By Accident or Design?
From theory, to concept, to interactive tool, to a long-term change in users

Dr. Nick Degens
Research Group User-Centered Design

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1 Introduction

A couple of years ago, the previous incarnation of the research group User-Centered Design and the related study programme Communication Systems started to change their focus. They wanted to see what was beyond the horizon and focus on other forms of media, besides the more traditional forms such as printed media.

It was clear to them that the creative industry had been growing in the previous decade, not only in size and scope, but also with regard to focus, as it started shifting to innovative types of technology, such as virtual reality and serious games. So the research group and the study programme slowly adjusted their course to follow this development. Their aim? To explore new forms of interactive digital media, in both research and education, and gain a greater understanding of how these new forms of media can be used to change the world for the better.

As a result, I was given the opportunity to breathe new life into the research group User-Centered Design, adapt it to this new focus, work together more closely with the related study programme, and connect it more closely to the professional field, both on a regional and national level. I am delighted to say that we have made a lot of progress over the last few years: the study programme has slowly shifted to become more design oriented and has officially made the transition to a Communication & Multimedia Design study programme, and the research group started working together closely with various national organisations and companies from the creative industries on innovative research projects.

With my inaugural speech, and the book that you are currently reading, I would like to invite you to think with me, as the one responsible for the research group, and us, the researchers within the research group, about the future and hopefully be inspired by our ideas and dreams so that we, in time, can create a better world for us to live in and for those who will come after us.

Dr. Nick Degens
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2 Technology & the Creative Industry

In the last few years, technological developments have been booming and the resulting technologies and systems have become increasingly present in our daily lives. Computers are becoming smaller, data exchange has become faster than ever, complex algorithms are able to process large sets of (personal) data, and smart devices are finding their way into previously unexpected aspects of our life. In some ways, one can say that the technology is ready to be assimilated into our lives in a ubiquitous and previously unexplored manner (or, as a fan of science fiction might say, ‘to boldly go where no man has gone before’).

These developments are largely due to the fast growth of ICT, which, due to this growth, is currently contributing at least 30% to economic growth in the Netherlands (Dutch Digital Delta, 2015). If one takes a look at the Fast 50 and the Rising Stars of Deloitte, the fastest-growing companies in the Benelux, one can see an increasing focus on applying ICT to existing markets and societal problems. This growth and focus can not only be seen in our slightly remote part of the Netherlands (Taskforce RIS3 Noord-Nederland, 2015), but even over the whole world (World Economic Forum, 2016).

It is sometimes easy to forget that there is also another player in this field, which is standing proud next to the ICT giants, namely the creative industries (represented in the Netherlands by the ClickNL Knowledge and Innovation Network). In the last decade, they have become increasingly involved in the creation of digital interactive technology, such as serious games and virtual reality. What they add is expert knowledge on how to bridge the gap between man and machine to solve society’s problems in a creative and innovative way, in the hopes of changing our lives for the better.

It is partly due to their work that interactive technology can be found in many aspects of our daily lives: from digital assistants that help us manage our day-to-day activities, to smart systems that help us drive more efficiently and safely, to applied games that help doctors practice their surgery skills, to drones that keep us informed of the water level and warn us of upcoming floods. As a result, the creative industries now house a great number of ambitious professionals, growing at a rate of about 7.8% on average per year in the last decade; the industry currently accounts for a total of 3.7% of all jobs in the Netherlands (ClickNL, 2015).
However, even though the creative industry is slowly maturing, there is still a lot of uncertainty about what makes a piece of technology or an application successful (and by successful we refer to the capacity of the tool to achieve its intended goal, such as behaviour change). Looking at the big mobile app stores for instance, one can see a multitude of different apps targeting and promoting healthy behaviour. Looking at an even more detailed level, one can see that a lot of these apps focus on very similar topics, such as increasing the users’ physical activity or supporting users in eating more healthily.
But why are there so many apps with similar purposes available? If the problem could be solved easily through interactive technology, why do new apps still enter the market every day, with the same promises as their predecessors? How exactly do they differ from each other and how do people discover which one they need? Important questions, with no real clear answers (for a good discussion about health mobile apps, see the work by Singh and colleagues (2016)).

