Coevolution of Intelligent Technologies and Social Institutions in Estonia: Design Anthropology for Future-Proofing Success

Antti Ainamo [1,*]

[1] *University of Tartu, Narva mnt 18, 51009 Tartu, Estonia*

Abstract

There is a paucity of research on intelligent technologies and how they are a generative and cognitive force challenging the regulative and other institutional forces by which the world stage has been understood to be organized. This paper blends analysis of ICT and software engineering with research on institutions and in anthropology to argue that intelligent technologies and institutional systems evolve in parallel. Initiatives around the world illustrate how social considerations sustain first-mover advantages. The paper proposes how there is less need in a first-mover country such as Estonia to celebrate past success than there is a need for her to come up with measures on how to continue to be first mover. "Design anthropology", and "small observatories" such as ateliers, studios, sandboxes, makerspaces, hackerspaces and policy labs provide particularly interesting measures on how to be and continue to first mover.

Keywords

Intelligent technologies, institutions, coevolution, Estonia, design anthropology

1. Introduction

Evolution in intelligent software technologies and institutional systems of rules and norms are similar phenomena to one another in that both are forms of abstract code tending towards "maintenance" [1][2][3]. Both phenomena develop so that initial bugs are corrected and adaptation is done to keep the system usable. Over time, the above kinds of steps in "perfecting" maintenance detect and correct faults proactively; that is, even before such faults ever become effective [4]. Such perfection risks system stagnation and decline with ruling out of new ideas, risks that domain or environmental shifts will amplify.

Anthropology is a human-centered inquiry with a tradition of inquiry involving empathy and ethnographic observation of a social or cultural system's present and past. Such inquiry increases our understanding of how local social "belief systems" over time tend to institutionalize local "craft", lessen innovation, [1] and resist adaptation to both local and global change. Anthropological understandings have contributed to research on institutions and foci on such terms as "survival" and "celebration" [5][6][7]. "Design anthropology" is a spin-off from traditional anthropology that is future-oriented and prescriptive. Design anthropology is suited to consider new ideas and new knowledge about intelligent technologies, rather than editing out such ideas and knowledge.

In this paper, we extend the above kinds of ideas as to institutions, anthropology and design anthropology and connect these with software engineering [8][9]. We operationalize design anthropology as a three-phase model of "understand the past", "control the present", and "shape the future" [10]. The empirical narrative in this paper involves a historical backdrop to post-Soviet times and the birth of Estonia's systems of socio-institutions and software engineering, which both to a significant part trace to the Estonia's "Tiger Leap" initiative that kicked off in 1997. This paper proposes and interpretation of this narrative as one whereby the practice and policy in Estonia until

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*Corresponding author

antti.ainamo@ut.ee (A. Ainamo)

0000-0003-0210-0294 (A. Ainamo)

the time of this writing this paper has been a living system characterized by “technologies” [11], in the first hand, and social and institutional evolution, on the other hand.

While this paper applauds the success of practice and policy in Estonia for success in software technologies and forging a great ecosystem worth celebration, this paper also constructively warns about the risks of forgetting about social institutions. There are risks in replacing local systems of socio-technical “craft” and local “belief systems” with “imagined futures” momentum of hype of the inevitability of ever more global success [1][5][11][12][13]. Celebration of the past without consideration of occasional needs for changes stagnates these systems of the past intellectually, risking regression of a previously first-mover country into a "maintenance state" [14]. A "maintenance state" will imitate its own past and systems and models of countries more limited and less innovative than herself. The scenario of coevolution that goes with a turn towards a maintenance state is illustrated in Figure 1 (next page).

To foreshadow its contributions of this paper, this paper proposes measures by which Estonia– or perhaps any other first-mover country – may continue exhibiting vitality given prospects of ever new intelligent technologies. Institutions of higher education, for example, can play with elements such as design thinking, crafts-professions traditions, master-apprentice forms of learning, sandboxes, studios, hacker and maker spaces, ateliers, and the like. Integrating “tinkering” in such forms of learning with scientific research is a path for truly “useful knowledge” [13].

