Interactive Technology as Toolkit—Structure of Communication, Senseware, and Research Strategy

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Abstract

This research introduces a toolkit for creating interactive objects as a strategy to observe and discuss their construction and experience as scientific, artistic, and social subjects. Interactive technology as toolkit is presented to be senseware (Hara, 2009), following three specific trajectories in depth: the design and programming of interactive objects; the understanding of rich interaction; and the role of the design objects and their concurrent (scientific) models into the lived-in world. A multi-viewpoint theoretical approach investigates the concept and use of toolkits based on interdisciplinary research, replacing single viewpoint categorization. This is coupled with the concept of thickening (Geertz, 1973), as the research seeks to define a liquid form of understanding capable of approaching the complexity of artifacts that cross media and discourses, illustrated with an exemplary case study of Skweezee, a squeeze interaction toolkit.

Keywords

Human-computer interaction, lived-in world, methodology, Skweezee, interactive technology, toolkit.

Media History

The history of interactive media or artifacts is relatively short. Recent studies by for example Bruno Latour [15], or Zygmunt Bauman [2] identify an apparent shift in the way we experience and deal with modern society replacing the rigid cognitive frameworks by more 'fluid' social and cultural interactions. Lev Manovich [19] contends that the rise of the 'new' media did not lead to a fundamental rewriting of the methods analyzing art, technology and culture but only provoked an increase of medium-bound labels for different forms of artifacts. He describes a 'post-media aesthetics', where art or design objects are a form of information design triggering a certain information behaviour. However, the initial theories, relying heavily on cognitive values, neglect the affective side of information.

In recent years, new media and the associated human-computer interaction (HCI) has become established as a distinct subject through a series of theoretical approaches (developments and models) applied to digital artefacts, their uses and influences. Several authors including Lev Manovich [18], Gunnar Liestol [17], Jay David Bolter and Richard Grusin [4], Christiane Paul [21], Mark Dery [5], Lisa Gitelman [10] have debated the role played by the digital media in contemporary society and demonstrated the variety and complexity of digital domains opening the field for new development.

The research examines 'modes of transition' in various recent interaction designs and theories concentrating on the body of work which established, and exemplifies 'rich interaction' as a new framework for the interpretation of interactive objects including 'affective' dimensions–referred to as an 'interaction aesthetic'. In this paper, the practical implications of the current theoretical understanding of 'rich interaction' are investigated through the engineering of a toolkit for creating interactive objects. The paper focuses directly on the extend to which the concept of rich interaction is embodied by the technology, by testing the potential of the toolkit within the lived-in world as a new framework of understanding interaction design and the application of interactive technologies.

Design, Technology, Usage, Convergence

Today, the main outcomes of the Western model, science and technology, have become the core business of our society. This focus on technology and science has been well discussed and examined by theorists such as Lev Manovich [18], Jay David Bolter [4], Mark Dery [5], and Bruno Latour [16, 15] to name a few. According to Lisa Gitelman [10] today's new media artifacts are used as the all-encompassing example in media theory to illustrate the end of media history. She states: "the imagination of that end point in the United States remains uncritically replete with confidence in liberal democracy, and has been most uniquely characterized by the cheerful expectation that digital media are all converging toward some harmonious combination or global synergy, if not also toward some perfect reconciliation of man and machine." [10]. With the introduction and engineering of a 'toolkit', the question is asked if or how this interaction between old and new media, in short the media, establishes a 'convergence culture'. As a result, all elements building up media theory and practice, whether it concerns media production, distribution or consumption, are affected. Consequently, all our ideas and projections about a technology mould its final use and generate new trajectories and developments, which in turn trigger new reflexive and discursive processes. According Brzyski: "If inter-relationship posits engagement between terms (nations, disciplines, media) then transrelationship creates a vision of transcendence

of the system, a Utopian state of disengagement that nonetheless affirms the system as real. [...] Here as with the interterms, in order to transcend one must have something to rise above. Without the referents of nation, discipline or medium, there can be no trans-nationality, transdisciplinarity, or transmediality." [10].

