STT 76

PLAY ON

Serious Gaming for Future Seniors

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INTRODUCTION

While most gamers play for fun games have more to offer than entertainment only, an ever increasing amount of research shows. Regularly playing games is good for your eyesight[1], it improves the eye-hand coordination[2], slows down memory loss or even prevents it[3] and gaming is good for developing problem solving qualities[4].

The positive outcomes of gaming are often seen as merely beneficial side-effects to something otherwise solely entertaining. These side-effects are, however, becoming the main objective in the development of games now. Games in which entertainment is not the primary goal but games with a particular kind of goal. Serious games.

Serious games are up and coming. Market research bureau IDATE predicts the worldwide market for serious games will grow with almost 50% per year with an estimated value of 10 million Euro in 2015[5]. These high expectations are closely linked to the conviction that games will be used in a huge variety of areas. Gaming is thus seen as a solution for all kinds of problems: *'patients recover quicker, soldiers going to Uruzgan are better prepared, mayors function better in a crisis, employees become happier.'*[6]

Obviously, this growing enthusiasm for serious gaming has triggered the interest of scientists who justly question the reliability of these boastful claims. How do serious games work exactly? What effects can be expected in practice? Under what circumstances? How do serious games 'score' in comparison with other media which have serious objectives?

It is important to look closely at both the possibilities and limitations of the present generation serious games. But an exciting subject as serious gaming also raises questions for the future. What will serious games look like in 10 years' time? After the growing pains have subsided, technological barriers are overcome and new concepts have presented themselves, what kinds of serious gaming will surface? For what kind of serious aims will games be used? In which sectors? What kind of play will serious games trigger in the future and will we be able to recognize them as such?

These kind of questions were the starting point for the STT futures study on Serious Gaming in 2009.

The complete footnote texts can be found on page 70

ABOUT STT

The Netherlands Study Centre for Technology Trends (STT) explores new trends and develops inspiring foresights on technology and society. STT has a broad scope of interests and organizes studies around specific themes. In the past, there have been studies from the perspective of specific technologies (such as nanotechnology or communication technology) but also on domains in which a variety of technologies converge (for instance in health care, living, or nutrition). More than seventy future studies have been conducted in the last 40 years.

In the past years many efforts have been made to develop new methods for future orientated research. At the same time, it is clear that the future is not easy to predict. In fact the Dutch WRR (Scientific Council for Government Policy) recently concluded that '*the term 'predict' must be set aside*' in favour of ways of future research in which '*both*

acceptance of uncertainty and open enthusiasm is fully accepted.'[7]

With this in mind, STT chooses the activity of exploration as its method of research. The term 'explore' emphasizes the searching character of the activities involved and indicates that the results of these activities are essentially uncertain.

If nothing can be predicted with certainty, what does the futures study have to offer? Since results can only be accurately determined in hindsight, its *value* lies, above all, in its power to *inspire*. This is clear from the way futures studies are appreciated. A futures study may be credible, for instance, or absolutely incredible but very thought provoking. It may generate beautiful images or disquieting scenarios. But whatever the case, inspiration characteristically provokes a *call to action*. In so doing every futures study should prompt towards follow up in the future.

The basis for this inspirational potential is laid during the process of the study. This process focuses on both quality as regards to content, as support from the recipients of the study. STT futures studies are therefore always collective processes. By bringing experts and interested parties together in an open space, STT wants to evoke as much crossovers in knowledge as possible. The key to this process concerns a multidisciplinary group of people who exchange knowledge and experience and, in doing so, develop new insights and ideas. Participants are challenged to free themselves of the present and think about future processes and

possibilities. By combining unexpected encounters and the ability to think beyond the known, STT creates space for creativity and for exciting perspectives.

In successful studies 'producers' and 'consumers' are, to a certain degree, the same parties. The parties contributing to the study take the results as a starting point: by picking up specific points of action or by doing additional research, for example, but also by keeping important networks active or by evoking and supporting new initiatives.

Depending on the chosen subject, the target group will surface of the futures study. Experience shows that results find their way into society through a variety of routes. The impact of STT studies is most visible in:
– Educational institutions that use the results of the study in their research programs and curricula.
– Companies that use the results of a futures study in their (R&D) strategy.
– Governments that use the futures study for making policy.

STT is an independent organization and the future studies are played out in an open and non-competitive context. Participants join without having stakes and the results of the study are public.

For more information, check the website of the Netherlands Study Centre for Technology Trends STT at www.stt.nl

**STT Netherlands
Study Centre for
Technology Trends**

[7] WRR:
Uit Zicht:
toekomst-
verkennen
met beleid
(in Dutch)

INTRODUCTION TO THE FUTURES STUDY SERIOUS GAMING

SERIOUSGAMES

OBJECTIVE AND APPROACH

The futures study on Serious Gaming was set up to develop inspirational perspectives on (digital) games that aim for more than entertainment only. For this we outlined two main starting points.

The first starting point was an exploration of the future of gaming in the broadest sense possible; by looking carefully at the next generation of serious games with no specific application in mind. For this we organized a series of expert meetings in which experts presented their visions of the future. We invited prominent figures in related fields such as entertainment gaming, social & mobile media and interaction design. The video recordings (in English) of these meetings can be viewed at www.seriousgames.tv.

Secondly, we were looking for ways to make the futures study as visual as possible by introducing relevant social issues. We aimed to develop visions on serious gaming within the scope of these issues. We chose two specific issues: the influence of gaming on organizations and management issues and secondly, the role gaming might play in the lives of future seniors. A report of the latter is presented here.

Although the futures studies on Serious Games for Management and on Serious Gaming for Seniors have a different scope, there are also many similarities. Futures studies, whatever the subject, generally follow similar considerations. That is why

we have used the following conceptual framework for both projects.

FUTURES STUDY AND SERIOUS GAMING: CONSIDERATIONS AND FRAMEWORK

Considerations

Thinking serious gaming through towards the future is not a simple task. On the one hand the field has a wide and substantial variety of drivers, in the sense that new applications and developments are constantly being absorbed into the field. On the other hand the future of serious gaming is not easily separated from the fields it caters for.

Future research becomes increasingly complex as the number of relevant factors grows. Since there are many drivers to reckon with in serious gaming, this adds an extra challenge. Serious gaming is embedded in a variety of traditions and has diffuse roots. It may be the next logical step following the positive aspects in entertainment gaming, thus moving from welcome side-effect to ultimate goal. But it can also be positioned in a long tradition of (computer)simulations, becoming increasingly interactive within an expanding play space. It can be an educational tool, thus becoming the next step in e-learning. Obviously it is difficult to bring it back to a singular source and there are hardly any widely accepted definitions available. This in turn influences the way its future is envisioned. Definitions by nature create boundaries, and by doing so, it becomes

evident which developments are relevant and which ones are not. As of yet, serious gaming still misses clarity. To do justice to the complexity of serious gaming while envisioning a future for it, a large and varied amount of drivers must be taken into account. From technological developments in 3D-modelling or artificial intelligence to new didactic insights. From paying attention to the analysis of Huizinga's Homo Ludens to shifts in the social acceptance of entertainment games.[8]

Exploring the future of serious gaming is further complicated by the fact that serious games cannot really be viewed separately from the context in which they are used. Games are employed to gain awareness on social issues or as a training instrument for medical staff or security officers. They are a means for recruitment and selection, a learning method or playful approach towards making tedious work more appealing. The nature, scope and urgency of these questions are also dynamic since new times generate new questions. So to envision the future of serious gaming, it is important to take the context into consideration and ask what kind of problem a game attempts to solve.

A framework

Since the context of serious gaming is so complex, a clear framework seems indispensable. In this project we have defined serious gaming as 'finding game-based solutions for social issues.' This definition emphasizes that serious games hardly have any boundaries in its scope of application; games can be used for every domain and for whatever social issue at hand. At the same time this definition stresses the functional character of serious games. Serious games are always a means; they are a solution to a problem, not an aim in themselves. Serious games distinguish themselves from other means by the game-based character of the solutions they have to offer. We refer to a game-based solution if *game mechanics* and/or *enabling technologies* are used.

Game mechanics

The development and use of serious games implies a 'gamy way of thinking'; to see (new) possibilities by using game mechanics. Game mechanics is a generic term for the rules, principles and mechanisms of play, easily recognized by their timeless and universal character. Regardless of technological developments, they have been used for centuries all over the world to engage people and move people into action.

[8] More about this subject in the position paper of the futures study (in Dutch)

[9] Michael Wu: Gaming science

Seth Priebatsch has developed the concept of adding simple principles of play to change any environment into a play environment. In his TED-presentation called 'The Game Layer on Top of the World,' he describes how behaviour can be directed with the help of a variety of game dynamics in the future. For example:

– Appointment dynamic: a dynamic in which to succeed, one must return at a predefined time to take a predetermined action.
– Influence and status: the ability of one player to modify the behaviour of another's actions through social pressure.

– Progression dynamic: a dynamic in which success is granularly displayed and measured through the process of competing itemized tasks.
– Communal discovery: a dynamic in which an entire community is rallied to work together to solve a problem.
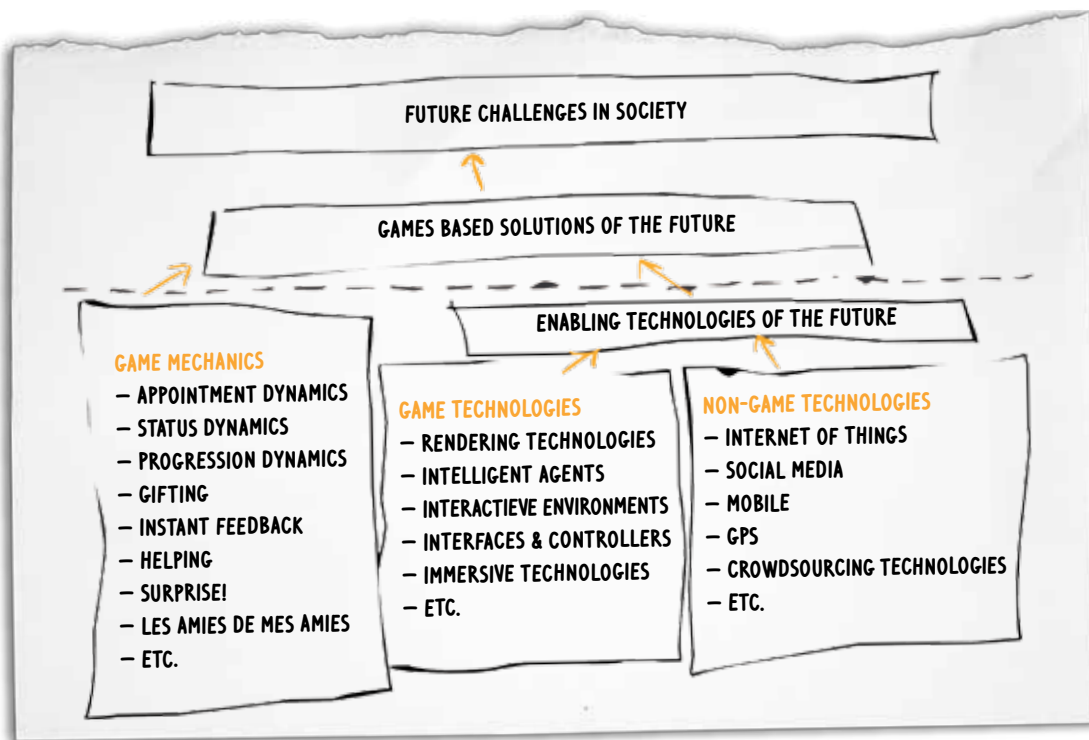
The presentation of Seth Priebatsch can be viewed at http://tinyurl.com/255o4yt

Enabling technologies
Using new technologies is a second important pillar for inventing game-based solutions. These are the technologies we traditionally associate with games, such as rendering technologies, 3D, intelligent agents, interactive environments and new generation interfaces and controllers. But they are also technologies that have not yet found their way to the (serious) gaming field or only to a limited degree. This includes new technologies such as GPS, social media, mobile media, crowd sourcing technologies or a fully fledged Internet of Things.

This framework is used as a broad outline for the futures study Serious Gaming for Seniors.

FUTURE CHALLENGES IN SOCIETY

GAMES BASED SOLUTIONS OF THE FUTURE

ENABLING TECHNOLOGIES OF THE FUTURE

GAME MECHANICS
– APPOINTMENT DYNAMICS
– STATUS DYNAMICS
– PROGRESSION DYNAMICS
– GIFTING
– INSTANT FEEDBACK
– HELPING
– SURPRISE!
– LES AMIES DE MES AMIES
– ETC.

GAME TECHNOLOGIES
– RENDERING TECHNOLOGIES
– INTELLIGENT AGENTS
– INTERACTIEVE ENVIRONMENTS
– INTERFACES & CONTROLLERS
– IMMERSIVE TECHNOLOGIES
– ETC.

NON-GAME TECHNOLOGIES
– INTERNET OF THINGS
– SOCIAL MEDIA
– MOBILE
– GPS
– CROWDSOURCING TECHNOLOGIES
– ETC.

THE FUTURES STUDY SERIOUS GAMING FOR SENIORS

To structure the futures study Serious Gaming we set up two working groups according to the starting points as described above. The working groups convened regularly, starting from the end of 2009 to the beginning of 2011. They were given the task to develop the sub-projects both conceptually (aims, focus, method) and in practice (organization). The following experts participated in the working group Serious Gaming for Seniors:

– Sander Bakkes, The Amsterdam University of Applied Sciences
– Ellis Bartholomeus, Ellis in Wonderland
– Thomas Geijtenbeek, MOTEK Medical and Utrecht University
– Mary Lam, intern at STT
– Jacco van Uden, project manager STT
– Sabine Wildevuur, Waag Society

The team set itself the goal to envision how games might help future generations of seniors. To do this the possibilities of new generations of games were explored from the perspective of 'typical' senior issues, such as limitations in motor control, cognitive ageing and a progressively less active social life. We wanted to contribute to ongoing research into healthy ageing and its practice – a 'movement' seeking possibilities of growing old in mental and physical good health.

This publication brings together the results of these explorations. It has become a futures study in which many people and heterogeneous parties have cooperated. By challenging experts from different professions and sectors to look beyond the boundaries of what already exists, we have made an attempt to compose a comprehensive picture of the future.

STRUCTURE OF THE PUBLICATION

We begin with a short introduction on the seniors of the future. (Game) technologies are not the only developing factor; the elderly of today are, after all, not the seniors of tomorrow. What do we know of the next generations of seniors and of the issues that they (i.e. we) will have to deal with?

Secondly we briefly introduce the present status of seniors and games. What connections are there now? In which way and why?

We will consequently delve further into the central question of this futures study: how can games contribute to the process of ageing in good health for the coming generation of seniors? We have done this in a number of ways such as a report of the symposium 'Play On' in which we specifically looked for ways games can trigger seniors to stay physically and socially active. The heart of this publication, however, consists of interviews and discussions held with experts in the academic world and in the business and non-profit sector.

SENIORS OF THE FUTURE

Since the focus of this futures study aims at the future potential of games for seniors, changes in this target group must be examined too. The seniors of tomorrow will probably differ quite substantially from the elderly of today.

We know that the proportional rise in ageing population of the Netherlands has two sides: not only is the number of seniors in the Netherlands increasing but seniors are also, on average, becoming older than earlier generations of seniors.

'The number of senior citizens is expected to increase between now and 2040 from 2,4 to 4,6 million. Life expectancy at birth will rise for men from 78,8 years of age to 84,5 years. For woman life expectancy will increase from 82,7 years of age to 87,4 years.'[10]

While these statistics are significant in themselves, their consequences are more relevant for understanding the seniors of tomorrow. What characterizes the future senior? What are the typical concerns a senior deals with in daily life?

[10] CBS (The Dutch organization Statistics Netherlands): population prognosis 2010-2060: increasing life expectancy, more older people (in Dutch)

JENNY GIERVELD

Jenny Gierveld, emeritus professor in sociology at the VU University Amsterdam, gave a keynote on the characteristics of new generations of seniors at the STT symposium 'Play On' on the 18th of January 2011

" For professor Gierveld it is clear that the seniors of 2031 will differ significantly from seniors of 2011. Different 'cohorts' of seniors have distinct outlooks on life since their experiences, marking their personal life-course, differ so strongly from each other. To give an example: the generation of seniors born in 1903-1910, generally has a grateful attitude towards life. They lived through the depression of the 1930's and experienced the introduction of the General Old Age Pension in 1957 as a blessing. This is very different from the babyboomers, for whom the General Old Age Pension only entails a small percentage of their pension. Their outlook on life also differs substantially due to other social developments, for instance, concerning the emancipation of women.

If we want to find out more about the seniors of the future we have to look at people who are about 45 years old at the moment. What characterizes them and what is their outlook on life?