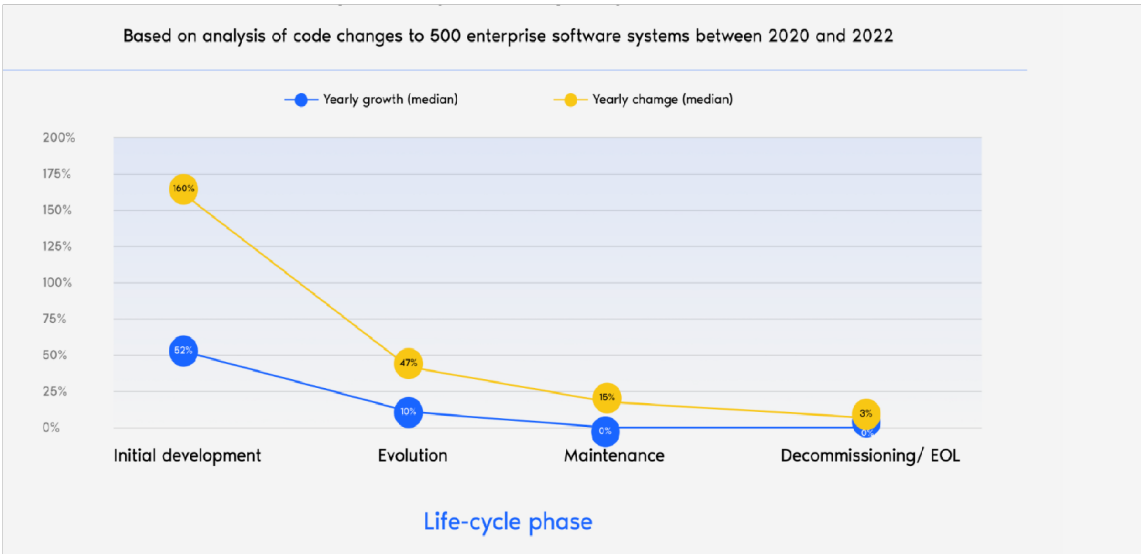

Figure 1. Typical yearly change in any software system [15].

2. Rules of the game and when and how to renew them

Douglass C. North, the recipient of the 1993 Nobel Memorial Prize in Economics, defines institutions as a society’s rules of the game. These rules -- whether formal or informal ones, or both -- are humanly devised constraints that shape human interaction and structure incentives [5][16][18]. Similar rules as in social institutions can be found also in software engineering.

2.1. Formal rules (laws & regulations) and standards

North defines that formal rules include constitutions, laws, and property rights. All formal rules that are explicit, codified constraints are deliberately and socially or humanly created and written to govern human interaction. By the words “explicit”, “codified” and “written”, it means here that these rules are "in the books", so to speak; that is, they are documented. There are a high-order set of constitutional rules for "rules about making rules" (a.k.a. "parameters") that defines the basic structure of the systems allows for a clear, standardized reference for what is permitted or forbidden,

and what is not. Without clear formal property rights, the risk of "theft" or "confiscation" by others (or the state) would be too high for markets to function efficiently. Property rights are thus perhaps the most critical formal rules in society. They define who owns what, how it can be used, and how it can be traded.

A good working system of formal rules has enforcement mechanisms that, like the rules themselves, exist as hierarchies. The mechanisms of doing so are institutions such as the state and its government, legal system, courts, and police. The ultimate purpose of these rules and enforcement is to reduce uncertainty. When everyone knows that laws, rights and standards are secure, "transaction costs" (the cost of measuring, monitoring, and enforcing agreements) go down.

Because formal rules and many standards are humanly devised, at least in principle, if not in always in practice, they can be changed by a legislative or standardization body or some other ruler [18]. This makes formal rules and standards in principle powerful tools for leaders and their lobbyists to try to redirect paths of development into directions of they prefer. Even strangers to one another may be able to trade with one another, which is the foundation of a modern, complex economy [18].