For the purpose of this paper a toolkit will be defined as *a structure of communication, containing technological protocols shared/used by different people*. This interpretation is similar to the definition given by Lisa Gitelman: "I define media as socially realized structures of communication, where structures include both technological forms and their associated protocols, and where communication is a cultural practice, a ritualized collocation of different people on the same mental map, sharing or engaged with popular ontologies of representation." [10]. The protocols Gitelman is referring to consist of a series of social, economic and material relationships. As a consequence the term media so often used is not a unifying denominator with one unifying theory, rather it delineates a collection of different mediums with their distinct protocols. Thus seen in this way, media are very specific artifacts containing very specific characteristics and specific cultural assumptions. Likewise Espen Aarseth concludes: "The digital medium (singular) never existed, and chances are overwhelming that it never will [...] Like the term Internet, medium is hardly more than a convention, a term hiding a plethora of social and technical meanings and levels." [10].

For Bolter and Grusin, new media are: "refashioned and improved versions of older media. [they] can best be understood through the ways in which they honor, rival, and revise linear-perspective painting, photography, film, television, and print. [...] What is new about new media comes from the particular ways in which they refashion older media and the ways in which older media refashion themselves to answer the challenges of new media." [4]. This process of refashioning between the different media is called 'remediation' according to Bolter and Grusin. They define this concept of 'remediation' as the oscillation between two opposite forces, 'immediacy' and 'hypermediacy'. Immediacy (or transparency of the medium) makes that the medium in itself disappears so that only the represented object is presented and acts as the driving force for the innovation of new media. At the same time there exists a longing for the medium itself, making people aware of the medium, this concept is defined as 'hypermediacy'. According to Bolter and Grusin those two concepts are the result of two human aspirations, the 'desire for transparent immediacy' and a 'fascination with media or mediations'. An additional consequence of 'remediation' is that in this process not only the possibilities of the old (remediated) medium become visible, but in doing so also makes its limitations more apparent and noticeable. Historically, film demonstrated the possibilities and limitations of photography, digital photography made very specific characteristics of the analogue photography apparent. This focus on the old medium, through the new, often accounts for a revival (nostalgia) of the old. Seen in this way, the old media reinforce their place not 'despite' but 'thanks to' the new. 'Remediation' becomes a tool, a method to analyze the different media and to investigate how they refashion each other. However, within this context, media are considered to be agents and actors in themselves, remodelling, transforming and absorbing other media without any cultural, human interplay or development. Today, more than ever, we are aware that the social, political, economic and artistic fabric is central to the construction of media artifacts and consequently its history.

Toolkit

When conceptualizing a toolkit as a structure of communication, the toolkit contains technical components and protocols to be shared and used by different people. When applying this idea to a toolkit to create computational, interactive objects, the toolkit makes the range of possible relations between user actions and computed system reactions explicit. Intermediate system components encode, interpret, and decode the message–the user/object (re)action. These mechanisms are formally described and accessible as shared technical protocols.

As a 'new' medium, such a toolkit for interactive objects embodies the plurality in interactive technology. Possible connections between several components described as protocols make technical specifications such as resolution, dimension, and bandwidth explicit. With the aim of keeping possible applications of the underlying interactive technology as open as possible, the degrees of freedom–from a technical point of view–become tangible outside the circle of engineering, for example to artists and designers. By exposing its inherent technical characteristics in an accessible manner, the toolkit invites to recombine components to create interactive systems and thus to explore the possibilities of the interactive technology, like senseware [12]. Kenya Hara coined the term senseware, as "matter that stirs human creative instinct and awakens the desire to make things" [12], which he further illustrated with a stone or paper. Artificial fibers are presented as senseware, pointing at the importance of the creative process of finding novel applications for the fibers in the development of the fibers. "new materials may be attractive, but the problem we face is to discover how they can best be used. [...] Without ideas for applications, advanced materials just stagnate, with their potential left unrealized." (Ibid.). We argue that interactive technology faces similar challenges, and suggest a similar approach to tackle these. In this light, a toolkit for the creation of interactive objects is senseware.

