in the museal field, including the heritage preservation, research and communication, and the development and changes in a museum institution and the alterations in its operational essence.

In the light of the first research question of this study and the associated assumption, the academic discussion outlined above and the empirical findings of the present study, which have proved Argument 2 and partly proved Argument 3, the author concludes that prior definitions unduly narrow the research field and believes she has proved **Argument 1**: examination of the diffusion of digital innovation within the museum sector underscores the necessity to expand the boundaries of the cybermuseological research field as it has been theoretically defined thus far, and should encompass opportunity to investigate all institutional facets and the fundamental issues of heritage preservation, research and communication.

Assumption 2
The phenomenon of the digital divide as operationalisation tool might shed light on the patterns by which digital innovation is diffused across various institutional

dimensions within museum sector.

- In this study, the author focuses her exploration of the broad field of cybermuseologocial research on digital innovation diffusion. By explaining how new ideas spread over time in a specific system as a framework, diffusion illuminates the emergence of new ideas, practices, experiences and attitudes and associated changes in the museum sector both on institutional related aspects and heritage preservation, research and communication functions.
- The digital divide, digital gap or digital inequality concept in the present thesis enables the author to explore the changes and challenges in Latvia's museum sector altered by the diffusion on innovation. Digital divide serves as a suitable tool to operationalize diffusion regarding institutional dimensions which enables a systematic analysis of several interrelated study fields such as (1) technological availability or the innovativeness-needs paradox, (2) the imprint of socio-demographic factors, (3) implications of the usage gap, (4) importance of social desirability of diffusion outcomes.
- Four conceptual dimensions of digital divide allows the author to explore empirically assumptions 4– 7 to answer the second research question of the thesis.

Assumption 3
The core function model of museums serves as a relevant conceptual framework for operationalising the diffusion of digital innovation through museum experiences and attitudes.

- If the digital divide is argued in the thesis as a suitable concept for operationalizing diffusion to explore the sector's institutional dimensions, then to study diffusion-related experiences and attitudes in the museum sector, the author substantiates the tripartite structure of museum functions – heritage preservation, research and communication, also known as *triologie indissociable*. Model is recognised by museum theorists and practitioners thus serves as an apt framework to structure empirical study.
- In theoretical writings on cybermuseology, the preservation function is often highlighted as the most essential – *a sine qua non* with a solid potential for diffusion of innovation in the two remaining functions. Museums are encouraged to give serious attention to digitalising their collections, with a distinction being made between digitisation, denoting a process where heritage is converted into a digital format, and digitalisation, where heritage has a broad accessibility and applicability potential, whilst acknowledging that the entire process is fraught with challenges and requires substantial changes such as re-evaluation of the purpose and worth of digitalisation, new and active preservation policies that poses multiple tactical challenges, new type of heritage and others. Coupled with the growing competition in the preservation function, the latter sparks a discussion about the impact such diffusion may have on museums posing pertinent questions about the future role of museums as musealisation institutions.

- In the research function, the author identifies at least four dimensions of discussion that have become increasingly relevant with digital innovation diffusion across the sector. Museum scholars find new research themes in their collection work and new opportunities to re-examine their prior interpretations and assumptions. On top of that, the sector grows richer with new pathways for applied studies on the adopted new digital practices. Beyond that, new opportunities and tools emerge for studying museum visitors, cutting the distance between the research and communication functions or at least adding a new dynamic between the two. Last but not least, new dissemination instruments have emerged.
- Finally, diffusion of digital innovation creates imprint in attitudes and experiences with the communication function, subcategorised in this thesis as alterations in heritage display, museum education and digital communication. Diffusion brings new opportunities for museums to enrich visitor experience and share more diversified, more personalised information with diverse audiences. Besides, digital innovation diffusion introduces new options towards democratisation efforts across the museum sector and broader public engagement. At the same time, it is a cause for concern whether museums are able to reconcile historically traditional attitudes and practices with the much different nature of communication in cyberspace.

