

SPECIAL PUBLICATION

GAME RESEARCH

UTRECHT CENTER FOR
GAME RESEARCH



GAMES THAT
CHANGE YOUR MIND



Utrecht University



Utrecht Center for Game Research

Over the past four years, Utrecht University has created four strategic themes and twelve research focus areas to strengthen the focus and enhance the societal impact of its research. Game Research is one of these research focus areas. We started the Utrecht Center for Game Research in 2014 to develop an integrated approach to scientific and social questions by linking academic excellence and fundamental research to the university's societal mission.

By organizing networking meetings, offering valorisation support, and allocating seed money grants to interdisciplinary projects, we have strengthened our research and teaching, expanded our research volume, and increased societal impact, especially within the three domains of Games for Learning, Games for Health, and Games for Change.

- **Games for Learning:** e.g. games for children, higher education, and professional skills. Examples of research projects are the use of games to develop number sense with children, and to train pharmacists in communication skills.
- **Games for Health:** e.g. healthy living, well-being, and rehabilitation. Our research includes game-based enhancement of behaviour control, and training stroke patients in a virtual reality environment.
- **Games for Change:** e.g. for sustainability, social inclusion, smart cities, conflict and security. We perform research, for example, on playful cities, and how games can be used for energy saving.

In this magazine, we present an overview of the work we have done during the past four years. We have invested not just in research but also in a broad field of game-related education and in collaborative efforts with partners in government, business, society, and other universities. We achieved high-quality research results through our interdisciplinary collaborations. We combined knowl-

edge about games, technology, persuasion as a means of changing attitudes and behaviour, learning processes, and design. The necessary expertise was provided by our research groups from disciplines including sociology, psychology, media studies, computer science, education, and medicine. All faculties at Utrecht University were involved.

For the years ahead, we are looking forward to implementing the university-wide objectives as they were set out in its *Strategic Plan: 2016-2020*. We will further strengthen our interdisciplinary research collaborations on a local, national, and international scale; we will continue to contribute to the education of the next generation of game scholars; and we will keep on addressing the question of how serious games can best be theorised, designed, and validated to help solve major global issues, and by doing so contribute to a better world.

We would like to thank Utrecht University's Executive Board for making Game Research one of Utrecht University's focus areas for the period 2014-2018. Our special thanks go to our deans, Professor Gerrit van Meer (Faculty of Science) and Professor Keimpe Algra (Faculty of Humanities); without their support, Utrecht University would not have acquired such a prominent international position in the field of Game Studies.



Joost Raessens & Remco Veltkamp
Utrecht University, September 2017

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about the
Utrecht Center for
Game Research

100

PARTICIPATING
RESEARCHERS

7

Faculties

VII

EDUCATIONAL PROGRAMS

20

projects

€5,000,000

total funding

50

collaborating companies

GAME RESEARCH MAGAZINE

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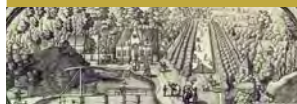
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*The impact
of ecogames*

Sustainability

Games with a focus on ecosystems and sustainability improve awareness of climate issues. They imagine both a future world and how to turn this world into a better one.

By: Joost Raessens

Digital games are not only used for entertainment purposes, but also for making players aware of the need to find solutions for major global issues, such as climate change, war and conflict, poverty, an ageing population and migration. *Ecogames* –or games with a focus on ecosystems and sustainability– belong to these so-called *Games for Change* (G4C). They are imaginative spaces for playing and learning, expressing often contested moral and political values, raising awareness for a variety of sustainability issues, such as renewable energy transition, circular economy, sustainable mobility, and green water use and energy consumption.

These persuasive and participatory games represent an experiential turn in climate communication and storytelling, trying to reinforce ecological attitudes and behaviour and stimulate collaborative environmental decision making.

Ecological citizens

Contemporary digital games are increasingly

used to persuade people, raise their awareness and change or reinforce their attitudes and behaviour for the good of society. Persuasive ecological games not only seek to contribute to ecological thought but also to convince people to become ecological citizens. In the last few years, digital games have encouraged support, sympathy and action for a variety of ecological issues. According to many researchers, there is growing evidence on the effectiveness of games as a medium for persuasive communication. This kind of validation research actually helps Dutch gaming companies in the design of better games, and to answering the question of under what conditions playing these games could actualize their ‘civic potential’ and help turn players into ecological citizens.

Climate paradox

What makes ecogames so special is that they seem to be able to counter the critique of researchers such as Danish psychologist and economist Per Espen Stoknes. According to Stoknes, conventional climate communication

IMAGE LEFT:

ECO, Winner of the *Games for Change Climate Challenge Award*.

Eco is an online game where players must collaborate to build a civilization in a world where everything they do affects the environment.

STRANGELOOPGAMES.COM



A CIRCULAR AMSTERDAM

A role playing game designed for local entrepreneurs and citizens to gain knowledge on circular urban development and link it to their daily business.

GAMESFORCITIES.COM

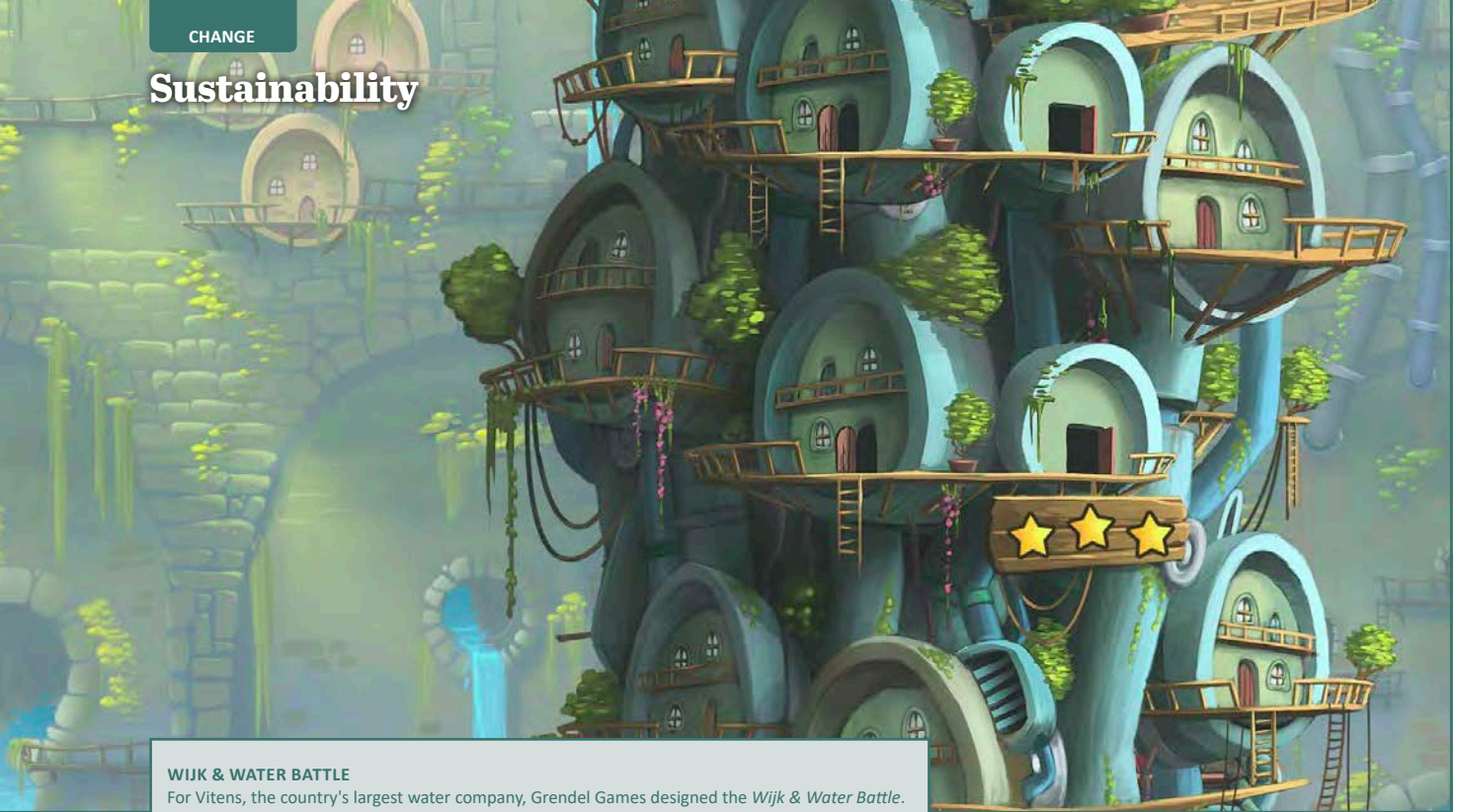


FROM5TO4

A gamified solution that helps reduce traffic congestion by persuading commuters to travel smarter for just one workday: by cycling to work, taking the train, carpooling, or working one day a week from home.

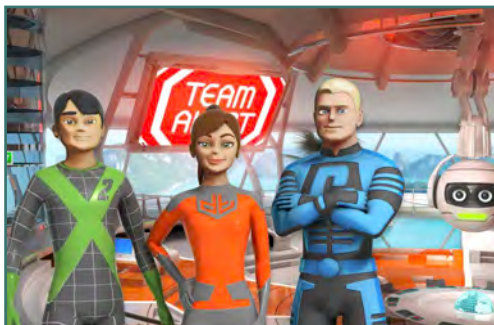
ORGANIQ.NL

Sustainability



WIJK & WATER BATTLE

For Vitens, the country's largest water company, Grendel Games designed the *Wijk & Water Battle*. This game was developed to reduce customer's water consumption and to avoid peak moments. GREDEL-GAMES.COM



ELEMENTARY SCHOOL-LOI KIDZZ

A new type of environmental education. Playing ecogames helps children prepare for school entrance exams. LOIKIDZZ.NL



► PROF.DR. JOOST

RAESENS is full professor of Media Theory at Utrecht University, Faculty of Humanities, and one of the directors of the Utrecht Center for Game Research. He is project leader of the NWO-funded project *Persuasive gaming. From theory-based design to validation and back* (2013-2018). His research concerns the 'ludification of culture,' focusing in particular on persuasive, serious, or applied gaming (in relation to global issues such as climate change, refugees), on the playful construction of identities, and on the notion of play as a conceptual framework for the analysis of media use.



COLLAPSUS-ENERGY RISK CONSPIRACY is a conspiracy thriller about ten young people all over the world and how the worldwide energy crisis affects them. It links the necessity of energy transition with the notion of stable energy delivery and economic independence. COLLAPSUS.COM

often leads to the 'psychological climate paradox': the fact that climate science facts are becoming more solidly documented and disturbing every year, while most people either don't believe in or do not act upon those facts.

Top-of-mind

A study of The Netherlands Institute for Social Research in 2016 shows that, for the Dutch population, the issue of climate change and energy transition is indeed not 'top-of-mind'. Research done in the NWO-funded project *Persuasive gaming: From theory-based design to validation and back* shows that the playing of ecogames can help improve this situation (see the article starting on page 13). These games can inform players about the issue of climate change, and can change or reinforce

their attitudes and behaviour. The collaboration of game researchers and leading Dutch game companies helps finding solutions to major global issues such as climate change.

Civic imagination

Environmental issues pose imaginative challenges for game producers. Games for Change made in the Netherlands such as *Wijk & Water Battle* (Grendel Games, 2015), *From5to4* and *Elementary School-LOI Kidzz* (both Organiq, 2014), *A Circular Amsterdam* (Play the City, 2016) and *Collapsus - Energy Risk Conspiracy* (2010) embody what American media theorist Henry Jenkins described as 'civic imagination': it shows the ability of ecogames to imagine both a future world and how to turn this world into a better one.



One of the games of the Transmango European game jam project on the future of food, by Team Rebound (Glasgow, Scotland)

Game co-design for sustainable city governance

This project focuses on the use of game co-design as an approach to innovative urban governance toward sustainable future cities. City-level responses to sustainability challenges show great potential, due to the concentration and nature of urban populations and organization. To harness this potential, there is a need for the participatory conceptualization and design of creative, societally engaged city governance strategies. We see game co-design as being uniquely suited to this need. As strategic planning tools, games can function as system representations, but also allow players to step into actor roles and investigate interaction possibilities. Game co-design goes beyond the limitations of games as pre-designed objects with preset procedural rhetoric – instead, those involved in game co-design can actively experiment with game rules as representations of institutions, creating more ownership and possibilities for insight and creative governance solutions. A great number of activities on game co-design for sustainable cities have been conducted by the project research

team. An example is a large-scale series of game jams across Europe on food futures with the Utrecht School of the Arts and the EU-funded *Transmango* and *Jam-Today* projects. One of the games emerging from these game jams has been used in Kyoto to help people in the urban food system experiment with new forms of governance such as food policy councils. Several games designed to communicate urban governance concepts such as the circular economy and the common good have been developed. One has already been used with stakeholders in the city of Eindhoven to help plan more sustainable futures. A number of proposals have been submitted, several of which have been secured, focusing on projects from the local to the global. Among these is a project funded by BNP Paribas on anticipatory governance in the Global South with the Universities of Oxford, Wageningen, and partners in four global regions. Furthermore, this project focuses on building a community of practice on its topic, and contributed to the 2017 Focus Area Symposium on Ecogames for this purpose.