Similarly to formal rules of the game in a society, APIs and protocols in software engineering are "statute laws" or standards for working interaction across one software, user and system, and another. Software systems must adhere to specific data formats and communication sequences to exchange information successfully. In software systems, there are stacks of multiple layers of software, which in complex works in way not unlike how society works, or ought to work. Service-level agreements (SLAs) represent formal contracts for exchange of resources between stakeholders, defining the legal and operational boundaries of a software system's performance. The penetration of AI into parts of societal structures is a dynamic process where algorithms shape, and are shaped by, organizational infrastructures and "abstract code" (rules, algorithms, and legal frameworks), a process expected to remain contentious as intelligent technologies such as AI continue to evolve [1].

Various associations and standard bodies enforce rules and standards in software engineering. 'The formal grammar and rules of each programming language act as a hierarchical stack of parameters and rules similarly to how North's do rules of the game in society. If you break a formal rule or standard, there is a predictable, official penalty, lack of certification, or the like. Who fails to abide by principles or parameters and rules is inclined to experience that the software system one is attempting to design and build will not succeed.

2.2. Informal constraints (norms & culture)

North's theory emphasizes path dependency or the idea that initial institutional choices constrain future possibilities. Informal rules (i.e. informal constraints, social norms, cultural norms, customs, traditions, codes of conduct) are often more persistent than are formal ones [5][15]. Unlike formal rules that are documented, informal rules are unwritten and passed down through culture. Informal rules and cultural norms (like honesty" and "work ethic", appropriate design patterns, forms of common sense) change very slowly over generations.

The maintenance of informal rules and norms is often subtle, involving continuous reconstruction, repair, and adaptation [3][2]. Rather than being enforced by state apparatus, informal rules are enforced by peers or through social pressure (such as being ostracized). Historians and institutionalists share a focus more on the past than the future [16] and the conviction that change often is often easy. The nature of cultural change and reorienting old habits toward a new symbolic order tends to be "frictional" process.

Despite informal rules in the above ways tending to be more a force for stability than a force for change, there are possibilities for change and productivity growth. Yet, anthropology has unpacked how some peoples successfully navigate "struggles" of modernizing without losing their core identity. Such navigation sometimes takes the form making informal rules as clear and transparent as possible, akin to formal rules. Sometimes institutional change thus does occur [1][5][13][18][19] When it does, "celebration" is a "story people tell themselves about themselves" [6]. Upon such celebration, ritual and ceremony in some ways replace rational thinking [2][20]. This is not to say

institutional theorists such as North and Mokyr would have found strategies of change that they could yet openly recommend.

In software engineering, one would think change is easier than in institutional theory or in anthropology. In principle, at least, software code is codified, written, and therefore explicit. However, software code is often accessible and explicit only in a limited way rather than fully open and accessible. There exist many cultural norms that are not enforced by the software compiler but act as cultural norms in software engineering.

These informal rules guide software engineers toward maintainable and scalable solutions rather than design. Principles like “solid dry” a.k.a. “don't repeat yourself” and "kiss" or “keep it simple, stupid” in software engineering change very slowly over generations.

2.3. How design anthropology can change the rules

Many software engineers know from experience that one learns more readily from the present and the past than from the future. The most useful knowledge often comes from “tinkering”; that is, fixing what is broken [13]. The institutionalist Joel Mokyr, the 2025 Nobel Memorial Prize in Economics recipient who has taken much inspiration from anthropology, has written how the most "useful knowledge" involves a transition from "tinkering" to propositional and useful knowledge [13]. What is key in both learning from experience and useful knowledge is "mapping" or explaining why something (a what) works in practice and how. The good innovation will not erase the indigenous narrative and cultural values related to the object, product, or software. Rather, it exemplifies respect for informal rules, thus has legitimacy and there is an individual or a few (a who) to takes responsibility [21][22]. Process of change is complete the process and outcomes of the change are made “impersonal” [18]; i.e. independent from any person.

In line with the thinking of experienced software engineers and research on institutions building on anthropology, this paper blends a historical and contemporary narrative and its interpretation [6]. The age-old craft tradition of Masters and Apprentices is common sense has carried on as a model into Master’s curricula in universities and other institutions of higher education. There are spiritual and communal values at play in crafts making. Since the Enlightenment and the Industrial Revolution, the goal has moved from blind tinkering in the above kind of traditional effort mimicking a Master towards a model of "informed innovation" based at least in part also scientific proof.