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RQ2: What specific diffusion characteristics, resulting from the digital divide, are observable within the museum sector?

The second set of conclusions rests on the findings from an empirical analysis of Latvia's accredited museums in the context of the digital divide to find empirically sound answers to a number of assumptions stemming from RQ 2: What specific diffusion characteristics, linked to the digital divide, are observable within the museum sector?

Assumption 4
The innovativeness-needs paradox in the museum sector is linked to disparities in income among digital innovation adopters.

- Diffusion of digital innovation in the museum sector is inconsistent and affected by various internal and external factors. This means there are no shared diffusion determinants for the entire diffusion process or the entire museum sector. However, in the present study, the author has observed and one hundred per cent corroborated the gradual unfolding of the process in the museum sector and distinctly different degrees of innovativeness across the board. The thesis categorised these into three groups – A, B and C.
- Museums overwhelmingly emphasise the massive importance of digital technologies in fulfilling their role, moreover, the least innovative museums (C) tend

to be overly generous in self-assessment, labelling themselves as more innovative than the actual practice suggests. However, due to stratification, a third of the museums (C) have adopted substantially fewer new practices than the more innovative cohort (A), which slows down diffusion across the whole sector.
- The digital divide between the most digitally innovative museums (A) and their least innovative counterparts (C) extends up to twenty years if analysed in terms of available technologies. Those who need more technological support have fewer opportunities to get it – also known as the innovativeness-needs paradox. The divide remains and even grows due to rapid technological development, further exacerbating digital inequality. Since the digital age is widely described as pertaining to the late-twentieth century and onwards, innovation laggards are still where the innovators were at the start of the twenty-first century.
- The more innovative museum cohort (A) has experienced broad innovation diffusion, enabling museum workers to connect, communicate and cooperate. In all cases, museums that have adopted fewer innovations in general have also been less active with new practices towards institutional functioning and cooperation among employees.
- Another specific feature of the museum sector is the case of the only innovation introduced by a top-down decision that has technically diffused across the entire sector (99%). Introduction of the Joint Catalogue of National Museum Holdings (JCNMH) initially had

begun to reduce the innovativeness-needs paradox, bridging the technological availability gap. The digital divide has nevertheless persisted as it is linked to museums ability not only to purchase, but also to maintain and renew technologies longterm.

- The author's analysis suggests a connection between digital innovation adoption and the total museum income, but also with diversification of financial sources – targeted funding won from competitions at the State Culture Capital Foundation and earnings from museum services characterise more innovative museums. The least innovative museums tend to have a small yet stable, mostly municipal budget. That said, funding alone is no determinant. In fact, this conclusion confirms the complex nature of the digital divide – it stems from different interconnected variables identifiable through quantitative and qualitative data and exposed by other dimensions of this compound phenomenon.

Assumption 5
Particular contextual factors within the museum sector restrict the explanatory power of socio-demographic factors in explaining diffusion.

- In literature, geography vector is found characteristic to diffusion of digital innovation, as it tends to spread from larger into smaller settlements. However, the geographic location of museums is a secondary or consequential factor as larger settlements tend to have larger museums, which tends to have larger budgets and more staff and, therefore, larger spending.

- The specific nature of the museum sector suggests: although there is no universal agreement in previous studies on the connection between digital innovation adoption and museum workers' age, in this study, the structure of museum staff is a significant element. The museums that have experienced a more active digital innovation diffusion (adopted more innovations and at an earlier stage than the others) also have more staff, and younger staff aged under 30 often work alongside with employees above retirement age. This combination seems to enable the transfer of knowledge and practices across generations.
- Museum workers' subjective views on age as a significant variable in the context of the digital divide are perceived differently. The more digitally innovative museums tend to see age as a stereotype, for example, it is given as an important factor in the beginning of the interview, however, corrected later as insignificant factor. Conversely, for digital innovation laggards, age is one of the most significant explanations of the slow on non-existing diffusion of innovation.
- A distinct feature in Latvia's museum sector is gender inequality, with museum staff composed predominantly of females, which is associated with lower earnings. Extremely low financial renumeration is compensated by the need for external approval and internal non-monetary motivators, even small gestures of kindness an recognition such as 'like' in the facebok post. The author details this argument when discussing the last dimension of the digital divide – that of social desirability.