PROJECT LEADS:

MICHEL DE LANGE is assistant professor of New Media Studies at Utrecht University, Faculty of Humanities. He is co-founder of The Mobile City, a platform for the study of new media and urbanism.

JOOST VERVOORT (for bio see the boxout)

STEFAN WERNING is associate professor of New Media Studies at Utrecht University, Faculty of Humanities. He coordinates the graduate program Game Research and the Utrecht Game Lab.

Games as a tool for policy & strategy

Beside his role as co-leader of the project on game co design for sustainable city governance, Dr. Joost Vervoort is involved in a great number of projects focused on the use of games for sustainability. His focus is primarily on the use of games, and in particular game co-design, as tools for policy and strategy.

He is the leader of a global project that uses games and other futuring techniques as tools for policy formulation in the context of climate change, agriculture and food security (the *CCAFS Scenarios Project*) – a project which has helped develop policy in seven global regions. Another example is the *Seeds of Good Anthropocenes* project, which has united researchers who have worked on major global sustainability assessments in an attempt to help develop plausible, actionable bottom-up futures by collecting different transformative sustainability practices from around the world that are currently operating in the margins but that could grow to have a global impact. Vervoort and his colleagues focus on how games can be used to imagine new futures based on such current practices. Other projects include the development of games for widespread educational purposes for university students, and a collaboration with Purdue University on the development of a negotiation and imagination game for country delegates who take part in global climate negotiations.

JOOST VERVOORT is assistant professor of Foresight for Environmental Governance at the Copernicus Institute of Sustainable Development, UU (Faculty of Geosciences), and Senior Researcher at the Environmental Change Institute, University of Oxford.



Sustainability

Environmental impact of games

The symposium *Ecogames: Game Research meets Sustainability* (Utrecht University, 30 January 2017), brought together experts in the fields of game design and research, communication, media and urban studies, ethics, geosciences, data and computer science. It explored the psychological, social, cultural and institutional con-

ditions of a transition to a sustainable society, and the role ecogames could play in such a transition. Four Dutch game studios and creative storytelling agencies (Grendel Games, Spektor, Organiq, and Play the City) presented their media productions and discussed how these productions can be understood as rhetorical devices.



Vice-Dean Wiljan van den Akker

The main focus during this symposium was on how ecogames and their characteristics can help in the debate on global warming and sustainability.

Vice Dean Wiljan van den Akker opened the evening by providing the overall context, focusing on the societal impact of academic research. He stressed the importance of creating an academic context for dealing with complex issues such as sustainability. Bringing together designers of games and scholars from computer science, informatics, the humanities, communication studies and philosophy, the symposium was a perfect example of research with impact.



Prof. Joost Raessens

Prof. Joost Raessens referred to an alarming conclusion from the Netherlands Institute for Social Research. A recent study identified a big gap between national and international policy on the one hand (such as the Paris Climate Agreement, the Dutch Energy Agenda and the Dutch initiative for a climate bill) and the general lack of concern among the Dutch, on the other. The energy transition is simply not a matter of high interest for most people in The Netherlands. According to Raessens, Dutch ecogames such as the *Wijk & Water Battle* (Grendel Games, 2015), *From5to4* (Organiq, 2014), *A Circular Amsterdam* (Play the City, 2016) and *Collapsus - Energy Risk Conspiracy* (Submarine, 2010) can play an important role here. They can raise awareness of a variety of sustainability issues, by reinforcing sustainable attitudes and behaviours and stimulating collaborative sustainable decision-making.

Tim Murck,

Strategic Lead at the storytelling company Spektor

The power of narratives was discussed by several speakers, as well as some aspects of narratives which should be considered when designing for sustainability. Murck explained the story of *Hemelswater* – a beer promoted by Spektor in a sustainable way that became big partly due to the narrative. According to Murck, game mechanics and storytelling are valuable tools in turning a narrative into an experience. This latter category is necessary to hook the audience and ensure lasting actions. Murck functioned as a practical example on the value of narrative in the efficacy of ecogames.



Game scholar Joost Vervoort

Exploring alternatives to current conditions within ecogames design was advocated by Vervoort. According to him, co-designing games will let players question what alternative roles they can take in a certain situation or problem, and help them explore multiple possible actions and other system elements. Ecogames can let players practice policy through their co-designing involvement in scenarios.

Communication professor Hans Hoeken

Hoeken focused on what elements in narrative can be used pragmatically to form a strong narrative of the kind described by Murck. Hoeken spoke about the importance of character identification - agreeing with a character's values - as is the case in *Collapsus - Energy Risk Conspiracy* (Submarine, 2010), which, according to Hoeken's analysis, is a good example of a successful ecogame.





Reducing household energy consumption

Persuasive games and gamification can be effective ways to change people's attitudes on energy use. When people are highly engaged in the game they are apt to adopt the attitude promoted in the game. This can lead to a higher awareness of relevant factors involved in saving energy, for instance. In effect, they may experience a positive change in attitude which may then trigger a change in energy saving behaviour itself.

For our research project, we designed the *Powersaver Game*. Families play this game for five weeks in their own household. Real-world behaviours, e.g. the use of electricity and gas in the home, are integrated into the gameplay. A real time connection between the household energy meter and game server is accomplished by dataloggers with an Internet connection. The main goal is to reduce energy consumption by at least 15%. Every other day, the game sets the family on missions to save energy

The first experiment in the form of a media comparison study asked whether people learn better from games or conventional media. Families were asked either to play the game or use the energy dashboard as a control version. The form, timing and content of the information the control condition were kept as similar as possible as in the game condition, but excluded game elements. This was followed by a value-added approach which queried which of the game's features promote learning. What impact did such features as feedback (minimum versus maximum information), personal relevance (by means of customized avatars, activities, goals and feedback) and social interaction (by means of competition) have on energy consumption knowledge, attitudes, and behaviours.

PROJECT LEAD:

JAN DIRK FIJNHEER is PhD candidate Persuasive Games and Lecturer at the Faculty of Science, Utrecht University & Lecturer at Inholland University of Applied Sciences.



Prof. Maarten Hajer

Another important aspect discussed in the symposium dealt with the power of imagination. Raessens mentioned civic imagination, or showing both a future world and how to turn this world into a better one. Prof. Maarten Hajer discussed the problems of imagining, and especially why imagining a different future is so difficult. By creating imaginaries – constructed hypothetical versions of a situation – sustainability can be approached more creatively than with technical jargon. The social values of technology can be reflected upon in imaginaries – placing the many possible futures more firmly within the realm of experience of citizens.

Game designer Ekim Tan

The idea of co-design was demonstrated by Tan, founder of *Play the City*, who showed examples of games that support informed decision-making about urban issues. As such, ecogames can play a big role, not necessarily in changing citizen behaviour, but in helping the debate along.

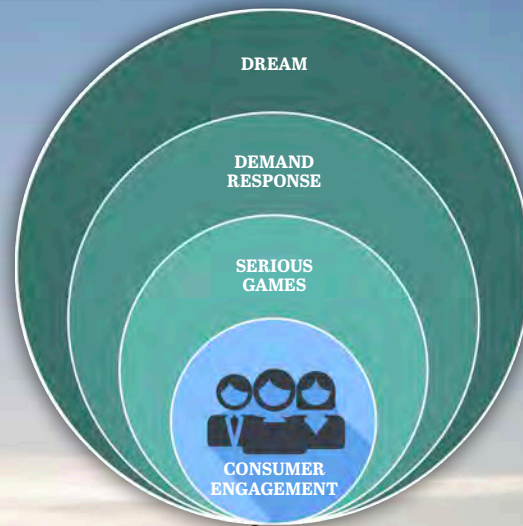


Prof. Marcus Duwell

Finally, Duwell rounded up the symposium by considering the ethical side of sustainability. He reflected on the possibility of choice in the current political climate. Referring back to the call to create imaginaries, Duwell explained that there are always more choices to be made. If a situation seems to be without alternatives, the smart thing to do is to keep looking, creatively and collaboratively. The symposium was a tribute to this final thought.



Demand Response Energy Application Methodology



The DREAM project aims to contribute to a cost-effective energy transition.

The increasing share of intermittent renewable energy resources and the targets for the reduction of greenhouse gas emissions pose enormous challenges for the reliable and economic operation of electrical power systems. An effective energy transition requires drastic actions for the efficient integration of distributed demand and supply in combination with increased energy savings and efficiency. As prescribed by the European Union energy winter package 2016, emphasis should be given to empowering consumers, enabling demand flexibility, and promoting prosumers, aggregators and local energy communities.

Flexibility is considered one of the intrinsic features that will characterise future power systems, both for power system management and energy market objectives. The further development of flexibility, including demand response, self-consumption, aggregation entities, and energy storage, is recognised by academics, policy, and industry bodies as crucial for the efficient integration of intermittent renewable energy resources into the grid.

Demand response programmes are designed to incentivise end-users to alter their short-term electricity usage patterns by scheduling and levelling the instantaneous power

«Emphasis should be on empowering consumers»

demand. Demand response options are employed by electricity system planners, market parties and operators as resource options for market optimisation, balancing supply and demand and ensuring system security.

Game-enhanced consumer tool

The *Demand Response Energy Application Methodology* (DREAM) project aims to contribute to a cost-effective energy transition by exploiting the opportunities offered by demand response mechanisms and consumer engagement. DREAM is targeting the design, development and deployment of a game-enhanced consumer tool to address consumer engagement in demand response mechanisms through gamification techniques while stimulating and organising cooperation between consumers.

The tool will be part of a web-based platform that provides energy analytics through smart meters in order to assess the role of game features on consumer behaviour. The tool will be designed, implemented, tested, and validated through pilot experiments with participating consumers and prosumers. The knowledge generated in DREAM will result into a methodology with high replicability potential for further exploitation by other relevant stakeholders throughout Europe.

PROJECT LEAD: **IOANNIS LAMPROPOULOS** works as a postdoctoral researcher at the Copernicus Institute for Sustainable Development, Utrecht University, Faculty of Geosciences.



Persuasive games Games that change your mind

Games that make you think, change your behaviour, or mentally prepare you for medical treatment. Teresa de la Hera helps us understand this phenomenon.

Interview with Teresa de la Hera

Playing an immigration officer in a fictional Eastern European country? In what universe does that make for an appealing game, one that two million people will buy and actually play? Well, as it turns out: ours.

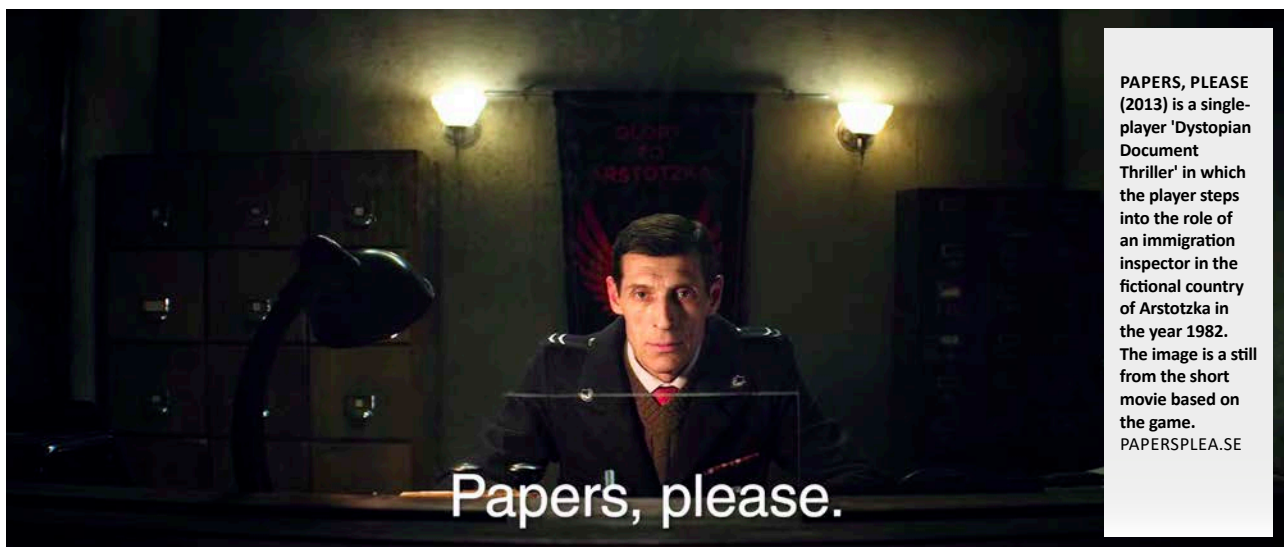
Papers, Please is literally the name of the game where players do little else than denying or granting access to people crossing the border. Role-playing the immigration officer seems simple, maybe even superficial at first. It is, however, the complete opposite.

“This game made me think”, says Teresa de la Hera, a postdoctoral researcher and lecturer at Utrecht University. “And I feel this is the real

potential of games: to have us reflect about things, talk about them. Games can be great conversation starters.”

De la Hera wasn't really surprised by the impact *Papers, Please* had on her. She couldn't have been, since she's one of the most prolific researchers in the field of games with a message, with a goal beyond entertainment or training. A lot of her research revolves around what is called 'persuasive games'.

