

# Miteinander: Engaging Intergenerational Participation With Playful Methods & Intelligent Things

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## ABSTRACT

Three areas of interest are discussed that are focused on participation and that are connected by their aim to solve problems in designing for the demographic change. The first is the political agenda for developing interdisciplinary research competencies in Europe. The second is a interdisciplinary research scheme in Interaction Design that focusses on dynamic dyads for a better participation between disciplines in practicing interdisciplinary research. The third is an ongoing research experiment within one of those dyads for shaping participation in practice. The later makes up the larger part of the position paper. This presentation traces the entwined lines of a conversational prototype and a design method for exploring prototypes in connecting design research and product design for a continuous unfolding of participation within the design of Internet of Things artifacts.

## Author Keywords

Prototyping; Participation; Persuasion; Transdisciplinary, Interdisciplinary, Older Adults, Demographic Change

## ACM Classification Keywords

User interfaces - user-centered design.

## INTRODUCTION: DEMOGRAPHIC CHANGE

We present a variety of areas of interest that are connected by their aim to solve problems in designing for the demographic change. Their overarching commonality is their – albeit very different – focus on tackling problems of the demographic change by participation of different disciplines and different stakeholders with different artifacts. We will outline methods and tools for collaboration of designers and users in the context of intergenerational housing, social isolation and the Internet of Things (IoT). This presentation is very much work in process, as it sketches modes of participation as they are laid out for a five year research project that has just begun. We have more questions than answers.

## CORE CONCEPTS: DESIGN METHODS AND IOT

Constitutive feature of the IoT is the embedding of sensors and networks into everyday objects, thus advancing their connectivity and offering a greater value to their users. In

this sense, the IoT is of special importance in regards to the demographic change, because it allows to integrate communication, persuasion, motivation and other potentially positive socio-technical features into common artifacts, without the downsides of cultural or age dependent features of many modern digital devices. Constitutive feature of Design Methods is their ability to support (re-)definition and (re-)solution of problems in creating bridges between problem and solution spaces.

## POLITICAL AGENDA: DEMOGRAPHIC CHANGE & HCI

The emerging problems of the demographic change are manifold. Apart from diverse cultural challenges due to immigration, a huge shift in population distribution is apparent. Due to decreasing natality and increasing life expectancy younger generations face longer working lifetime and the need for longer fostering time for their parents and grandparents, while facing their own retirement with a much smaller population of working age and thus a likely shortage of nursing personnel. Older generations on the other hand grow older and thus face impairments that range from instability, incontinence and impaired intellect to immobility and isolation (12). In this regard, the development of HCI applications for the demographic change is of great importance for current research funding. Under the umbrella of the European Unions Horizon 2020 funding eight radically interdisciplinary projects in Germany aim for this goal (<http://www.mtidw.de/ueberblick-bekanntmachungen/ikf>). All of them involve five to seven researchers each, whose only similarity is their different disciplinary background. All of those projects explicitly approach Human-Computer-Interaction (HCI) for older adults as an interdisciplinary challenge.

## MITEINANDER:

### UNFOLDING INTERDISCIPLINARY CREATION

We present a preliminary research plan for *Miteinander* – one of the above mentioned research projects. It builds on the concept of „Crossworlds“ (<http://crossworlds.info>), an interdisciplinary post graduate program that amalgamates social science, psychology, computer science and design research. In Crossworlds two customarily disjunct

disciplines are grouped in unique tandems for working on one research project per pair, thus fostering interdisciplinary skill acquisition and communication. Building on this foundation *Miteinander* amplifies this proposition to dynamic dyads of every combination of the involved disciplines that are outlined as following:

- Social Science** (context, ethnography, living environments)
- Computer Science I** (multitouch-table, user-recognition)
- Computer Science II** (IoT-networks, technically secure and ethically sound network structures)
- Bio-Informatics** (network- and community-mapping)
- Product Design** (persuasion, motivation, multimodal and multisensory interaction)
- Design Research** (novel design methods)

These fluctuating dyads extend every one of those fields in their specific vocabulary, as well as intersubjective knowledge and communication skills in the context of HCI, IoT and Participation therein. Which is a great idea in theory, is a manifold communicational dilemma in practice. These fifteen interdisciplinary crossroads stretch the basal points of reference for theory building and designing to a huge extent. It challenges e.g. existing design methods in HCI (4), vocabularies of the properties of prototypes (5) and practices of prototyping themselves (11).

#### **MITEINANDER: ENGAGING INTERGENERATIONAL PARTICIPATION**

Most research projects that address the intersection of aging and technology overestimate technophobia of older adults and overexert technological solutions for societal problems. The willingness of older adults to shape their remaining years has yet to be sufficiently supported by design research. Until today we have to cope with a current set of design methods that are mostly unadjusted for the successful participation of older adults and disciplinary vocabularies that are unadjusted for meaningful and continuous interdisciplinary collaboration.