These questions should also be considered from a business case perspective; if there are already so many similar tools available, how can a company ensure that their new tool is able to survive in the market and return the original investment? This is vital information for those who want to enter the market, such as the, ever increasing amount of, young professionals that have just finished their studies.

It is clear that there are some major challenges to overcome when making these kind of tools, and in this speech I will talk about a few specifically:

Firstly, making interactive systems, particularly those using novel technologies, is often expensive and time-consuming, and companies tend to spend a lot of time on ‘getting the darn thing to work’, which might impact the amount of time available to ensure that it actually achieves its goals.

Second, when designing interactive systems for a specific domain, one needs to combine knowledge from many different fields: technological knowledge, to better understand the system that is being developed, domain-related knowledge, to better
understand the goal that is to be achieved, and knowledge from psychology and sociology, to better understand the users’ needs and how technology can be leveraged to their behaviour. All of these together need to somehow fit together in a single coherent package.

Third, it is still difficult to ensure that users actually keep using the tools; most of the applications experience a huge drop-off rate in users after the first few interactions (e.g. Adjust, 2016). It is becoming increasingly crucial from a business and behaviour-change perspective to ensure that users are motivated to keep using the tool and keep coming back.

Fourth, the chosen technology itself might not be able to achieve the intended effect in users. This is what we refer to as ‘technology push’, in which the choice of technology drives the development of new products, instead of choosing the appropriate technology to solve a certain problem. If the wrong technology is chosen, this can lead to high development costs and unsuccessful products.

Lastly, there is still a lot of uncertainty with regards to what works and what doesn’t work. Researchers and practitioners have trouble finding the so-called ‘golden egg’, a be-all and end-all guide that can ‘predict’ whether such tools will actually be able to change the behaviour of the user.

These are current problems for those who work in the field of creative technology, both in practice, research, and education, and they will be the focus of my inaugural speech today.
3 Design Science Research

There are many problems that we encounter on a daily basis in the field of technological development, but none of them are as challenging as the age-old ‘why’ question. As in: why didn’t our tool achieve its intended effect (or the less frequently asked question: why did it actually achieve its intended effect)? To answer this question, we need to look ‘inside’ the tool.

Imagine, for instance, a watch. We mainly see the end result: a nifty little machine that is able, amongst other functionalities, to tell us the time. It is easy to forget the intricacy of the inner workings of a clock; many different bits and pieces have to work together in perfect harmony. For the layman, it is difficult to identify the individual use of every piece, but as an expert will testify, the whole is the sum of its parts. As such, the designer plays a crucial role; he needs to determine each piece that goes into the system and he understands how they can work together in harmony.

When designing interactive systems, the designer has an even more complex role. The whole here is more than the sum of its parts, which is due to the interactive nature of the tool. And, perhaps in contrast to the clock, there is little consensus on how we, as humans or users, perceive the world, or, in the case of this inaugural speech, how we perceive and interact with a piece of technology. This may be due to personal differences and preferences, but aspects like culture and biology can also play a large role (Degens et al. 2014). The designer needs to determine how man and machine can work together harmoniously to ensure that the tool will have an impact.

Besides the interaction between man and machine, there are other factors to consider: domain-related knowledge, knowledge about technology, existing relevant products, practical programming skills and visual design, just to name a few. And, as if the witch’s cauldron was not yet already stuffed to the brim, some of these will change based on the specific project or domain-related problem you’re working on. Finally, after carefully mixing this mysterious mixture, and having spent a lot of money and time in the process, we end up with a nice tool, and we come back to the original question, does it work?
The educational games field is home to many comparative review studies that aim to answer the age-old question of whether educational games are (at least) as effective as other educational materials, such as traditional classes. In short: do they actually work? Their findings: no, yes, maybe. The results are never clear and always ambiguous; sometimes they do and sometimes they don’t (Boyle et al., 2016; Dondlinger, 2007). It’s the same with other types of technology; taking a look at the literature on how to change behaviour through digital tools, we find many conflicting theories and hypotheses (Michie & Johnston, 2012). Again, sometimes it works and sometimes it doesn’t.