“A persuasive game is a game that has been designed with the intention of influencing the attitude or behaviour of a player beyond the gaming session”, de la Hera explains. “There



PAPERS, PLEASE (2013) is a single-player 'Dystopian Document Thriller' in which the player steps into the role of an immigration inspector in the fictional country of Arstotzka in the year 1982. The image is a still from the short movie based on the game. PAPERSPLEA.SE

are multiple applications in many different fields, think education, health, advertising, politics... They can be used, for example, to change the attitude of players towards relevant matters such as climate change or the refugee crisis, by being used as persuasive media.”

“Persuasive games are also used to motivate and engage players into activities that they need to perform, but are difficult or boring for them, such as therapies for cognitive rehabilitation, just to mention an example.”

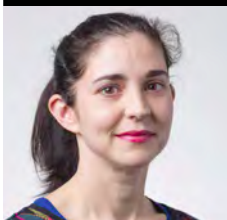
Fascination

De la Hera's 2011 PhD thesis *Persuasive Structures in Advergaming* was called ‘the best academic work by a Spanish scholar in the field of audiovisual communication’. It's just one entry in her long list of projects and publications on persuasive games. Why the fascination?

“Through different research projects I had the opportunity to see how persuasive games have been used to change the life of players in positive and significant ways. It is fascinating to discover to which extent new technologies, and especially digital games, can be used to make us think about a topic in a different way, to engage us to do something that we want to do but we cannot find the motivation to perform, or to connect people.

“I conducted a study, for example, in which a game was used to foster interaction between children with different cultural backgrounds, who recently arrived in the Netherlands and who did not have the language skills to communicate with classmates. The game was used in this case as mediation tool to initiate an interaction in which verbal communication was not central. It was really exciting to see the evolution of the relationship of players during the playing sessions.”

Bio.



► **DR. TERESA DE LA HERA** is postdoctoral researcher and lecturer at the Faculty of Humanities, Utrecht University. She started her academic career in Spain in 2006, where she conducted research in the fields of new media and persuasive games. She moved to the Netherlands, where she obtained an International PhD Fellowship to finish her PhD *Persuasive Structures in Advergaming* at Utrecht University.

Project Info.

► **PERSUASIVE GAMING: FROM THEORY-BASED DESIGN TO VALIDATION AND BACK**

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PROF.DR. JOOST RAESSENS
DR. TERESA DE LA HERA
ERASMUS UNIVERSITY
ROTTERDAM:
PROF.DR. JEROEN JANSZ
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EINDHOVEN UNIVERSITY
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PROF.DR. BEN SCHOUTEN
DRS. MARTIJN KORS

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Connecting people and making them think, is no mean feat. However, games have the capacity to go even further. De la Hera: “I love the cases in which digital games are used to improve the quality of life of players in different and meaningful ways. I have studied, for example, the different ways in which digital games have been used to increase adherence of young children to cancer treatments. Cancer treatments are difficult to go through and have a lot of side effects. For children it's not easy to understand why they have to undergo these treatments, as they make them feel terrible. Digital games have been used in different ways to help them to adhere to the treatment. *Re-Mission*, for example, is a well known example of a game that is used to help children and adolescents to better understand how the chemotherapy works in their bodies. By understanding how the treatment works they are more open and positive to get through, even though they feel terrible during the process.”

Effectiveness

One of the research projects De la Hera was recently involved in was the project *Persuasive gaming: From theory-based design to validation and back*. “The unique aspect of that project is that we study three different aspects related to persuasive games, by joining the expertise of researchers from three different universities. First, at Utrecht University, where I work as postdoc researcher, we focus on explaining in which different ways persuasive games can be used to persuade players from a theoretical perspective.

“Second, at the Eindhoven University of Technology, my colleagues transform theoretical claims into design principles to be used to support the design of persuasive games. They

constantly work on student projects that help them test which design strategies work better, depending on the purpose of the game. One example of this is *A Breathtaking Journey*, a virtual reality game which has been designed to increase empathy for refugees.

“Finally, at the Erasmus University Rotterdam my colleagues are focused on validating the effectiveness of persuasive games. They are not only testing the effectiveness of concrete games included in their studies, but also proposing validation protocols and models that can be used by researchers and companies working with persuasive games.”

And? Have you proven their effectiveness? “We cannot say, in general, if persuasive games are effective or not. It really depends on the game and its objectives. Persuasive games are effective when the game is effectively designed considering specific persuasive objectives, the context in which it is going to be played and the characteristics of the players that are going to play it. The results of our project include theoretical models and design and validation protocols that help not only to study persuasive games, but also to design them and validate their effectiveness.”

Attractive

If a game is typically designed as a persuasive game, is it still capable of reaching a large audience? Obviously, without an audience, even a good persuasive game will not persuade anybody. “A persuasive game is a game. It should be designed in a way that is attractive to the players that are supposed to play it. If it is not interesting to them, then it is a bad persuasive game, in the same way you can find a bad entertaining game.

“A persuasive game can reach a large audience if that is the objective of the game. In some cas-



RE-MISSION 2 (2013), a series of games from the non-profit HopeLab, uses the research and experience obtained from the first *Re-Mission* in 2006 to provide an even more accessible and engaging series of action games targeted specifically at adolescents and young adults with cancer.
RE-MISSION2.ORG

More.

► PERSUASIVEGAMING.NL

A BREATHKING JOURNEY (2016) places the player in the shoes of a refugee who is fleeing from a war-torn country in their struggle to escape the increasing violence against citizens. This interactive virtual reality experience is an attempt to increase empathy towards refugees.
ABREATHKINGJOURNEY.COM



es, however, the game is designed to reach a specific target audience. So, it, again, depends on the objectives of the game. But it does not mean that because the game has a serious purpose, it should be boring or not attractive enough to players.

“A relevant challenge is to find a game mechanic that is attractive to players and that works for the persuasive goals that the game needs to meet. Our research project, *Persuasive gaming*, is focused on providing knowledge that helps to better connect these different aspects related to persuasive games.”

Bad games

Asked for an example of a bad, dysfunctional, and therefore non-persuasive game, De la Hera opts not to refer to a specific game, but to a concrete ‘mistake’ she commonly encounters in persuasive games. “I was talking before about the need of persuasive games to be interesting and attractive to players. Sometimes, with the intention of designing games that are attractive to players, game mechanics get implemented that are not in tune with the persuasive intent of the game. For example, designing a game to learn a new alphabet, and including time pressure as one of the mechanics to make the game more exciting. If I am trying to learn new letters, I need a game mechanic that allows me to take the time that I need to learn each character. If you add time pressure, I probably need to repeat the same steps again and again, and I get frustrated or bored.

“It’s also common to see a persuasive game that is a copy of an entertainment game, just with a different theme. For example, the *Bejeweled*-game transformed into an advertising game by changing the diamonds for logos of the brand. Why would someone play the advertising version of this game instead of the original one? So, a good balance between entertaining goals and persuasive goals is relevant to design a successful persuasive game.”

Control the crowd... & save the day





Image: Still from a movie showcasing the Utrecht University crowd simulation plug-in for the Unity game engine.

Crowds deciphered: simulation and control of the mass

Have you ever felt unsafe when walking in a dense crowd? We have researched a model for simulating crowds in big infrastructures, at events, and in computer games.

By: Roland Geraerts

How can a city accommodate 500,000 people during an event? How long does it take to evacuate a train station? Where and when can potentially dangerous situations occur, how can we detect them, and what can we do during an event to avoid these situations? These are important questions, illustrated by tragic incidents that happened during events such as the Hajj in Mecca (2,400 deaths), the Love Parade in Germany (21 deaths) and Dutch Remembrance Day (63 injuries). Simulating big crowds can be of vital importance to be better prepared.

So why do we need simulations to answer these questions? Simulations are needed because large-scale exercises (with over 500 people) are impractical or impossible in the real world. For instance, such a real-life exercise has a big impact on the environment or surroundings, it costs a considerable amount of time, tests can be performed on a few scenarios only, and the building/infrastructure may not even exist yet. Using simulations instead can alleviate these problems.

Gaming applications

The availability of more realistic computer games is growing because PCs, consoles and smartphones are becoming more powerful. While much innovation has been done in 3D graphics, the AI side is lagging, including the

Bio.



► **DR. ROLAND GERAERTS** is assistant professor at the Virtual Worlds group in the Department of Information and Computing Sciences, Faculty of Science, Utrecht University. There, he obtained his PhD on sampling-based motion planning techniques. His current research focuses on path planning and crowd simulation in games and virtual environments. He is one of the co-founders of the annual Motion in Games conference.

Start-up.

Roland Geraerts and his group have received an *NWO Take-off grant*. "This allows us to realise our dream: setting up a start-up, *uCrowds*, which offers a software engine for simulating crowds in big infrastructures, at events or in computer games."

quality of simulated agents. These agents need a navigation mesh which is difficult to extract from a 3D virtual environment. Agents behave unrealistically, they collide a lot, get trapped near narrow passages and react poorly to sudden changes in the environment (like a collapsing bridge). Hardly an optimal game experience. Finally, current simulations cost a lot of processing power and, consequently, the number of simulated agents is kept to a few hundred at the most.

Software engine

Our team has created a software package for efficient crowd simulation in multi-layered 3D dynamic environments. The framework generates a compact but complete representation of the navigable areas in an environment so the simulation can be run efficiently and accurately. This representation is a navigation mesh suitable for representing the walkable areas in a 2D environment (such as a city with a footprint that represents buildings) or a multi-layered 3D environment, such as a train/metro station, or a soccer stadium.

Our simulation framework consists of the following five levels of planning:

- At the top of the hierarchy, event management and action planning generate a set of geometric path planning queries, consisting of start/goal pairs. In this phase, we support so-

Smart city: an augmented-reality crowd simulation demo

In May 2016 we demonstrated an augmented-reality crowd simulation demo to all EU ambassadors and policy makers who were paying a visit to Utrecht. The demo displayed a simulation in a part of this city. Users could interact with the simulation by inserting or removing illuminated blocks. This allowed them to play with different scenarios in an interactive and intuitive way.

The table is designed by Wijnand Veneberg and Machiel Veltkamp (z25.org).



cial groups, large groups, re-planning of agents when the navigation mesh changes or when crowd densities change, for instance.

- Next, the global route planning level uses a query to produce an indicative route for an agent or group, which indicates how they would generally walk.
- The three lower levels move the crowd in every step of the simulation. On the route following level, the global routes are being traversed, yielding preferred velocities (i.e. speed/direction pairs).
- The preferred velocities are adapted in the local movement level where an agent might temporarily deviate from its general route to coordinate its movements and to handle potential collisions with the crowd, yielding a velocity that is used by the animation system in the lowest level to move an agent.

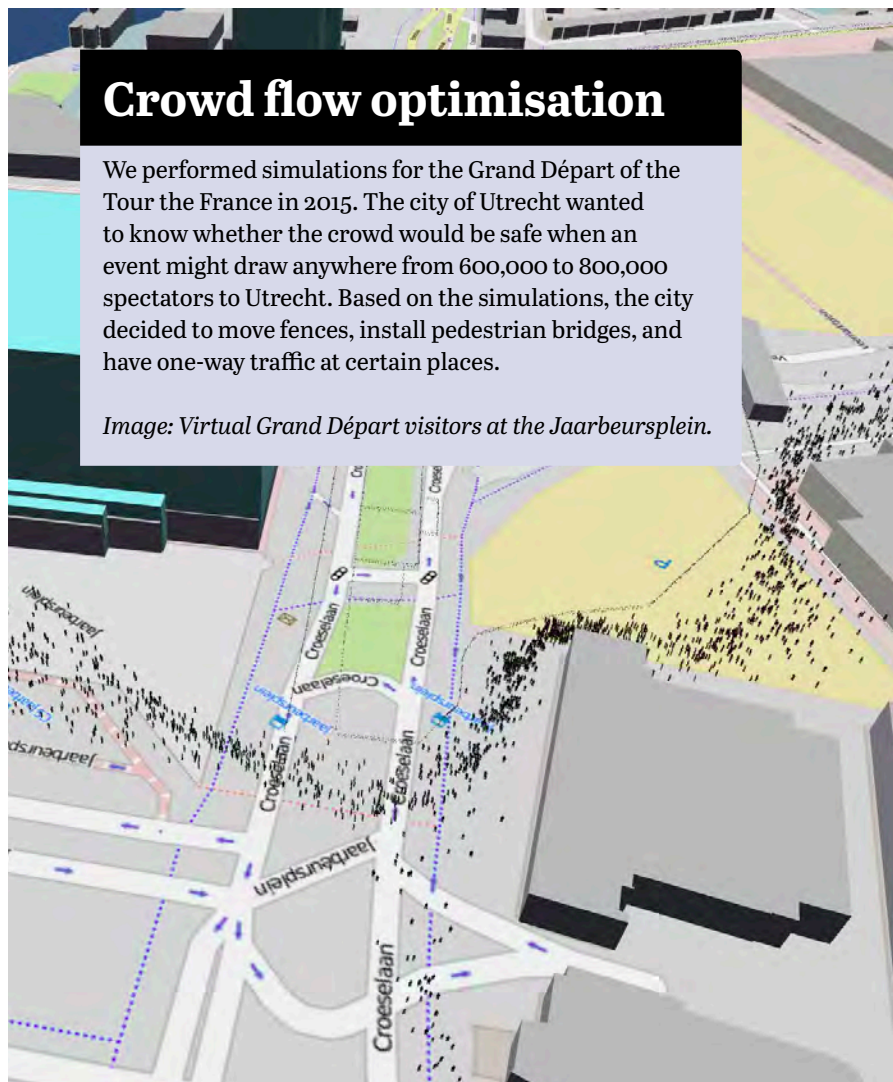
Usage in practice

Our software was used to investigate the amount of time it takes to evacuate a metro station. We did that in collaboration with our partner Movares for several stations of the North/South metro line in Amsterdam. With Movares we have also analysed a large range of scenarios that could occur during the Grand Départ of the Tour de France in Utrecht. Finally, we created a plug-in for a popular game engine, Unity, to enrich computer games with big and believable crowds.