We know that the life expectancy of men is rising at a faster rate than the life expectancy of women. Previously the gap in life expectancy was about seven years, now it is five years and it is expected to grow smaller. This will lead to a completely different demographical make-up. At the moment, the stereotype single senior is still a woman. In the future, this will often be a man. At the same time, due to the closing gap in life expectancy between men and women, couples can stay together longer. Yet another noteworthy fact is that the number of relationships with partners living apart is expected to increase. This means that people living alone are not necessarily single.

These are relevant developments since it is a well-known fact that having a relationship and a higher education have a positive effect on one's health.

If we take these developments further down the line, the future seems to offer good perspectives, at least in general. The prospects for couples look favourable and since the educational possibilities are improving for each cohort, it seems likely that serious health problems can be delayed to an older age. In general. The 'general senior' doesn't exist, however. The differences between seniors of the same age are substantial. Women with a higher education become eight years older on average than women with only elementary education. According to Gierveld, one of the biggest challenges for the future is thus to guard against a divide in social participation and isolation.

Isolation

Gierveld defines isolation as the subjective experience of an unpleasant or even intolerable want of (quality in) social relationships. Since the church and other associations no longer bring people together as much as they used to, we live in a society in which people are expected to generate their own 'community factor' or solidarity through their own efforts and competences. Socially empowered individuals consequently gain opportunities while socially less empowered individuals run risks.

Isolation relates to the absence of someone close to talk to – a partner, an adult child, friend, brother/sister – to share deep feelings genuinely (emotional isolation). But isolation also manifests itself in the absence of a broad social network of neighbours, acquaintances and friends (social isolation). The consequences of social isolation are often underestimated, even though they can be far-reaching; as for instance in the case of moving house at a later age.

Although good interventions to scale down isolation are available, professor Gierveld stresses the importance of prevention. It is important for people to maintain their own 'convoy': one's network of social relationships with an inner circle of friends, but also ex-colleagues, acquaintances, club members of the choir, the sports club or volunteer club etc. Keeping up these contacts is crucial for preventing emotional and social isolation. New (social) media play an important role in this but the advantages of new forms of communication are not evenly spread out. According to Gierveld, the Mattheüs-effect is at work in this context: people who are already socially privileged and who have a valuable network in the first place, use social media to maintain and strengthen those social contacts. The more socially vulnerable lag behind since they may not have a computer or cannot use it properly or they have no support in their social circle to do

so. Access to the internet does thus not automatically lead to improved social contacts. Furthermore, research shows that the socially vulnerable in the age group of 55–70 years who have access to the internet, use it much more frequently (nine times more), to chat for example, than the socially privileged, even though they are the most isolated group. ❞

Vr. 38 jr., aantr., sl., kast.br.haar, lief, spont. en opr. karakter, houdt o.a. van lezen, muz. en wandel., zkt integere, rust. en vriend. man om samen online gezelligheid te delen en iets duurzaams op te bouwen. Lft. ca. 30-55 jr

Female, 38, attractive, slim, brunette, sweet, spontaneous, open minded, loves reading, music and walking. Seeks friendly and honest male for online companionship and perhaps something more.

GROWING OLDER HAS CHANGED

At least one thing can be said with certainty about the future: the variety among seniors will be large. According to Carolien Smits, professor Innovation in Geriatric Care at the Christian Polytechnic Windesheim, the media present two extremes in cultures of ageing: *'the pitiful seniors, fleeced by the Socialist Party, who are highly dependent on care and on the other side, the well-to-do, highly educated babyboomers who know what they want and will get it too.'* In reality there are many cultures of ageing according to Smits. Many variables play a role, such as lifestyle and value systems towards work, oneself and the other, social participation and perspective towards the future. Descent also plays an important though complex role: *'the new senior is not only the mature director or the well-educated senior who knows how to find important information. Migrants are also new seniors. Defining the 'migrant senior' has become an umbrella concept: the only thing these seniors have in common is that they have moved to the Netherlands in the past. Though seniors from Suriname and the Netherlands Antilles seem to be finding their way, senior Turks and Moroccans have more problems.'* [11]

The two-sided rise in ageing population and the increasing diversity within the senior population create daunting challenges for the future, especially when it comes to health care. Many discussions concerning health care in the Netherlands are directed towards the health care

system. Although a great number of ideas and opinions exist on how the system could be changed, one thing is clear to all parties: the current system is not working. It is unwieldy, inefficient and not particularly customer-friendly. Above all, it is too expensive. The Netherlands Bureau for Economic Policy Analysis (CPB) has calculated that the share of expenses for health care will rise from 9% of the gross domestic product in 2001 to over 14% in 2040. Unless policy changes are enforced, the Bureau estimates that one in five employees would have to work in health care in 2040 to meet the demands. The researchers question both feasibility and desirability of such a situation. [12]

Things obviously need to change.

The different views on a sustainable health care system for the future direct a lot of attention to geriatric care. This is not surprising since not only do we know that the rise in ageing population will generate more demand, the average costs for health care strongly relate to the age cohort: the older one is, the higher the health costs. [13] To keep geriatric

AGE COHORT	AVERAGE COST OF CARE PER DUTCH RESIDENT (2007)
0	8.690
1-14	3.049
15-24	2.569
25-44	2.849
45-64	4.085
65-74	6.910
75-84	13.239
85+	30.491

Source: RIVM, www.kostenvanziekten.nl

care affordable in the future, a new, more efficient way of working is necessary in order to deliver the same care with less costs. But this in itself is not enough. Things need to change on a system level. Fresh perspectives, innovative care concepts, the use of advanced care technologies, new care networks and cooperation. In other words, 'care 2.0'.

Games have become popular for finding smart ways of meeting the demands of a new generation of seniors.

[11] Carolien Smits: Care given and taken by seniors; innovation in cultures of care (in Dutch)

[12] (CPB) The Netherlands Bureau for Economic Policy Analysis: Taking care of care (in Dutch)

[13] RIVM (National Institute for Public Health and the Environment): Costs of illnesses (in Dutch)

GAMES AND SENIORS: A FIRST IMPRESSION

'There are games now for pretty much every age, every demographic .. It comes down to everybody is playing games. Games are just evolving like species in order to fit into every little niche of our lives.' — Jesse Schell [14]

[14] Video game technology shifts to rewarding play

[15] Dutch National Gaming research (in Dutch)

[16] Adult gaming memo

INTRODUCTION

Although not many people will associate games directly with seniors, an increasing amount of research shows that seniors are a target group to reckon with. The Dutch National Gaming research (2008) states: *'the assumption that computer games are only played by young people turns out to be incorrect. Almost all Dutch youth of eight to nineteen years old plays computer games (more than 95 percent) but more than half of the Dutch 50-plus population also plays regularly: 57 percent.'* [15]

In the same year, a quarter of the total gaming population were American seniors. What's more, senior gamers are fanatical:

'Older respondents who play games are more avid players [than younger generations]. Older gamers, particularly seniors, tend to play games more frequently. Over one-third (36%) of gamers 65 and older say they play games every day or almost every day ... Senior gamers may play more frequently because they have more time to play than younger gamers, as 77% of senior gamers reported being retired.' [16]

The Entertainment Software Association (ESA) predicts that the share of seniors playing games will increase in the coming years. And this is not only due to the fact that gamers are growing older and will eventually become senior gamers. Games are expected to become important for the process of healthy ageing. The ESA is convinced that the statistical growth is partly realized by *'nursing homes and senior centers across the nation now incorporating video games into their activities.'* [17]

The ESA is not alone in this. Other parties also see the combination of games and seniors as a natural step towards addressing issues of health and wellbeing. 'Since the arrival of video games in the eighties', Jeroen van Mastrigt says, 'games are being developed and applied for health care and this trend is likely to persist.'

'For five years now the number of game applications for health has grown fast. There is a vast accumulation of knowledge, competence and experience in using games in the domain of health. The number of publications, conferences, workshops is increasing, world-wide and in the Netherlands. There is better hardware and software to develop health games. The number of companies and organizations that develop these kind of games is growing. It looks like we have an all systems go.' [18]

The entertainment-business is an important driver of *games for health*, a sector in which they do good business: *'The genre 'exergames' is big and continues to grow… The genre 'brain training' game is also commercially very successful in the consumer market. These two entertainment genres of consumer health games make a turnover of 6,6 billion dollars a year world-wide.'* [19] Apart from the entertainment game-industry which focuses primarily on consumers, there is an increasing number of game developers who see potential in the combination of games and health. Research into 33% of the Dutch applied game developers shows that health and wellbeing is one of the popular areas of application in the sector. After educational games, health and wellbeing are

the biggest area of application. 56% of the 75 companies works in this area of application. [20]

The future looks bright for companies devoting themselves to this segment. Thanks to the new seniors:

'It is common knowledge that Dutch health care has a great deal of challenges to face in the coming years. The population is ageing; the demand, requirements and costs for care are increasing while the working population is shrinking. Terms such as health games, exergames and game assisted therapy are heard more often in discussions on the innovative developments in care and wellbeing. These games can contribute to making care more effective and efficient.' [21]

So expectations are high. But are they justified?

In this publication we make an attempt to answer that question by getting acquainted with existing good practice and current research in the area of gaming for seniors. In so doing we delve further into the possibilities for the future.

[17] ESA: Game player data

[18, 19, 20, 21] IZOVATOR; the development and use of games for health (in Dutch)

FUTURE SCENARIOS

INTERVIEW

WIJNAND IJSSELSTEIN

Wijnand IJsselsteijn is associate professor at the Eindhoven University of Technology. He works for the research group Human-Technology Interaction and he is the director of the Game Experience Lab. For more information: www.gamexplab.nl

GAMES AS A MEANS FOR SOCIAL INTERACTION

Why are you interested in the theme of gaming and seniors?
I think seniors could benefit greatly from games. This is still hardly the case, however.

How can seniors benefit?
Though the benefits for seniors still need empirical support, I see many opportunities for activating the mental and physical condition of seniors with games. Games have the potential to support self-efficacy; self-confidence in one's own abilities and one's attitude towards (new) technologies. Seniors often think that 'technology is too complicated for them; high tech is something their grandchildren love.' A game can possibly evoke more confidence in a new technology, thus making seniors feel more competent. When another new technology comes along they might take up the challenge again and think; 'I can do this, no problem.'

Gaming fits perfectly in the general concern for health, being one of the main strategic focus points of the Eindhoven University of Technology.

Games stimulate motivation and they are accessible and fun to play with. By stimulating intrinsic motivation, there is no need to deploy rewards to make people play. We want to optimize this to help people do tasks that are good for their health. But as I said previously games for health need more substantial proof of effectiveness.

What role can the Game Experience Lab play in this?
The Games Experience Lab is a physical lab in which we try to measure people's experience of a game. By measuring objectively, we come to understand the subjective experience of a game. Objective measurements are physiological effects, such as perspiration or heartbeat and behavioural reactions such as posture and movements and the way in which the controllers are handled.

These kinds of data are valuable since it is real time information. The data are registered while the player is actually playing. This makes the effects of specific game elements directly visible.

In comparison to filling in a questionnaire after playing the game, this is a big advantage.

The next step is to interpret the real time data correctly and return that information to the computer so that the game can respond adequately. At present, all games track the achievements of the player in some way. In most cases this means that if you do well, you will automatically go to the next level. Information can be added to this which deals specifically with the *experience* of the game. Take for example, education. A child with a high degree of self-efficacy will not lose confidence so easily when making a few mistakes during a math game. Such a child can be challenged without creating much frustration. A child who is less confident, however, will be quick in concluding that he or she cannot do the task and possibly give up. If a game can measure achievements and the way the activity is experienced, *personalization* is close at hand: this means that the player can be challenged precisely and adequately as adapted to his experience at that moment.

Seniors, more than young people, want a clear pay-off, a sense that something is to be gained from playing the game

Is this still a future scenario?
For schools it is but we have, for example, made an emotionally adaptive Pac-man. For this we first needed to know how someone behaves when frustrated or happy – this differs individually. In the case of this game, we measured the pressure a player applied to the keyboard. This proved to be a good indicator of frustration. If someone shows frustration (through the keyboard), the computer

can adapt the game level by, for example, reducing the pace of the game. Though still small-scale, lab-bound measurements, it is not hard to imagine that in the future all kinds of experience data will give the game feedback, enabling it to adapt in real time to the player.

When could this become reality?
To me this looks to be just around the corner; it should be possible within five years. Systems such as Xbox Kinect, Playstation 3 and Wii already use movement sensors and pressure measurement. Facial expressions can also be registered but this is not yet used in a very adaptive manner. It won't take long though before game designers can 'tune' games according to the measured experiences of the players.

Returning to the seniors: what requirements must be taken into account when designing games for this target group?
We have researched this in the Game Experience Lab. One of the important conclusions was that designing games for seniors need not necessarily revolve around making games more accessible. Offering seniors the same content as young people but with a bigger font is just not going to work.

Seniors, more than young people, want a clear pay-off. In other words they want to gain something out of the game that interests and helps them. When designing games for seniors, it is important to take into account what desires and aims they have. Seniors have a different perspective on life, given their different experiences throughout life. This has important implications for the content of the game. A variety of small researches show that seniors do not like violent games. History, trivial pursuit, solving mysteries and puzzles, on the other hand, are very popular.

Seniors prefer a social aspect when playing games. They are less interested in playing online together but prefer sharing a physical space together; so-called *co-located gaming*, making it easier to share experiences.

Again, one should not forget that the 'general senior' does not exist. There is an enormous variation in seniors. Young people may see all people older than seventy as senior but there is, however, a huge generation gap between someone of seventy years old and someone of ninety years old.

Be careful not to stigmatize. If you want to develop successful games for seniors, try not to introduce your game as a game especially made for seniors. It just does not appeal to them since it is always somebody else who is old, never you. It is better to address subjects in which the target group is interested.

What will games for seniors look like in the future? What possibilities and limitations still play a role?
I think that the social acceptance of technology will not be such an issue in the future. It is already improving. Nintendo has, for instance, made a successful move with the Wii; it uses the TV for its fun, accessible and social games which are a familiar medium to seniors. Other media such as mobile telephones will presumably be familiar to everyone in the future.

It will be a real challenge to genuinely use the social aspects of gaming. Games are used increasingly for revalidation, making boring exercises more fun. It is relatively new, however, to include one's social circle in this process. Revalidation can thus take place by playing games with and against each other. This kind of multi-player variation must be designed well. *Inter-generation gaming* is also an option, making it possible for grandma to play with or against her grandchild. But seniors don't want to be blown away in a game, children, on the other hand, want something challenging to play. We are looking for ways to apply *asymmetrical game design*, in which other demands are made of the player who must revalidate than of the younger child. You can compare it to golf, in which handicaps are used to enable competent and less competent players to play together. To create a fun and challenging game environment for all parties is

highly relevant since only then the grandchild will invite grandma to play a game.

What other possibilities do you see in the future?
I think games will increasingly become a part of daily life by adding elements of play to work, sport, cooking food or cleaning. I especially see mixed-reality games developing in which healthy physical exercise generate benefits within the game. For example, by connecting your step counter app to your computer, you receive better swords or new shields. In this way the game world and the ordinary world cross borders.

The 'virtualization' of real life and the 'realization' of virtual life offer many possibilities, also for seniors. With augmented reality technology on your mobile phone, a virtual layer of information will float above reality: *social tagging*. A senior, walking in Eindhoven, can thus add historical information to locations; 'in 1944 there were tanks here and this building lay in ruins, this building used to be...' This is interesting for children during a school trip, for instance, and it is a nice way to actively involve seniors in games.

The senior becomes a producer of game content?
Yes, seniors have fascinating stories to tell. Unfortunately they are often put into the passive

role of the consumer. In today's society seniors are pushed towards its fringes. We take care of them but they shouldn't cause too much inconvenience. In this way they are marginalized socially even though they have life experience and stories to share.

Can games play a role in this?

Young people are interested in the experiences of seniors but it needs to be presented in a captivating way. A video in which grandma tells her story is perhaps not so appealing to a child nowadays; it is a bit too linear. If you make that story visual and interactive, the experiences of grandma come to life. It becomes easier to empathize, after walking in her shoes for a short while.

Creating shared experiences is extremely valuable since the need for social contact is so essential to people. We do, however, often miss a socially accepted reason to help us over the threshold of making contact. In this context, the American sociologist William Whyte introduced the concept of *'triangulation'.* This term describes the phenomenon of two strangers talking to each other in the street due to a so called 'third object'; a dog, a car accident, a new statue or a juggling clown. This principle can also be utilized with new technological possibilities. Imagine tagging a house which used to be the home of the now elderly PSV football player Ruud van Nistelrooij. Two passers-by, by choice open to this kind of thing and who are coincidentally both club members of PSV, could be linked to one another. Like-minded spirits can thus be brought together. This is also possible with *familiar strangers*, people you may recognize but whom you don't know. For instance, people you see in the train regularly or in the supermarket. It is possible to connect these people with game technology and game principles. Play thus becomes an 'excuse' for social interaction.