I’d like to argue that these confusing results are due to us asking ourselves the wrong question. Instead of looking at ‘does it work?’, we should be looking at ‘what makes it work?’ What were our underlying assumptions when creating a tool and how did they end up in the final product? Maybe we should start looking inside the metaphorical watch and try to understand what makes it tick.

This requires a new perspective on the design of interactive systems as a whole. Instead of perceiving these tools as black boxes, which have been made with a lot of effort and creativity, we should be perceiving these tools as intricate systems in which each design decision has an impact on its eventual effectivity. In short, we need more insight into the design process of interactive tools.

Design research offers many models that can be used to formalize the design process. One of these is by Hevner et al. (Hevner, March, Park, & Ram, 2004). In short, one takes a problem from a given field, searches for relevant theories and existing artefacts, combines these in an iterative design cycle, and checks back to see, preferably multiple times, if the tool is able to achieve the intended effect. Sounds easy, in essence.

Hevner et al. ’s (2004) work on formalizing the design research cycle.
The magic happens in the so-called design cycle, in which design assumptions and choices will lead to meaningful design specifications. However, these specifications will change throughout the entire design process, based on new insights from theory or results from user evaluations. There is a need to gain a greater understanding of these design assumptions, how they change throughout the design cycle, and how they may lead to the intended effect.

The research group User-Centered Design has translated these important questions into three research topics: 1) formalizing the design process, 2) the connection between the intended outcome, the technology to be used and (individual) users and 3) the long-term effects of tools.

**Formalizing the design process**

**A common language**

The first step is creating a common language: if we don’t know how to call the little ‘cogs inside the watch’, we cannot hope to differentiate them from each other. In the field of design research we call these the concepts, or constructs; the so-called building blocks of our technological design (March & Smith, 1995).

These concepts should be formulated in such a way that they become operable, or, to put it plainly, so that they have clear boundaries and can be explained to others. To translate these concepts into something a computer can understand, one needs to quantify ‘vague’ theoretical constructs.

For instance, in previous work I had to integrate sociological concepts, such as culture and ritualistic behaviour, into an educational tool (Degens et al., 2016). But the challenge of finding a completely objective definition of culture or rituals proved insurmountable; theorists hardly ever agreed and trying to establish boundaries between similar concepts led to much debate.

This translation of abstract to specific can be particularly difficult when dealing with complex sociological theories from specific domains, as one has to be able to quantify knowledge from a field outside of one’s own expertise. However, even within the field of design there is a lot of discussion between designers and researchers on the definition of concepts, which, for instance, can be seen in the game design field, where even basic definition of a ‘game’ is heavily debated among peers (Deterding, 2011).

One lesson that we can all learn from design is that there is no such thing as ‘the best’ definition or ‘the best’ choice. Even when defining concepts to include in a tool, one can only hope to achieve ‘good enough’. This is clearly different from the more fundamental sciences:
“Whereas natural science tries to understand reality, design science attempts to create things that serve human purposes. It is technology-oriented. Its products are assessed against criteria of value or utility – does it work? Is it an improvement? [...] Rather than producing general theoretical knowledge, design scientists produce and apply knowledge of tasks or situations in order to create effective artefacts.” (March & Smith, 1995)

From theory to design

Now that we have created a common language, we need to understand how the concepts in this language relate to each other and how they will (eventually) lead to the intended outcome.

Unfortunately, no single concept can be responsible for a large change in behaviour. It is rather how these concepts align together with one another as part of a larger system. As such, there is a clear need to define the relationship between these concepts and clarify how these relationships lead to the intended outcomes. This is what March & Smith refer to as models (March & Smith, 1995).

Many fields have already begun the process of ‘opening the black box’. For instance, the behaviour change technology field started formalizing the differences between interventions (Michie, Stralen and West, 2011) and the educational
The game design field has tried to link game characteristics to outcomes to greater understand how games should be designed (Wilson et al., 2009; van Staalduinen & Freitas, 2011).