Crowd flow optimisation

We performed simulations for the Grand Départ of the Tour the France in 2015. The city of Utrecht wanted to know whether the crowd would be safe when an event might draw anywhere from 600,000 to 800,000 spectators to Utrecht. Based on the simulations, the city decided to move fences, install pedestrian bridges, and have one-way traffic at certain places.

Image: Virtual Grand Départ visitors at the Jaarbeursplein.



Smart cities evolved

Turning citizens into creators

Thanks to digital media technologies, our cities will become smart. How can games and play involve urban stakeholders in making the smart city?

By: Michiel de Lange

How can games and play involve urban stakeholders in making their city? In recent years many cities have adopted smart city policy agendas, often in collaboration with technology companies and knowledge institutions. These policies seek to use smart technologies to address urban issues like mobility, clean energy, water and food production and distribution, health, living and public participation. But what about the people living in these cities? How are they involved?

The playful city is a complementary take on the efficiency-driven smart city agenda. In this vision, games and play enable citizens to become creative agents who can take ownership over urban issues and act as decision makers. The playful city assumes that play has a lot of potential to include citizens in the making of smarter cities that are not just designed for them, but also with and by them. How? First, games and play can be used to leverage citizen creativity (smartness). Second, games and play are ways to organize engagement and create collectives (civic participation). Third, games and play can be used to experiment with alternative solutions and futures for the city that are not just technology-driven (cityness). Let's have a look at *Rezone*, a game about vacant urban spaces, in which I have been involved as a

Quick View.

In recent years cities have been trying to become smart cities with the use of technologies. The emphasis is often on smart technologies instead of smart people. Games and play can be useful tools to leverage the smartness of different people in shaping the future of their urban environment and take ownership. In this contribution we look at *Rezone the game*, which attempts to bring together a variety of stakeholders around urban vacancy.

Lingo.

► **SMART CITY**
A city that uses digital media and data to improve infrastructures and services.

► **PLAYFUL/PLAYABLE CITY**
A city that attempts to foster creativity in its people to improve liveability and potentially address societal issues.

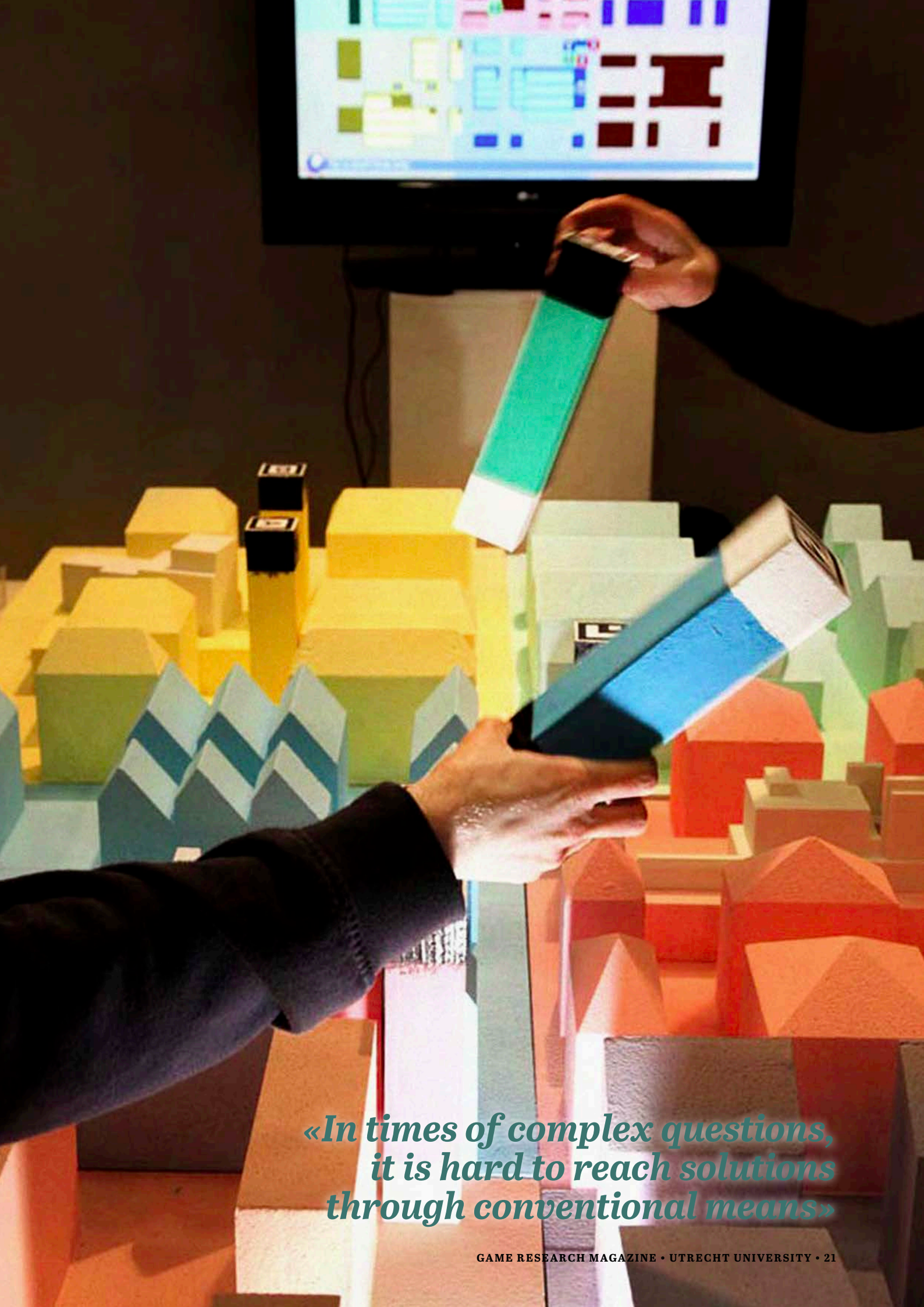
researcher, in order to find out how this may happen.

Rezone, the game

Can games help to address a complicated urban issue like vacant buildings or underused land? In times of complex questions and economic decline it is hard to reach solutions through conventional means. Traditional parties involved in urban development are not inclined to invest. They wait for others to take the first step. Two cultural organizations from Den Bosch in the Netherlands, *The Bosch Architecture Initiative* and *Digital Workplace*, collaborated with a game design school to create *Rezone* (rezone.eu), an urban game that challenges players to 'fight blight'.

Players in the game keep the city safe from deterioration and vacancy by salvaging real estate from decline. It features four player roles: the proprietor (owner of real estate), mayor (representing the municipality), engineer (urban designer) and citizen (neighbours).

Rezone is composed of a physical board game with a number of 3D printed iconic buildings that represent the neighbourhood, an augmented reality layer of real-time information about these buildings projected on a screen, and a computer algorithm programmed to let buildings descend into vacancy like a wildfire.



*«In times of complex questions,
it is hard to reach solutions
through conventional means»*

«In Rezone, citizens are not merely passive users of their city, but clever creators»

A camera above registers the players' moves by scanning QR codes on pawns. The game engine continually adapts to changes. To beat the system, players must strategically collaborate instead of pursuing their self-interest. The game was tested during a series of events like *The Playful Arts Festival*, and *Rezone Playful Interventions*, with, among others, the mayor of Den Bosch playing –as the mayor, of course! A big Dutch building company got interested and this started a collaboration that led to a new game concept.

Playful atmosphere

In *Rezone* citizens are not merely passive users of their city, but clever creators. Through play they can take ownership. The game helps stakeholders to generate smart plans for the future of their city. However, *Rezone* does not provide solutions, at least not directly. By playing together, trust and connections between stakeholders are forged. Stakeholders meet each other in a playful atmosphere instead of at the negotiation table. The game is fun and acts as a catalyst for potential follow-up steps. It is a simplified artificial setting where real emotions and preferences and horizons for action emerge. It invites people to temporarily stand in their adversaries' shoes. This could lead to better understanding of mutual standpoints through embodied experience instead of mere argumentation and deliberation. Playful civic participation puts agency central in the notion of citizenship instead of rational discourse.

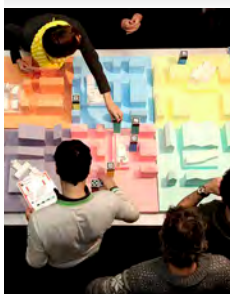
What can we take from this case? There is a long-standing history of understanding the city in terms of games and play. From the "bread and games" of the Romans, to the ludic and subversive artistic interventions of the Situationists, the city has often been viewed as playful. Today, that connection becomes even more important for at least two reasons. First, for an increasing number of people playing



► DR. MICHEL DE LANGE is assistant professor at the Department of Media and Culture Studies, Faculty of Humanities, Utrecht University; co-founder of *The Mobile City* (themobilecity.nl), a platform for the study of new media and urbanism; co-founder of *[urban interfaces]* (urbaninterfaces.net), a cross-disciplinary research group focusing on media and art and urban culture. He works as a researcher and teacher in the field of (mobile) media, urban culture, identity and play.

More.

► REZONE THE GAME:
WWW.REZONE.EU



games is part of their cultural repertoire. Second, many argue that we live in a playful media culture. We are continuously surrounded by a plethora of technologies that offer spaces for playful experimentation and shape our understanding of the world as playful. For these reasons it no longer seems strange to have all kinds of organizations turn to games to address serious issues.

What do we want?

The playful city opens up key questions about smartness, about the future of cities, and about technologies and civic participation. Such questions can be grouped along the lines of *feasibility* (can it be done?), *viability* (what values can we generate with it?), and –especially important for my argument– *desirability* (do we want it?). I argue that the challenge of making our cities smart impels us to ask what desirable outcomes are. Do we want smart tech programmed by companies to make decisions for us? Or do we want to include the 'smarts' of actual people? Do we want efficient cities, or do we include other values like playfulness and a sense of ownership? Do we consider technologies as just a solution, or more broadly as part of our everyday culture and experiences? My answer is that if we are serious about smart cities, we need to understand our cities as playful.

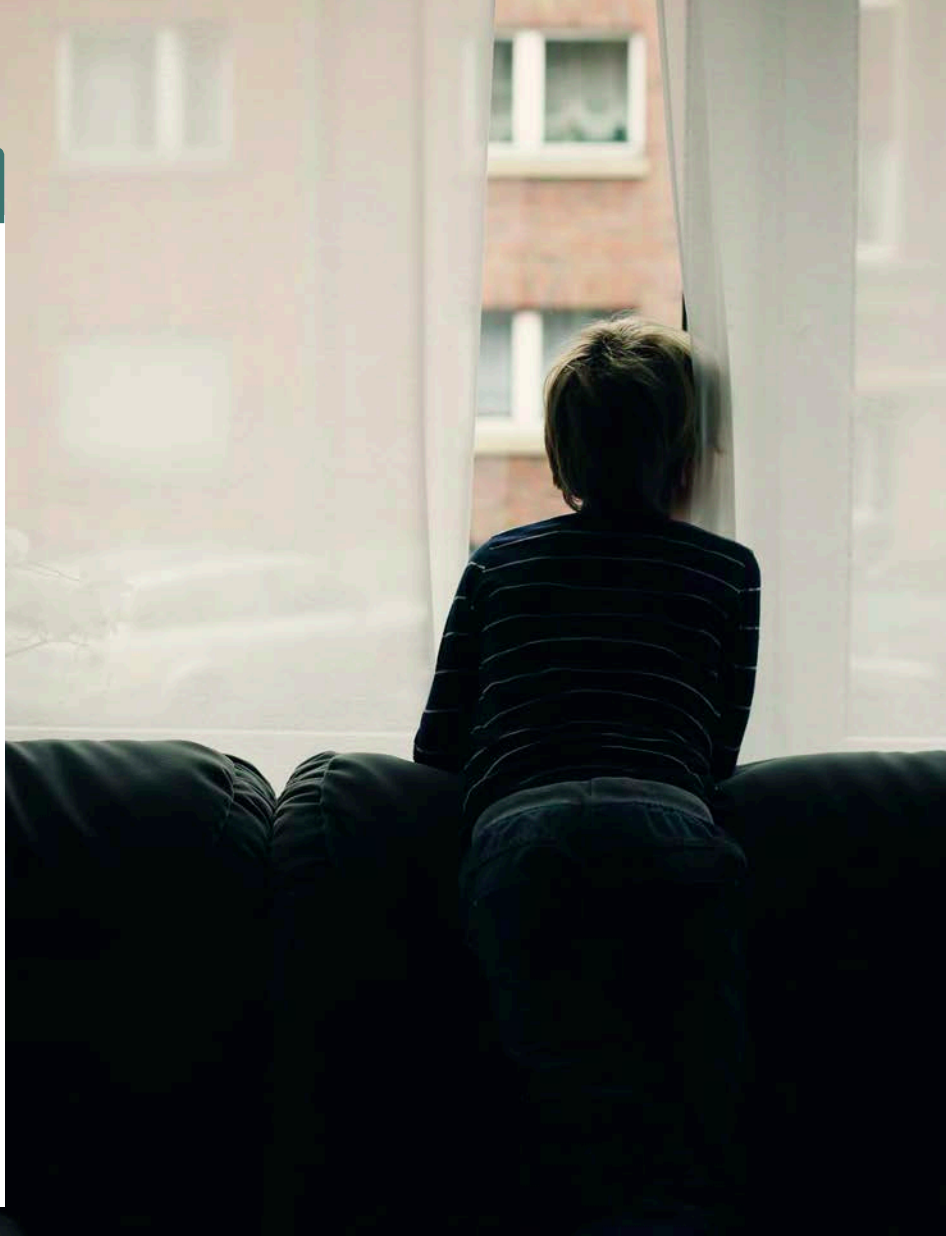
Hence, the playful cities agenda should be pushed along these lines:

1. *Research*: What aspects of urban issue lend themselves to being addressed by games, and what are the limitations and considerations?
2. *Design*: What type(s) of games, and which mechanics-dynamics-aesthetics, can be employed for particular complex urban issues?
3. *Validation*: How can we assess and validate the role of games and play in urban culture?
4. *Governance*: How can we scale up and institutionalize the use of games for complex urban issues (stakeholder coalitions, toolkit, best practices)?