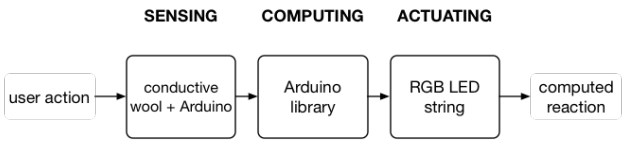

Figure 1: Skweezee as structure of communication. For each component, alternatives are available, each with their own specific technical constraints and possibilities.

As an exemplary case, we present the Skweezee toolkit[1], as a set of resources to create squeeze interactions [25]. Using the toolkit, soft physical objects can be augmented, activated, or computationally-enabled (see Figure 1). Manipulations of the soft object are manifested through the material (the squeeze), and are sensed by dedicated components. The sensed signals are then processed and result in a computed reaction through selected actuators.

The toolkit invites to look beyond existing 'old' interaction techniques and computing paradigms, such as regular buttons leading to binary or discrete computing, and to investigate what this 'new' interaction technique could be. At the same time the obtained understanding of the 'new' can can reinforce existing 'old' interaction techniques, such as the button and discrete interactions.

Interaction Part I

The element of interaction, defined as the relationship between audience and artwork, is the second characteristic of the computer influencing and shaping digital artifacts. Several authors have debated the different levels of interaction, ranging from simple to complex, from a simple mouse click or touching buttons over accessing different layers of information and thereby changing the narrative of the work to complex systems where "the user can influence the meaning or morality of the artwork [...] thus, the basic structure of the narrative." (Qvortrup referring to Eva Liestol, [17]). Seen in this way, the design of the artifact is not a static object but has the potential to change and interact depending on the user. This plurality of characteristics and different forms interactive designs can adopt excludes easy definition. Digital art and human-computer interaction (HCI) is often characterized, defined and catalogued on the basis of these primary 'technological' abilities and their relation with the user, viewer, or participator. Features such as, 'interactive', 'real-time', 'collaborative', 'generative' to name a few, can be attributed to digital artifacts, in a single configuration or in a combination of two or more specific features. As a result a uniform definition of digital, computer-based becomes unattainable. In her book 'New Media in the White Cube and Beyond' Christaine Paul reaches a similar conclusion and considers the definition of new media art and design as a result of the constant evolving technological and conceptual environments an elusive goal. She states: "The successful evasion of definitions is one of new media art's greatest assets and a main reason why so many artists, curators and practitioners in general are attracted to this art form." [22]. Charlie Gere, author of the books 'Digital Culture' [7] and 'Art, Time and Technology' [8] finds a possible additional reason why so many artists and designers like to work in the field of the possibilities brought by the digital format. In his article 'New Media Art and the Gallery' [9]: "Furthermore, such practice, in both its historical and its current manifestations, is important for its capacity to reflect our current technological condition." [9]. Technologies such as the World Wide Web, Playstation consoles, the Internet, mobile phones and so on are related to (and in a way made possible) globalization, biotechnology, artificial intelligence, tele-robotics, hacking and cyberterrorism and other phenomena. Artworks produced with these technologies help us to reflect upon media and technology and "helps us understand how our lives are being transformed by these very media and technologies." [9].

By emphasizing the active role science and technology conduct in cultural and social production, by investigating the intermediate or grey zones between media classifications and by transcending them, the construction of the toolkit can be defined as a catalyst for action and transformation as well as a mechanism providing a framework of reference in conditions of change. In this respect the toolkit as carrier for social action is not referring to the specific notions of 'transition' and (historical) assumptions generated by the (new) technologies in terms of the identification of their prophetic nature, the creation of an 'Utopian' technocratic world with new social and political orders. As Tom Gunning [11] describes: " [...] their address to a previously unimagined future. Every new technology has a Utopian dimension that imagines a future radically transformed by the implications of the device or practice." [11]. Gunning also refers to Kittler [14]: "What reached the page of the surprised author between 1880 and 1920 by means of the gramophone, film and typewriter - the very first mechanical media - amounts to a spectral photograph of our present future." [11]. According to Gunning it is this imagined future that will never be able to completely disappear, only forgotten to some degree. The research therefore is not installing an Utopian state of mind, propagated by so many media theorists, nor is it referring to an unpredictable (technological) future but instead is referring to and embedded in the contemporary art and design practice which as Annette W. Balkema (cited in [11]) optimistically stated is nowadays often preceding theory.