What are the implications for the design of these kind of games?

At the moment we see too much game-centric design. There is too much fuss about the game itself whereas it should simply be about creating meaningful experiences. It is relevant to know that seniors who play a game tend to talk about it extensively afterwards. The game becomes a social object, a topic of conversation connecting people. Since the physical and social context in which a game is played is relevant, it is important to take this into account when designing a game.

To conclude, what inspires you personally on this subject?

Recently I read the book 'Infinite Reality' by Jim Blascovich and Jeremy Bailenson. The authors describe the impact of virtual reality on our lives in popular scientific terms. The question of how technology effects us is, after all, just as interesting as the question of what we do with it. Technology is never neutral, it changes the way we think, what we do, what we feel. It's an interesting book to read since changing physical en social parameters is much easier in virtual reality than in our day-to-day reality and in so doing, we can observe the consequences of these changes.

Infinite Reality

www.infinitereality.org

GUIDO BAND AND JESSE VAN MUIJDEN

Guido Band and Jesse van Muijden both work at the Faculty of Social Sciences (Institute Psychology, Section Cognitive Psychology) of the University of Leiden as associate professor and PhD student

GUIDO BAND

JESSE VAN MUIJDEN

RESEARCHING THE EFFECTIVENESS OF GAMES WITH SENIORS

How did you turn to the combination of games and seniors?

Guido Band: On the one hand I was interested in ageing and on the other in doing double task skills. A double task is a combination of two unconnected tasks, for example, driving a car and talking on the phone. They both need attention which is something seniors have trouble doing. Research showed that playing video games has a positive effect on the double task performances of young adults. Looking into the literature on the subject, it turned out that the effects of games have been being researched in cognitive psychology since 2005. The research showed positive connections between playing games and things such as attention, pace and perceptual processes. This always concerned research with young adults, however. Due to my interest in seniors, I began an investigation into existing research on this target group in relation to games.

And?

There were some interesting lines of approach but often these were not scientifically supported. I could not draw any conclusions on the basis of existing research. So this was a good reason to research the subject in the first place. There seemed to be a lot of unfounded claims of effectiveness on websites and products for brain training. 'Play keeps the brain fit' is often heard from a brain research perspective, or the motto *'Use it or lose it.'* The research done prior to these kind of statements often falls short, however. It is just too easy to claim that if we put seniors behind the computer, everything will turn out fine.

If games have a positive effect on the cognitive skills of seniors, there are many benefits to gain, especially within the context of the rise in ageing population. This should be researched properly by determining if performances really improve in daily life due to the games played.

Jesse, what is your link with games and seniors?
Jesse van Muijden: I have a background in cognitive psychology and cognitive neuroscience. My specialization is perception and goal-oriented action. Amongst other things, I was involved in a project in which seniors after having a stroke, learnt to walk again and at the same time, pay attention to obstacles. This is a very practical example of a double task. A lot of people lose their independence after falling, breaking something and consequently losing their mobility. This research is therefore socially very relevant. The project is also theoretically challenging for that matter.

How did you set up the project?
We develop our own games. These games are reasonably simple; we put a strong emphasis

PROJECT 'DO VIDEO GAMES KEEP THE BRAIN YOUNG'?

Old age inevitably affects cognitive flexibility and working memory capacity, which is a growing problem for the ageing society and the individual. Cognitive training can slow down decay, but is experienced as aversive. In contrast, dedicated computer games may protect against cognitive decline, while being entertaining. Unfortunately, there is an alarming lack of effectiveness studies of these games. The current project performs a randomized controlled intervention study into the trainability of working memory capacity and cognitive control in older adults (age 65-75 years). Behavioral and psychophysiological measures are recorded before and after a ten-week gaming period, and in follow-up sessions.

For more information:
http://hersentraining.fsw.leidenuniv.nl/ [in Dutch]

on the player's cognitive control and working memory. Cognitive control is a group of functions that makes sure the brain does what is needed to do a task at a particular moment in time. People are very capable of taking action according to a specific routine. Once a task is new, however, cognitive control is called upon. As one grows older however, this becomes more difficult. Working memory is a bit like a computer: all the information needed to do a task must be ready at the right moment. Cognitive control and working memory are important because they have a central coordinating role. To achieve improvements in this area could have implications for a bigger and broader terrain. It happens to be that the most significant changes can be measured in precisely these two cognitive areas. So we have a good chance of achieving success by directing our efforts on to this.

Where are you in your research project? Is it possible to draw a few initial conclusions?
Band: We found one effect; an improvement in the inhibitory control; the control over locomotion. For this we asked someone to choose between two options, pressing either left or right. As soon as you start to press the button, however, you suddenly hear a sound implying: no, don't press the button. With this task one can measure how quick the brain is able to restrain itself. The group that plays the most games shows a better score in this.

There are also a few other more modest results in improving the scores for intelligence tests. Though perhaps not significant enough to put forward as a conclusion of the research, these findings are promising. At this point, we would like to take these preliminary results a step further.

How?
Firstly, by making the games more appealing and challenging. In this way we can engage people more fully so that they are playing at the limits of their capabilities. As soon as players are stuck in a certain pattern, they learn less, so games need to continually create surprise. As a player it is also important to play a variety of games.

What is the next step?
Van Muijden: We want to research the effects of playing games in the long term. We want to test players prior to playing and directly afterwards. If positive effects are found, we would like to follow the players for two years to see if they can maintain the achieved improvements.

Band: The measurements take place in lab conditions which is, by definition, small-scale. To test a hundred seniors is already quite an achievement. We want to research this on a much larger scale and include people from all over the country. Once we are able to test more people, significant conclusions can be made and we can do more justice to the diversity of seniors. In doing so, we can differentiate. There is a good chance that seniors who are not very active cannot be compared to overly active and fit seniors.

What do you want to include in the research?
Depending on how the research develops and who participates in it, we can start to measure more things. At first we want to measure cognitive performances. But it is also relevant to research changes in the brain. With EEG-measurements we can measure which processes take place in which parts of the brain and how efficiently this takes place. A next step could be working together with other researchers using MRI scans. Perhaps, by playing games which demand more of the coordinating function of certain parts of the brain, new 'paths' can be made or recovered between different areas of the brain.

We have even been doing research into genetics. In a first run we took DNA material of 80 seniors to find out if the susceptibility to the effects of games can be linked to genetic differences. There are many chemical reactions in the brain that generate the production of new connections between neurons. Substantial differences between individuals on a genetic level exist and can be easily determined in a lab. Those differences influence the extent to which one can predict an individual's benefits through playing games. If people have the 'wrong variation' of

genetic make-up, they do not benefit at all, if they have the 'right variation' they benefit all the more.

How do you see the future?
If education and health care would make more use of games, I can imagine that the government will offer more targeted support. Only evidence based games and methods will be used. Scientists can play an important role in researching and supporting the claims of effectiveness. This means that scientists and business should work together. Scientists cannot always keep pace with relevant technological developments, needed for their research. Game developers do keep up with new technological developments and they have the ability to use them creatively, something universities often lack.

Games in which the rules change continually are the most effective

Van Muijden: The idea is to create an inter-disciplinary field in which all kinds of crossovers take place. We don't want developers acting like psychologists saying: 'this is how the brain works and we will influence it this way in a game' and we don't want scientists thinking they can design fun games either.

It is not easy to integrate the expertise of all parties involved. The process of developing a game and the pace of scientific processes differs enormously. Furthermore, when doing research on the brain, we want to include as many perspectives as possible; this means one is dealing with all kinds of knowledge from very different disciplines.

Our research is further complicated by the fact that interface design is not just the game designer's business. Interface design is an essential part of game design and it genuinely contributes to the

effectiveness of the game. Scientists working in the field must therefore be involved with the interface design.

In general, are there games that work and games that do not?

Band: Literature shows there is much to be expected from games in which players are continually kept on the ball; checking danger coming from left or right, or having to change weapon quickly. First person shooters appear to be more effective than puzzle games in which players do only one task for a longer time without any pressure. Players are not challenged enough then. Games in which the rules change continually are the most effective, as research now shows.

But again, much more research is needed. Games for the iPhone, the Wii or games using Kinect have also not been researched enough yet.

Is the game's effectiveness influenced by the age of the player?

Every new generation is able to appropriate with new technologies. I don't think we need to worry that people who have not grown up with games, will not be able to deal with them and use them to their own advantage. The game industry obviously works hard to keep games as accessible as possible. Usability still increases with ever more appealing game-formats, good interfaces, and design which connects to the experience of the player.

Van Muijden: When discussing seniors and the future, you are actually talking about the present babyboomers. They have most probably already worked with computers at their jobs. This does not apply for people who are in their eighties now; they don't know what an address bar is, for example.

What kind of games will seniors like to play in the future?

Band: I think they will like games that are largely a continuation of what they already like to play. If people don't like going out in the first place, they will want to play games at home. If they enjoy going to clubs, they will prefer more social games. Needs are reasonably stable. By improving game design we can meet more needs with a game. I also expect to see more games for specific target groups. There will no longer be games for everyone who is 65 or older but games that are, for example, specifically targeted at people who like to travel with a caravan in the Provence. This kind of branching of target groups will increase, connecting personal profiles to specific needs.

There are genetic differences which predict the extent to which an individual benefits from playing games

Van Muijden: I think there will be a lot of changes in the physical interaction between game and player. Gaming will be far less limited to a specific location in the future, due to the potential of technologies such as augmented reality and the mobility of electronic equipment. Games will become increasingly integrated into daily life, as long as this does not jeopardize people's privacy and free will.

Anti-aging and health aging
http://tinyurl.com/3znq7cq

Example anti-aging clinic
http://tinyurl.com/3rmnq68

Final question: what inspires you personally?

Band: Anti-ageing clinics are popping up in the USA in which different perspectives on healthy ageing are mixed together. People are checked medically and receive advice and treatments for a healthy life. Gaming is just one of the perspectives used. I think this is wise since we shouldn't have the illusion that gaming can solve all ageing issues. It is more about seeing the big picture.

Van Muijden: I have recently read some interesting publications on how our brains are growing weaker because we hardly have to remember anything anymore. We can look everything up on the internet. I think this is relevant since the idea that we will only have enough neurons to find a computer in the future, thus living our lives as snails, is a rather scary scenario to me!

How computers can harm your children's future by damaging their brains

http://tinyurl.com/m59gnj

LAURA EGGERMONT

Dr Laura Eggermont is a researcher at the department of Clinical Neuropsychology at the VU University Amsterdam. She presented her talk on the relationship between movement and functions of the brain at the STT symposium 'Play On' on the 18th of January 2011

NOT MOVING IS DISASTROUS FOR THE BRAIN!

It used to be assumed that the brain was 'finished' at some point without further development. Nowadays we know that the brain retains its plasticity and that new brain cells are produced up to a very advanced age. We also know more about the relationship between movement and certain functions of the brain. Research shows a positive relationship between movement and cognitive functioning over a whole life span: childhood, adolescence, middle age and old age. The more people move, the better people function cognitively, for example, with regard to memory and attention.

Movement leads to the secretion of chemicals (neurotrofines), creating a favourable climate for brain cells to develop and form new neuronal networks. Neurotrofines not only support existing neurons but also stimulate the production and growth of new neurons and connections between areas in the brain and development of new brain circuits.

Since ageing is accompanied by the shrinking of certain parts of the brain (accompanied by less activity in these parts) the plasticity and pliability of the brain should be exploited for as long as

possible. Research shows that the frontal areas of the brain play an important role in complex functions of the brain such as taking initiative, planning, flexibility, attention and inhibition (restraint). Maintaining these kind of functions not only matters for simple tasks such as making coffee. They also prevent seniors giving in to depression, which diminishes the capacity to take initiative and causes apathy to set in. Consequently, it becomes even more difficult to motivate oneself to take action. Physical activity therefore helps slow down the decline of cells in important areas of the senior's brain.

An increasing number of studies shows that people who are physically active run less risk of developing dementia. They also exhibit less cognitive disorders. Although a direct causal relation has not yet been proven, there is without doubt a connection. What we can confidently claim is that *not* moving is disastrous for the brain.

As is often seen in nursing homes, the negative consequences of not moving have an amplifying effect. Seniors with behavioural issues (restless or aggressive behaviour) are sometimes fixated to prevent problems, such as falling. The problematic behaviour might, however, have to do with a *lack* of movement, making the problem worse by fixating the senior in question. The frontal part of the brain doesn't get stimulated enough, causing an increasing lack in restraint which only makes the senior in question more restless. Practical and organizational objections often stand in the way of making sure the seniors in question receive guided movement: there is not enough staff to assist with physical activities or have a stroll in the park. Due to this shortage in staff, people in nursing homes are sometimes in bed for a stretch of 17 hours a day. Staff has limited options but as a result the much needed stimulation of the brain does not take place.

JORIS WIERSINGA

Joris Wiersinga started SilverFit together with Maaike Dekkers-Duijts. The company develops systems for 'virtual training'. SilverFit is primarily oriented towards rehabilitating seniors. For more information: www.silverfit.nl

REHABILITATION WITH A FUN FACTOR

Games and seniors?
SilverFit makes games for seniors who are fragile or who have had an incident; for example a stroke, having a broken hip, people with Alzheimer or Parkinson. Very fragile people. For many of them it is important to move regularly but in practice, they hardly move at all. This also applies for people in nursing homes, where seniors sit down most of the time waiting for something to happen. Rehabilitation exercises are often difficult and boring, so with our games we want to motivate people to do their exercises for recovery and we see that it really works.

How big is the problem?
These days many people live independently for a much longer time. To lose one's independence after a fall or stroke, to not be able to get dressed or wash oneself, is a big loss. Moving into a nursing home implies that you are a patient, reliant on the care of others. A lot of people experience some degree of depression, thus finding it difficult to muster the energy for rehabilitation exercises, even though these will help them to return to a healthy life. There is little support in this difficult phase in

assisting people to confront the problems they are faced with.

What does gaming have to offer in this?
Games give people the feeling that there is something new to discover. It is often the first time our target group has played a computer game. Play is a fun way of giving the senior responsibility in his or her own process of recovery. One can determine objectives, just like in normal games. What do I want to achieve, which score did I have last time, can I improve this time? This approach has a completely different effect than telling someone 'put your hand on the table and move it forwards like this.'

Are they games or exercises?
We call them exercises based on game technology. By calling it a game, it is possible to go beyond the medical relevance. In the Netherlands, the word 'game' is used but in the United States, where we also work, the term *geriatric exercise* is used instead. It is important not to give the impression that you are just offering games to play, especially when talking to insurance companies.

Can people use your games by themselves?
They have been designed to use independently. At the same time, a supervising therapist should always be present. Many of the exercises challenge their players to the best they are capable of. The therapist must therefore watch that the player does not fall, for instance. This is very different from what we were used to. Without the games, the challenge lies in motivating people to make the movements. With the games you occasionally have to say 'perhaps you should take a rest now?' since people sometimes go too far.

What kind of games are we talking about?
Exercise is the first priority. A common exercise, for example, is the sit-to-stand. For this we developed a game that relates to what people like, for example Bingo. You watch a screen with numbers and if your number is drawn, you have to stand up. In this way, a lot of sitting and standing is exercised in a sensible way.

How does this work?
The movements we want the seniors to make are *evidence based* or at least *experience based*. We base our games on evidence in scientific research or, if this is not yet available, on the physiotherapist's experience in treatment. In the game we reproduce an exercise. Step by step, taking both the level and progress of the player into account. So when playing Bingo Mr Brown only has to lean forward while Mrs Robinson has to finish the whole exercise of sit-to-stand.

How do you make the game fun from the perspective of the players?
Motivating people is what it's all about and we do this by using game principles. What are the useful and fun elements of play, tried and tested in existing good games? It is also important to find a theme the target group likes. By discussing this with the target group, it may be Bingo, garden walks or something that has to do with history. It is very important to organize test sessions to find out what works and what doesn't.

Are games for seniors essentially different from other games?
I think specific themes may be linked to certain age groups, mechanisms of play. However, they are universal. There is quite an overlap between what young and old people find boring or fun. I don't think seniors necessarily want to work together in a game or that young people are always looking for more competitive elements. I see a lot of competitive behaviour with seniors, only they approach it in a more cooperative manner; for instance, by offering to show how to play the game and thus showing off a bit.

Seniors exhibit competitive behaviour in a more cooperative approach

Is a social dimension important?
Our equipment is located in special practice rooms so people are always aware of what *other* people are doing around them. Practising thus becomes a social activity. Is the other managing? How should I approach it? Maybe I should help out? We take these kind of things into account when designing a game. We put some elements in a game just because we know that other people will be watching it. Funny figures on the screen are fun to watch, even though the player may not notice them at all. The one watching becomes enthusiastic and may be the next player.