Change: Inclusion

Games have the unique quality to break through any of the barriers we build as a society. Whether it's age, gender, race, religion or sexual orientation, games transcend all differences and bring people together. That's why they play such a big part in these three projects about inclusion.



1. *Children in multi-resident families*

Where do I belong?

Project Info.

► WHERE DO I BELONG?
CHILDREN IN MULTI-RESIDENT FAMILIES

INTERDISCIPLINARY PROJECT, WITH THE UTRECHT CENTER FOR GAME RESEARCH AND THE CHILD EXPERTISE CENTER

PART OF DYNAMICS OF YOUTH • DYNAMICS OF YOUTH IS ONE OF THE STRATEGIC THEMES OF UTRECHT UNIVERSITY.

Most of our knowledge on family relationships, parenting, and child development stems from traditional two-parent families. However, there are often questions and concerns about the psychological and ethical aspects arising in modern, non-traditional families.

Research shows that the quality of the parent-child relationship does not depend on the genetic relationship between parent and child, and that family structure matters less for children's psychological development and well-being than the quality of family relationships. The project aimed to provide an innovative interdisciplinary perspective on these societally relevant issues. We've looked at them from a psychological/pedagogical perspective, the perspective of language and communication, and a legal perspective. We've learned about how to use serious gaming to facilitate the development of a sense of belonging and social identity in children, and to create a (partly) virtual environment where children feel safe and where they can stay in touch with their parents even if they don't live in the same household. ▶



2. *Young and old*

Intergenerational digital game design

For this project we conducted a literature review of sixteen academic papers that discussed the use or design of digital games to foster intergenerational interaction or that were aimed at mixed-aged players.

Among these papers we identified four types of benefits of this type of games:

- (1) The potential to reinforce family bonds.
- (2) The capacity to enhance reciprocal learning.
- (3) The value of increased understanding of the other generation.
- (4) Their usefulness in reducing social anxiety.

We also identified two types of factors which are important when designing intergenerational digital games: player-centric and game-centric factors. Player-centric factors include: the nature of the interactions between older and younger players that the game is aiming for, the motivations of targeted players to play digital games and the different abilities of targeted players. The most relevant game-centric factors were found to be goal-related (competitive versus collaborative play) and space-related forms of interaction (co-locative versus virtual play).

Team members.

UTRECHT UNIVERSITY:
TERESA DE LA HERA
EUGÈNE LOOS
MONIQUE SIMONS

3. Social skate

Ice skating exergame played by refugees

Team members.

UTRECHT UNIVERSITY:
TERESA DE LA HERA
CATRIN FRINKENAUER
EUGÈNE LOOS
MONIQUE SIMONS

ERASMUS UNIVERSITY
ROTTERDAM:
AMANDA PAZ

UNIVERSITY OF
GRONINGEN:
CLAUDINE LAMOTH

Exergames are digital games combining exercise with game play. These games and the playful interactions fostered during play contribute to help establish, reinforce and change the nature of social interactions among refugees and Dutch children in school classes.

Exergame play enables multiple players to compete or cooperate on a team, thereby providing both virtual and real social interaction. In this case we focused on cooperative play in order to enable cooperative interaction. By working together, participants had common goals and equal status, which facilitated the opportunities for intercultural interaction. The game selected for this project was a Dutch ice skating game that was played by 15 pairs consisting of one refugee and one Dutch child (8-9 years old) in controlled playing sessions organized at two different schools.



«Change the nature of social interactions among refugees and Dutch children»



Healthy urban life

More and more people live, commute and work in the city. But how do we keep cities good to live in and healthy? These are challenges many big cities are dealing with. The success of Niantic's *Pokémon GO* shows the many possibilities mobile games offer to reach a big audience and 'play' with the way you use a city.

Together with a European consortium, Healthy Urban Living researcher Monique Simons of Utrecht University received 350,000 euro from the Erasmus+ programme for the big interna-

tional research consortium PRE-Health. They do research into how digital applications –apps and mobile games– can be deployed to encourage people in the city to use the public space more often for physical exercise. Besides the Netherlands, the consortium also consists of Germany, Greece and Hungary.

The deployment of mobile games for a healthy urban life is one of the research lines of the interdisciplinary research group Healthy Urban Living (HUL) of Utrecht University, which includes Simons.

Health games symposium



Health games –or games with a focus on health, healthcare, and well-being– are interactive virtual worlds for playing, training, and learning, often as a form of simulation. They are used, for instance, to train for rehabilitation or prevention, to assess health conditions, and to teach facts and skills.

Using game elements such as posing challenges, giving feedback, offering different levels, and relations allows users to play, train, and learn in a safe environment.

This symposium, which was organised by the Utrecht Research Focus Area Game Research, brought together experts in the fields of game design and development, psychology, neuroscience, physiotherapy, and data and computer science. The program featured talks from game researchers, developers, companies, and medical experts. A demo market offered a range of live game demos.

Photo: JAN WILLEM HUISMAN, co-founder and creative director of leading serious game developer IJsfontein, talking about his company's format to chart the needs and wishes of their clients.



DietCare: the value of game elements

Keeping track of your daily intake of food and fluids can be a hassle, even if there's a handy mobile app to help you. But what if that app contains game elements? What if keeping track feels like playing a game rather than paperwork?

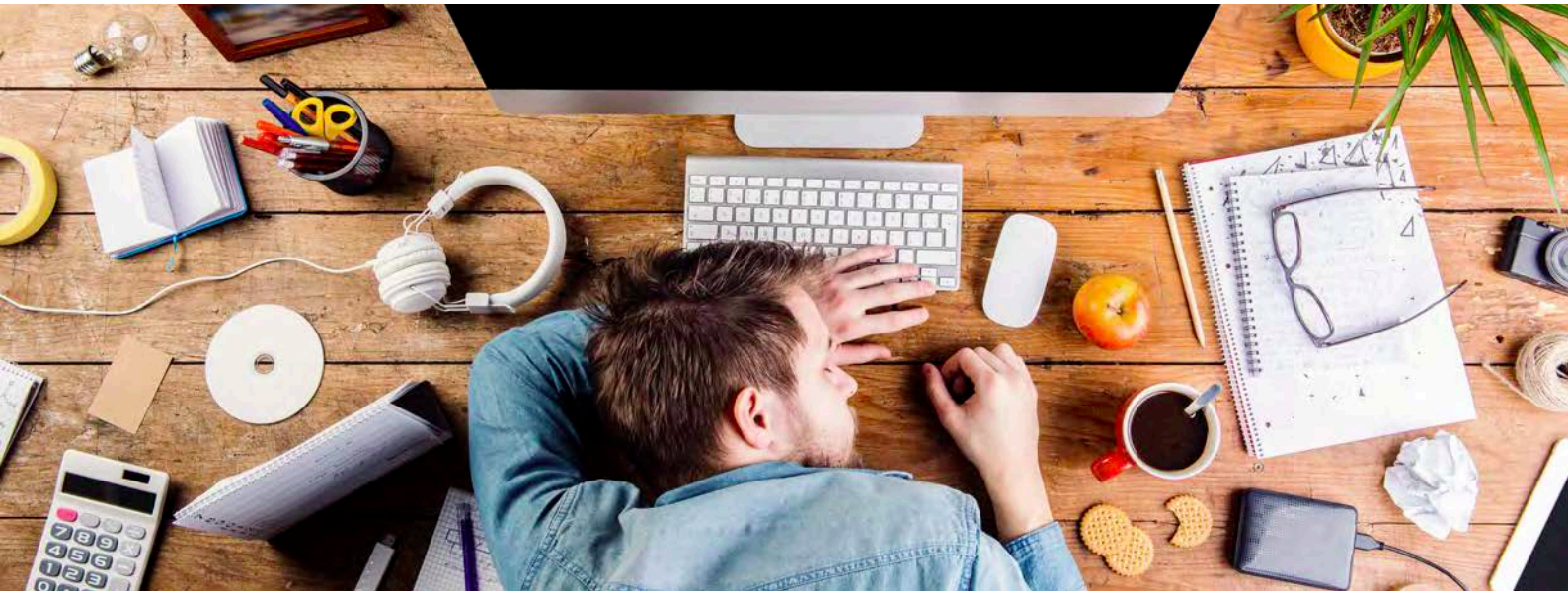
It stands to reason this would increase the accuracy, or actually the frequency of data input by the user. To find out if it really works like this, Utrecht University student Chris Verbeek is conducting an interesting research project, *DietCare*. In his own words: "The goal of the experiment is to provide an answer

to the following research question: *What gamification aspects would serve as stimulus to record fluid intake in a health coaching app?*

One baseline and three gamified prototypes are being tested in order to assess and compare their performances. Here, performance is defined as the degree to which a gamified prototype stimulates participants to measure (keep track) of their daily fluid intake compared to the baseline, non-gamified prototype."

Project lead: Maartje Poelman

A virtual sleep coach in your pocket



PROJECT: SLEEPCARE
MORE: WWW.IKGALEKKERSLAPEN.NL

PARTNERS: UTRECHT UNIVERSITY AND DELFT UNIVERSITY OF TECHNOLOGY. SLEEPCARE IS SUPPORTED BY PHILIPS, THE NETHERLANDS ORGANISATION FOR SCIENTIFIC RESEARCH (NWO), AND THE NATIONAL INITIATIVE BRAIN AND COGNITION

Researchers from Utrecht University, the University of Amsterdam and TU Delft have developed an app that helps users learn to sleep better. The goal of this virtual coach is to help people who suffer from chronic insomnia comply with their recommended course of treatment. The coaching process with the app is comparable to personal coaching using *Whatsapp*. There are many different ways to support insomnia treatments with technology, such as apps that measure your sleep or smart alarm clocks that wake you at the right time. However, such technology-supported

sleep training programmes are completed by only half of the people with sleeping problems. Researchers from Utrecht University, the University of Amsterdam and TU Delft recently revealed in the *Journal of Medical Internet Research* that the effectiveness of insomnia treatments is related to therapy compliance. In order to increase the effectiveness of sleep training, the researchers developed an interactive virtual coach, the *SleepCare* app.

The app is currently available for Android phones.

Virtual supermarket

The Virtual Supermarket is an innovative way to study the brain performance of people who have had serious health issues and experience psychological traumas as a result. The research combines virtual reality with custom made VR eye tracking technologies. This allows better testing, overview and measurement of behavioural responses than typical pen-and-paper tests do.

PARTNERS: UTRECHT UNIVERSITY, BRAIN CENTER RUDOLF MAGNUS OF THE UNIVERSITY MEDICAL CENTER UTRECHT (UMC), ATOM 2 BITS, HOOGSTRAAT REVALIDATIE, REVALIDATIE FONDS





Annihilating alcohol abuse ...with a game



Prevention & adolescents

**Preventing binge drinking
among adolescents? Let them
play games, but not just any.**

Interview with Wouter Boendermaker

The game is called *The Fling*. On the screen, little green cubes race across three lanes, towards the player. In sync with the music, these cubes cross a certain threshold near the bottom of the screen. At the exact moment a cube crosses that line, the player hits a key. And again. And again. Following the cubes crossing the line and the rhythm of the music.

Then, suddenly, one of the cubes doesn't bear the colour green. It's red. The player's instinct tells them to tap the key when that cube crosses the line, just as with all the other cubes. However, the red colour says 'no'. Ignore me. Do not follow the rhythm with this one.

To avoid making the mistake of pressing the key at the wrong moment, i.e. a red cube crossing the line, the player needs to summon some sort of reflexive self control. They need to suppress an almost subconscious signal to hit that button. That form of self control is underdeveloped in adolescents who show a greater fondness for alcohol than is healthy for anyone. The game described is an experimental means of training that exact counter-response of inhibition and self control.

Wishful thinking?

Granted, alcohol abuse is the result of many factors; social environment and genetics play an important role. Preventing alcoholism with a mere ▶

«We may move to heavier drinking adolescents, for our next study»

game may sound like an oversimplification, if not plain wishful thinking. Wouter Boendermaker, PhD, researcher at Utrecht University, talks us through the idea of a serious game actually helping in this matter.