However, it is important to recognize that, due to the creative and iterative nature of the design process, one’s assumptions will change slowly. Also, theory will never give a specific answer, in terms of design choices, on how to solve a complex problem. So one needs to formalize one’s underlying assumptions in terms of what we call design requirements. These design requirements help us bridge the gap between theory and design, similarly to how mid-range theories were used within the field of sociology (Merton, 1968).

Our final aim is to generalize the design requirements from our research in specific domains, so we can attempt to validate them in other domains or for other problems. For instance, in the design of a tool to make people more physically active, one needs to consider adherence, i.e. how do we ensure that people keep coming back to the application. In what way can those adherence aspects be applied to other tools or other domains, such as an educational game trying to teach mathematics?

**Methods and methodology**

So, we end up with a set of operable concepts and a set of design requirements that can be used to relate design choices to outcomes. Based on this knowledge, we can now look at the overarching design process and the designer’s journey in creating an interactive system.
This need for methodologies is present on many levels: for instance: how can we evaluate the long-term effects of educational tools or how can we use technology for a certain group, such as the elderly? These methods are mainly related to a specific problem, e.g. are mainly applicable in a specific domain, but we also need to create methods related to the design process in general, such as: how do we monitor the changes in design requirements that occur throughout different iterations?

The goal of creating methodologies is to abstract from specific domains or problems and try to create generic methods that can be applied for different technologies, users and goals. Creating these generic methods is extremely useful for those in the industry, as they represent a concrete set of steps they can incorporate into their own design process.

**The connection between design, technology and (individual) users**

Formalizing the design process is only one piece of the puzzle. We also need to consider the relationship between 1) the technology/medium/underlying concept to be used, 2) the intended target audience, and 3) the goal to be achieved (Degens, Bril & Braad, 2015).

![Model](image.png)

Model, adapted from previous work (Degens, Bril & Braad, 2015), emphasising the relationship between user, medium and goal.

Let us start this section by looking from the perspective of the user. As is often said in our field, there is no such thing as an average user. There are large differences between users, on the one hand in terms of their understanding of technology and capability of using it, and on the other hand in terms of their knowledge, skills and motivation.
If these differences become too big there may be severe consequences. A large gap between the tool and the user may lead to the user being unable to use the tool, i.e. lead to usability or user-experience issues, or not wanting to use the tool. A large gap between the user and the goal to be achieved may lead to a user being unable to overcome specific challenges or becoming disinterested (Csikszentmihalyi, 1990).

One way of becoming aware of these differences is through big data and its (largely automatic) analysis, a so-called data-driven approach. Using often complex algorithms, we can compile data sets of user characteristics and behaviours and classify them to make sense of that data. The problem with this approach is that it is inherently different from our ‘anti-black box mentality’; our goal is to understand how we need to adapt our tools, so we can generate generic knowledge that is applicable in other domains, a so-called model-driven approach. However, big data algorithms, which works primarily bottom-up, and theory-derived models, which work primarily top-down, will ultimately have to be combined to bring our use of technology to a new level.

**Adaptive systems**

Many tools are aimed at an average user; the tool does not take the previous experiences, knowledge, motivation or skills of each individual user into account. This is particularly relevant when we aim to change their behaviour: if your goal is to make someone more physically active, one would first need to consider

'Proper' interface design is also something that may change over time.
When trying to solve an important problem, such as preventing hearing damage in MBO students, one sometimes finds that the target audience doesn’t even consider it a problem. In these situations it is crucial to understand the potential user and their motivations.

goes for education: if your goal is to teach somebody about a complex topic in mathematics, one would first need to know if they have the prerequisite level of knowledge; otherwise the challenge may be too small, creating disinterest, or too great, creating frustration.

So, it is becoming increasingly important that we create tools that can ’adapt’ to individual differences between users to ensure long-term behaviour change. To do so, we need knowledge about specific individual differences in the target audience (the user), a formal model of ways in which the interactive tool can be changed (the medium), and a clear understanding of the intended effects of the tool (the goal).