How many of these products are there?
Game technology is not used much yet for exercising with vulnerable seniors. Although a lot of research is being done, there are not so many products yet.

And what about the Wii?
We sometimes joke that once people have played with the Wii, they want to buy a SilverFit. The Wii stimulates and triggers people to activate themselves. The Wii does not, however, deliver

for our target group; it doesn't offer the right movements, the right level or the right interaction.

Why aren't more companies developing these kinds of products?
It is not easy to market these products. Firstly, fragile seniors are simply not an appealing target group for a lot of people. Games helping children to fight obesity, for instance, are much more popular. If you say in the pub that you develop games for nursing homes, people give you a funny look, saying 'ah ok...'

It is a difficult market. It is important to know how nursing homes are run and how decisions are made. Things take a long time and finances are slow in coming since many small parties are involved. Sometimes very complex financing constructions are necessary. It is important to keep working at it, the more so since there are no standard mechanisms or standard answers in this field.

And the insurance companies?
The SilverFit systems yield money, in the sense that it is possible to exercise effectively using less hours of therapy. This befits the present state of care in which therapists must deal with a lot more patients at the same time instead of one to one. It is tricky though, since the business case of our target group of vulnerable seniors is difficult to pitch. In the case of someone having to return to work it is clear where the advantages of a shorter period of therapy lie. With seniors these calculations are more complex; what, after all is gained at the end? Successful recovery may lead to a higher life expectancy. Just looking at the money, you could say that if people grow older they also make more expenses when it comes to (medical) care. You have to make clear that if people do more exercises they won't need care for a substantially longer period. But marketing the advantages of preventive care is not easy.

SCORE
0030

SCORE
0031

LEVEL
PLAY ON

PROGRESS

The business case for seniors is not easy to make because more expenses for (medical) care are made as people grow older

Then how do you market games like these?

Things would change dramatically once an interested party says 'we value the quality of life and we think Mrs Brown should be able to get dressed herself.' This is a very different perspective and it could also be the reason a nursing home says: 'Yes this is something we want and that's why we are going to invest in this.'

And the consumer market?

The costs in nursing homes can be spread out over a large amount of residents using the installations. This is very different for individual users at home. Since people view this kind of thing as health care costs, they expect insurance companies to reimburse the costs. Insurance companies, however, make their own considerations.

It's not so simple…

No it isn't simple but this applies to the whole Serious Gaming project. The important question is how to market it. People often think 'If we make a game of it, it will sell' but that's simply not true. Developing a game doesn't mean that it will be purchased straight away or that people in a nursing home will automatically play the game. Even a popular entertainment game like *Call of Duty* didn't sell by itself, tens of millions were spent on marketing. But once people start playing the game and they like it, you can seize the target group.

What does the future hold in this respect?

Game technology will soon be integrated in physiotherapy equipment since it is so motivating to do exercises enriched with game elements. This is already happening now sporadically but this will improve. The popularity of say, jogging on a treadmill, cycling or doing leg presses will, no doubt, grow once these activities take place in a play environment.

Doesn't the novelty value wear off at some point?

Of course people will want to play something else after a while. But it all depends on what you compare it to. The games we make do not compete with say drinking a cup of tea with your neighbour. That is obviously more fun. Our games compete with difficult and boring exercises in a recovery room. Some people, especially those who have always done sports, don't need the games. For many people, however, physiotherapy is top-class sport. We may not offer them an unforgettable experience but we can make the necessary exercises fun.

Do you see a new generation of these kind of games developing? What kind of possibilities are there?

Our games focus purely on motivation: they make it more fun to do movements that contribute to the recovery of certain neurological paths. But there are researchers who suggest that strong virtual reality can support the recovery of a paralyzed hand without actually moving it. Mirror neurons make it possible to see your own 'virtually recovered hand' move, and this consequently supports its actual recovery. If this is true, a lot is to be gained from this kind of virtual reality.

Mirror neurons

http://nl.wikipedia.org/wiki/Spiegelneuron (in Dutch)

And a little closer to home?

Rehabilitation is about functional actions. We strive to help people go about their own business, in the kitchen for example. So we reproduce a kitchen. Your kitchen is different than mine, however. Once a recovery environment can be personalized virtually in an affordable manner, we can make a step towards tailored forms of recovery.

The duration of the exercise is another important factor. Rehabilitation still means doing a series of exercises which can sometimes last for over an hour. It can be more effective, however, to do the exercises for five minutes every hour. For this reason we are investigating the possibilities of integrating rehabilitation into day-to-day routines. For instance by using wearable sensor technologies which track the sit-to-stand movements you make during a day, checking if you are doing them properly.

A game might not offer an unforgettable experience but it can make necessary exercises more fun

Can augmented reality contribute to the field?

With augmented reality you add things to reality which are not there. This can be confusing, especially for people who have psychogeriatric problems. But it can also be used to create a trusted environment. Cycling in your own neighbourhood, for example, but then virtually. This is already possible with Google Streetview. The quality of the images is not great yet and the movements are a bit square but the potential is definitely there. This is another example of personalization, of finding a good fit between the real world and the people themselves.

What inspires you personally?

SilverFit stems largely from frustration. Frustration about how much should be improved in nursing homes. Without doubt the staff does their best but there are so many things that could be better. The Dutch book 'En in het uur van onze dood' (In the hour of our dying) by Ardy Stegerman, for example, is about abuse of demented seniors in health care. SilverFit really wants to make a difference and we can do this with serious games. If I find out tomorrow that all I have to do is put flowers on the tables of all the nursery homes to achieve the same result, I would be the first to do so.

'En in het uur van onze dood, Ardy Stegerman' (in Dutch)

http://tinyurl.com/3l2zhmx

SABINE WILDEVUUR

Sabine Wildevuur is head of the Creative Care Lab at the Waag Society. For more information see: www.waag.org

GAMING AS A MEANS, NEVER AN OBJECTIVE IN ITSELF

Is gaming important to Waag Society?

Very much so. Waag Society develops technology for social innovations. The user is always central to this approach. We start with the question: What are the user's needs or problems? From there we look at how technology can play a role. The possibilities of gaming have been part of this for some years now: we use principles of play with a variety of technologies. For games there are many opportunities in education and in health care. Applications in the last category seem endless: from behavioral disturbances to autism, from treating burns to preventing loneliness.

Waag Society is working on a pilot for health care called Scottie, as part of the research program GATE (Game research for Training and Entertainment). Scottie is a serious game which can be used to encourage solidarity amongst its users. Scottie was first meant for children who were away from home for a while, because they have to stay in a hospital, for example. The concept was to connect the children to home in a playful way, other than by phone. It is about an implicit and intuitive way of communicating; we are

doing research on which principles of play support this form of communication. After doing a test with seniors, it turned out that Scottie seemed to really catch on with this target group too.

Besides this, we are developing a game together with seniors on the theme of loneliness. The game is called *Play with your Life!* It is part of Express to Connect, a European project that focuses on reducing feelings of loneliness with seniors and enriching their life. To begin with, we want to strengthen existing relationships with family, friends and acquaintances, through the game.

For what age is 'Play with your Life' specifically targeted?

We start from the age people retire since this is a phase of many changes. Once people stop working, they often experience a decline in social contacts. In addition changes can be triggered by physical or mental limitations or by the loss of loved ones. These kind of 'discontinuities' occur more often after people have stopped working. But one can't generalize when it comes to seniors. *'The'* senior does not exist but elderly people do share certain phases.

Scottie: maintaining personal relations over some distance (in Dutch)

http://www.waag.org/project/scottie

Express to connect: prevent older people to become lonely and enrich their lives (in Dutch) http://www.waag.org/project/expresstoconnect

What are your ambitions with this project?

The project has many objectives. Loneliness relates to physical and mental problems, so to curb loneliness is a form of preventative health care. If people are less lonely, they will make less use of the medical system. In addition they are happier, which is also relevant of course.

How have you set up the project?

As I said earlier, the user is central to our projects. Seniors are actively involved in the whole design process. We call this: *users as designers*. In the process we make an attempt to connect to what people can still do instead of starting from their limitations.

In an earlier project, we were struck by the power of stories. To tell a story, you have to recall your memories, thus triggering memory in the brain. Reminiscence is important for seniors and it is often used in nursing homes. Stories also connect people to each other; one story triggers another one. We see stories as a way to bring people together and this concept has been included in *Play with Your Life!*

But it is a game?

We do not focus on the term game. It is important to keep check of the objective, not the means. We first ask the question 'What do I want to achieve?' and then 'Do games offer possibilities to achieve this?' For this project, we think they do.

Curbing loneliness is a form of preventative health care

How is the game being developed?

Many parties are involved in developing the game; each one with his /her own interests and stakes. Parties include sponsors, scientists, game designers, users. It is quite a complex process. Obviously it is important to at least have some knowledge of the subject: in this case seniors and the issues they are faced with. It is very important not to stigmatize; you don't want to develop a product that is blatantly meant for old people. Like the special telephone for seniors with the big buttons. By implementing *inclusive design* principles in products – they can be used by everyone – in this way we try to reach a broad group of people. Furthermore, it is very important to do a lot of testing. To see if your presumptions are correct or to see if you are on the right track. In this way you won't add content which is not interesting to the target group.

Where do we stand in serious gaming?

We know more and more about the effects of using games. The treatment of burns is supported by the serious game SnowWorld which uses virtual reality. Brain research with an fMRI-scan shows that doing this leads to less irritation of the painful area by using virtual reality.

Cyber-psychiatry is also developing fast. It is employed, for instance, by using virtual reality to treat people with a phobia, or as therapy for people with social behavioural issues.

Virtual environments have added value since you can practice new behaviour in a realistic environment but without the disadvantages of doing this in the real world.

The serious game SnowWorld is used for treating burns, leading to less irritation of the painful area by using virtual reality

There will be new technologies which help to increase the quality of this kind of therapy. But more importantly, technologies will become cheaper and more accessible. If, for instance, the price of virtual reality applications drops, such game-based interventions will be much easier to realize in the future.

And what does the future bring?
The future will be largely determined by making use of the possibilities available now. Play is deeply embedded into every culture and technology offers possibilities to do something with this.
The most important challenge of the future is to

realize the potential of technological possibilities in the benefit of the user. We live in a world in which 'all things' – sensor technology, RFID (radio frequency identification) and surveillance cameras are connected to one another: the Internet of Things. We are continually under surveillance but what if we can use the power of the Internet of Things for our own needs? What if, say, you are allergic to peanuts. This information can be translated as a stop signal to your augmented reality device telling you not to buy the product you just picked off the shelf.

But that's not really a game…
I think it is important not to try to turn everything into a game; the so called 'gamification' of the world. Don't build games for the sake of building games. The game should have an objective. What are the needs of people and which role can a game or game elements play in this? It sometimes helps to approach things more playfully. In other situations the power of games can divert the player's attention by offering him an alternative world; for instance when treating people with serious burns. Yet in other cases, a simple game principle like a reward can be used to change people's behaviour.

What do you foresee in the future?
You can see a reoccurring pattern in the medical sector in which people are overly enthusiastic at first, and then become disappointed as high expectations have not been met and finally they become optimistic due to unforeseen but successful applications. I suspect this will also apply for serious games. In ten years we will also conclude: 'this is not quite what we envisioned but it's great we achieved this!' There are so many things going on in serious gaming, I cannot imagine that nothing good will come out of it.

A last question; what is your personal inspiration when it comes to seniors and games?
I am not a gamer myself but I am inspired by the fact that seniors are supported by games which make their lives more pleasant. Not just for fun but in a useful sense. I saw a fascinating film of a man with Parkinson. In the first part of the film

you see that the man can hardly walk; he is shaking intensely. In part 2 you see the man sitting on a bike; someone gives him a gentle push and he cycles off all by himself. Without any help! Starting from this more research has been done into cycling as a way to control the extreme shaking of Parkinson

patients. I think this is a good example of how you can find a playful way of relating to people's abilities by not focusing solely on their limitations.

Breakthrough in Parkinson research (in Dutch)

http://tinyurl.com/332kkwu
http://tinyurl.com/43mzux6

SANDER BAKKES

Sander Bakkes is a researcher in IT and health care at the CREATE-IT Applied Research knowledge centre of Amsterdam University of Applied Sciences. For more information: www.create-it.hva.nl and http://sander.landofsand.com

ARTIFICIAL INTELLIGENCE AND THE ACCEPTANCE OF GAMES

How do games and seniors combine for you?

In two ways really. While doing my PhD on artificial intelligence in games, I researched how to make games more personal by adapting them to individuals. These games not only take the player's cognitive and motor control capacities into account but they can also conclude, on the basis of his behaviour during the game, that a player reacts cautiously or anxiously in situation X or Y. Since games are still unfamiliar to many seniors, personalization brings the game closer to them. This can help in making seniors more receptive to the positive aspects of gaming.

At the CREATE-IT we are also interested in how smart technologies might enrich our work and living environment. We focus especially on care, on how to create an environment which makes people feel safe and at ease. A house which feels good to dwell in. So on the one hand we are researching the possibilities of sensor technology and on the other hand, we are interested in opportunities through gaming. Using principles of play to trigger and support social interaction, for example, between people who live in the same apartment block.

Where do we stand when it comes to personalization through artificial intelligence?

In reality not very far. The characters in a game are usually pre-programmed as in 'if this happens, than that happens.' But as soon as an environment becomes more complex, it is harder to apply this rule in a realistic manner. The learning ability of programmed game characters is very limited as they do not learn from their mistakes: a character still shows the same behaviour, follows the same pattern, simply because it has been pre-programmed to do so. Millions are invested into the development of games, still the player is vexed by the huge contrast between a world that looks super realistic and characters that continue to walk against the walls.

The game's visually enticing reality simply implodes. If a game does not adapt to the behaviour, progress and preferences of a player, he will maintain a distance without making the game 'his own'.

Does artificial intelligence have benefits for health care issues?

Certainly. Sensor technology can help track behaviour. You can see how much someone moves and where he or she goes to or doesn't go to. If you connect this information to someone's medical history, this can produce useful information. But how to use this? This kind of data is still sent to the medical specialist who concludes that somebody who is overweight should move more. We want to move towards a situation in which this kind of valuable information is given back to the person in question; as a positive challenge to take action. This triggers both self-efficacy and self-management. An intelligent system could then make the connections between somebody's personal history, current measurements and suggestions for desired behaviour.

Won't people experience this as a deterioration of care?

That depends on how innovating health care is approached. If costs and efficiency are primary and you are only looking for ways to replace personal contact with systems, then people will not be particularly enthusiastic. We know, however, that people react positively to systems like this if it enables them to influence and control the care they receive; 'the system can see I am ok, so the help at home needn't come for a while and my family is not worried about me.'

The extent to which someone is open to advice from a life coach may be age related. But as generations start to grow up with these kind of possibilities and technologies are improved, I think there will be more acceptance of these kind of things in the future.

How do you introduce these kind of innovations practically speaking?

You don't want users to feel that innovations have been forced upon them. Sensors can really make a difference in the care seniors receive but seniors don't always want to use them. There is a low acceptance of sensors since people feel they are being watched. And not without reason. Choosing intelligent care technology means taking the perception of the user into account. You have to make sure the user sees the innovation as something pleasant, as added value instead of an interference. A lot of seniors like the idea that they are not left to fend for themselves; there can be some kind of monitoring as long as it is not too obvious. Small, almost invisible sensors that can hardly be seen are a great improvement.

If you are only looking for ways to replace personal contact with systems, people will not be particularly enthusiastic to use these innovations

This also applies for games. On the one hand games should really fit the user by making use of personalization. It should be accessible since seniors are prone to giving up sooner than young people. On the other hand seniors often feel they are not taken seriously. Paternalistic games are not appreciated. It is important to launch the game properly; not too forced as in 'thou shalt play' but by enriching an environment in such a way that people feel motivated to do something with the possibilities at hand.

So no technology push then ..
Forcing all kinds of new technologies onto people, in the hope that they will appeal to users, has rarely been successful.

Even so, do you have high expectations of certain technologies for the future?
Obviously there are some exciting new developments, such as mixed reality in combination with mobile computing. This offers opportunities to move away from a static game environment such as playing behind a computer. If the next generation of games means you can put an extra layer of information on top of the world by means of a high-tech contact lens, I see many possibilities for the future. Mixed reality games, in which the real world overlaps with the fictive world, could potentially work out very well. The world around us could suddenly become a game environment in which all kinds of physical tasks can be done; this could create a really nice and fun way for people (consciously or not) to get moving. A game may also invite you to play together with others which could provide a welcome incentive to make more

social contacts. This may only be limited to the duration of the game but who knows, the contact might have a follow-up in real life.