“The idea of a serious game is that it combines two aspects: a fun element, the game, and a more ‘serious’ element, which can be based on scientific research. *The Fling* is based on a cognitive training paradigm aimed at strengthening inhibitory control functions in the brain. This aspect formed the basis for the game design. As such, it is not necessarily the game aspect that helps people to drink less, but rather the evidence based training principles underlying the game design. The game elements are primarily used to make the training more fun to do, which could result in lower dropout rates and potentially better training outcomes.”

Results

So far the theory. The game has been put to the test. Boendermaker shares the results the team collected so far. “We evaluated the game in an experiment where we compared the active game training with a placebo game without inhibition training, and a regular inhibition training without game elements. During one month, 185 adolescents trained in four twenty-minute sessions. As expected, we found that the game variants were evaluated more positively than the standard training. Inhibition also improved, but also in the placebo game group, suggesting the game activities alone may already have had a beneficial effect. “As the levels of drinking in our first sample were low, no significant training effects on drinking behaviour were found yet. However, now that we know that the game training can be effective, both in terms of motivating the participants and affecting inhibition, we may move to heavier drinking adolescents for our next study.”

The researcher, somewhat of a gamer himself, stresses the importance of more studies. “Every serious game, especially in health-care, really needs to be validated. Sometimes it seems inevitable an idea will work, but you only really know after extensive, scientific, controlled tests. More importantly, in extreme cases, a badly designed game could even trig-

Bio.



► **DR. WOUTER BOENDERMAKER** is a psychological scientist with interests in child development, clinical intervention techniques, experimental design, development (programming) of scientific assessment and training tasks and serious games and teaching at bachelor and master level. He works at the Faculty of Social and Behavioural Sciences, Utrecht University.

Project Info.

► **BEAT IT! TRAINING BEHAVIORAL CONTROL IN ADOLESCENTS**

MAIN PROJECT MEMBERS: WOUTER J. BOENDERMAKER, REMCO VELTKAMP, ROBERT JAN BEUN, RENS VAN DE SCHOOT, AND MARGOT PEETERS (ALL UTRECHT UNIVERSITY)

FUNDED BY DYNAMICS OF YOUTH

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ger an adverse effect. You should only claim something works after you have validated the method.”

More applications

Going back to *The Fling*. Notwithstanding the need for further research, the first results invite cautious optimism. Assuming in the end, a game like *The Fling* does indeed help to prevent alcohol abuse, could it have more applications? Boendermaker: “Previous research has shown, to some degree of success, that the same cognitive training principles can also be applied in subjects with ADHD, anxiety, and other substance use problems. As the training paradigms are very similar, they, too, can be used as a basis for serious games. As the field of cognitive training, especially through serious games, is fairly young, there is still a lot to discover. Among other things, questions that remain to be answered are which training paradigms, but also which game elements, work best for which audiences? Can we take these trainings out of the lab to have people train at home? We are currently working hard to find the answers.”

Small warning

Boendermaker has a small warning concerning the use of serious games: do not call them a game. “When you tell a group adolescents they’re going to play a game, they think of big 3D action games, of popular shooters like *Call of Duty*, *Battlefield*. When presented with a non-commercial, perhaps less exciting, serious game, they may get disappointed before they even get started.

“However, when you first tell them they’re going to do some tests, some exercises, and then they find out it’s actually a nice, little game, then that’s going to be an unexpected plus. A pleasant surprise. And that creates a way better mindset to start with.”

Grand Theft Auto

Speaking of popular games, why not have large, commercial studios incorporate inhibition control training exercises in their games? Wouldn’t that instantly turn them into the world’s most popular anti alcohol abuse-tools?

“Unlikely”, says Boendermaker, not entirely unexpected. “Combining the very specific, evidence-based cognitive training paradigms with



«There are still many avenues to be studied in our research»

Still from Grand Theft Auto V. "Combining the very specific cognitive training paradigms with commercial games will in be very hard to achieve"

commercial games will in most cases be very hard to achieve. Imagine incorporating large pictures of alcoholic beverages, and systematically approaching or avoiding these pictures, throughout a game like *Grand Theft Auto*. The seriousness of such a game would probably also stand in the way of the commercial aspects.

"Nevertheless, there has been some research that has looked at the cognitive effects of commercial gaming, which has shown some interesting benefits in hardcore games. However, for the purpose of directed training, these games may be less suitable.

Explicit messages

"Another option is to take the more direct route of explicit drug education as a basis for a serious game. The benefit there would be that explicit messages are probably easier to incorporate in commercially fun games. However, the efficacy of such explicit techniques may also be more limited, especially in the case of substance use. For example, most people already know that smoking is bad for their health, yet they still have a hard time quitting.

"So in short, there are still many avenues that can be studied in our search to find ways to help adolescents battle their heavy substance use, and I believe serious games can certainly aid in that effort." ◀

A cure?

If games can prevent alcoholism, is there a chance that they could cure it? Well...

Wouter Boendermaker: "Actually, the strongest scientific and clinical effects using regular training are found among longtime heavy alcohol users in clinics, where the cognitive trainings are combined with cognitive behavioural therapy, but still result in an added effect. Although a cure is probably too strong a term in this context, given the notion that currently, relapse prevention is still a big problem, any significant improvement we can achieve is relevant. Whether games can play a role depends largely on the patient's own motivation to change their behaviour: if it is already high, games may only make the training a bit more bearable, but if motivation is low, as is typically the case in adolescents, then a good serious game training may really make the difference."

More.

▶ **PROJECT BEAT-IT!**
[UU.NL/ONDERZOEK/
BEAT-IT](http://UU.NL/ONDERZOEK/BEAT-IT)

▶ **PERSONAL
WEBSITE OF WOUTER
BOENDERMAKER**
WWW.WOUBOE.NL

To play, or not to play

Healthy play, better coping

Stimulating play through games may empower chronically ill children in their everyday lives.

By: Sanne Nijhof, Stefan van Geelen, Stef Haarler, Sasja Duijff, Christiaan Vinkers, Heidi Lesscher

*«I always feel as if people can't help me with any of my problems. This makes me anxious, nervous and lonely»
Adolescent patient with Chronic Fatigue Syndrome*

Chronic diseases negatively impact children's physical, behavioural and cognitive development beyond the actual illness itself. Also in infants with (early) life-threatening events, such as remission after childhood cancer or admission to neonatal intensive care unit (NICU), physical development obviously can be affected, but negative consequences on their psychological well being and social participation could be significant as well. Physical disabilities, developmental disorders, and social exclusion are major factors that may lead to limited play options for these children. Play behaviour is essential for the development of an individual. Therefore, on top of their (physical) disease, impaired play may have long-lasting consequences for these children as they grow up. Studying and developing play and game interventions for this particular population is of utmost importance: to empower them and combat the conse-

quences of their chronic or life-threatening condition, so that they can ultimately develop into healthy adults.

From a developmental perspective, play offers ample physical, emotional, cognitive, and social benefits. It allows children and adolescents to develop their motor skills, experiment with their (social) behavioural repertoire, helps them simulate alternative scenarios, and address the various positive and negative consequences of their behaviour in a safe and engaging context.

Innovative forms of play

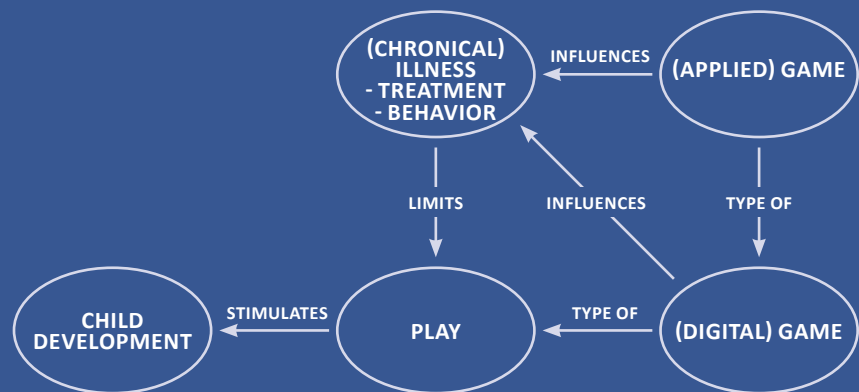
Recently, we started a new multi-disciplinary research project regarding the developmental and therapeutic aspects of play and applied games in children and adolescents with chronic or life-threatening conditions. A promising collaborative network of professionals from various disciplines across



*«Will I participate at the level of an elderly person, or will I not participate at all?»
Young patient with Cystic Fibrosis*



«I remember that I always had to be aware of my arthritis. When other kids played outside, I couldn't take part» Young adult patient with Juvenile Idiopathic Arthritis



Conceptual research area of games as intervention for (chronic) diseased children.

the Utrecht University campus will help to answer questions such as: What is the adaptive functionality of play in children with chronic or life-threatening diseases? How can innovative forms of play and gaming interventions stimulate coping with their situation? Will better coping improve their development, leading, for example, to better social participation later in life?

Bullying

Children and adolescents with chronic conditions constitute at least 15% of the Dutch population under the age of 18. This means that roughly 600,000 children in the Netherlands are chronically ill, ranging from mild impairments to severe limitations in daily functioning. Naturally, they suffer the somatic and psychological consequences of their illnesses. However, isolation, stigmatization, inequality, bullying, and doubts concerning their physical and intellectual capacities are everyday realities for this vulnerable group in our society.

Health redefined

In 1948, the World Health Organization defined health as 'a state of complete well-being and absence of disease'. Recently, it has been proposed to

Bio.

► **DR. STEFAN VAN GEELEN** is a philosopher and researcher at the Wilhelmina Children's Hospital Utrecht. His main academic interests are in the conceptual and empirical study of how vulnerable patient groups experience themselves and developing and testing new strategies to promote health.

► **STEF HAARLER** studies Information Science at the University of Utrecht and is contributing to this project for his master thesis.

► **DR. HEIDI LESSCHER** is behavioural neurobiologist and researcher at the Faculty of Veterinary Medicine. She is interested in the role of behavioural characteristics, including social play and impulsivity and age-of-onset in the development of addiction and behavioural control.

► **DR. CHRISTIAAN VINKERS** is a psychiatrist and researcher at the Rudolf Magnus Brain Center. His overall research objective is to investigate the neurobiological background of stress resilience and vulnerability including (epi)genetic, neuroendocrine, and brain circuitry factors, with a special interest in the GABA system.

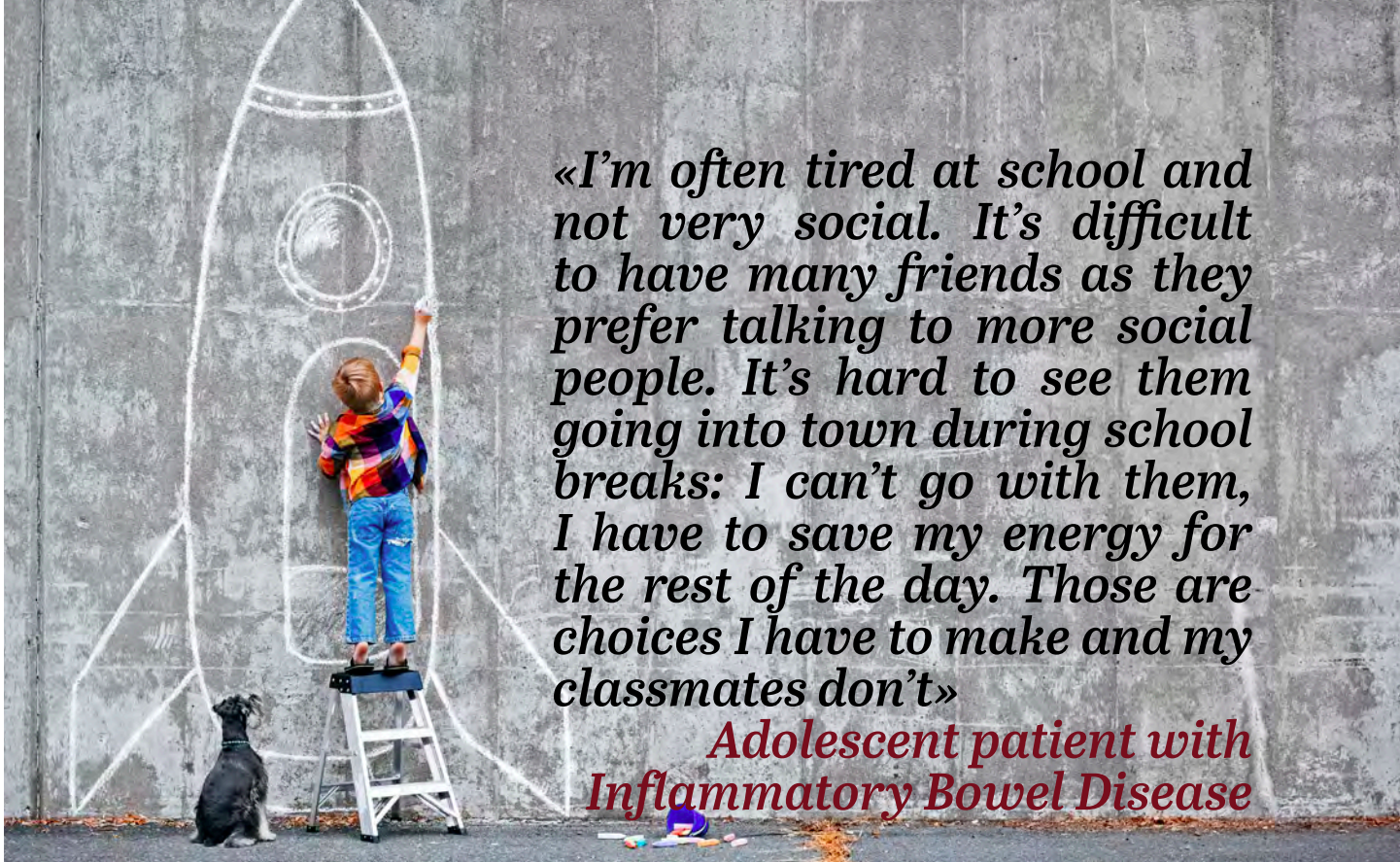
► **DR. SASJA DUIJFF** is a paediatric psychologist and researcher at the division of Paediatrics, UMCU. She has a special interest in the cognitive development of children with the 22q11.2 deletion syndrome.