In *Miteinander* we are developing IoT applications together with inhabitants of various housing projects to tackle potential isolation of people living in apartment blocks. We focus on developing meaningful modes of participation – applications that may be developed are not yet defined, as they will be designed in collaboration. We aim to 1) foster participation of older adults during the design of the technology itself, 2) develop *naturally-to-use* IoT technology for motivation and persuasion of those users to reevaluate their social habits with the aim to reduce isolation in their respective housing situations. Thus addressing *isolation* by engaging the people potentially concerned in the development of tools that help overcome said isolation in situ and in the long run. We aim to achieve this by intertwining *Things* and *Methods*, as outlined below to 3) actively support the development and adaptation of a shared understanding between stakeholders and disciplines that enable continuous collaborative design processes. This strikes out a way for a continuous process of engagement

and collaboration in all stages of the design process between all involved stakeholders. We are about to continuously engage prospective users in the development of the very socio-technical artifacts that shall improve their well-being. By doing so, we hope that the acceptance of the underlying social (re-)solutions will increase their usefulness and their acceptance in society in general, and will supply sufficient arguments for the rejection of undesired technological developments.

#### **CRAFTING THINGS & METHODS**

We plan a transgression of self developed design methods in conjunction with self designed IoT devices for an evolving continuity of participation. As the project has just begun, we present a first example of the intertwining of one analogue design method and one IoT device that is the blueprint of further potential applications that are easy to make, adapt and to explore. Later on, we sketch out one possible overarching plan for future modes of participation.

The first in-project cooperation in *Miteinander* occurred between design research and product design. It includes a card deck based explorative design method and a persuasive, analogue-digital IoT application for persuading prospective users to change ingrained habits for their own good. Both concepts show how an oscillation between a prototype and its exploration can be transported into participational practice.

#### **Things as Conversational Anchor Points**

Persuasion design is design that strives to change one's habits (6) – in the best case for one's own good. Among the many concepts are smart mobile »machines« (10) that are integrated into our environment, as connected artifacts for saving energy, eating healthier and so forth. In the context of *Isolation* and coherent syndromes like depression, the concept *Into the Sun* was proposed by us (8) for persuading users to go out of their home to engage in physical activity and „to collect“ sunlight in order to treat isolation and depression. One IoT application was developed for optimizing the use of sunlight and involving the user/patient in the design of the treatment and the treatment itself.



**Figure 1**

First, the IoT application consists of a wearable device that measures the received light intensity, records and displays the exposure to sunlight and serves as a tangible reminder to help users to increase her awareness for individual exposure to natural light during the winter months. Second, an augmented clock enables users to plan daily activities in order to collect enough light in the shortest time, by

visualizing a forecast of the most light-intense hour of the day. In order to transgress the borders of this first prototype, we used a card deck design method for playful derivation of the existing prototypes dimensions.

### Method Documenting and Transgression of a Prototypes Properties

In another work (2) we presented a card deck based explorative design method for making sense of prototypes and synchronizing its descriptive vocabulary. Its main focus is exploration and reflection of prototypes and their possibilities by users, designers or both in cooperation. The underlying categories have been developed, building on prototyping research (1) as a meta theory and qualitative content analysis (3), thus forming a core definition. The categories have been shown to be helpful for practitioners and users alike for discussing properties of prototypes at hand (2). The derived card deck can be used in a variety of configurations. For example, the deck can be used to completely **identify all properties** of an existing prototype. It is a precondition that the prototype is on hand and two or more stakeholder seek to find consensus which properties this prototype inhibits and to document those directly on the cards, thus forming and documenting a shared vocabulary of the prototypes properties.

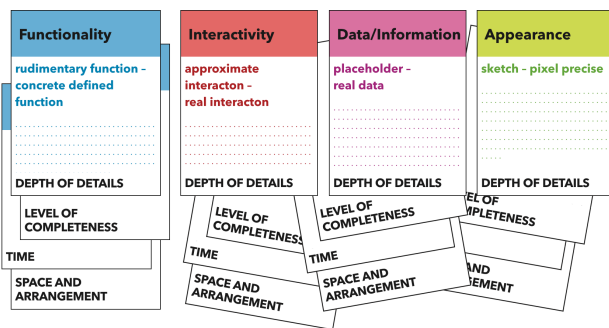


Figure 2

### METHODS & THINGS AS AN INTERTWINED ARGUMENT

We started with staged design events and used the cards and the IoT device in a variety of ways. For the sake of the argument, we will for now oversimplify design processes as the (very basal) concept of *Divergence* <> *Transformation* <> *Convergence* that occur throughout every design activity.