Last question: what is your personal inspiration for your work?
Perhaps you know the Italian film 'Cinema Paradiso'? The film is a beautiful portrait of the nineteen-forties, about a boy who discovers the projector room of a small cinema. He becomes fascinated with film and is swept away by the friendships and love affairs in the stories. The film shows that technology is not cold and that it can provoke sincere feelings. I try to keep this perspective on my work by joining projects that cherish a feeling of the romantic ivory tower for scientific 'bricolage' and everything around it. Passionate, a touch of isolationism and above all, looking to be useful on the long-term.

© Cinema Paradiso

GAMES FOR THE PHYSICAL WELLBEING OF SENIORS: SPECIFIC IDEAS

On the 18th of January 2011 STT organized the symposium *Play On: Gaming for a new Generation of Seniors*, together with the expertise centre Games and Game-Design (EGG) and Taskforce Innovation Utrecht (TFI). The aim of this symposium was to explore the question of how gaming can contribute to the physical and social wellbeing of seniors in the future.

In the symposium we addressed two crucial aspects of healthy ageing; physical exercise on a regular basis and good social contacts. The need to go outside becomes less since seniors are able to live at home for a longer time (domotics, telecare, telemedicine, sensor technology etc) and more things can be organized from your home. Notwithstanding the obvious advantages, this could also cause a decline in physical movement and social contacts.

With these risks in mind, the aim of the symposium was to investigate how *game mechanics* and new generations of *enabling game technologies* can contribute to seniors going out more.

After a plenary morning with presentations by Jenny Gierveld (the new generation of seniors), Laura Eggermont (the relationship between movement and cognitive functions) and Tim Laning (the combination games and health care), the afternoon consisted of workshops in which participants were asked to devise game-based solutions for specific issues. Fictitious seniors were central to each case, each with his or her background, home and health situation, quality of one's social network etc. The cases came from parties who hosted the 'Play On' workshops: iZovator, Utrecht School of the Arts, Habion,

The Dutch Red Cross (district The Hague), Waag Society, Technology Trial Centre, Brevidius and the Center for Media & Health together with the National Senior Trust. To help participants acquaint themselves with the possibilities of the future, cards were used with descriptions of proven game mechanics and images of next generation enabling technologies.

THE INTERNET OF THINGS

Everything, from keys to fridges and from clothes to people is connected to the internet. Everything communicates with everything. Obviously everything is location-based

IMMERSION

A player who is completely immersed in a game loses his critical distance and becomes emotionally involved

SURPRISE!

Use the curiosity of the participants to surprise them unexpectedly and delight them

CONTROL

People want the illusion of control over their environment, it gives them the feeling they can influence things and make a difference

Golden rules for game design and developments in gaming (in Dutch)

http://www.stt.nl/uploads/documents/217.pdf
http://www.stt.nl/uploads/documents/218.pdf

RESULTS

1. For the senior globe-trotter who risks becoming lonely: one could intensify existing international contacts with the help of augmented reality, in so doing making a far friend close. The desire to keep travelling in spite of limitations can also be granted with the help of virtual reality. The senior in question may extend his social network in his direct local environment on the basis of digitally shared personal interests.

2. For the man from Bulgaria who doesn't make social contacts easily but does like to play cards; a scenario was developed in which playing cards on the computer increasingly becomes a social activity. First he plays cards with the computer, then with other online players. The last step is offline card games with players of the same level. The computer assists the process towards the outside world. In this way, the virtual world forms a step up to the real world.

3. For the widower who wants to share his experience and knowledge with younger generations, a game was devised in which family members are invited to join in and do assignments on geographical locations where a part of the family history has taken place. By playing the game, you get to know more about your own family and due to the shared experience a collective frame of reference starts to develop in which family members can converse with each other on a deeper level.

4. An old lady who has Alzheimer could be helped by a solution promoting self-efficacy. The solution could be a pair of glasses with augmented reality that recognizes daily situations, informs the wearer of the glasses (memory support) and suggests options of action on the basis of experiences and preferences. A play element could be added that stimulates the brain for instance by not giving the name of your neighbour walking towards you but only the first letter of her name.

5. Food – doing the shopping, cooking and having dinner – has a strong social aspect for a lot of people. This process offers the opportunity to bring people together that might be at risk of becoming socially isolated. The concept: people are informed about a collective dinner that evening, recipes are suggested and a favourite recipe is voted for. After that one can do the shopping on a treadmill, passing all the necessary ingredients at the market. This offers safe shopping at your own pace and with the possibility to add elements of play; for example by testing your knowledge of ingredients. A delivery service brings the order home. If someone is not able to be physically present, he or she can still be 'present' at the collective dinner with hologram technology.

6. Active gaming is expected to offer a lot of opportunities for many senior target groups, especially if a social layer is added to this. For example, the relatively fit woman who wants to stay active but who also needs to stay home a lot and look after her ill husband. Or the man who is running health risks due to an unhealthy lifestyle and who would like to move more but needs some help to do so. Or the woman who is afraid to move after having had a heart attack and who doesn't dare to go outside alone. The future could look like this: through an interactive wall you can invite other people into your living room or visit other people to dance or just to have a walk. You are in a familiar physical environment with the possibility to virtually access the good old days.

TIM LANING

Tim Laning is co-founder of Grendel Games which develops both entertainment games and serious games. Grendel Games aspires to motivate people intrinsically to improve themselves and learn more. Grendel Games is involved with *the Healthy Aging through Serious Gaming* (HASeGa) project (see page 48 Northern Polytechnic Leeuwarden). Within this project Grendel Games is developing a game for seniors to train motor skills. The game is about dancing the English Waltz, a dance many seniors have grown up with. The dance is simple but reasonably intense and it strengthens the muscles needed for stability. His presentation can be viewed at: http://tinyurl.com/3rlzcld

The Dutch presentations of all the cases at the STT symposium 'Play On' can be viewed at:

http://tinyurl.com/3p6ndb2

VALENTIJN VISCH, MARIEKE SONNEVELD AND HESTER ANDERIESEN

Valentijn Visch, Marieke Sonneveld and Hester Anderiesen are industrial designers who work at the faculty Industrial Design of the Delft University of Technology. They are involved in the project G-MOTIV, Designing Motivation: Changing Human Behaviour Using Game-Elements. For more information go to: http://crispplatform.nl/projects/g-motiv

INTERACTION DESIGN WITH ELEMENTS OF PLAY

VALENTIJN VISCH

MARIEKE SONNEVELD

HESTER ANDERIESEN

Valentijn Visch: G-MOTIV incorporates motivation in products: how to design products that stimulate people's motivation to change. A lot has been written about the relationship between motivation and education; i.e. about learning. We are especially interested in motivating people to actually change their behaviour. We focus specifically on the possible benefits of elements of play for motivating people.

G-MOTIV consists of three projects with different areas of application. Addiction is central to the first project. This project focuses on mental changes in behaviour. The second project is about encouraging a degree of 'pro-social behaviour' between employees. This concerns social behaviour changes. The last project, Hester's project, concerns the prevention of physical inactivity of seniors living in a health care institution. This projects looks at physical behaviour changes.

Is industrial design as the area in which you work, a natural match with games?
Marieke Sonneveld: G-MOTIV is not about games in itself but about the use of elements of play while the user interacts with the product. Although every designed interaction should make people curious to discover and use the product, this is not yet done by explicitly adding elements of play. But this is only a next natural step in the development of the field. We not only look at the product, but also at its use, context, and interaction. A screwdriver only becomes a screwdriver, for instance, when someone uses it to drive a screw into the wall. If someone opens a can with it, it is a can opener. Nowadays the focus of product design is especially directed to what a product might mean for somebody and what you can do as a designer to seduce people to use a product in a certain way. Bringing motivation into the equation and the role of elements of play as possible motivators fits nicely in this line of development. At the same time, it is the start of something new in the field of industrial design.

Visch: With this in mind it seems quite logical that industrial design and serious gaming cross link one another. Serious gaming may come from a different perspective; its aim is similar, however, focusing on possible changes in behaviour.

What is the focus of the project with seniors living in nursing homes?
Hester Anderiesen: We know that seniors who move to a nursing home often suffer from depression. We focus on what happens in a new environment in which seniors seemingly lose their independence. All of a sudden they can't make their own coffee any more or get dressed themselves, something they were still capable of doing before.

We want to clarify what it means to move to a nursing home and why this is accompanied with inactivity in the new context. For this reason we are investigating which activities people develop at home and how much time they spend doing this. What habits exist before and after moving to a nursing home. We want to find out as much as we can about the situation at home and the situation after the move, to be able to anticipate the changes.

What is the objective in this?
To enable people who move to nursing homes to be more self-reliant in their daily activities for as long as possible.

How do motivation and play fit in?
The relationship between movement and brain activity of seniors has been researched at the VU University Amsterdam. The researchers were interested in finding out more about this relationship by asking seniors to walk for half an hour a day. Many participants quit walking, however, consequently bringing deficiencies into the research data. The researchers needed to find ways of motivating people to keep participating. We were approached to help add elements of play, thus gaining a positive effect on motivation. In this way the two lines of research came together.

Using elements of play is not the same as making activities more fun: it is about triggering motivation

In the third project of G-Motiv, we have started looking for activities seniors enjoy and their motivation for it. We want to place this list of activities next to a list of available game elements, to find out which elements of play one can use to motivate seniors. After that we can start designing possible solutions.

Sonneveld: It is important to remember that using elements of play is not the same as making activities more fun. It is about triggering motivation.

Visch: Creating a challenge is an important motivator to continue doing something. This doesn't necessarily have to be fun. Look at sports, for instance. You want to carry on cycling, even though your legs hurt badly. Gaming appeals to the desire of people to be challenged.

Sonneveld: As said, we are not just interested in games but in the addition of elements of play. We are gaining more experience in this. For instance, coming from a different target group: children with cerebral palsy forget to use their paralyzed arm even though it is important they use it. Parents at home continually have to remind them. As a solution a bracelet has been devised which sends a signal every time the child is in the vicinity of a local opportunity to use his or her paralyzed arm, for instance a door. 'Oh yes, I must use the other arm.' In combination with a pictogram at the door, giving positive feedback to the child, this can be very helpful.

Visch: Another example: carefully using one's energy is an important issue for patients with cancer. We have developed a concept, together with graduate Marloes de Wit, using a bead necklace. One can activate the necklace in the morning by making a planning of activities and assessing the amount of energy and emotional charge of the activities. At the end of the day you can review your settings. By playing with the settings, patients learn how and when to apply their energy in the best possible way.

Back to the group of seniors in nursing homes. Why is movement so important for them?
Anderiesen: In this project it is not so much about the movement itself but moreover the motivation to start moving. We focus on self-efficacy which is a bit like self-confidence; you know that you can do what you want to do. If you can strengthen that feeling, it influences many daily activities. In other words, if you design something so that a senior can take up at least one task, this could provoke a domino-effect as in 'If I can make myself a cup of tea, I could perhaps try to go to the toilet myself again.'

As a resident of a nursing home, many daily activities and chores are taken out of your hands. In practice this means that you are not doing the tasks yourself anymore and after a while you are not able to do them anymore. Such a negative spiral should be put to a halt. There is a lot of loving care in nursing homes but there also is a big gap between the day-to-day practice of health care and what is already common place in thinking about self efficacy and supporting this for as long as possible.

Visch: With G-Motiv we are looking to bridge science and daily practice. We collaborate closely with partners in the field, health care institutions, consultancy bureaus, game developers and researchers coming from industrial design and behavioural sciences. This is the good thing about G-Motiv: everyone contributes with their expertise towards a collective objective.

Last question; what are your personal resources of inspiration when it comes to the future of games / elements of play for seniors? A film, book or article ..
Visch: In the QR below you will find a link to an inspiring film that shows how design can seduce someone to start moving. With relatively simple means, people voluntarily choose the staircase instead of the escalator!

The fun theory: the stairs as piano. Design that seduces you to move (in Dutch)

http://tinyurl.com/yeyjrxz

TILDE BEKKER

Tilde Bekker is assistant professor at the faculty of Industrial Design at the Eindhoven University of Technology. She is also associated with the Capacity group User-Centered Engineering

PLAYFUL PERSUASION

Games and seniors?
I am researching how to seduce people in a playful manner with the aim of provoking certain behavior, *playful persuasion*. Amongst other things we examine how we might be able to prompt seniors in undertaking social and physical activities.

So, how do you do this?
We do extensive research into intelligent design principles and how these might be implemented effectively. We found that good design helps people make transitions. As people grow older their receptivity towards new things drops. The challenge is to design something that evolves with its user. Something that is meaningful for people while they are fit and healthy and feels familiar when they are confronted with mental or physical problems. With *design for transitions* we can also steer away from possible stigmatization that we see when products and services are designed 'for old people'.

Tangibility is another important theme. In one of our studies, we focus specifically on the question of tangible social networks. A social network such as Facebook is not yet used by many seniors, probably since they make other demands of their social contacts. Research shows, for example, that many seniors are more concerned with the quality of social interaction than with the scale of their network. With this in mind, it may be possible to develop a social network which supports qualitative social interaction. For seniors this might mean not using the pc. If people are not particularly IT-minded or if even starting up a computer forms the slightest barrier, it may be easier to work towards a tangible object. Students are working on this. They have been assigned to explore how to design an interesting social network for seniors. In this project, specific attention is given to how one can seduce seniors to maintain their contacts in a playful manner.

A game?
Not necessarily. It is more about using elements of play. In the projects we do we regularly discuss with all parties involved what 'playful interactions' really are. One can say: 'I am going to design a game' but, alternatively, one can approach something that already exists in a playful way. This is a completely different starting point in which gaming is a means to an aim, not an aim in itself.

What elements of play do you use for the target group of seniors?

This could be all kinds of things; so in every case you should first check which 'interaction mechanisms' or experiences work best. This could be curiosity, friendship, care, etc. Once you know which mechanism might work, you need to integrate this into your design in a subtle way to see how you can activate the mechanism. People are willing to help each other, for instance, but children do this in a different way than seniors. The central question in design is: what behaviour are you looking for and how do you provoke that behaviour in the target group?

With design for transitions you can steer away from possible stigmatization that we see when products and services are designed 'for old people'

We did a project on social interaction at dinner in a nursing home, for instance. The idea was based on the assumption that people enjoy their food more when they talk to each other at the table. To this end, Laura van Geel, a bachelor student of industrial design, designed a system of music manipulation. Every table has its own jukebox and table-companions can suggest music they would like to hear and vote for what music to play. The jukebox provokes social interaction: 'Ah is that one of your favourite tunes? I used to play that too!' In designing the jukebox, you try to implement the whole process around what is in fact a voting activity to invite people to start talking with each other. With an interaction mechanism such as curiosity, it is important to optimize this function. So by downplaying the voting button, the emphasis is placed on triggering curiosity towards one another; in so doing creating a space in which people can ask and inform each other about their musical preferences.

What should be avoided when designing for seniors?

Being forceful or pushy about things. One of the underlying ideas of playful persuasion is that you create possibilities for people who do not want to join in. It is very important that people are in control, the choice should remain theirs. In a brainstorm session on the possibilities of independent living for seniors, someone suggested asking people to fill in a profile for possible social interaction. An algorithm would then lead to the conclusion that Mrs Jones and Mr Brown are a match on the basis of a shared interest in stamps. I don't believe this works since there is, after all, no self-control. Why would these people necessarily want to talk to each other about stamps? People want to determine themselves who they talk to, about what and when. As a designer you can create possibilities but you cannot enforce them. This is a subtle process which is encouraged through a playful approach of issues. Returning to the example of the dinner tables at nursing homes, you could take a step back and ask yourself the question: why would people want to sit together at a specific table? Is it routine, is it a question of time or are there other more organizational concerns? If you know what the stakes are of all the parties involved, then you might be able to arrange the process of having dinner at a table in a different, more playful way. In a way that does justice to the resident's need to make his or her choices freely, also at dinner.

You call design a subtle process, why?

Take informal care (given by family members, friends and neighbours), for example. In the interaction between seniors who need care and their caregiver's emotions play a big role. Many seniors would like more social contact, for instance, but they feel uncomfortable saying so, afraid to burden any one with this. The telephone may not feel like the right medium to establish contact. 'I might call someone but he might feel obliged to pick up the phone even though it is not a good time for it.' And so they do not call at all. We are looking for a system that enables people to maintain contact with a social network, without having the feeling that they are a burden to the other. A way of carefully and not too obtrusively contacting people. This is a complex assignment that requires a subtle approach. This does not, for that matter, apply only to seniors. Everyone has the need to occasionally receive some sign of life, without directly using the telephone. You might be tired, you don't have much time or whatever. But the desire to have some kind of contact remains, even if it is only briefly.