Interaction Part II

The presented toolkit is discussed as a framework to investigate the theoretical and practical understanding of 'rich interaction'. Wensveen et al. offered the Interaction Frogger (IF) framework [28], where the theoretical coupling between user action and a product function is described in practical characteristics. The IF framework covers feedfoward and feedback, and identifies three layers of information in a product: inherent, augmented, and functional information. The user action and layers of information can be coupled on six 'practical characteristics': time, location, direction, dynamics, modality, and expression. "Unifying action and reaction on these six aspects can be seen as an operationalization of intuitive interaction." (Ibid.) In total, the framework structures the coupling between action and function in 36 conceptual connections that allow designers to "enrich" the interaction.

Connecting components in the toolkit realizes the couplings as described in the IF framework on a technical level. For example, each connection has a technical dimension and resolution influencing the coupling. The APIs of the components thus formally expose the technical possibilities and constraints of connections and make possible couplings explicit.

[1] http://www.skweezee.net

We illustrate how the Skweezee toolkit [25] influences the couplings as described in the IF framework [28] through six examples. The table below gives an overview of the influence of sensing, computing, and actuating components on coupling in Time and Location:

	Time	**Location**
Sensing	Measuring frequency	Sensor configuration
Computing	Time series analysis	Vector analysis
Actuating	Response time	The screen

Measuring Frequency The Skweezee technology senses squeezes by measuring the resistance in conductive wool between several points in the object. The rate at which all these resistances are measured determines the coupling in time. For example, a complete sensing cycle within 30ms allows for a frame rate of at least 30 fps, sufficient for a fluent visual output.

Sensor Configuration Depending on the number of sensors and their placement in the 3D object, squeezes are projected in a volume, on a surface, or on a line. The physical sensor configuration thus determines to what extend differences in locality can be sensed and coupled.

Time Series Analysis Extracting features from the sensed signals over time through time series analysis offers powerful ways to enrich interaction. For example, a moving average functions as smoothing filter while a moving standard deviation reveals information regarding the stability of the squeeze: is the user holding the object, or is the squeeze changing? However, this analysis comes at a cost of time as a series of samples is required to calculate the features.

Vector Analysis While several squeeze interaction technologies depend on machine learning to distinguish squeezes (including an earlier Skweezee implementation using support vector machines (SVM) [26]), the current Skweezee implementation depends on vector analysis [25]. A direct consequence of this change of calculation method is that this simple vector analysis requires far less computational power and can run on small microprocessors. Where machine learning implementations depend on computers due to their computational requirements, simple vector analysis allows for embedded implementations: local computing and thus coupling on location.

Response Time Depending on the chosen actuators, their physical constraints define the response time. This response time adds up to the previous sensing (including measuring frequency) and computing times (for example time series analysis) and further influences the coupling in time.

The Screen Choosing a computer screen for output—as frequently in described squeeze interactions in HCI literature—decouples squeeze actions from system output on location by default. By offering alternatives to the screen, such as through electronic components, the Skweezee toolkit aims to broaden the design space for squeeze interactions by making couplings on location possible.

These six examples of how technology determines coupling in time and location are of course interconnected. For example, an increased measuring frequency does influence the impact of time series analysis, or embedded implementations through electronic components as actuators are possible because of vector analysis that runs on a stand-alone Arduino. Furthermore, sensor configurations also influence direction, dynamics, and expression—other couplings in the IF framework. We therefore argue that the interactive technology presented as toolkit serves as a framework to investigate the practical and theoretical understandings of coupling user action to system output—or the concepts of 'rich interaction' and 'interaction aesthetics'. The technical constraints and possibilities get exposed through the toolkit, ready to be explored in the creation of interactive objects.