Assumption 6
Disparities in usage gap across the sector are associated with learning habits and access to technologies within the museum environment.

- The study has exposed significant differences between the most digitally innovative museums and their least innovative counterparts in the context of the usage gap. The museums that have introduced new digital practices, products and services sooner and to a larger extent have more employees with longer years spent in the formal education setting. Workers with secondary education are the most represented in all museum groups. However, they play a minor role in the more innovative group because the innovating museums have larger staff numbers, and less formally educated employees work with those with higher education.
- Although museum workers demonstrate a shared tendency to readily acquire new digital knowledge and skills related to their direct duties in the workplace, in the more digitally innovative museums, continuous innovation requires learning profound, specific and complex usage skills. There museum workers lacking basic digital skills become redundant.
- Meanwhile, in the innovation laggards' cohort, i.e., in the least innovative museums, learning is tied to the so-called operational or basic skills in technology- and Internet usage. Besides, their rhetoric suggests they regard humans as far superior to technologies intellectually and emotionally, believing these qualities cannot be replaced by automation. The

same logic persists even in cases, where museum technologies have already replaced people, for example audio-guides.

Assumption 7
The phenomenon of social desirability phenomenon serves as a powerful catalyst for diffusion of digital innovation within the museum sector.

- In the context of social desirability, digital technologies are overwhelmingly perceived as significant and very significant in museum work.
- Social desirability is often related to digital ambitions to be the leading player in the sector with a new product or service, to be an opinion leader, and to shift public opinion towards seeing museums as progressive institutions, more associated with the West.
- Unlike the less innovative museums, the more innovative ones more often transform their ambitions into strategic documents and are two times more often able to identify employees who advocate adopting new digital technologies, also called innovation champions.
- Innovation champions in museums play an important role in facilitating diffusion. Such museum workers self-identify as growth-oriented, 'crazy' and 'fanatical'. They value quality performance, an open environment, opportunities to experiment and getting support from their colleagues when introducing new digital initiatives in their museum.
- In digitally more innovative museums, the champions

appreciate an open professional environment oriented towards self-exploration, or at least not interfering with their self-development and letting them live a creative and exciting professional life. These workers often quote being trusted by their managers and colleagues, even given *carte blanche* by the highest officials. This is easier to imagine in a high-tech start-up but less self-evident in museums as "time-honoured institutions" and "gatekeepers of tradition" that often are state or municipal institutions.

- In Latvia, state and municipal government institutions normally carry a bureaucratic load, nevertheless, new ideas often need stepping out of the box beyond the regular document flow and accounting systems. Study suggests that innovation champions occasionally implement their new ideas with their personal funding and instruments. This is tied to another tendency: innovation champions not only introduce new practices but also take responsibility for the areas they perceive as lagging behind or lacking quality, which they often address with their private resources to improve the situation in their museum.
- However, encouragement and trust are often related to the responsibility to attract external funding for new ideas. Thus, innovation is squashed by bureaucracy and snowballing workload, which can lead to overworking and burnout, relying on personal resources and contacts, volunteering one's free time, and even losing one's family. Thus, innovation champions in the museums are important for achieving museum ambitions achieved at the expense of staff health and quality of life.