Adaptivity usually starts with a certain input, i.e. a certain characteristic of the user. This characteristic can be something that occurs throughout the interaction, such as the cognitive load of users during a training exercise (van Merrienboer & Sweller, 2005), but can also be based on a priori skills, such as the physical fitness of a certain user (e.g. low, medium or hard exercises). To acquire this input, the system needs to be able to measure the differences between individual users and adapt the training content accordingly.
It is also important to consider that the input can and will change throughout the interaction; a user will not stay the same throughout the entire interaction lifespan of a tool. Even in their daily life they will continuously acquire new skills or knowledge, not to mention their often fluctuating changes in mood.

**New technologies**

Another important aspect of digital innovations is the interaction between man and machine. This interaction has changed a lot in the last few years and ‘evolved’ into a set of best practices, such as the Windows task bar, the common computer mouse or the symbols that we can find on our remotes. Usually, these interfaces feel ‘natural’ to us and match a certain piece of hardware (adding the Windows task bar to mobile phones did not lead to the same level of satisfaction).

The Nintendo Virtual Boy (1995) is a good example of a piece of technology that was developed when neither the market, nor the technology, was ready for it.
New and innovative forms of technology can’t really build on those previous experiences, as they offer a completely new way of interacting with technology and, as such, require a new set of affordances to learn, especially since these technologies are becoming increasingly disconnected from our traditional desktop computer setup. New questions arise: how do we want to interact with an interface within a virtual reality environment or how do we want to interact with our self-driving car?

It is important to design intuitive interfaces, or make sure that they are quick to learn and can be used by people from all walks of life. Especially that last part is quite difficult, as it may be more difficult to design a virtual reality environment for the elderly than it would be for tech-savvy children. Furthermore, we need to understand whether these technologies are actually able to achieve certain outcomes; for instance, when would a virtual reality device be a better learning medium than a traditional desktop computer?

Lastly, we need to consider the interaction between people through this new form of technology. Sooner or later, technology will become more pervasive in our society and interaction with digital technology will likely occur outside of our traditional computer screen. These developments may sound like science fiction, but augmented reality glasses or applications already offer a way of interacting together in a digital world that is overlaid on our own; remember, for instance, the Pokémon Go craze.

**Long-term effects?**

So, once we’ve successfully adapted tools to individual differences and ensured that the interface is natural and intuitive, we finally have a nice tool that is hypothetically able to achieve its intended use. That is, if the users keep using the system. That’s a big if, and crucial to the long-term success of the tool. In our work we look at five different aspects to stimulate long-term use and effect: embedding it in the life of the user, connecting it to the activities of the user, ensuring that the tool leads to an increase in intrinsic motivation, empowering the user, and making sure the tool will last.

Many tools are intended for solitary use and are inherently an isolated and time-consuming activity. For those who have busy lives, finding the time to do so will be quite difficult. In an ideal situation, training yourself through the use of a digital tool would fit naturally within your schedule and in your environment. If not, there is a large chance that the tool will be used less or even forgotten after a prolonged period of disuse.
We believe that the tool to be designed should be *embedded* in the life and work of a user, such as an educational environment or part of the work environment. By doing so, we create a strong link between the daily activities and the use of the tool, and, ideally, make it part of a habit, to ensure a long-term impact on behaviour (Lally & Gardner, 2013).

For example, if the goal is to increase the physical activity of a user, one could create a tool that ties into their daily physical activities, such as adding a detour to their regular cycling path as an extra challenge. For healthcare solutions, one could tie the tools to existing meetings with healthcare professionals, so that real-world activities could be used as input for the tool. The crucial aspect is that the effort that the user has to spend to interact with the tool should be kept to a minimum.

Robots are becoming increasingly prevalent and are, even though we are not quite there yet, a ‘natural’ way of embedding technology in our lives.
Besides embedding the tool into the life and work of a user, it should also connect to their experiences and expectations. They should be able to relate the interactions and the outcomes within the tool to their own lives and actions. This is comprised of two aspects: the adaptive nature of the tool, which we described in the previous chapter, and transfer of what happens in the tool to outside the tool.