The Fabric for Innovation

In his book 'Where good ideas come from' [13], Steven Johnson states that in order to understand the exact nature of innovation we need to study its behaviour in many different contexts. He clarifies that if we draw analogies to patterns of innovation that we can identify in other contexts or disciplines it enables us to answer questions more accurately, to understand things more comprehensively. The argument of his book is that "by approaching the problem in this fractal, cross-disciplinary way, new insights become visible." [13]. Steven Johnson furthermore minimizes the role of competition as the engine for innovation. He contends that competition overstates the role of proprietary research and 'survival of the fittest competition' and that this focus "as the standard textbooks do - distorts our view." [13]. Instead, he makes a plea for openness and connectivity as the most important parts of innovation. Innovation and creativity, should be approached in the broadest possible meaning, that is in all its subtle forms of innovation and invention, in all its "different modes of creativity: artistic, scientific, technological. [...] to suggest the cross-disciplinary vantage point [...]." [13]. In his book 'The Nature of Technology' [1], Brian Arthur constructs a framework of thinking regarding innovation which bears a lot of similarities with the concepts of Deleuze and Guattari regarding territorialization and the re-defining of meaning. When referring to innovation Brian Arthur states: "They are the expressing of a given purpose in a different set of components, as when the provision of power changed from being expressed in waterwheel technology to being expressed in steam technology." [1]. He introduces the concept of 're-domaining' as the prime characteristic to delineate those innovations which are significantly powerful in generating new insights. The process is one of constant re-expressing or re-domaining: "[...] is about the creation of new processes and arrangements, new means to purposes." [1].

According to Liestol, Morrison and Rasmussen, innovation, as a general term, "encapsulates the essence of contemporary social change." [17]. For them, innovation is the result of deconstructing, taking ideas, beliefs concepts, structures, etc. apart and assembling them again in new ways and different combinations: "Scientifically, the ethos as well as product of innovation is realized in various forms of 'disciplined multidisciplinarity"'. [17]. As a result, innovation requires an

enhanced flexibility and at the same time an augmented complexity as well. They conclude: "As innovation in this way is a process of observing and critiquing, it refers as much to the position of the observer as to the nature of the object. To recombine elements into new objects – whether they are hardware, software, middleware or meaningware – implies that we look differently, that we apply new concepts and models, and that we analyze reflexively how, why, and when to shift perspective. It may even mean that we do the virtually impossible, that is, we observe from two or more positions at once. Multidisciplinarity, one could argue, is to look simultaneously from two or more angles to fix an object in a multidimensional space of double description." [17]. The research is therefore focusing on a dual action, the first involves the understanding of squeezable interaction, modelling and mapping, the second is concerned with the very fabric of their understanding (literary theory, aesthetics, sociology, media studies, art, etc.).

State of the Art

Squeeze interactions as exemplary case throughout this paper mainly exist in the lab. In academic writing, the possibilities of squeeze interactions are being explored. In HCI literature, we find innovations on the several technical components of such systems. Nakamaru et al. present "Three Dimensional Soft Sensors with Porous Materials" [20] as a novel material to construct squeeze interactions, while Sugiura et al. developed a method to sense the deformation through 'photoreflexivity' [24]. Geurts et al. [26] discuss the use of a Support Vector Machine (SVM) to compute and distinguish 'squeeze gestures', while Weinberg [27] illustrated the use of squeeze interactions as a mechanism in 'intuitive' musical instruments as one of the first papers about this interaction technique. Stienstra et al. [23] addressed the affective compontent of squeezes in the communication with robots.

The recent line of argument regarding materiality in HCI [29] points at a yet to be explored design space within HCI. We identify under-explored dimensions of squeeze interactions in HCI research following this material approach. The toolkit as presented throughout this paper aims to contribute to this investigation.