In light of the theoretical analysis and empirical findings outlined in the thesis, as well as the above-discussed conclusions and reasoning that a systematic study of the digital divide in the museum sector brings new insights that disprove prior arguments by other scholars creates new knowledge about the specific nature of the digital gap and the barriers to digital innovation diffusion in the museum sector, which do not shorten the gap, i.e., Group A museums never stop so Group B and C could catch up, the author believes she has substantiated **Argument 2**: A systematic exploration of the digital divide, with a pronounced emphasis on its various dimensions, reveals not only the distinctive characteristics of Latvia's museum sector but also the barriers hindering the reduction of digital inequality across the sector.

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RQ3: How, if at all, does the diffusion of digital innovation manifests in the experiences and attitudes of museums towards their core functions?

The third group of conclusions includes insights from an empirical analysis of experiences and attitudes in Latvia's accredited museums in the context of fulfilment of their core functions of heritage preservation, research and communication to answer RQ 3: How, if at all, does the diffusion of digital innovation diffusion manifest in the experiences and attitudes of museums

towards their core functions?

Assumption 8

The digitalisation of museum collections within the preservation function constitutes a prerequisite for the broader diffusion of digital innovation across other museum domains.

- In Latvia's museum sector, the principal digital innovation to do with digitalising museum collections is the adoption of the Joint Catalogue of National Museum Holdings (JCNMH). Adopted through the so-called authoritative decision making (Rogers, 2003), it has diffused across the entire sector. Adopted in 99% of the museums that participated in the study, it is one of the few new practices within the sector where the diffusion process is technically completed.
- At the same time, correlation analysis in this study between the number of digitised museum objects and the number of adopted new digital practices does not confirm the assumption about collection digitalisation as a precondition for further digital innovation diffusion in other areas. In case of Latvia, JCNMH has been rather a catalyst of the diffusion of object digitisation practice, instead of digitalisation or broad accessibility of digitised objects.
- Despite massive national resources being spent on JCNMH development, digitised heritage availability for broad application is limited, and user experiences are different, often negative. The annual heritage digitisation rates that need to be met, combined with the problematic access, raise the question of whether

JCNMH has not become an instrument of discipline and control of musuems instead of a tool to ensure general accessibility of Latvia's national heritage and further digital innovation diffusion in the sector.
- In parallel to usage of JCNMH, museums wish to keep their local heritage digitalisation and management systems, although the latter (if at all) are mostly available to public users only directly at the museum, in its physical location. Thus, the scarce resources available for museums are stretched even more.
- The situation with the diffusion of digitally born heritage and one of rare heritage-driven innovation in the museum sector – is especially critical, even though it has been defined as a new type of heritage already in 2003 (UNESCO, 2009). Up to 95% of museums have encountered various kinds of digitally born objects via their core functions, the total amount of digital heritage in the primary collections is under one per cent, thus the study exposes several tendencies in museum experiences shared by the entire sector.
- The study has exposed different attitudes among the most digitally innovative museums and their least innovative counterparts regarding digitally born heritage. The least innovative museums overwhelmingly place authenticity within the analogue objects realm. Consequently, digitally born objects are considered less valuable or unsuitable for preservation in the collection. They are not preserved due to museum workers' attitudes, the collection policy in place at the museum in question, where priority is given to analogue objects, poor knowledge, skills and resources associated with collection and

preservation tactics and lack of relevant normative regulation. On contrary, the most digitally advanced museums do not question the authenticity of digitally born heritage, rather discuss nuances of collecting and preservation: the number of copies, the question of collecting the objects or just their rights and instructions, and the issue of authenticity with regards to data carriers.