With regards to the latter, it is important that the activities in the interactive tool are not too disconnected from the relevant activities in the user’s daily life. The user needs to understand, conceptually, that the actions they take in the tool can also be applied in real life. Consider for instance an educational game, in which the user practices debating skills in an alien environment; this environment may be too abstract to relate these activities to their own life. This either requires a set of activities that closely match those in real life, or a good debriefing, helping the user to make that conceptual step (Fanning & Gaba, 2007).

Another aspect is that the users should be or become intrinsically motivated to continue using the tool. Research has shown that users may be persuaded by through motivational rewards, but that the motivation and the attention will wane in time (Lally & Gardner, 2013). Furthermore, some interventions that target extrinsic motivation, for example through gamification, may find that there are negative consequences on the long-term (Gneezy et al., 2011; Deci et al., 2001).

The end goal of technology should be to empower people to change their own behaviour. Making tools for specific problems or domains is a very cost-intensive process. What if we could use technology to help them improve or change their own behaviour? This taps into concepts like self-regulation, where users determine their own learning goals and then organize and monitor their own learning process (Deci & Ryan, 2010). In the field of persuasive technology, self-monitoring and reminders were found to be the most beneficial features with regards to long-term behaviour change (Karppinen et al., 2016).

The final aspect one has to deal with is making the tool last. There are many tools that, once they have been released on the market, are not updated anymore. Tools should be continuously monitored and updated based on new insights (releasing it in the wild may lead to whole new insights from unexpected users). Design is inherently an iterative art and a product will never really be ‘ready’.
4 Working Together

Working together requires bringing all the stakeholders together. Only through an equal understanding of each other’s expertise and knowledge can innovative tools be made (advisory group LudoVita).

To help create the innovative and effective tools of the future, we, as a research group, need to work together with entrepreneurs, students, companies, (non-profit) organizations and other research groups, both inside and outside of the creative industries.

We play a central role in connecting these partners: we try to understand the current problems of the industry, translate those to long-term research questions, develop innovative solutions with both students and companies together with experts in the domain of the relevant problem, distil the insights into generic knowledge, and finally share this knowledge with companies and other academics.

This is a typical role for research groups from universities of applied sciences, as our aim is not to conduct fundamental research, but rather help to develop of new knowledge that can be directly applied to the work of professionals, in our case primarily the creative industries and the tools they create. This is a challenging task, as companies usually do not have ‘the time to wait around’ for researchers to conduct their work.

Nonetheless, integrating our research with the work of companies should be our first concern. I believe that for research to have an impact on our daily lives, we need somebody to give that knowledge a body, in this case an interactive tool, and ensure that the tool is able to reach the target audience and eventually change their lives. Too much research and knowledge never leaves academia and, through my work at the Hanze University of Applied Sciences, I aim to change that as much as I can.
In our projects, we work together primarily with the bachelor’s programme Communication and Multimedia Design, which aims to help students become young professionals in the creative industries. The goal here is twofold.

First, by letting them help with innovative projects, we acclimatize students to questions that the industry will have to deal with in the coming years. This helps prepare them for the future and increases their competitive value on the job market. Second, the creativity of students knows no bounds, and their novel ideas can sometimes surprise even industry veterans. Coming up with a winning idea doesn’t necessarily require a plethora of experience (even though it does help).

It is important to recognize that the role of students in our work is not just to make prototypes, but to let them experiment, and even fail, and through this process acquire new insights that we can then use as input for our research. This is the same for us as researchers: research should not primarily revolve around performance, but rather about discovering something new.

Lastly, we believe that the integration between education, companies and research needs to become more structural. We should not work from one project to another, which is what often happens in the creative industries, but rather work together on larger projects, and eventually create modular platforms that can grow in the future; only by doing so will we be able to create tools of enough scope to have a significant impact. We aim to do this in living labs, and in particular the upcoming Digital Society Hub, which will aim to connect students, entrepreneurs and researchers in long-term projects.
5 The Creative Professional of the Future

Some may argue that I’ve painted a complex picture, perhaps even too complex for us to achieve within the span of four years. But to create tools that can effectively and consistently change behaviour, there are many different aspects that need to be considered and many questions that need to be answered. As such, the aims that I have described in this inaugural speech are only a starting point, an ambition, for the work that is necessary to transform the way our society interacts with technology.