As the current implementations of squeeze interactions mainly live in lab environments, the toolkit serves to open up the technology beyond engineering and the inner academic circle of HCI research. By presenting the underlying interactive technology to create squeeze interactions as an accessible toolkit, we invite a broader circle of makers, designers, artists, and researchers to explore 'rich' squeeze interactions, their aesthetics, and to explore the artistic and social potential of this interaction technique.

Thick Description - Methodology

Making use of a (anthropo-)sociological analysis of the toolkit has extended the notion of modes of interaction itself. It will be argued more extensively how models through their design (in general), and by extension maps or theories as frameworks for thinking and understanding only seem to work locally, or in this case partially, thereby revealing the discontinuity between an original purpose of all-encompassing truth and its lived-in reality. Acknowledging these discontinuities and local realities, theoretical discussion of 'modes of interaction' will focus on the possible relations between these different models, maps or theories by looking at their interfaces. The use and application of the toolkit we will argue is shifting perspective from within a system to a perspective (also) looking between systems. In other words, by the process of thickening as proposed by Geertz, by transferring meaning from one system to another, the process enhances the meaningfulness of the different concepts. Category based understanding, while a useful and precise tool undermines the general idea of multiple points of view, needed in our liquid culture as debated by Bauman [3, 2]. Through shifting perspective, unexploited or unexpected elements can be identified, to be argued as the first and primary action of a designing a Toolkit for squeezable interaction. In his landmark book 'The Interpretation of Cultures' published in 1973, the anthropologist Clifford Geertz elaborates on this concept of 'thick description'. For Geertz what a researcher is faced with (except the automated routine of data collection) "is a multiplicity of complex conceptual structures, many of them superimposed upon or knotted into one another, which are at once strange, irregular, and inexplicit, and which he must contrive somehow first to grasp and then to render." [6]. Furthermore, understanding (of a culture for instance) for Geertz exposes a certain normalness without reducing the particularities. It renders information accessible and dissolves its possible opacity. However, he also warns that this approach, sometimes referred to as 'seeing from the actor's point of view' or 'the verstehen approach', often may lead to a notion of fantasy or speculation and must therefore be approached with great care. As a result, a thick description is needed where case studies, events and theories can be studied in detail, by building layer after layer, so one is able to assess and evaluate the degree in which the conclusions made are also valid or convertible to other systems or situations or time frames. One must not only study the phenomena but also the context in which they take place in order for them to become understandable for a third party. This thick or multi-layered description has a double function: "Such a view of how theory functions in an interpretive science suggests that the distinction, relative in any case, that appears in the experimental or observational sciences between 'description' and 'explanation' appears here as one, even more relative, between 'inscription' ('thick description') and 'specification' ('diagnosis') – between setting down the meaning particular social actions have for the actors whose actions they are, and stating, as explicitly as we can manage, what the knowledge thus attained demonstrates about the society in which it is found and, beyond that, about social life as such. Our double task is to uncover the conceptual structures that inform our subjects' acts, the 'said' of social discourse, and to construct a system of analysis in whose terms what is generic to those structures, what belongs to them because they are what they are, will stand out against the other determinants of human behaviour. In ethnography, the office of theory is to provide a vocabulary in which what symbolic action has to say about itself - that is, about the role of culture in human life - can be expressed."

[6]. In other words, Geertz is well aware that meaning is always changing, always in flux and rooted in a specific culture, therefore he suggests the thick description as a means to describe the phenomena together with their context through a multi-layered approach. For the development of the toolkit, it is exactly this multi-layered view that enables understanding as well as context, where results and interpretations are being transferred and interpreted in a different context to investigate their validity.

Conclusion

This paper introduced a toolkit as a strategy to observe and discuss the ways that media and particularly interactive objects are constructed and experienced as scientific, artistic, and social subjects.

The research presents interactive technology as toolkit—being senseware—and follows in depth three specific trajectories: the engineering of technological components on a meta-level; the use of these technological components in the design and programming of interactive objects; and the role of interactive objects, its concurrent (scientific) models and embedded technology in the lived-in world.