#### Convergence / Shared Vocabulary

Each card of the deck has room for annotating the prototypes properties for this specific combination. One card is drawn from the deck and is used to determine the corresponding properties of the prototype. It fosters the discussion between the involved designers and users and helps to form a shared knowledge base about the prototype and establishes a synchronized vocabulary. For the IoT device that is being developed, the intersection of Appearance and Space/Arrangement read like: *presentation of data on an analogue clock* or *presentation on a smartphone screen*, while maintaining the very Function

and Data. Users employed the cards to define the meaning and to understand the IoT device and its concrete implementation in order to pitch in the best manifestation of the prototype for their circumstances.

#### Transformation / Variations of Properties

*Into the sun* can be developed as a multi-adaptive interface that might recur in different appearances. Measuring the light intensity may only be sufficiently achieved with a sensor. But the card deck can also be used in design sessions for shaping e.g. different manifestations of the augmented clock. While users may first recognize the main function of the device – displaying the most light intense time of the day – they can develop a variety of derivations for expressing this very function. As many older adults are not yet fully familiar with the digital world, presenting the function as an analogue device might be preferable to a digital application. However, with the help of the card deck the very same function was also being transformed into a smartphone app for users who are often on the move or who are more tech-savvy. Thus making it possible to engage in different interactions and appearances of the very same function. Together with users and the card deck it is possible to actively transform the properties of an artifact, while constraining crucial properties.

### METHODS & THINGS AS A CONTINUOUS ARGUMENT

The previously discussed touchpoints of Methods and Things are examples for participational design events in some of the steps in the design process. The findings of those design events have been continuously documented on the card deck(s). Thus the re-application of these documentations in later steps of the design process helps to engage in connecting those singular exploratory design events to a continuous discussion over time. In addition, the usage of the card deck will then be acquainted to its users and thus foster its application for even more different use cases.

Beginning with the analogue card deck, users have been involved in the process of making sense of the properties of one IoT device and expressing their say in developing those properties into further applications. In the course of the project *Miteinander* a wider variety of IoT devices will be developed - always with the goal of a more meaningful connection of neighbors in apartment blocks.

After developing of a new IoT configuration into tactile prototypes, users will have the opportunity to explore those applications in practice. With the help of said card decks users might be able to continue their contemplation of a prototypes properties over time. Bringing these documents back into design meetings, this elicitation will be the basis for a follow up design event where future prototypes are developed. Thus the usage of the device and the documentation with the help of the Card deck can be intertwined and a documentation and critique of usage can be communicated.

### Divergence / Future Scenarios

Various design sessions that connect the usage of an IoT device and the exploration cards can help to extrapolate various similar scenarios like estimating the best time for exercise, finding the best time for walking ones neighbors dog, maximizing time with friends and interchanging artifacts with the same function with a different appearance or interaction – or vice versa – exchanging function, but preserving appearance and function.

### Divergence / Shared Understanding Over Time

Artifacts that remind of or mimic common devices like the one proposed here, are able to engage people of different age, different skill levels and different ways of engagement. In a future inception of a card deck like design method, users of a new IoT device shall be able to document their continuous engagement (or lack thereof) with the prototype over time, thus keeping track on how it is able to change their habit, how it interferes with their life and whether the devices functionality is to be adapted or rejected. While those cards will be used in continuous exploration of the IoT prototype, they will in return be helpful in staged design events to discuss future directions and transformation of possible interactions. They will also be able to stage impromptu exchange between neighbors about their digital companions in absence of a regular design jour fixe.

### FUTURE WORK

Various connections of the presented Card deck Method and various more IoT devices, of which we presented one, are useful for a more meaningful Co-Design format, that will help unfold participation and will be more continuous than consecutive but singular design events. Thus we hope to blur the line between designers (who give form) users (who define meaning) and design researchers (who develop methods) by unfolding engagement and collaboration over and through time of a design project. As next steps a multitouch wall or table is planned to be installed in one apartment block, where users live that explore some of our IoT prototypes. In their phase exploration they will be able to use the central wall or table installation to continuously touch down their exploration of their devices. Thus we will be able to interconnect users with different devices, but similar experiences to meet up at informal events to share their experiences. They will also be able to „call-in“ for feedback to the designers of the IoT devices. Those in turn will be able to adjust devices and the agenda for future staged design events. finally this will enable longitudinal design stage adaption where the emergence and usage patterns of IoT devices, can be studied and adapted in close collaboration with designers, design researchers and users alike. The current status of the combination of Methods and Things is shown in Figure 3.

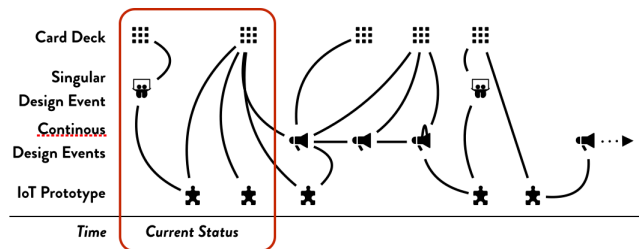


Figure 3

*We hope to gain inspirations from other research plans on how unfolding of participatory design events is envisaged and we hope for valuable criticism of our preliminary approach.*

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