The good news is that achieving our goals isn’t impossible: there are many success stories of successful tools that have had a massive impact. In the news we can see educational games receiving much praise and applications that help people in remote areas to learn new skills or languages. But there are still many different tools and apps that fail and never see the light of day. To me, this feels like a shame, because so much energy and time went into making these tools. And let’s not forget that the livelihood of the creative professionals involved is at risk every time one of these tools fail.

We believe that the creative professional of the future will have to work beyond boundaries and tackle greater societal issues than we currently know about. It is my goal, and that of my research group, to help these professionals in the coming years. To ensure that they learn more through their education, that they are supported by us in their daily work to create innovative and successful tools and that, after all is said and done, they will have made the world a little bit better through our help.
Examples

- LudoVita
- Ongehoord
- Care2Wear
- Adaptive Systems & students
Gi ziet dat Ans begint om mevrouw Spengel naar de rolstoel te verplaatsen, wanneer ze naar haar benen gript. Welke reactie geeft Gi? Klik op een tekstbalk

Zeg Ans, laat mevrouw Spengel zelf haar benen naar voren optillen als je haar uit bed wilt, dat kan ze prijmen zelf. "Niet zo hard!" Dat benaart jou, het is niet duur of moeilijk een hema.

Zo, mevrouw Spengel, u ziet er moe en uit vanmorgen, denkt u dat het u lukt zelf even de benen op te tillen zodat we u makkelijker uit uw bed krijgen?

Ik help je even! "Helps Ans zonder iets aan te merken op haar werkplek.*

"Dit verbaalt: Klop aan Ans, trekken naar het vuisten met om Ans er op te wijzen dat mevrouw Spengel best zelf haar benen kan op tillen. Uiteraard zo onopvallend dat de cliënt er geen erg in heeft.*
**LudoVita**

A collaboration between Lerenophetweb, an e-learning company, Impuls, a rehabilitation centre, and Ergoenzo, long-time specialists in coaching health care professionals.

In this project we aim to support healthcare professionals in nursing homes, hospitals and other institutes in preventing the physical and mental strain that they encounter during their daily work. This is a well-known problem in the Netherlands and may have significant long-term effects on both the employees and the state of healthcare (Bronkhorst et al., 2014).

One of the problems causing the physical strain on caretakers is due to their daily activities.

Handling patients often requires a certain posture, for instance when lifting them out of bed. If these postures or behaviours are learnt or applied incorrectly there is a high chance that their physical condition will deteriorate when they become older. Even those who do know the proper techniques are not exempt to these problems; a lack of time or the lack of proper equipment will quickly lead to ‘cutting corners’.

Besides this physical strain, the healthcare professionals also experience mental strain due to a high work load or interpersonal conflicts at work; there is often too little time to do all the work. It is sometimes difficult for them to understand how they can solve these problems in a pragmatic manner (if they even understand the underlying reasons for the stress at all).

The goal of this project is to help healthcare professionals with these problems, by letting them become aware of the long-term physical and mental consequences of their day-to-day actions. We do so through engaging game-like scenario’s in which these professionals are confronted with their own behaviour. In these realistic scenario’s they can experience how their own behaviour plays an important role in their physical and mental stress. The platform into which these scenarios are embedded can then give the user information on how they can change their behaviour.
Ongehoord

A collaboration between &ranj, a serious gaming company, the Hoorstichting, a non-profit organization focusing on preventing hearing damage, and the MBO Council, the branch organization of vocational (MBO) schools in the Netherlands.

According to estimates, there are nearly one million employees who may be in danger of suffering long-term hearing damage because of their daily work. Work-related hearing damage is one of the most unpreventable and untreatable occupational diseases in the Netherlands. Hearing damage is irreversible; it is incurable and can thus only be prevented.

Even though it is incurable, there is little attention for the prevention of hearing damage in MBO education, which is striking as these groups are consistently confronted, throughout their studies and their future work, with activities that will cause hearing damage if one does not take the proper steps (such as putting on hearing protection).