► **DR. SANNE NIJHOF** is a paediatrician and researcher at the Wilhelmina Children's Hospital Utrecht. She investigates 'patient related outcomes' like fatigue, pain, well-being, and societal participation in various somatically defined paediatric patient groups, and uses their experience in research at web-based monitoring of health-related outcomes and treatment modalities.

redefine health as 'the ability to adapt and self-manage in the face of social, physical and emotional challenges'. In line with such notions, patients, researchers, caretakers and policy makers emphasize the need to help people with chronic and/or life-threatening conditions to increase their ability to adapt, and their self-manage capacities. Optimal comprehensive strategies addressing childhood conditions might therefore use theories of play as a conceptual framework. They will also systematically monitor the child's capacity and ability to play and the well-being of the patients and their families. This will help to assess vulnerabilities and resilience among children with chronic and/or life-threatening conditions. This knowledge can be used as an innovative and interactive method for creating prevention and treatment strategies. Conceptualizing and studying play – precisely understood as stimulating the ability to adapt and self-manage as an integral part of child's health - is therefore timely and much needed.

Constructive influence

There is growing evidence that action games can have a constructive influence on young people's cogni-




«I'm often tired at school and not very social. It's difficult to have many friends as they prefer talking to more social people. It's hard to see them going into town during school breaks: I can't go with them, I have to save my energy for the rest of the day. Those are choices I have to make and my classmates don't»

Adolescent patient with Inflammatory Bowel Disease

tive processes such as focus, problem solving skills, spatial skills and mental rotation. Moreover, a positive relationship between playing video games and a child's creativity has also been reported, and high usage seems to be positively correlated with good intellectual functioning and academic achievement. Just as with regular play, video games can be real enough to make the accomplishments of goals matter, but are also a safe way to practice such skills as controlling or modulating negative emotions in order to achieve those goals. It has also been suggested that the immersive social context of today's games help gamers rapidly learn social skills and pro-social behaviour, which might generalize to their peer and family relations outside of gaming environments. In this context, it becomes increasingly interesting to study whether interactive technology might enable young patients to rise above the limitations of their conditions and to participate in play in augmented realities.

Animal models

Still, very little is known on the relation between play/gaming, child development and chronic and/or life-threatening illness. To address

these complex multi-level topics, the consortium uses animal models to determine whether and how chronic or life-threatening illness affects social play behaviour and, as a result, alters social and neurocognitive development. From a developmental perspective, we will examine the role of impaired play behaviour resulting from childhood health issues on social development, societal participation and stress-regulation. This can result in novel preventive strategies to increase the resilience and social participation of young people with long-term illnesses. In a collaboration between preclinical neuroscientists, paediatricians, psychologists and other caregivers/scientists, we will attempt to influence treatment outcomes and assess whether stimulation of play will help children with chronic or life-threatening diseases, as well as their families, to more effectively deal with their condition. Using innovative applied gaming approaches and interaction technology in childhood illness, we aim to facilitate the healthy development of bodily self-awareness, physical and motor skills, emotional sensitivity and flexibility, cognitive abilities, social competence, creativity and problem-solving capabilities. 

Project Info.

► HEALTHY PLAY, BETTER COPING

FUNDED BY DYNAMICS OF YOUTH
DYNAMICS OF YOUTH IS ONE OF THE STRATEGIC THEMES OF UTRECHT UNIVERSITY

APPROXIMATELY TWENTY TEAM MEMBERS ARE INVOLVED IN THIS PROJECT.

THESE ARE THE PARTICIPATING INSTITUTES:
WILHELMINA CHILDREN'S HOSPITAL (WKZ)/
UNIVERSITY MEDICAL CENTER UTRECHT (UMCU)

DEPARTMENT OF INFORMATION AND COMPUTING SCIENCES, FACULTY OF SCIENCE
UTRECHT UNIVERSITY

DEPARTMENT OF ANIMALS IN SCIENCE AND SOCIETY, FACULTY OF VETERINARY MEDICINE, UTRECHT UNIVERSITY

FACULTY OF SOCIAL AND BEHAVIOURAL SCIENCES, UTRECHT UNIVERSITY

UTRECHT UNIVERSITY SCHOOL OF GOVERNANCE, FACULTY OF LAW ECONOMICS AND GOVERNANCE, UTRECHT UNIVERSITY

PRINCESS MAXIMA CENTER FOR PAEDIATRIC ONCOLOGY UTRECHT

TRIMBOS INSTITUTE UTRECHT

«The robot is designed as a tool to support preschool teachers»

The 4 Rules of Robot Research.

The L2TOR project addresses the following four objectives:

1. Study the science and technology of social robots for second language tutoring with children in a preschool setting.
2. Define the pedagogy of robot assisted language tutoring.
3. Determine design principles of developing a social robot for (second) language tutoring with a clear commercial focus.
4. Innovate multimodal interaction management for robotic tutors.



L2TOR: the RoboTeach Child friendly tutoring robot

Language acquisition benefits from early, personalised and interactive tutoring, thus, a robot is created to teach preschoolers a second language. Its name? L2TOR.

L2TOR (pronounced 'el tutor') is a scientific research project officially named *Second language tutoring using social robots*. The project's aim: design a child-friendly tutor robot that can be used to support teaching preschool children a second language (L2) by interacting with children in their social and referential world.

In particular, the project focuses on teaching English as L2 to native speakers of Dutch, German and Turkish, and teaching Dutch and German as L2 to immigrant children speaking Turkish as a native language. The L2TOR robot is designed to interact naturally with children about four years of age in both the second language and the child's native language.

Body language

The robot's social behaviour is based on how human tutors interact with children, and uses verbal as well as non-verbal communication, such as gestures and other types of body language. The robot is able to adaptively respond to children's actions and engage with them in tutoring interactions. The child is provided with increasingly complex stimuli and utterances in the second language, as well as appropriate feedback that supports the child's language development.

This L2TOR system has been designed and will be evaluated for three educational domains typically used at preschools, and incorporates language-based tutoring about: 1) numbers and pre-mathematical concepts, 2) spatial language, and 3) basic vocabulary



SOCIAL ROBOTS are an increasing part of our society, and can support humans in a multitude of ways – in health care, elderly care, entertainment, and education. The vision is that social robots can contribute to Europe's aim to teach every child a second language (L2) through one-on-one tutoring. The role of a social robot as a second language tutor can facilitate the one-to-one tutoring of children using a perfect model of the target language, while at the same time being proficient in the children's mother tongue. Moreover, being situated in the physical world, interactions with a social robot can be multimodal and refer to concrete objects and events, thus enhancing the learning environment of the child.

Bio.

► **PROF. DR. PAUL LESEMAN** is a full professor of education, in particular learning disabilities and school problems of low income and minority children, at the Faculty of Social and Behavioural Sciences, Utrecht University.

learning through storytelling. For each domain, three lessons have been defined in specific domain-relevant language, such as counting numbers or spatial prepositions (in, on, over, etc.), which are being taught to the child.

Commercial use

The robot is designed as a tool to support preschool teachers by allowing children at risk of language delay, or those learning English as a foreign language, to spend time with the robot in one-to-one tutoring sessions. Tutoring robots have considerable market potential. They could find their way into formal education, as assistive teaching technology offering one-on-one tutoring to children who need additional support or who enjoy an additional challenge. But there is also potential in the edutainment market for language tutoring robots; the already large edutainment market has room for social robots for informal home education.

The L2TOR project capitalises on recent developments in human-robot interaction in which the use of social robots is explored in the context of teaching and tutoring. Social robots have been shown to have marked benefits over screen-based tutoring technologies, and have demonstrable positive impacts on motivation in learners and their learning outcomes.

► L2TOR is an international collaboration between these partners: Plymouth University, Tilburg University, University of Bielefeld, Utrecht University, Koç University, Aldebaran Robotics and QBMT.

The Virtual Patient

The good news about bad news

Good news: delivering bad news can be trained. And thanks to a game, that training just got a whole lot more accessible.

Interview with Johan Jeuring

Telling a patient they have an incurable disease is not easy. But holding such conversations is a skill that can be learned. There is no need to reinvent the wheel for every such conversation.

“A bad news conversation typically consists of a number of steps that have to be performed in the right order. The bad news should be delivered immediately, and the information provided should be limited.”

Speaking is Prof. Dr. Johan Jeuring, a long-time researcher of computer programming; his first scholarly publications dating all the way back to 1990. Jeuring helped create *Communicate!*, a game that trains users how to have such conversations.

The *Communicate!* project was started in response to lecturers' requests for a tool to teach communication skills at health care study programmes. Typically this is done by actors, making training time intensive and expensive. By contrast, a game, once developed



► PROF. DR. JOHAN JEURING is Head of department and professor of Software Technology for Learning and Teaching at the Institute of Information and Computing Sciences of Utrecht University (Faculty of Science), and professor of Software Technology at the School of Computer Science of the Open University (OUNL).

and adapted to a specific group of students, has almost no additional cost per trainee.

Choices

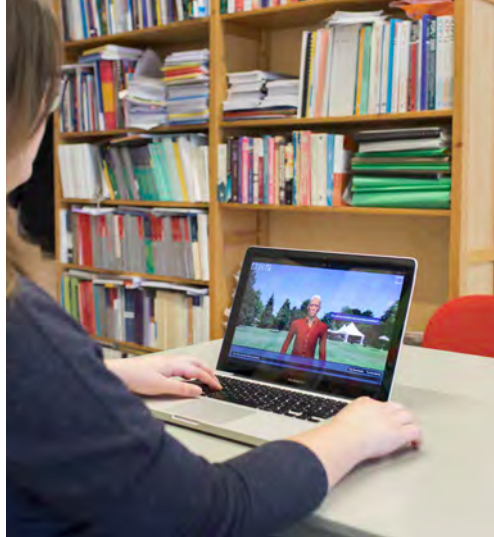
Jeuring explains the workings of the game: “Using *Communicate!*, a student chooses between several dialogue options, and observes the reaction in a virtual character, both in an emotion as in a response sentence. If a student does not follow the desired sequence of steps, the virtual character gets very angry, and leaves the scene. Each choice has a score on the learning goals of the dialogue, and at the end of a conversation, the student gets an overview of the results of their choices on the learning goals.”

The game has been through a long testing process, including a pilot. Jeuring continues: “There are several aspects of *Communicate!* we have tested throughout the years: how do students play the game, how can it be used in a communication skills course, how do the choices of students change when they play

«It started as a research project, but ended up delivering a usable product»



«It is not the goal of our research to develop products that can be sold on the market»



two similar dialogues? Is there a difference between first reading about communication skills and then playing, or the other way around, et cetera?

“In some experiments the game worked better than in others. Three aspects we think are important. *One* - a scenario should not be too long: a scenario that takes longer than 15 minutes to play is too hard. *Two* - it is easier to create a scenario for conversations with a clearly preferred structure. *Three* - it is good to have some different scenarios for the same purpose.”

Virtual Patient

Currently, *Communicate!* is used at the university in several programmes: pharmacy, psychology, veterinary medicine, medicine, pedagogy, and more programmes are working on it. Health care foundation Stichting Volte created its own version, called the *Virtual Patient*.

Jeuring: “The Volte Foundation uses the *Virtual Patient* to train professionals for difficult situations, in which there is no obvious wrong or right. Trainees discuss several options offered in the scenario, and sometimes even add their own. Utrecht University uses *Communicate!* to train students in slightly more structured conversations, such as a bad news conversation, or an anamnesis.”

Conquer the market

Communicate! started as a research project, but ended up delivering a usable product.

However, that was not the initial idea. Jeuring: “It is not the goal of our research to develop products that can be sold on the market. The distance from research to marketable products is almost always too large. In this case, the product was directly usable in education, and turning the prototype into a market-ready product turned out to be not too hard. In such a case I think it is very nice to take the step to the market, and to show what we can contribute with the research we do.” ◀

Project Info.

► COMMUNICATE!

TEAM MEMBERS:
JOHAN JEURING, FRANS
GROSFELD, BASTIAAN
HEEREN, MICHIEL
HULSBERGEN, RICHTA
IJNTEMA, VINCENT
JONKER, NICOLE
MASTENBROEK, MAARTEN
VAN DER SMAGT, FRANK
WIJMANS, MAJANNE
WOLTERS, HENK VAN
ZEIJTS

FUNDED BY UTRECHT
UNIVERSITY TEACHING
FUND

Games in education.