In a perfect world, one ought never to lose traditional crafts values but to preserve them where they still make sense. The Master-Apprentice model should be at least in part be institutionalized as a Northian "rule of the game". The "struggle" faced by an apprentice that culminates in the "celebration" of a given Master-piece or at least a piece worth honorable mention ought not to lose cultural values so that the piece becomes a symbol of ritual and ceremony, and nothing more, unable to be updated when new user requirements for new intelligent technologies come into play [1].

As one synthesis of the above kinds of controversies, Lungu and Lanza [10] have suggested that "design anthropology" can be operationalized as a three-phase model of “understand the past”, “control the present”, and “shape the future” (see Table 1).

Around the world, there are already initiatives in models of design anthropology when it comes to software engineering. The d.school at Stanford University is a multidisciplinary "collision space" for a radical non-degree cultural mindset for "design thinking". Software is just one of many tools used to solve human problems in a way that is to change the future in a way that is feasible [23]. The d.school at HPI Potsdam treats anthropology as a structured form of research within software engineering. It is the most technology-oriented of the three models, emphasizing the translation of human observation into large-scale IT systems [24]. Design Factory at University of Swinburne approaches indigenous knowledge systems and real-world industry placements for software using ethnographic methods, working to make software not just user-friendly, but socially and ethically inclusive and culturally and professionally responsible [25]. Against the background of Stanford, Potsdam and Swinburne, let us next review the case of institutions and intelligent technologies in post-Soviet Estonia, starting with the innovative narrative of “Tiger Leap”.

Table 1
Institutional theory and anthropology and design anthropology: key differences

	Institutions in trad. anthropology	Design Anthropology
Goal	Describe and understand cultures	Intervenes and transform.
Output	Narrative & interpretation.	Products/Services/Prototypes
Approach	Lone non-intrusive observer.	Multidisciplinary co-creation teams.
Stance	To preserve and understand system as it is.	To change system as it ought to be.
Time orientation	Focus on the past and present.	Focus on the future.

3. Estonian Tiger Leap that established the “rules of the game”

In Estonia, “Tiger Leap” (Tiigerhüpe) has been the main concept orienting Estonia’s transition beyond mere "technologies" to create a wholly new institutional environment for Estonia’s society and economy [11]. The history of this initiative is that, after returning to an independent nation-state in 1991, those in charge in Estonia held the belief that information technology (IT) should be used for the benefit of social development.

Toomas Hendrik Ilves, the Estonian ambassador to the U.S. in the mid-1990s, conceptualized in 1996 the idea of a Tiger Leap, realizing IT was an area where a small, newly independent nation could "leapfrog" traditional development stage that both larger Western countries and fast-growing Asian “tigers” that had leapfrogged those Western countries had gone through. Linnar Viik, a prominent Estonian IT expert and innovator, quickly became recognized as one of the architects of the Tiger Leap. Jaak Aaviksoo was the Minister of Education at the time, and he was crucial in implementing the program, supporting the necessary educational reforms and infrastructural investments. Lennart Meri, then the President of Estonia, officially initiated the program and advocated for modernizing the education system to meet the needs of a new information society [26].

Tiger Leap represented Estonia in many ways a strategy of existential survival. Emerging from decades of Soviet occupation, the struggle was not so much technical as it was existential. Lennart Meri, famously framed Tiger Leap, at the launch of this initiative, as a way for a small nation to "catch up" and survive in a globalized world. Having emerged from 50 years of occupation, Estonia according to Meri could not afford a slow, linear recovery. Instead, it had to "leapfrog" traditional development stages through technology to ensure its future sovereignty.

The core of Tiger Leap was that it was primarily an educational project designed to alter such norms as digital literacy. By targeting schools, the program ensured that an entire generation viewed digital interaction as a standard "code of conduct" rather than a specialized skill. The Tiger Leap initiative stood on three core pillars [26]: it was 1) infrastructure providing computers and high-speed internet access to all schools (by 1998, every Estonian school was online); 2) teacher training in 1997, alone, equipped 4,000 educators with the digital skills necessary to teach in a tech-driven environment; as well as 3) educational software that developed native-language electronic courseware for general education [27].