- The vague normative status of digital heritage and unwritten traditions or informal practices and professional myths across the sector prevent museums from including digitally born heritage in their primary collections, defined as the Latvia's most valuable heritage under the protection of the state. Most museums collect digitally born heritage in their auxiliary collections, if at all. In some cases, it is filed into research archives or simply saved on a computer.
- Due to these wait-and-see attitudes, digital heritage may not be accessible to future generations or may become "a meaningless mass of information" (Assmann, 2011, 132). However, museum tactics to organise temporary preservation might also suggest that they intuitively wish to preserve this type of heritage in the hope there may come a collective or authoritative decision, clear criteria or standards before it becomes too late to interpret the heritage in question. The experience with JCNMH suggests that authoritatively introduced new practice can be effective instrument to diffuse innovation across the sector and can become catalysts for bridging the digital divide. Therefore, the author predicts that promoting the preservation of digitally born heritage

and ensuring its accessibility could help museums perform their core functions with due and adequate quality and reduce the future digital divide.

Assumption 9
Diffusion of digital innovation enhances the research function within museums.

- The study has shown that research in Latvia's museums is the least innovative out of all three core functions. The findings suggest the museums tend to have shared experiences. The intention for JCNMH to become a significant catalyst for innovative research development has not materialised. Firstly, there is a diverse perception of the research function, ranging from a perfunctory description of collection objects to an in-depth analysis of heritage, thematic collections and related topics. Secondly, in most museums, employees do not trust their own digital skills nor the quality of information uploaded into JCNMH by their colleagues and because of the system's significant drawbacks.
- Another shared problem is the absence of digitally born heritage in museum research. Paradoxically, digitally born heritage cannot be found and accessed digitally to be researched by other museum workers or researchers outside the museum sector.
- In collection research, the study exposes significant differences in attitudes between the most digitally innovative museums and their least innovative counterparts. The innovators differ from the less innovative ones in their attitude towards the potential

of artificial intelligence. The first cohort identifies research gains in knowledge interpretation and new knowledge creation. Meanwhile, the second group believes artificial intelligence is an issue or challenge for a more distant future and unlikely to affect their research in their lifetime.

- During the pandemic, whole more innovative museums focused on innovative communication practices, the less innovative museums re-focused on the research function. On the one hand, such decision increased digital divide and put them at a risk of falling behind even more. On the upside, new digital tools were introduced in museum research, such as the so-called citizen science or participatory science, which are becoming increasingly popular in academic circles and rely on involving the local population in identifying collection objects and figures of import or supporting museum workers in fieldwork and data recording.
- Pertaining to the dissemination and accessibility of research data and findings, the study identifies certain shared experiences across the board. The most popular new digital practice diffused during the pandemic is the online dissemination of research findings. However, clear differences exist between the most digitally innovative museums and their least innovative counterparts. For example, when online conferences became especially popular, the latter were more passive, waiting for the face-to-face gathering and networking opportunities.
- Another shared experience in the museum sector is hesitation to share research data and results

internationally. Access to knowledge, best practices, discoveries, and methodological achievements is significant for the diffusion of best practices, institutional networking and partnerships towards new discoveries and re-interpretation opportunities. Conversely, Latvia's museums frequently admit their research data and findings should not be available in cyberspace. Instead, researchers should visit physical museum locations. Museums explain guarding their findings with the need to protect their professional prestige and scholarly authorship, as well as mention wanting to profit from their research (for example, publications), even while e-commerce in museums remains poorly developed.

- Paradoxically, the museum sector expresses a positive attitude towards broad accessibility of heritage data online from other institutions, but at the same time, museum workers' views on the accessibility of their own research data and findings are poles apart. Limited access to museum-owned data is both a conscious choice and, possibly, a missed opportunity or the result of poor skills and lack of relevant information. Consequently, should these circumstances persist, digital innovation diffusion in the research function might unfold substantially later and slower than in the case of other museum functions.
- Museums have become increasingly focused on researching their visitors due to digital record-keeping and ongoing convergence of other data-gathering methods and technologies. In these circumstances, visitor research as a field of special museology is a

significant element to strengthen diffusion of innovation between the research and communication functions. This experience, however, is very different between the digitally more innovative museums and their less innovative counterparts. The innovators research their visitors with nuance and diversity, and their staff has the necessary knowledge and skills. In the less innovative museums, visitor research is less frequent and more perfunctory. More often visitor research is described with "hopes" and "beliefs". Their social media accounts are often managed by their founding institution, and no objectives are set to reach.