What further complicates the matter is that MBO students do not seem to care about potential hearing damage, in or outside of work. They have difficulty imagining what consequences this would have and tend to ignore or forget hearing protection aids.

The Hoorstichting foundation, the MBO Council, &ranj and the research group User-Centered Design want to change this situation by developing an innovative intervention, in this case a serious game, to ensure that MBO students take hearing damage more seriously. One part of the design of such a tool is trying to understand how such a game can lead to a long-term change in behaviour. Secondly, we need to understand how we make the students more aware of the problem, without them having the feeling that they ‘are forced to take better care of themselves’.

Different students may come up with completely different ideas, ranging from a VR app in which you are attacked by sound waves, to a simulated environment, with realistic sounds, in which you have to evade enemies by listening to their actions.
Care2Wear

A collaboration between Elsdon Health, a technology company, the research group Healthy Ageing, Allied Health Care and Nursing and a coalition of nursing homes.

It shouldn’t come as a surprise that the median age of the population of the Nederland is increasing, mainly due to a decline in fertility and higher life expectancy. The physical and mental consequences of the ageing population will have a massive impact on the daily life of the elderly, particularly since there is a trend in the Netherlands for elderly people to want to keep living independently (with a large group living in far-off rural places).

The consequence is that informal care, care given by relatives or friends, will become increasingly important. However, this is quite time-intensive for the caregivers, even more so if they live far away from those who require help. In addition, if the elderly person suffers from dementia, they will slowly become even more unable to take care of themselves.

In the Care2Wear project we are experimenting with different forms of new technology, such as augmented reality, to see if we can relieve the work load of these informal caregivers. In particular, we are looking to see if we can help those with Alzheimer’s to better navigate on their own and we are attempting to increase their motivation to be more physically active, so their chances of falling due to deteriorating leg muscles go down.

A big challenge here is dealing with a complicated target audience; dementia encompasses a large range of different conditions, so it is difficult to understand what problems they may encounter in their daily lives. Secondly, we are dealing with novel technologies which aren’t easy to introduce to the target audience or embed in their daily lives.

Even for those well versed in technology it is sometimes difficult to understand how new technologies can be applied for specific problems or target audiences.
Adaptive Systems & students

Nearly all the research groups of the Hanze University of Applied Sciences will involve students that are working on their bachelor’s thesis. Within the research group User-Centered Design we try to let talented students work on more complicated questions, usually questions that have the potential to change the field in the upcoming years. We do so in a safe environment, where students can experiment and are encouraged to fail.

An example of this is work being conducted on the design of Adaptive Systems. There are many questions that the students can explore on their own: how will people respond when they know a game is able to adjust to their level (do they feel cheated / do they feel like their victories are due to their own skills)? What is the influence of story and plot twists on the reflective ability of the users while learning a new skill? Or how can we use the concept of mastery and performance orientation to shape different types of feedback in cognitive games, such as Mastermind?

It is not our goal, nor that of the student, to focus on acquiring new fundamental knowledge, but rather to gain a ‘fingerspitzengefühl’ for the relationship between important concepts, the design requirements and the resulting design specifications.
6 References


Nick Degens is responsible for the research group User-Centered Design at the Hanze University of Applied Science. The research group aims to support small and medium sized enterprises, in particular those from the creative industry, and (public) organisations with the design of effective interactive digital tools. It does so by trying to relate theory, design decisions, and behavioural outcomes in a generic manner as to better understand how these tools can be used to change the behaviour of the users.

There are two major research topics within the research group: Adaptive Systems and New Technologies. The goal of the research topic Adaptive Systems is to better connect interactive tools to individual differences in users, such as differences in motivation, behaviour, or knowledge, to ensure a more suitable and ultimately more effective tool. The goal of the research topic New Technologies is to better understand how novel forms of technology can be used or integrated to deal with (future) societal issues.

The research group is part of the Marian van Os Centre for Entrepreneurship and the Institute of Communication, Media & IT. Projects are conducted with students from the study programme Communication and Multimedia Design, who are working to become the creative professional of the future.

Our mission is to experiment, fail and learn together with companies, students, and other researchers, so we may eventually change the world for the better through the use of interactive digital tools.