Sometimes people develop their own 'language' with existing means of communication to manifest this desire for social contact. For instance with the mobile telephone by letting it ring just once and then hanging up again. 'I don't have the money to have a long chat on the phone but I am thinking of you.' In other cases you may have to look for a new medium to do justice to a need for social contact. Playful persuasion could play an important role in this.

What inspires you in your thinking about the combination of playfulness and seniors?

I think it's a combination of personal experiences and the Dutch book 'Homo Ludens' by Johan Huizinga. Huizinga describes beautifully how people are playful creatures and how many activities can be approached playfully. I have also noticed that seducing or being seduced is much more fun when done playfully. I would, for instance, like to stay in touch with friends but I have noticed that this doesn't always work out in practice. Small ways of giving and receiving 'communication signals', as a kind of teaser, would be really helpful to me. Much better than an email that reminds me that I haven't been in contact with a friend for over a week.
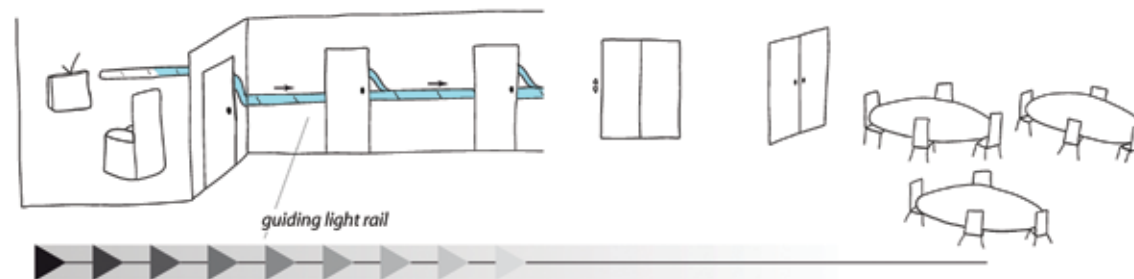
→ *How to seduce people in a playful manner to go to the common space?*

guiding light rail

Johan Huizinga: Homo Ludens: A study of the play-element in culture (in Dutch)

http://tinyurl.com/3fmb6fb

BOUDEWIJN DIJKSTRA AND HYLKE VAN DIJK

Boudewijn Dijkstra (senior researcher and assistant professor) and Hylke van Dijk (professor serious gaming) work at the NHL University of Applied Sciences. For more information: www.hasega.nl

BOUDEWIJN DIJKSTRA

HYLKE VAN DIJK

GAME DESIGN AS SITUATIONAL DESIGN

How do you make the link between games and seniors?
Boudewijn Dijkstra: The NHL University of Applied Sciences is working on the project HASeGa: Healthy Aging through Serious Gaming, together with a number of parties such as the Kyushu University in Japan. In this project we focus on how serious gaming might contribute to improving the gross motor skills of seniors. We directed this towards the prevention of falling.

Why this focus?
In 2010 22.000 people (in the Netherlands) needed a new hip after they had fallen. This cost 454 million Euros. Moreover, one should not underestimate the amount of pain and distress involved. People older than seventy years become very vulnerable in such a situation. We know that as a consequence of breaking their hip sixty percent of this group die within a year. People tend to spiral into depression, being immobile and having to deal with operations and complications. Falling thus becomes the beginning of a serious chain of events. So there is much to gain from preventing seniors falling.

What is the biggest problem?
As one gets older the leg muscles and ankle joints must continue to function well. This is relevant for breaking a fall but also for preventing one. Once muscles and joints lose their strength and flexibility, the front of the foot may drag, causing one to trip over the edge of a rug, for example.

And how do you move towards gaming?
On the one hand, at the NHL we are already interested in areas of application for serious gaming. On the other hand, there is sufficient evidence that combining gaming and the prevention of falling really works. We want to build further on these experiences with practice-based research.

How?
From the start we have made it clear that this project is not just about training motor skills. We also wanted to underline the social character of gaming and use it. So once we situated a game installation in an old people's home, we invited a social welfare student into the team to research how to activate the social context of motivation and interaction. We are still in the middle of this research phase but up till now the results are

promising. Take, for example, participants who score significantly better for walking tests. In this way a combined approach works well; taking not only movement but also *perception* into account.

This approach fits in well with the broader development of experience-orientated care. Experience-orientated care not only takes the bare facts into account but also how a person

Hjoed: Erasmushiem oan'e games (Erasmushiem, a nursing home gets into gaming) (in Dutch)

http://tinyurl.com/3fa9l7z

who wants care, experiences his or her specific situation. People are usually not particularly keen to start working solely on the improvement of their motor skills. So we need to look for something else to achieve this goal, something that works on a more unconscious level. With a game you can appeal to people's wish to improve; to do better than the last time or to be better in something than the others. One can trigger such motivations by, for example, giving certificates or challenge cups, something we do regularly.

Do you study existing games only?
No, we are also developing a prototype for a new serious game on fall prevention. A dance game. The choreography for the game is based on movements of which we know that they are important for training relevant muscles and joints. And players can do what they like doing, in this case dancing in a beautiful environment that reminds one of days past.

In a dance game the players can train their muscles and joints in a fun way

How do you accomplish a game like this?
The first prototype has been developed with the help of the so-called CAREN-system, a system through which we could translate the required postures and movements to a dance game with the help of a pressure sensitive platform and infra-red cameras. At the moment we are researching how to make this into an affordable game on the basis of a different technology. That last point is crucial. If you want to roll out a game like this to a broad public, the costs must go down. We work with an open source version of Kinect (www.openkinect.org), a consumer product with which we can develop a good game with relatively little money.

We look at the overall situation to assess how the game can be played optimally. For instance, is it always necessary to dance under the supervision of a therapist or is it possible to dance without any guidance in certain circumstances? Does one dance with or against each other or alone? Do we reward the players with points or do we try to motivate players in other ways? We try to answer all these questions in our research; not as desk research but in cooperation with all participants.

Which are the seniors ..
Certainly but not exclusively. Games have become an instrument to innovate health care. Games cannot just be handed over to health care institutes with the message: have fun and goodbye. Nothing will happen. You have to include the whole context. Obviously end users are involved, but also activity supervisors, nurses, physiotherapists and management. Though this makes things complex, it is the only way to achieve objectives.

How do you see the future of serious gaming?
Hylke van Dijk: Within the NHL's research program on serious gaming, we focus on what

I would call *situational games* or sit games. What I mean is a game that involves the environment in the broadest sense possible. I think the traditional console game will eventually disappear. We are moving towards games which are latently present in one's environment, responding to the situation. This could be the geographic location but it could also respond to the presence of other people or certain sounds. Technology obviously plays an important role in this. More and more daily objects are being augmented with *smart technologies* which you can use as a game designer. Accelerometers, cameras and GPS are mutually connected, making it possible to make a game environment of the physical space. These technologies are increasingly being included into normal objects, progressively becoming a part of people's frame of reference.

Why do you direct your focus to this specifically?

We are looking for ways to change the behaviour of people, for instance the way they move. People *know* how they should move but they don't *do* it; the old behaviour, not the desired behaviour is hardwired. It is possible to develop games which have no link to reality, in the hope that people will exhibit the correct behaviour they had in the game and maintain this in their daily activities. It is one step further, however, to blend game and day-to-day reality. With an accelerometer on a smartphone, you can measure how often somebody stoops in a day. This information can be given back to the person in question or in the case of a sit game, this information can influence the course of your favourite game.

Intelligent systems are a source of valuable data. In Japan there are toilets that can measure your blood pressure, heartbeat and stress levels. In nursing homes, these kinds of data could be included in a game by translating this information to a player's profile or by adapting the objectives you are attempting to achieve in the game. So this is really personalizing on the basis of intelligently gathered data.

Game and reality will thus increasingly merge in the future?

Dijkstra: I think there will certainly be games in which play and reality flow together. At the same time I think that people will want to keep making the distinction between game and reality and choose from there: do I want to jump into this play situation or not? People are generally good at making the distinction between what is real and what is not. My estimation is that if normal life and game reality are structurally intermeshed with each other, reality and illusion will not be so easy to distinguish anymore. I don't think people will want to stay in such a permanently more or less 'psychotic' situation.

In a general sense, I think for many people it is difficult to continually maintain different identities, for instance a real and a virtual identity. It is confusing since people find it hard to experience parallel worlds next to one another. In the short

term I do see a mix of these worlds developing, but I expect that the situation will evolve to return to a distinction between virtual world and reality. One will step in and out of games. That doesn't mean that everything in the game world will occur along the line of consciousness. Serious games are a fantastic instrument to delve into the subconscious. This is relevant since the subconscious is far more powerful than the consciousness. But still, people should be able to consciously switch between both worlds.

What other images of the future do you see?

Van Dijk: In the contemporary development and use of serious games you see that people want to maintain control over the whole situation. How can I get this done? Which buttons do I want to press? How can I prevent this from happening? I am really interested in taking artificial intelligence a step further so people will let go of this need for control. Instead people may gain more faith in the device and in the way in which the game unfolds. Serious games still look like linear text books. The game as a story that unrolls before your eyes. It really becomes fun, however, once the game is not a path but a landscape; you can explore by having a look over the hill and consequently deciding to take a different route than you initially started. A lot of work is being done now to make this technically possible.

What inspires you on this subject?

Dijkstra: I started working in this area due to my broad interest and activities in both care and wellbeing and (new) technologies. I am happy to do this with Dr Ate Dijkstra from the lectureship iHuman at the NHL University of Applied Sciences. He is my main source of inspiration and the reason for getting into this subject. I believe that play, as an accepted social environment of experimentation, can contribute to intrinsically motivated changes in behaviour concerning healthy ageing.

Van Dijk: I come from an academic context which is organized in a reasonably monodisciplinary manner. You can bring interesting developments together for fun at the coffee table but after that you go back to work. The good thing about serious gaming is that everything is

Lectureship iHuman
NHL (in Dutch)

www.nhl.nl/
lectoraat-ihuman

about finding workable relations between different parties. Each party has its own wishes, possibilities and limitations. You are confronted with each other on different levels and in so doing we are making an attempt to develop a communal language. This searching character of the field appeals to me. Just do it, try to understand how it works and then build a system.

Lectureship Serious
Gaming NHL
(in Dutch)

www.nhl.nl/
seriousgaming

HENK-HERMAN NAP

Henk-Herman Nap is project manager in serious gaming, domotics & eHealth at the Foundation Smart Homes. For more information, go to: www.smart-homes.nl

PLAYFUL DOMOTICS

In which way is Smart Homes interested in games?
Smart Homes is the (inter)national expertise centre on home automation and smart living. Smart living is about finding and developing intelligent technological solutions in people's personal dwelling and living environment. We include health, facilities, energy and leisure in this. Leisure obviously led us to gaming.

When I think of leisure, I think primarily of entertainment games, not serious games.
Entertainment games still are the most common form of application. Puzzle games, for example, are sometimes added to the services of domotic applications. A puzzle game is almost always additional; it's just a bit of extra fun. Aside from their poor quality, they are hardly ever integrated into other services which is a pity I think.

How do you see games integrated into these kind of services?
A large part of domotics has to do with health. E-health and telemedicine related services are often quite boring. You are instructed to measure your blood pressure or heartbeat or you have to fill in a questionnaire which is not particularly motivating. Gaming could make these things a lot more fun, not as something separate but as part of the other services.

For example, sensor technology can tell you whether a resident is moving, drinking or eating enough. People can accordingly be told to move or eat more but it is also possible to seduce them with *persuasive technologies*. Gaming could play an important role in this by motivating people in a fun way to look after themselves, in so doing increasing the fun factor in their life.

How do you see this in practice?
Take, for example, the intelligent electricity meter that enables you to check your power consumption. With relatively simple means, you can compare your power consumption to that of your neighbours. You can have your power consumption visualized. These are very simple functionalities but they can possibly help in gaining awareness of power consumption, thus using energy more consciously.

Possibly?
It is always important to research how to trigger your target group. Which principle of play works well with a specific group? By investing in research you can find more answers. In many games for example, social competition is presumed to do the trick. But perhaps for seniors other principles of play apply, for instance, the principle of personal wisdom; of gaining more understanding in one's personal development. Or alternatively, games could be developed with a collective objective, only achieved through the principle of collaboration.

And this would lead to the development of specific games for seniors?
Perhaps, but another thing to take into account is the enormous diversity of seniors. Abilities of seniors vary greatly, both cognitively and physically. There are enormous differences, also in terms of preferences in content. Young people have more in common with each other; they enjoy the same hypes. Seniors, on the other hand, are better at expressing their own specific preferences.

Are there any specific design parameters when developing games for seniors?
Accessibility is important. A new technology with an intuitive interface such as a touch screen might seem more accessible but accessibility is still a huge challenge and it begins at the start of every process of making a game. Which concepts are you going to use? What meaning is attached to these concepts? What is the structure of the game, how many layers are in there? These are important questions of accessibility. We know, for example, that certain visual, cognitive and physical abilities deteriorate as one grows older but this is still often not taken into account when designing games for seniors.

So design is still not sufficiently based on evidence?
There is a lot of scientific research game developers can take advantage of. For example, with regards to effective training programs for people with signs of dementia. By using that knowledge, you won't develop the umpteenth memory game with concepts based on how children learn. Fundamental support for the game is still often lacking. Commercial concerns may be involved but if it is about health, *evidence-based research* should underpin the game. And there are still many things we don't know yet, which should be researched further. By developing games step by step, you can monitor your progress by carrying out research into the effectiveness of your game. For me, validation is an important factor for a healthy future for serious gaming.

Are there other important conditions?
I think personalization is very relevant, in the sense that games should really adapt to users. Right now, you still have to specify all kinds of preferences in a computer menu to make the game to your liking. In the future a game will adapt to your personal situation: your preferences, development, medical history etc.

With persuasive technologies you attempt to seduce people to do things that are good for them. Gaming adds the fun factor

Personalization could also mean taking advantage of a relationship which a player cultivates with a virtual character: a kind of 'buddy avatar' who is familiar with your situation. This avatar might invite you to get up out of your chair and do a couple of physical exercises. He could assist you by demonstrating the exercises first or he could suggest drinking a glass of water, based on your medical profile and real time data. If such a trusted avatar is not platform dependent, he could also 'travel' with you, linking different technologies; at home on your television, in the train on your mobile phone. This is relevant to domotics since important data generated outside of the home is returned to the home system.

There is, then, a lot of potential thanks to technology?
Yes but not without giving people the possibility of keeping control. With both persuasive technologies and serious gaming, one should guard against pressing possibilities forward too much. Especially when it comes to games, it is essential to play voluntarily.

What inspires you personally in the combination of gaming and seniors?
I enjoy seeing how people become fully involved in a game in a positive way. While doing our research I came across a 71 year old man who happened to be a fanatical gamer. Little was known at the time about the combination of games and seniors. He was particularly enthusiastic about racing and flying. I was very impressed by the way he approached the flight simulator. He was extremely professional about it; he checked the flight schedules, airplane specifications, even the

weather forecast before the flight could begin. The thing that I really remember is that this man also flies occasionally – in real time – to the States. He would take off in the evening and after a few hours of flying, he would put the plane on auto-pilot, have a sleep and wake up just before landing. After meeting this man I was absolutely convinced that we should take games and seniors playing games seriously!

WEACT

WeAct from the Dutch city Deventer develops applications for the health care of seniors. The objectives of the applications are to boost the fun in life and stimulate the movement of seniors who are partly dependent on care. One of the projects of WeAct is the development of a serious game.

GAME DESIGN DOCUMENT: TAILOR-MADE GAMES

An interdisciplinary research team, assigned by WeAct, drew up a game design document in which specific demands and wishes of the target group were met. On the basis of desk research, interviews and interim tests the research group made a list of requirements and conditions that should be taken into account when designing a game. Here are some of the *user requirements:*

Preferences in genre
Casual games, (cards, puzzles, word games, and board games) are very popular with seniors who already play games. Adventure games in which players have to do a variety of tasks to get to the final destination are also popular. The challenge with multiplayer games is to develop the game in such a way that competitive seniors can play without making it less fun for the non-competitive players.

Content
The content and themes seniors like in games relate to excursions, travelling abroad, dancing, sailing and visiting markets.

Platform
The PC is the most popular game platform amongst seniors.

Audio
Audio signals must be adapted to the level of hearing of seniors. Seniors have difficulty with artificial speech. Lower tones (500–1000 hertz) are easier to hear than higher tones.

Image
Seniors often have problems reading small letters, especially on complex screens. Solutions are sought by making colour and contrast adjustments, in the format of the screen, the scroll ratio and the possibilities of zooming in and zooming out.

Interface
The mouse or any other controller must be easy to handle.

Tailored motivation and stimulation
In existing games a general learning curve is taken as a starting point: a man of about thirty years old. More alternatives for the learning curve of seniors should be taken into account, to enable the player to get a feel of the game.