The government prioritized ICT development, despite the country still facing limited resources following the only recent restoration of independence. A “Tiger Leap Foundation of Estonia” was set up in 1997. The mandate was to manage the initiative and promote technological education in Estonian schools, connecting all Estonian schools to the internet and equipping them with computers was achieved by the year 2000. Tiger Leap evolved incentives for both the public and private sectors to contribute.

There was, perhaps not surprisingly, significant internal friction in Estonia, due to skepticism among teachers and bureaucrats who were wary of radical change. Tiger Leap created within Estonia a digital divide, where those unable to adapt risked being left behind in the new "rules of the game". The Tiger Leap marked a moment, from which on innovation would be rewarded over rent-seeking. At the same time, there was not only a renewal of systems of governance and social transformation. The new digital infrastructure was reducing transaction costs [28].

Tiger Leap, Estonia, as a result of investing heavily in digital infrastructure in the mid-1990s, "locked in" a trajectory that made subsequent digital innovations (like e-Voting) a path of least resistance. Besides education, Tiger Leap had a significant role in more than one kind of regulation, standardization, and modernization within Estonia's public education and public systems. It led to the development of X-Road, the national data exchange layer, which layer in turn was a foundation for formal technical and legal protocols for how government agencies must share data. Tiger Leap was thus also a legislative framework that catalyzed a host and series of formal institutional shifts. It necessitated the creation of the Identity.

The "Identity Documents Act" of 2002 in Estonia made digital ID cards compulsory—a fundamental "rule" for participating in Estonian digital life. Tiger Leap paved the way for legal frameworks also in terms of property rights in terms of e-signatures and digital transactions, effectively digitizing the "rules" of commerce and governance, for example. Tiger Leap rewrote the institutional script for how Estonians interact with each other and their government [11]. Within a few years, the Tiger Leap contributed to a rapid emergence of a tech-savvy generation, fostered a "digital first" mindset, and paved the way for e-Estonia, enabling Estonia develop "proactive public services" [29] and become a global first-mover in digital public services, digital ID adoption, and having the highest number of startups per capita in Europe by 2020s.

Tiger Leap had impacts in terms of trust and transparency. It fostered a culture of openness and accountability. The informal expectation that citizens should be able to audit who accesses their data became a "rule" of trust between the state and the individual.

Over the years, the original Tiger Leap has evolved into specialized programs. "Tiger Leap Plus" focused on competencies needed for information and communications technologies. "ProgeTiger", launched in 2012, focused on the technological literacy and digital competence of teachers and students. "IT Academy", also launched in 2012, was a cooperation and development program among the state, ICT sector companies and universities, to increase the number of ICT professionals. This leaping is widely credited, especially within Estonia, as the foundation for Estonia's evolution into "e-Estonia" and status as global first-mover.

By 2025, the path had transpired into "AI Leap", a new initiative to integrate artificial intelligence into schools. The intent in AI Leap has been to incorporate cutting-edge artificial intelligence applications into Estonia's education system. Estonia believes it is the first, or at least one of the first countries, to introduce AI into the entire nationwide education system at one time, rather than doing so piecemeal, in specific schools or regions, as has been done elsewhere.

The AI Leap plan has been to provide 20,000 10th and 11th grade high school students with access to AI apps, and 3,000 teachers will receive training on how best to use them. The goal is for students to build a skillset that will allow them to remain competitive at personal, company, and national levels. This plan was initiated by President Karis in 2025, with the participation of various entrepreneurs and the Ministry of Education and was jointly funded by the government and the private sector. After teacher training, the plan includes that teachers, students, academics, businesses and community members form working groups to define target competencies, curricula, tools and training programs.