- Visitor research also suggests that digitally more innovative museums play an active role in initiating the diffusion of new ideas and practices. For example, the more digitally innovative museums have started collecting data and designing methodologies for digital visitor counts, eventually considered equal to onsite visits. They wish to disseminate their ideas across the entire sector, i.e., use their rich data pool and methodological considerations not only to improve their own relationship with the public but also to contribute to the sector on the whole through uniform standards for annual reports on museum work, which should include the results and effects of created and implemented digital products, services and other resources developed to serve diverse audiences in cyberspace.

Assumption 10

The diffusion of digital innovation is the most extensive and consistently evident in museum practices associated with their communication function.

- According to theoretical writings, communication function could be more digitally advanced in museum institutions since it is the most strongly tied to the audiences. The study suggests that the weakly innovative preservation and research functions are no prerequisites for digital innovation diffusion. In museum self-evaluations, it is the communicators who promote innovation diffusion, which is why museum experiences are the most diverse in this function rather than the other two.
- New practices related to heritage exhibition are the most broadly spread in physical (onsite) museum locations across the board, encouraging people to visit physical museum locations rather than expand the visitor pool in cyberspace. However, their diffusion is inconsistent and matches the overall innovativeness of each institution, and can be explained with the fact that at the time of writing, museums cannot use digital visitor numbers as a marker for their activity in the annual records submitted to the Ministry of Culture. Only the physical visitors count.
- There are differences between the more innovative museums and their less innovative counterparts regarding their attitudes to innovating. Digital tools in the exhibitions and displays of the least innovative museums are uncommon. The most digitally advanced museums are more experienced,

so they more often question if the given innovation will have a pragmatic goal, such as creating an added experience or popularising the museum internationally. Adopting digital technologies just for the sake of it (or the image of a progressive museums) is thought to be unjustified.

- The study suggests that the educational work done by museums is a significant driver for digital innovation diffusion in museums with more visitors, especially school groups. Education-related digital products are leading the charts in terms of diffusion. Their explosive spread across the sector is largely due to the Covid-19 pandemic. At the time of writing, they remain the only digital innovation that diversifies museum income from digital products.
- Educational work and external circumstances expose a significant gap in experiences and attitudes between the more digitally innovative museums and their less innovative counterparts. This is largely because, during the pandemic, innovators rapidly accumulated valuable experience with new forms of education. Meanwhile, in the less innovative institutions, there is hardly any diffusion with innovative digital education products and services – these museums focused on their research function or digitising the collection.
- The diffusion of digital innovation towards communication is the broadest, and motivations are similar - to activate followers and boost numbers, involve people, demostrate solidarity, and respond to global tendencies in the museum sector via social media, especially Facebook, as a less costly channel

controlled by the museum in question.

Given the theoretical discussion and the findings of the empirical study detailed in the thesis, as well as prior conclusions and reasoning, the author believes she has partly proved **Argument 3**: The diffusion of digital innovation in museum sector manifests as differing experiences and attitudes exhibited by the most digitally innovative and the least innovative museums in relation to their core functions of preservation, research and communication. In the context of preservation and research, irrespective of innovativeness of the institutions, their experiences are more often alike. Meanwhile, their experience with the communication function tends to vary. On top of that, in the context of all functions, some attitudes are universally shared across the board, whereas others differ between the more and less digitally innovative museums, for example regarding the authenticity of the digitally born heritage or the possible role of artificial intelligence, and regarding especially certain aspects of the communication function where diffusion is particularly broad but inconsistently spread.

RECOMMENDATIONS

The findings and implications suggest extensive opportunities for **further scientific research**. These can be divided into at least three broad directions.