More information on this project can be found at www.weact.nl

The research team
Carolien Smits is professor Innovation and Senior Health Care and Wim Trooster is senior advisor/researcher ICT & Education at the Windesheim University of Applied Sciences. In addition the research team consisted of three students: Roland van Holst, Sara Koch and Anne den Baas.

MICHIEL WESTERMANN, FRANS STEENBRINK AND THOMAS GEIJTENBEEK

Michiel Westermann (CEO), Frans Steenbrink (New Product Development) and Thomas Geijtenbeek (Manager Software Development) work at Motek Medical. For more information: http://www.motekmedical.com

MICHIEL WESTERMANN

FRANS STEENBRINK

THOMAS GEIJTENBEEK

FUNDAMENTAL RESEARCH MEETS APPLIED GAME DESIGN

What brings Motek Medical to gaming and seniors?
Frans Steenbrink: We develop games for improving the body's posture and movement. Seniors make an obvious target group in this and an important question is: how can we get them to move in a sensible way and minimize the risk of falling?

Thomas Geijtenbeek: We offer a platform on which other parties can develop applications without necessarily having specialist knowledge beforehand. As a toolbox it connects different kinds of hardware elements – motion platform, treadmill, kinetic sensors – so you can develop applications that are loosely related to serious gaming.

Steenbrink: We are collaborating in a research project that specifically looks at predicting the risk of falling. The idea is to develop a diagnostic instrument, which will probably be a compilation of tests, to find out how vulnerable somebody is.

Why measure the risk of falling?
At the moment seniors receive training for all kinds of things: muscular strength, mobility, cardiovascular training, reaction training, and cognitive exercises – everything in the hope that the senior in question will improve and not fall so easily. This is still very rule of thumb. If, on the other hand, you are able to map someone's risk status and you know which parameters are relevant, you can train directly and in a controlled way to lower the risk of falling.

**What role do games have in this?**
Michiel Westermann: One of the most important characteristics of games is real time feedback. You can see and experience the consequences of your actions directly. We also work with this principle. We do not intend to develop a game but we want to use the power of direct feedback.

Wii-related injuries: improper use of entertainment games can lead to injuries

How do you design something like this?
Geijtenbeek: It is important to reflect on how to give feedback. Visually, mechanically, through motor control, or maybe as a combination. That's why research is so important; by including variation and measuring which variations yield the best results. When it comes to seniors, we are looking for the 'bandwidth' of their movements, the amount and power of their capacity to move. Is there a breaking point, a point at which people risk falling? Accordingly, you start looking for ways to broaden their bandwidth by training with specific goals. Games can play an important role in this. Students of the Utrecht School of the Arts developed a game in which players stand on a tower that moves due to the wind. At the bottom of the tower you can stand easily since the wind is not strong. If you do well, however, you go up a floor and you catch increasingly more wind. This is a very good and intuitive example of a productive combination of fundamental research in movement and applied game design. It is also a very instructive project since it is clear from the start what the added value of the game should be. If you begin your research with one parameter, the game designer should not include any other things. The challenge for the game designer is to develop a fun and functional game around that one parameter.

Steenbrink: Things can really tilt in the wrong direction if the game itself and not its use is central to a project. Games can do more harm than good in that case. From scientific articles, we know that Wii-related injuries exist. They are caused by the feedback not being right or because people are compensating certain movements. In the latter case they may do well in the game but in doing so they injure their body with irresponsible movements.
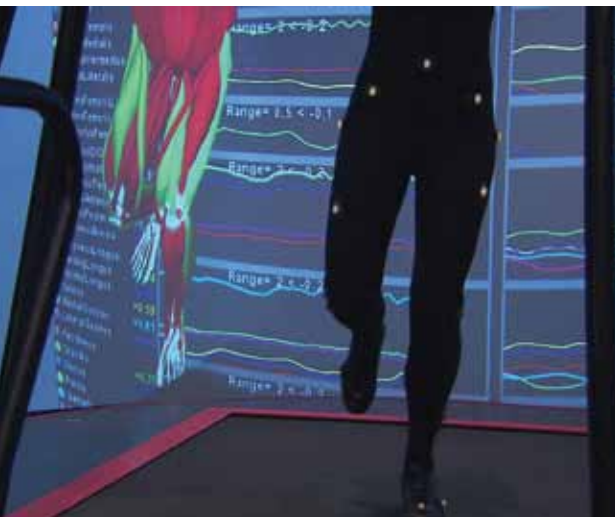
specific person? In the long term it might even be conceivable to include the mindset of the player in question.

Sound feedback: music to motivate someone to take that extra mile. Is this still a form of play? And does it really matter what we call it?
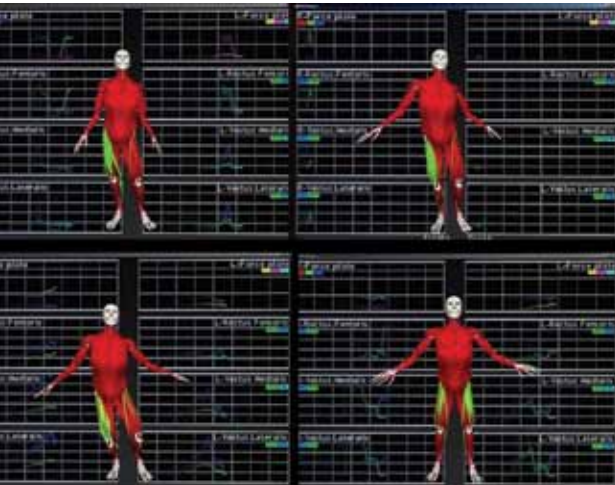
Steenbrink: For this we have to include more factors in our research, factors of which we do not know yet what their implications might be on the whole. What, for example, is the impact of someone's mindset on his motor skills? This is a challenging question. What is relevant? How do you measure this? How can this be translated into appropriate feedback? Not long ago, we received a request to start working with EEG-measurements. But EEG produces a whole lot of background noise. How can you determine what is relevant and what isn't? If you can clarify these relationships, you can offer detailed information to specialists, enabling them to do their work better.

In addition to this, I think that in the future people will apply themselves more according to their own expertise. When I worked as a physiotherapist, I treated sixteen people in a day. I would go for a walk with six of them; something an activity leader could do just as well. If this could be organized, the physiotherapist can focus more on the underlying issue. How does someone move and stand and with which exercises could this be adjusted?

Geijtenbeek: If you really dare to look into the future, autonomous robots could help. The robot becomes a buddy who goes out for a walk with you. Though often perceived as a bit of a joke, the combination of robots and seniors already exists

How do you see the future on this point?

Westermann: For me the future certainly involves real time feedback. I suspect there will be some spectacular applications within five years. A device like Kinect is still quite slow and rough around the edges but sensor technologies and camera technologies are developing fast. Accelerometers are also becoming more precise. I think the combination of training and gaming will benefit from these kinds of technological developments.

Personalization will play a bigger role in the development of intelligent feedback mechanisms too. What type of feedback works well for this

and has been proven to work. Tests showed that subjects have difficulty taking leave of their robot after it had accompanied them for a while. People are able to build up some kind of relationship with a robot, especially if the robot is always present. Remember, grandchildren tend to visit only once a month.

Any other visions of the future?

Westermann: Due to the combination of factors and developments mentioned, it is becoming increasingly harder to separate training, gaming or daily activities support. Take, for example, seniors who are in pain when walking because of decreased blood circulation in the veins. People stop walking even though their blood circulation would improve by continuing to walk and would lessen the pain. How do you trigger these people? With accelerometers we can register a change in the pattern of walking. Accordingly we want to spur somebody on to keep moving. This is possible with sound feedback. Music that gives you that extra encouragement to keep going, taking your situation and who you are into account. Is this still a game? And does it really matter what we call it?

To conclude, what is your personal inspiration for this work?

Westermann: My own experience of rehabilitation. I was operated on my hip, without any problems, but after this was done, the treatment finished. Our health system is still organized in such a way, also financially, that after an operation you only have the right to a certain amount of physiotherapy treatments. We should aspire to a situation in which not the means are the focus, or a new hip, or physiotherapy, but the objective moving properly again is the focus.

Steenbrink: During my training as a physiotherapist one of the biggest and most difficult subjects was neuro development treatment. Physiotherapists need more contemporary knowledge of what works and what doesn't. In addition it would be good if physiotherapists could focus on problems in posture and movement of the body. You now see that people have not been directed to the right care professional. People go to a physiotherapist

because this is reimbursed but they may actually be better off with an ergo therapist or social worker.

Geijtenbeek: A motion clip by Karl Sims from 1994 is very inspiring and still unmatched. It is about research into evolution and the self-learning potential of virtual creatures. I think it is great to see how these creatures, sometimes only consisting of three 'body parts', still give the impression that they have a character. Almost personalities even. It is a striking example of how it is possible to give technology a humane side with a minimum of means. People still feel some distance when technologies of the future are discussed. An important aspect of technological development is giving it a humane side. Self-learning algorithms such as that of Sims could play an important role in this.

Karl Sims: Evolved virtual creatures

http://tinyurl.com/4yv7pgv

ELLIS BARTHOLOMEUS

Ellis Bartholomeus graduated from the Design Academy Eindhoven in 1997. At Laika she became a game designer. Ellis now works as a consultant serious games which she combines with a PhD on games at the Delft University of Technology. For more information: www.ellisinwonderland.nl

SOCIAL FUNCTIONS PACKED IN EASY ACCESSIBLE GAMES

Games and seniors?
I was one of the founders of Laika, an agency for online solutions. User friendliness is central to Laika but we discovered that this is hardly the case in most online games. Most sites are full and cluttered with complicated games and blaring advertisements. We wanted to improve on this and in doing so we found out that accessible and user friendly games are especially interesting for seniors.

Why especially for seniors?
Many seniors have a lot of free time and they want to know more about the possibilities of the internet. Though seniors like playing games, the average game sites are not so popular. This is due to the lack in user friendliness but also, as our research showed, due to the fact that seniors are afraid of becoming addicted to these kind of games. Many of the existing websites focus on keeping visitors on the website for as long as possible. We were interested in developing a website that offered

a feeling of security to make computers and the internet more accessible.

How did you design this?
In several ways. We wanted to do something with the feeling of solving a puzzle in the Saturday morning newspaper, something which is done by many people at the same moment in time. A collective experience online, by working on a puzzle together at the same time and after this, going our separate ways again. Participants could indicate if they wanted to compare their own performances with those of other players. They could also contact each other, help each other or just chat a bit. We wanted to emphasize and facilitate gaming's social character without putting the pressure on. Players should be able to determine themselves if they would like to join in and play.

What did this process teach you?
I became very aware of the potential of user friendly games to familiarize seniors with computers and other digital equipment. The mouse stopped being a scary thing with a tail. Accessible games can free the way to other applications, like mail or chat. Since many seniors feel isolated, the internet can really open up their world.

Games as a stepping stone. But can the game itself teach us anything?
I think the discussion on the effectiveness of games as a means to train the brain, is very complicated. There are many factors involved which are often related to one another and which also influence the condition of the brain. To me it is clear though that gaming offers a different perspective on many things. If I can speak for myself, I am dyslexic and I have dyscalculia. I have always been able to work around it but numbers and letters used to scare me nonetheless. I like to play brain training games such as puzzles and Sudoku and this has given me a different affinity towards numbers and words. I approach them more playfully. This also helps me not to avoid things like doing my administration. I see it more as a challenge, as in sports; playfully doing the accounting.

Returning to the seniors, what possibilities do you see in the future?
It is important to let go of the idea that seniors should play specific games because they are old. You grow older every day and if you have been on Facebook all your life and played Sudoku's, then you can be reached easily on that platform. By relating to media which people already know, there are many new possibilities.

Take for example, the 'phone circle'. Old people often find this unpleasant; it seems a bit morbid that people should call each other to find out if they are still alive. It is stigmatizing too, creating a self-fulfilling prophesy: 'I am old now obviously.' Isn't it possible to harbor such an important social function in the media people use already? My mother plays board games on the Dutch website jijbent.nl every day. My cousin, who lives in the neighbourhood, occasionally plays a game of Yahtzee with my mother. She can also see when my mother was online for the last time. If my mother is offline for a longer stretch of time, my cousin gives her a call. My mother and cousin devised this system together. The website has become a kind of 'phone circle' without it feeling as such. My mother and cousin just play a game and have fun but in the meantime an important function is being fulfilled.

I hope that 'playfulness' will become a trusted layer on top of reality so we can look after ourselves with a bit of fun

There are, generally speaking, many opportunities at hand. Games can be used to put issues of ageing into a different perspective by taking the problem out of your own circle of thoughts. Health issues or actions concerning the quality of your social life could, at least in some cases, quite easily be transformed into a game. In this way you may

not be explicitly dealing with your health or with cultivating your social life but unnoticeably you are investing in it.

Why games?
People sometimes need a leg-up to get going. People who have a dog not only take the dog out for a walk but also themselves. Without the dog they probably wouldn't have a walk outside. Games can also provoke positive behaviour in a fun way. Your mobile phone could seduce you to go outside regularly, for example to pick up messages other people have left behind a tree.

Two people who play a game at a distance do this for fun but at the same time, an important social function is being fulfilled

It is clear to me that there are many opportunities which have not been taken up yet. This is partly due to the fact that game developers often merely digitize existing game concepts. The challenge lies in making it even easier to make the first step. The iPhone, Wii and Kinect have already contributed a lot to the user friendliness of games, but still they demand too many actions to spontaneously enter the game. In spite of the initial enthusiasm, I see the Wii gathering dust in the cupboard.

So games should relate more to reality?
Yes, once we see play as a part of reality I think we can optimize the advantages of gaming. I hope that 'playfulness' will become a trusted layer on top of reality in the future, so we can look after ourselves with a bit of fun.

What inspires you?
I think the work of game designer Jane McGonigal is very useful. She says that games can improve the world. That may sound ambitious but I believe in it.

Toru Iwatani, the inventor of Pacman has been my big example for far longer though. Pacman is an accessible game, also for the non-typical gamer. No explanation is needed and it is still challenging, for good players and beginners. Iwatani was in the Netherlands in 2010 and gave a talk on his vision on the role of games in the future: 'So you have to do something, for example, install a new machine. And you realize you did the job with ease and fun and you think damn! This was a game! This was a serious game!' Playfully living, with fun. That's how it should be.

Jane McGonigal: Gaming can make a better world

http://tinyurl.com/y9bkj96

MARTINE BOUMAN

Martine Bouman is founder and director of the Center for Media & Health. For more information: http://www.media-gezondheid.nl

GAMING FITS INTO A MULTIDIMENSIONAL APPROACH

Games and seniors?
At the Center for Media & Health we design new and innovative communication strategies, to communicate with various target groups about issues they are not a priori interested in. These strategies are based on scientific theories. Seniors are one of these target groups and gaming is one of the potential ways to get people interested to discuss and think about these various issues. These two things come together in the Center for Media & Health.

How so?
When it comes to health issues we focus on prevention and a healthy lifestyle. This is quite a challenge since we want people to start thinking about issues they haven't taken into consideration yet. To do this we make use of the so-called Entertainment - Education strategy (EE): integrating important contemporary themes in popular media formats.

Games in order to influence the lifestyle of seniors…
It is wise to keep a nuanced perspective on the added value of games. I think it is very ambitious to think that once people play a game, they will change their behaviour. I see games as one method to generate commitment on a specific theme within a target group. The function of a game could be to stimulate people to look up more information on a certain subject, or to talk to other people about it. We call this 'raising the potential for conversation'.

What is the added value of games?
We use storytelling a lot. For a different target group, students in the age group 15 to 18 years old, we developed several interactive drama lines dealing with transgressive sexual behaviour. One of the drama lines is about cybersex. What are your boundaries? As a girl, do you lift your shirt up in front of a webcam when a boy – status: sort of new boyfriend – asks you to: yes or no? Depending on the answer someone gives, the next step in the drama line unfolds, each time bringing new developments and a different outcome. These scenarios have been filmed and they are intriguing to

watch. With this project we stimulate young people to start talking more to each other about their boundaries.

Games are very useful for interactive storytelling. The good thing about games is that they facilitate 'vicarious learning'. You can try things out, take a different route, and experience the consequences through direct feedback. Another advantage is that you can use games privately and play at a moment that suits you. For each situation, for every context, you need to find out what the most suitable medium could be. In some cases, anonymity may be preferred, for instance, watching a YouTube film. In other cases it may be important to organize extra guidance in a group discussion. Each medium has its own advantages and disadvantages. For this reason our entertainment - education projects are based on cross-media and trans-media; games are a part of the whole concept.

Which projects are specifically directed towards seniors?
The Center for Media & Health was involved in the television program 'Nederland in Beweging' (Netherlands on the Move), an assignment given by several national health organizations. From the

start, we assisted in developing the program format which explicitly invited seniors to increase their daily physical activities.