The research attempts to take the theoretical and practical understanding of interactive technology beyond that of technological collaboration or cross- or multi-media innovation by exploring the relationship between interactive designs and their effects in the 'lived in world'. This approach involves a socio-anthropological dimension of meaning and engages a general debate on the concept and use of 'toolkits' in interaction design. The aim is to establish a multi-viewpoint theoretical approach investigating the use of 'toolkits' within the lived-in world and its implications for the engineering of the technology based on interdisciplinary research replacing single viewpoint categorization, a concept also to be applied to the engineering of the toolkit itself.

This is coupled with the concept of 'thickening' as proposed by Clifford Geertz with its implication of interaction between multi-layers of meaning. The research seeks to define a 'liquid' form of understanding and analysis capable of approaching the complexity of artifacts that cross media and discourses.

A squeeze interaction toolkit is presented as an exemplary case study, chosen for its comparative relationship for the theory and practice of technology engineering for and construction of interactive objects.

This research is about the ways artists, designers, and scientists deal with and endure new meaning and comprehend and construct the world. Here the 'toolkit' is proposed as a method or strategy, a theory, model or map, providing a framework of understanding in conditions of hybridity and change.

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Authors Biographies

Steven Devleminck holds a Master degree in Engineering from the Vrije Universiteit Brussel and a PhD in Art and Philosophy from the University of the Arts, London. Previously, he was the Director of the Transmedia Research Programme in Arts, Media and Design of the Leuven University College of the Arts (LUCA), and visiting Professor at maHKU, Utrecht. Currently he is the Head of the Mediated Environments Research Group at LUCA School of Arts and Professor at the Department of Computer Sciences at KU Leuven. His publications include books and a series of internationally published articles and conference papers. His practice based work has been shown internationally. Research interests are mediated environments, interactive technology, cartography and mapping. He is the Scientific Coordinator of the Innoviris Anticipate Smart Urban Community Interface Blocks research project investigating the design of IoT toolkits for creating interactive urban interventions for both placemaking and civic purposes.

Kathrin Gerling is an Assistant Professor at KU Leuven, Belgium. Her main research areas are human-computer interaction and accessibility; her work examines interactive physical computing technologies in the context of games, play, and with a purpose besides entertainment. Kathrin is interested in how interfaces can be made accessible for diverse audiences, and how playful interactive technologies can be leveraged to support well-being.

Luc Geurts is professor at KU Leuven where he currently leads the e-Media Research Lab. His research focuses on technology for tangible and playful interactions. He holds a MSc degree in Electronic Engineering and did a PhD on signal processing for cochlear implants. He now explores new paradigms for physical computing, investigates novel technologies for human computer interaction, and tries to implement these in the design and the development of playful interactive applications. A few years ago, he started to collaborated with several artists, helping them to create projects with challenging and novel technological components.

Vero Vanden Abeele is a professor at the Faculty of Engineering Technology, KU Leuven, teaching and researching topics on human-computer interaction, user experience design, gamification, motivational design, social shaping and adoption of technology for health. Vero led the Belgian Chapter of the ACM Special Interest Group on Human-Computer Interaction (SIGCHI) from 2010 to 2013, was academic chair for ACM CHI subcommittee games and play, and has been involved in the official organisation of ACM CHIPLAY since its advent. Vero is equally member on several program committees and guest editor for several journals related to human and player computer interaction. Her recent work, inspired by governmentality, focuses on disorderly design, i.e., the design of health technologies to support disorderly conduct and accommodate behaviors that escape normalizing power.

Bert Vandenberghe is a PhD student at the Faculty of Engineering Technology, KU Leuven. He holds a Master's degree Electronics and ICT Engineering Technology and worked at the Faculty of Social Sciences, KU Leuven to study Human-Computer Interaction (HCI) from the perspectives of the social sciences and humanities. In his current PhD research, he studies squeeze interactions by implementing this novel interaction technique in health care settings. His research methods are strongly influenced by value-sensitive design, ethnographic research, visual methods, and research-through-design. He has a strong interest in the adoption & appropriation of technology; the ethics & politics of technology; and critical engineering.