AI Leap is woven into Estonia's "Education Development Plan 2021–2035", or Estonia's strategic document for developing its education system. The strategic document aims to ensure high-quality and inclusive education for all, foster lifelong learning and innovation, and support the well-being and development of learners and educators. The plan covers all levels and types of education, including adult education. It involves the Ministry of Education and Research, other ministries, and various stakeholders from the education sector and society. The plan defines four strategic goals:

“momentum”, “participation”, “independence”, and “well-being”. It outlines the main features, strategies, and interventions to achieve these goals, in particular: developing a learner-centered and flexible curriculum; enhancing the digital and entrepreneurial competencies of learners and educators; promoting the recognition and validation of prior learning; supporting the professional development and well-being of educators; developing a comprehensive and coherent system of adult education and lifelong learning; and ensuring the sustainability and efficiency of the education system. The plan also discusses the expected impacts, the relevant milestones and timelines, and the indicators and sources of data for the implementation, monitoring, and evaluation of the plan. The plan is expected to be revised and updated every four years..

The long-term goal of the AI leap is for teaching to be more efficient, personalized, diverse and inclusive than teaching elsewhere or earlier in Estonia. Slim Sikkut, former Government CIO and now member of Estonian President Alar Karis’s Digital Council, voiced “We also want to reduce the digital technology divide and prevent a new divide between those who are AI savvy and those who are not” [29]. In short, the struggle from about 1996 to 2015 or so was the difficult, high-stakes transition from a suppressed past, while the ongoing cultural celebration has marked belief systems of being a world leader in the digital frontier. By making coding and digital literacy a permanent part of the curriculum (now evolving into the AI Leap), Estonia has begun to "celebrate" its mastery over the tools of the modern age, turning a technical program into a core cultural value.

In sum, the Tiger Leap and the AI Leap that has followed from it have established the “rules of the game”. It was through Tiger’ Leap that e-Estonian initiatives became organized and “institutionalized” [11]. Tiger Leap has become a central part of Estonia's modern national myth. It has become a "success story", a ritual. It was the project by which Estonia chose its own path as a re-independent nation. It shifted the national narrative from being a "former Soviet republic" to being the "digital pioneer". The anniversary of the Tiger Leap is frequently used as a moment of national reflection and generational pride, marking and being celebrated as the moment and collective success story of how that generation leaped into the future.

4. Conclusion and implications

This paper argues that that a digital first mover is in a risk to stagnate if it focuses on maintenance and celebration rather than on craft and renewal. There is according to this argument great value in research into products and practice of craft-based tinkering and learning. Such research can result in meaningful ways contribute to useful knowledge, growth, and sustainable first-mover advantage.

When institutions and software systems and infrastructures (standards, rules, regulations) in the 1990s n Estonia were weak i, software engineering could afford radical changes and progress faster towards intelligent technologies without being overly contested or resisted by social institutions. Conversely, over time, social institutions emerged to support, grow and maintain the intelligent technologies, with high growing rates of regressions, technical debt, and highly detailed codes of conduct to update "living documents". Within this condition of a maintenance state, continuing to be a first mover at the innovation and productivity frontiers of innovation in intelligent technologies and innovation, is not, anymore, as a straightforward task as it was when social institutions were less developed. Social institutions have become bureaucracies to proactively develop public services maybe even before there is any demand for these, in chase of identifying possible faults before such deviations from norms become effective faults.

Within the above kind of a context, to fight off stagnation and decline, one possibility is to initiate and organize into action a host of “small observatories” [10]. Such small observatories are community workshops, functioning within institutional and Lehman’s-laws constraints as bottom-up alternatives to formal R&D, allowing for the "reengineering" of digital infrastructure and intelligent-technology tools in a hands-on, community-driven manner. Such observatories as foresightful policy labs, sandboxes, studios, hackerspaces, and makerspaces can act as critical, decentralized, and often

informal sites for shaping and being shaped by new intelligent technologies and changing local and global institutional contexts. Below three kinds of examples of such observatories are presented.

1. Policy Labs. A spin-off of Institute of Baltic Studies, Policy Lab is a research lab and think tank operating at the interstices of University of Tartu and Tallinn University of Technology, Policy Lab has an economics take on its participation in various European Commission projects. The projects involve macro-economic studies of selected sectors in Estonia, Europe, and globally, as well as futures studies.