We developed a strategic communication concept for the campaign 'To Die in Your Own Way' (STEM 'Sterven op je Eigen Manier' for the 'Transmuraal Netwerk Midden-Holland'). The objective is to trigger seniors to think and talk more to family and friends about how they wish to spend their final stage in life. This is not an easy subject to discuss. To show how seniors go about this matter, the film company 'the Lachende Lens' made a couple of films, based on research by Motivaction and on a typology of seniors – the pro-actives, the uninhibited, the socials, the trusting, the rational-minded. The films trigger conversations on the subject between seniors and the people around them. This is not only important for the seniors themselves but also for the family and health professionals who can then give the specific attention and care seniors want in their final stage in life.

Did you use games in these projects?
In our campaign on preventing hearing loss, 'Sound Effects', we used feedback tools but no games. Not yet. This also has to do with budgets. It is imperative to carefully consider which methods and media you want to use. We always start with a specific question and a target group analysis; we never start just from the medium itself. Who is the target group and what is the problem? Accordingly we examine in which phase of awareness the target group is and what behavioural change is needed. For each phase we develop a methodology that really fits. A target group in which you first have to trigger awareness to enable behaviour change, demands a different approach with different tools than a target group which is further down the line and is ready to start with the desired new behaviour. Depending on the situation we decide what the best form is and we make our choice for means and media input from that. This could be a drama series on the internet, connected to an app, maybe a game, but it could also be a theatre performance or live event.

The good thing about games is that they facilitate 'vicarious learning'. You can try things out, take a different route, and experience through direct feedback the consequences.

Are seniors open to games at all?
As a sociologist I am interested in how different generations deal with dimensions of time and quality. Young people experience time differently than older people. You have to analyze how engaging a medium is in terms of the perception of time and quality and if the medium is sufficiently attuned to the specific target group. Young people these days grow up with very mediated forms of communication whereas most seniors prefer interpersonal communication, talking together with a cup of coffee. Games thus need to prove themselves in a fast moving media landscape by being useful and meaningful. For most people, TV is still the dominant medium. So what is the next step and how sustainable are the technologies which are being developed now? Are seniors getting enough opportunity to fit these new technologies into their lifestyle?

Many seniors see gaming as a part of youth culture. It is not a familiar medium for them and that makes it difficult to use games effectively for this target group. Of course there are seniors who are ahead of their time but many of them will let this cup pass them by. Who can blame them; they have every right to do as they please. To connect this target group to the power of games, you will have to embed this in media they are already familiar with. That's why focusing too much on

the word game is limited, too one-dimensional. I see more merit in applying selectively the useful elements of play.

Where do you get your inspiration from for your work?
I was genuinely moved by the reports on the consequences of social-economic differences in health. There is a big difference in life expectancy between people with a high and low social-economic status. The general life expectancy of people who only have primary school education is seven years shorter than people with a bachelors or master's degree. The difference in life expectancy without physical limitations is even 15 years. There is a lot of inequality in both life expectancy and the quality of life. Those differences cannot be solved with only communication but we can do a lot more than we have done until now. In the past too much has been communicated from a highly educated, cognitive and rational way of thinking. My ambition is to do this in a completely different way; to really reach out to people by giving more attention to the feelings and emotions of people concerning a specific theme. Games can play a role in this, just like other media, but the most important thing is that we really try to make a difference.

Inequalities in Health: The Black Report and the Health Divide

http://tinyurl.com/4yjrnct

GAMES FOR SOCIAL ISSUES

On the 30th of May 2011 STT organized a roundtable with three prominent trendsetters in the debate on games, new media and social issues. Marleen Stikker, Jeroen van Mastrigt and Ben Schouten discussed the first results of the Futures study Serious Gaming for Seniors and reflected on what the coming years may have in store for us.

Marleen Stikker is is founder and director of Waag Society, an organization developing creative technologies for cultural innovation. She is co-founder of IIP Create (a national think tank on creativity, technology and entrepreneurship) and the PICNIC festival.

Jeroen van Mastrigt is chairman of the Dutch Game Garden, consultant in the field of applied game design and fellow at the Utrecht School of the Arts.

Ben Schouten is professor Serious Gaming at the Fontys University of Applied Sciences and professor Design and Intelligent Systems of Playful Interactions at the Eindhoven University of Technology.

GAMES AND SENIORS: A FUTURE PERSPECTIVE

Moving directly towards the future: how will seniors benefit from gaming?
Marleen Stikker: The big question is how to continue making your life meaningful also in a later stage in life. Happiness and depression occur in all stages of life. People with severe (physical or mental) limitations may be very content with their lives. Whereas people who are physically fit and vital seniors wonder why they should go on living for another ten years.

Ben Schouten: I agree. At the moment a lot of games for seniors still focus on very specific demands or deficiencies, such as rehabilitation. I think the contemporary generation of games heralds something much broader. Playfully becoming older in a time in which the meaning of life becomes more important.

Stikker: Many care systems have become so big that the central notion of respect no longer holds. It is simply not possible and this worries me. If scaling up is the only option, is it possible to still maintain the advantages of small scale care in which people know each other? Could gaming play a role in this? If so, I am not particularly keen on scenarios such as: 'Mrs Jones wakes up and her avatar says good morning.' I can't imagine that this is what we are looking for.

I would like to see gaming grow beyond just implementing obvious incentives to influence behaviour. In my opinion these kinds of reward systems fizzle out pretty quickly.

What type of games are we talking about then?
Schouten: There are still many games that are not up to scratch to say the least. For example, a math game in which children earn points or a dinosaur picture once they solve an equation. There is no

relationship between game play and content. I prefer games that invite children to approach math in a playful way. This is a very different starting point which I think is more worthwhile. The same is the case for seniors: it shouldn't just be occupational therapy.

Jeroen van Mastrigt: The context determines to a large extent how meaningful a game can become for a player. You can develop games specifically for people with a disability, but you can also look for ways in which young and old, special needs or not, can play a game with each other.
Game sharing: everyone has their own needs and tries to realize their own aims in the same game environment.

Schouten: Visualizing the future helps to take some distance from the terms game and play. I am especially interested in the underlying question: can we develop layers of interaction that make new experiences possible for seniors, preferably integrated into existing applications?

Which technologies can help with this?
Stikker: For many people, growing old means your world becomes increasingly smaller. Game

technology and computer technology add 'trans-locality'. This means you are no longer limited to your direct physical environment for social interaction. In principle you can make contact with the whole world. So if you like to play bridge, there are plenty of online bridge players out there eager to play.

A development like 'trans-locality' demands new design principles though. For the present generation of seniors communication on the screen still differs substantially from face-to-face contact. How can this target group cultivate contacts at a distance? I think trust is an important aspect of this. Is it possible then to design a system in such a way that the physical distance does not stand in the way of building a trustworthy relationship?

Van Mastrigt: You could say the world is becoming smaller and bigger at the same time. Recently I saw a chip for top-class sportsmen which must be swallowed and which continually delivers information on the status and activity of your body. It measures blood pressure, cholesterol, weight, you name it. For many people the inside of their own body is like a black box. You only see it once a doctor makes an x-ray. In the future, data will continually give you an update on the effects of your eating, drinking or exercising habits. If the behaviour changes, so do the updates. The consequences of this are immense but I don't think data alone will generate a better relationship with your own body. People have to be able to connect their own understanding, experience and feelings, relationships and choices to these data. Game design principles can support this, with the condition that this is not about a top-down

mandatory of a health insurance company but an open system in which you control your own data, can take your responsibility and design your own rules.

Schouten: For me this is the desired movement; from a focus on gaming itself to a focus on a playful, exploring attitude, in this case in relation to your own body.

Gaming as a form of self-management?

Stikker: There certainly seems to be a lot of potential in this area. Insurance companies are very interested in the possibilities of gaming, also as a means for prevention. There is, for example, a lot of funding for projects on games and obesity.

Schouten: The stakes are high. It is clear that the costs for health care are getting out of hand. The present health care system cannot be maintained much longer.

Stikker: Everyone is looking for alternatives; the interest in gaming should be seen from this perspective. We are involved in a project on the future of informal care by family members, friends

and neighbours. Money is obviously not a motive for family and friends of someone who needs care, so how do you activate this circle to help? We are researching the possibilities of a kind of exchange system that is not based on money. Health care companies are also involved in these kind of projects since they know that existing models are no longer sustainable.

Van Mastrigt: In 2030 a quarter of the working population will have to work in health care to meet the demands. But this will never happen. I think, as I grow older I will have to be pretty self-sufficient when it comes to my health. This is called 'participatory health' which is a relevant new phenomenon. People develop alternative care systems together as a reaction to the unsustainable present state of formal systems.

A game environment as a system for care?

Why not? You can organize a game environment according to your wishes, that's the beauty of it. Arranging and working out a new world is a good way of experimenting, of finding out what works. This is already apparent in the mixed reality game *World without Oil* that Jane McGonigal developed. Participants of the game agreed to live in a world in which oil was presumed to be unaffordable. In this way players had to think through the consequences of the situation and develop alternative lifestyles.

Schouten: The power of games really lies in this. Playful experiments with alternatives. The next generation of games will differ substantially from what games have to offer now. Open ended games, sandbox games – these are no longer games in which everything is prescribed but systems in which new possibilities are explored playfully.

Stikker: We no longer talk about games as such but approach issues from a gaming perspective. If you look at a nursing home as a game, you see that a lot of the rules of the game don't seem quite right. People just sit there, without any kind of trigger to talk to one another. By adding elements of play to an environment like this, meaningful conversations between residents can be provoked and facilitated.

What design principles and implementation requirements should be met in the next generation of games?

Van Mastrigt: The principles of participating voluntarily and taking your own responsibility are very valuable to me. If you are not in the position to make a choice to participate or not, there is no game at hand. Participants have to know that they are taking part in something; they have to know the rules of the game. Otherwise they are played *with* instead of playing themselves. These are things you should take into consideration.

Schouten: These things could become complex in the future, especially with the type of intelligent games we are talking about here. In open ended games or games in which you can invent the rules yourself, the designer creates a context that will only be determined once the game is played. Many games become so complex it is highly doubtful the designer can control everything going on in the game. At some point game engines can be self-organizing, just like other computer systems. A system will arise that we no longer understand or have control of. With new causalities and rules and with unexpected emergent characteristics. This is a very interesting development but at the same time I am a little wary.

Stikker: On a more general note, I am glad to see that ethical aspects are becoming more explicit in

design requirements. Privacy issues are addressed sooner. We already touched on the importance of trust. How do you design trust in a system? This is possible by including a kind of mutuality in developing design requirements. The system not only takes but gives too. I play the game and give the system valuable information. Mutuality means that not only the owner of that system gets access to this information but the user too. This kind of open system doesn't exist yet which is very questionable from the point of view of trust. I think from a game perspective it is a missed opportunity. On an abstract accumulated level I would, for example, like to work with patterns in the travelling behaviour of all users of public transport.

Game sharing: people realize different objectives in the same game environment

Van Mastrigt: Making data playable and organizing this kind of mutuality as described above, could play an important role in supporting senior's self-efficacy. With well-designed games, you give people a tool to creatively direct the quality of their own life.

SCORE
0070

SCORE
0071

LEVEL
PLAY ON

PROGRESS

FOOTNOTES

1   Experts say games improve eyesight.
    http://tinyurl.com/dad4pt

2   Video games improve children's skills.
    http://tinyurl.com/3vqve28

3   Computer games could help prevent
    memory loss.
    http://tinyurl.com/3tdaznj

4   Researchers tout positive effects of
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    http://tinyurl.com/7tn85

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    April 2009. Serious gaming can clarify complex
    processes and situations. (in Dutch)
    http://tinyurl.com/3w5sds6

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    Gaming in 2009. (in Dutch)
    http://tinyurl.com/3nm5v6p

9   Michael Wu: Gaming science.
    http://tinyurl.com/4bhv8r6

10 CBS (The Dutch organization Statistics
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    2010-2060: proportional rise in ageing
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    http://tinyurl.com/3wkxgeu

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    http://tinyurl.com/3e767th

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    http://tinyurl.com/3ljy6r6

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    play.
    http://tinyurl.com/ycm3dzu

15 National Gaming research. (in Dutch)
    http://tinyurl.com/5zu2bm

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    http://tinyurl.com/bbbkn8

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    application of games for health. (in Dutch)
     http://tinyurl.com/3apk6wj

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information on STT, its current and past foresight
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Technology Trends**

GATE

GATE: GAME RESEARCH FOR TRAINING AND ENTERTAINMENT

It is always difficult to predict the future. But it is clear that the possibilities of gaming will rapidly increase over the coming years. Equipment is getting more powerful all the time. New graphics and physics cards allow for increased visual realism but this must be accompanied by increased behavioral realism of game characters. New interface technology will enable a different, more natural form of communication and control. Gesture recognition, tactile feedback, and possibly even direct brain connections will become possible. Games will also not only happen on a screen but can influence other actuators in the house. High-speed broadband connections and wireless access leads to new forms of collaboration and to new types of games, like large online game communities and mobile gaming, each with its own research challenges.

These developments will have a huge impact on both entertainment games and on training and educational use of gaming and simulation. It is already reality that people take part of their driving lessons in simulators. Games are used in training safety procedures and crisis management. Similar developments will happen in decision and policy making. In education, gaming offers ample possibilities for personalized learning, long distance learning, and lifelong learning. To advance the state-of-the-art in gaming, to facilitate knowledge transfer to companies, and to show the potential of gaming in public sectors, the government has funded the GATE project with a total budget of 19 million Euros, involving eight partners: Utrecht University, Utrecht School of the Arts, TNO, Twente University, Delft University of Technology, Waag Society, Thales, and NederlandBreedbandLand.

Ambition

The ambition of the GATE project is to develop an international competitive knowledge base with respect to game technology, and to train the talent required to enhance the productivity and competitive edge of small and medium-sized creative industrial companies.

The project substantially improved the competitiveness of companies producing (tools for) games and simulations by providing direct access to new technology and by technology transfer projects. This leads to larger companies, encourage the founding of new companies, and attract companies from other countries to the Netherlands.

The project also made people aware of the possibilities of gaming in public sectors such as education, health, and safety by performing pilots in these areas. As a result, gaming and simulation is becoming more commonly applied in these sectors, leading to quality improvements and cost reductions.

Research Program

The goal of the GATE research is to substantially advance the state-of-the-art in gaming, simulation and virtual reality to creating highly effective entertainment products and experience learning systems. In the research program the complementary and multidisciplinary knowledge of the partners is combined. The goal is to increase the international research position by fundamental research and application development, and to attract excellence by creating a stimulating environment and a concentration of talent, best students and best professors. There are four research themes:
– Modeling the Virtual World focuses on techniques for semi-automatically creating convincing and engaging virtual worlds that can be used in games.
– The theme Virtual Characters deals with the creation of realistic behavior for the virtual characters that inhabit the virtual worlds and games.

– The third theme deals with Interacting with the World. Here we study novel interaction techniques that will improve the way users can steer their games.
– In Learning with Simulated Worlds we study how games and virtual worlds can best be used for training and education.

Knowledge Transfer Projects

GATE is not only about academic research into games and game-technology. GATE is also geared towards developing this knowledge further into practical solutions. The mechanism to make that happen is through Knowledge Transfer Projects in which small and medium size enterprises collaborate with research partners. Companies provide knowledge questions and intended applications. The research partners provide new technology. The knowledge transfer projects combine these into practical solutions that make the research results fit-for-use for industry.

Innovative Pilots

Within GATE, a number of innovative pilot projects are carried out. The goal of these pilots is to create awareness of the potential of gaming and simulation in the sectors education, healthcare, and safety. In developing these prototypes we have established collaboration between various disciplines: game designers, creative artists, educational specialists, ICT experts, and domain experts.

More information

The GATE project ran from 2007 till April 2012. For more information, see http://gate.gameresearch.nl/ The intellectual legacy is from now on continued and expanded in the innovation agenda GATHER, see http://www.top-sectoren.nl/creatieveindustrie/ document/knowledge-and-innovation-agenda-clickgather

SERIOUS GAMING

The Netherlands Study Centre for Technology Trends (STT) initiated the futures study of Serious Gaming in 2009. The aim of the futures study was to develop inspiring concepts of games that offer more than just entertainment.

How serious games can play a role in the lives of seniors in the future received special attention in this part of the futures study. How can next generation games contribute to healthy ageing? Can games keep you fit, train your brain or improve the quality of your social network?

This book brings together the most important results of the futures study Serious Gaming for Seniors.

Many experts, interested parties and stakeholders have contributed to the futures study Serious Gaming for Seniors. The members of the working group were the steady factor in the process of exploration.

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All the results of the futures Study Serious Gaming can be found at www.seriousgames.tv

STT Netherlands Study Centre for Technology Trends

GATE