Firstly, the author's quantitative data combined with museum statistics offer a rich data set for a nuanced exploration of other museum-related topics. The data will be available to potential researchers in the Zenodo Open Data Repository after the research project launched in 2023 – "Striving Towards Participatory Engagement in Museums: Inquiry into Museum Education Practice in Latvia (MEET)" (No. lzp-2022/1-0379) – is completed.

Secondly, the study exposed the need to continue researching the diffusion of digital innovation through the lens of public demand and visitor expectations. The author's PhD thesis analyses diffusion of digital innovation by focusing on museums and their expierence. Many theorists suggest that digital development is affected by social desirability and positive bias. Museums also have a subjective assumption that the public demands innovative practices, so museums are responding to public needs. The more innovative museums and their innovation champions even maintain harmful self-exploitation practices to meet this assumed demand. However, little is known about what exactly the public expects from museums in the

context of new digital ideas, practices and services.

Thirdly, within the realm of heritage preservation, the study has unveiled a concerning trend: numerous museums are falling behind in their efforts to collect digitally born heritage of our era. This underscores the need for a more comprehensive investigation, an in-depth examination of Latvia's existing digitally born heritage preservation ecosystem, with a specific focus on entities (public, non-governmental and corporate) and individuals engaged in collection activities, an exploration of the guiding preservation principles, analysis of the associated risks and benefits of various approaches and exploration of potential avenues for museum collaboration or cooperative efforts.

The implications drawn from the research findings offer also several avenues for application. Firstly, the findings encourage practitioners and Latvia's Ministry of Culture as a functional supervisor to the entire sector to specify the normative framework. The vague normative frame and non-existent practice combined with the impressive and rapidly growing amount of digitally born heritage and all kinds of innovation require active preservation tactics, relevant knowledge and sufficient resources. Especially the less digitally innovative museums believe that given the above, it is best to postpone the decision until it becomes official and there is clarity within the sector so the already limited resources are not overstretched any further. Museums require more comprehensive preservation guidelines specific to digitally born heritage, a standardized terminology, a distinct sepa-

ration between content and data carriers in the Joint Digital Catalogue of National Museum Holdings, and mechanism for museums to seek answers to their inquiries, with the responses summarized and accessible to all institutions within the sector.

The second ring of questions concerns the double digital management of museum collections. Most museums consider their own local digital collection management systems more relevant and convenient. As to the joint holdings catalogue, they would appreciate broader access to the digitalised collections and a simpler user experience with a better search function and opportunities to integrate with Internet browsers as well as better access to the visuals, etc. Such changes go against the initial desire of museums to include in the joint digital catalogue all their specific wishes, which would demand considerable resources, not least new innovations, such as artificial intelligence, for functions like browsing and translation. In their absence, the joint digital catalogue will fail to reach its goal. Despite the resource investments from all museums and the funding attracted by the provider to improve the system, the endeavour is still in the phase of digitisation. Careful applied research would be needed to re-evaluate its potential to become a separate user-friendly and broadly accessible tool for the research, creative industries, educational purposes, etc., for diverse audiences in Latvia and beyond or to be integrated into other heritage digital accessibility systems.

Thirdly, keeping visitor records in the digital age is just as relevant and acute. Museums invest

significant funds and human resources to create digital products and services. However, the national regulations for keeping track of museum outcomes make no provisions for systematically counting digital visits, nor are the latter tied to museum assessment. In Latvia, the digitally most innovative museums are already working on their individual approaches to a data registry that would record digital visits. The recommendation is to agree on a shared methodology and include the data in museum statistics. Agreement within the sector about how to keep track of digital visitor numbers would stimulate the less digitally innovative museums to consider in their strategies if and how museums can help make heritage more accessible and reach the audiences they have not been able to meet so far.

Moreover, the empirical evidence presented in this study highlights numerous instances and prospects for mitigating the digital divide. These insights may prove instrumental for museums and their stakeholders vested in digital advancement, enabling them to formulate well-informed strategic decisions.

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