2. Makerspaces and Hackerspaces. These spaces foster "open source" collaboration, allowing individuals to take technologies apart and rebuild them, thus acting as sites for repairing or modifying the "abstract code" of digital society. These community workshops where members share tools (3D printers, laser cutters, computers) and the hacker ethic, enabling them to "hack" or reconfigure technology and, by extension, societal norms, especially in regulated environments. At University of Tartu Institute of Computer Science's Hacker Space, students work on installing Linux on computers that have run out of capacity to run modern Windows or Apple OS. The students engage in "radical repair" of cultural artifacts, using modern techniques to restore functionality while honoring the aesthetic "scars" of history.

3. Ateliers, Studios and Sandboxes. Creative cultural experiments and neurocognitive labs are ways to provide controlled, safe environments for co-creating, developing and testing algorithms, allowing for guidance in terms of design and technology choices and user interfaces, all before market release, thus formalizing institutional rules in before all-in exposure. Students at Sandbox, University of Tartu‘s version of d.school, a "design factory", has since 2020 been immersing themselves in knowledge of how new "accidental" discoveries in indigenous tinkering have been codified into systematic chemical knowledge. They are "apprentices" learning in the model of ateliers or design studios – working to merge digital fabrication with traditional craft to foster innovation and create "convivial tools". "Master practitioners" come into the Hacker Space and Sandbox as guest lecturers from Estonian unicorns, for example --unicorns that build on the Estonian tradition and craft of turning problems of scarcity of resources into intelligent technology or other forms of innovation.

In and across the above three kinds of observatories, artists and designers in their studios and students in and around Estonian institutions of higher education will engage in understanding indigenous "rules of thumb". They will "pilot" for others in their communities how to merge indigenous spatial wisdom with computational design. At University of Tartu's Sandbox, some are already learning in entrepreneurial software projects as to how Northian "informal constraints" can be made to function optimize employment of local resources and other conditions better than does standardized U.S. or Chinese-style coding, or a German-style corporatist approach, or an Australian approach. At Sandbox, using AI and algorithmic design to "tinker" with traditional structural forms can lead to engagement and flow in terms of digital twinning of indigenous structures so as to engineer software resilient against 21st-century requirements. Here, Master-Apprentice Labs with more than one "Master" may be a worthwhile organizational form. Visiting "Journeymen" or Journeypersons will add to the effectiveness of learning. The final project is a "Hybrid Structure" that uses local, sustainably harvested materials joined by 3D-printed biodegradable connectors, for example. In and across the above kinds of propositions, a central idea is that an each "Apprentice" learns to document the "unspoken knowledge" (tacit knowledge) of the "Master" and translate it into a "Manual of Practice" that can be shared with others, bridging the gap between rich local craft and globally scalable useful knowledge.

Estonia is not the only country internationally that needs to have not only hindsight of its legacy intelligent technologies but to start up new kinds of intelligent technologies, innovation, and new growth and ecosystems. By paying heed to the propositions advanced in this paper, also any other country in a similar situation as is Estonia, ought to be able to develop foresight and move toward an even more resilient identity and sustainable future than at present. There are similar design labs as in d.school in the U.S.A., d.school in Germany and design factory in Australia at e.g. Stockholm School of Economics (Sweden) and Politecnico Milan (Italy). These warrant research. Then, take

formerly first-mover countries such as “post-Nokia” Finland. In Finland, at the time of writing this paper, investments are low, unemployment is high, and the country’s government is battling to maintain social order rather than being focused on design anthropology to participate in innovation of new intelligent technologies, new sources of growth, and productive transformation of the country’s socio-technical institutions. Both the non-governmental organizational initiatives in universities and elsewhere, as well as countries benefiting from such initiatives, warrant longitudinal comparative research.

Declaration on Generative AI

Generative AI tools have not been used to adjust the text’s language or tone. The author used generative AI only to collect pro check correct names and years of political initiatives and policy documents having to do with Estonian history, as well as details on design-and-innovation initiatives at universities in the U.S., Germany and Australia. Generative AI was not used to analyse or interpret data.

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