Although *Communicate!* and its offspring, *The Virtual Patient*, may have found their way into the hands of students and professionals, games aren't particularly mainstream in current day education. Prof. Dr. Johan Jeuring: “The adoption of simulations and games in education isn't a speedy process. But I think it will accelerate and extend in the coming years. Everywhere I look, I see people introducing more tech in education.”

One of the obstacles is finding the right business models. “Currently, the large educational publishers are delivering the minimum of what schools are asking of them in terms of tech. A lot of books can be easily replaced by software, but there's no business incentive for the publishers.”

“The development of a game is quite expensive. Consider *Communicate!*, which took about five person-years to develop, and we're still working on it. On top of that, educational games should be easy to adapt to different groups of students, further complicating the development.”

Despite these obstacles, Jeuring is optimistic. “The European Union is really pushing schools to adopt more technology. And there are already some fields in which game-like environments are the de facto standard. Programming skills are a great example, with projects like *Code.org* being used by millions worldwide.”



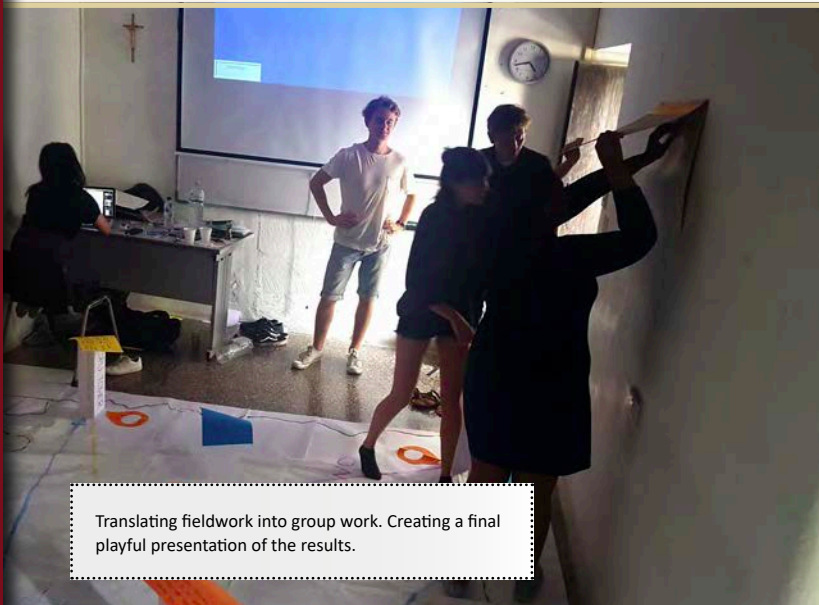
Island of science **Go Go Gozo – a playful field course**

The Erasmus+ funded *Go Go Gozo* field course project explored the links between play, mapping and mobility, delivering informal learning through field-based methodologies.

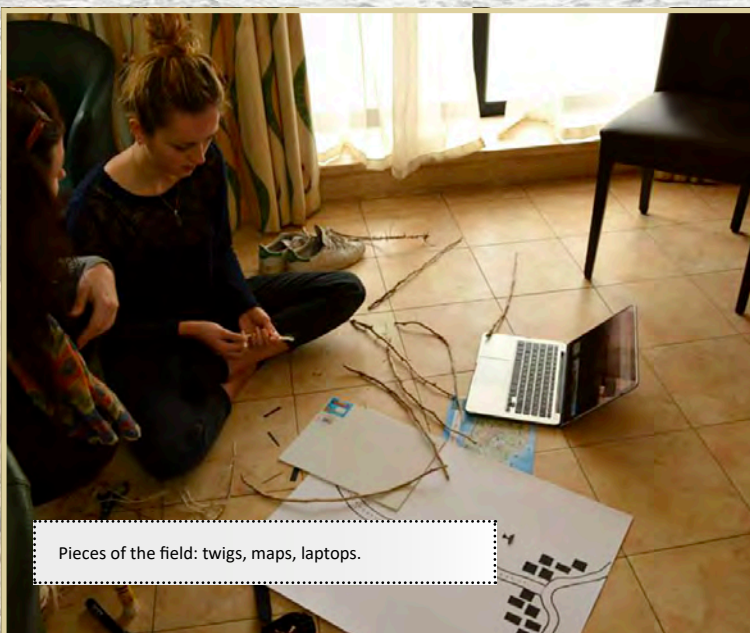
By: Alex Gekker, René Glas, Stephanie de Smale



A break in between classes at the Gozo university campus. Instead of a smoking or coffee break, we opted for short play breaks to energize the participants and open up potential new ways of doing things.



Translating fieldwork into group work. Creating a final playful presentation of the results.



Pieces of the field: twigs, maps, laptops.

“I’ve often been accused of making anthropology into literature, but anthropology is also field research”, renowned anthropologist Clifford Geertz once stated in an interview, “Writing is central to it”. Each year between 2015 and 2017, a group of Utrecht University staff and students ventured to the Maltese island of Gozo to participate in “Go Go Gozo”, a ten-day field course funded by the European Commission’s Erasmus+ program. The persisting question of these exercises was found in the tension identified by Geertz – how does one reconcile the messy realities of fieldwork with the crisp, clean writing outcomes expected from a researcher? Understanding the playful nature of research is key.

The course delivered a field-based encounter between students and staff from different disciplines, bringing together students with academic researchers from Media, Geography, Game and Play Studies, Sociology, Development Studies, Geoinformatics, Interdisciplinary Studies and New Media Studies (among others) in order to explore the links between mapping, mobility and play in an insular fieldwork setting. The other participating universities were University of Manchester (project lead), University of Warwick, University of Olomouc (Czech Republic) and the University of Malta.

“Go Go Gozo” explored the links between play, mapping and mobility, delivering informal learning through field-based methodologies. One of the key objectives of the project is to bring students from different contexts to the field where they will explore the use

HYBRID GAME LOCATIONS



A map of the hybrid game we created for the students to explore the island.

Bio.

► DR. ALEX GEKKER

is lecturer at the Faculty of Humanities, Utrecht University. He completed his PhD on the interplay between modern map-making practices, digital interfaces and the power that arises in between them.

► DR. RENÉ GLAS

is assistant professor at the Faculty of Humanities, Utrecht University, specializing in the field of game studies. Both within and outside of academia he is involved in projects dealing with video game culture and its history, play as a method to investigate this culture and history, and game literacy.

► STEPHANIE DE SMALE

is a PhD candidate at the department of Media and Culture Studies at the Faculty of Humanities, Utrecht University. Her interdisciplinary background is in communication and (new) media studies, specializing in: games and play, design, politics, ethnography, and violent conflict.

of embodied, digital, mobile and map-based research methods and skills, and to assess the potential of playful, experiential and participatory learning in this context. The staff and students participating from Utrecht University primarily came from the programmes Media and Performance Studies and New Media & Digital Culture, both within the department of Media and Culture Studies. As such, Utrecht University's contribution was very much dedicated to the playful and the digital within a methodological context. The photos on these pages capture the tension between free-flowing forms of play and rigid structures of education, as witnessed by us over three years.



Kite mapping: charting an island using camera's on kites.



Exploring the island of Gozo.

«The project plays with and challenges dominant ways of learning and doing research. Its playful character triggered my curiosity, while my curiosity triggered my playfulness, consequently opening creative spaces to practice/theory»
Peter, participating student

Simulations and games for tertiary education

Play to learn?

Games and simulations are finding their way into the university. But to what extent? And are they proper educational tools? An interfaculty study has the answers.

Simulations and games play an important role in how young people learn. Through simulations and games, students can practice skills that are relevant for professional practice. They learn to deal with complexity and diversity in a safe environment. Simulations and games already play a role in higher education, although it remains modest, fragmented and insufficiently embedded in learning objectives, and the evidence for their effect remains limited.

This was the point of departure for a broad-based interfaculty group of Utrecht University colleagues who, in 2014, set to work on the joint project, *Simulations and Simulation Gaming in Tertiary Education*, initiated by the Utrecht Education Incentive Fund.

Ambitious and diverse

From the outset, the objectives were ambitious and diverse. The primary aims of the project were:

- To make available and accessible knowledge about and the possibilities of simulations and games in tertiary (skills) education in relation to the learning objectives of courses and degree programmes.
- To stimulate those in charge of degree programmes to develop and integrate didactic methods into their programmes that concentrate on simulation and games that are responsive to the changes in learning styles and the learning strategies of students.
- To strengthen the alignment between tertiary education and the requirements of pro-

Bio.



► **PROF. DR. WIEGER BAKKER** is the initiator of this study. He is professor of Quality and Innovation of Society-oriented Higher Education at the Utrecht School of Governance of the Utrecht University Faculty of Law, Economics and Governance.



► **TOM OVERMANS** is the general project leader. He is assistant professor at the Utrecht School of Governance of the Utrecht University Faculty of Law, Economics and Governance. In 2014, after a successful career as organisational consultant, Tom transferred to academia.

The members of the project team that carried out the study: Mirjam Bastings, Wim Dictus, Anouck Gielisse, René Glas, Liesbeth van de Grint, Johan Jeuring, Marc van Mil, Gerard van der Ree, Benedikte Sam, Stephanie de Smale and Yvonne van Zeeland.

fessional practice and the labour market, in particular in executing complex tasks and concerning solving problems in multidisciplinary and interdisciplinary collaborations.

Project Results

To achieve the above goals, the team chose to deliver five sets of results summarised here.

1. Literature Review

The objective of the literature review was to investigate the effectiveness of simulations and games in tertiary education. We looked into the relationship between deploying simulations and games in university degree programmes and achieving learning objectives.

Results: From the systematic literature review we found a cautiously positive effect between deploying simulations and games, and achieving learning objectives. In addition, we found three key factors for the successful deployment of simulations and games: the role of the lecturer and game leader, the specificity of the simulation or game, and the integration of the simulation or game in the course.

2. Database

The objective of setting up a database containing all the simulations and games that were used at Utrecht University, was to lower the threshold for lecturers and professors to deploy simulations and games in teaching.



CRISIS IN DOM-CITY (Crisis in Domstad) is one of the database entries.

The subject of this simulation is the decision-making-process in times of crisis. The simulation is intended to increase your understanding of the relationship between politics and administration. It focuses on the interaction between politicians, civil servants, the media and various interest groups.

Results: There was much fragmented information, knowledge and experience at Utrecht University on the effective deployment of simulations and games in teaching. We brought all of these fragments together in one place that is logical and accessible to lecturers (tauu.uu.nl/games). They learned that sometimes an existing external or internal simulation or game could be well-suited for use in their own teaching, thus saving them much time and effort.

3. Knowledge Network

Building a knowledge network had both an internal and an external component. The first objective was to strengthen the interfaculty collaboration in this field at Utrecht University. In addition, the knowledge network was to connect with companies and knowledge institutions outside Utrecht University.

Results: The collaboration created opportunities for better and more structured internal and external exchange of knowledge. Simulations and gaming have been placed on the agenda and people now meet periodically.

4. Simulation Game Prototypes

Four simulations were developed by four different initiators on the project team.

1. *SMOI* is a business game used by students to practice leadership competence.
2. *EthiCo* is a game about coping with ethical dilemmas.

What's what?



► GAMES VERSUS SIMS

A clear and unambiguous definition of 'simulations' and 'games' does not exist. Simulations are generally considered to be models expressing complex, real-life systems. Games, by contrast to simulations, are goal-orientated activities with a distinct end. While playing a simulation, there are goals, but successful completion of the simulation does not necessarily result from meeting the specific conditions for a "win"

Image: Statecraft, a popular simulation targeted at university students. Statecraft could just as easily be called a game, considering its resemblance to commercial games such as Europa Universalis.

More.

THE DATABASE:
► TAUU.UU.NL/GAMES

3. *Clinical Reasoning* teaches students to solve a pathological problem in a systematic and problem-oriented fashion.

4. *The Performance Management Game* teaches hospital managers how to organise physicians in a clever, productive, yet humane manner.

5. Utrecht University Simulation Lab

The objective of the sub-project Utrecht University Simulation Lab was to explore the possibilities of developing and financing a simulation lab at Utrecht University. It could play an explicit role in further connecting researchers who are, for instance, involved in developing simulations or measuring the effects of simulations in tertiary education.

Results: the first concrete steps towards materializing a Utrecht University Simulation Lab were taken.

Conclusion

For simulations and games to have added value, attention must be given to the role of the lecturer and game leader, the specificity of the simulation or game and the integration of the simulation or game in the course. Simulations and games are not the final solution for all the problems in tertiary education. Nevertheless, they can play an important role in improving education and in increasing the extent to which specific learning objectives are achieved.



'I know that song!' Citizen science

How can you persuade a sufficient large number of people to participate in a scientific research? Making separate collections of folk songs and songs broadcast on early radio accessible to the general public.

By: Remco Veltkamp

«The amount of data is unprecedented in the field of music information retrieval»

►The Project

COGITCH, short for *Cognition Guided Interoperability beTween Collections of musical Heritage*, is a project of Utrecht University, the University of Amsterdam, the KNAW Meertens Institute, and the Netherlands Institute for Sound & Vision. The project's name also refers to 'cognitive itch', which is a song fragment that you keep on hearing in your head, also known as an earworm.

The Netherlands Institute for Sound & Vision possesses a unique collection of popular Dutch music. The Meertens Institute possesses a unique collection of Dutch folk songs. These two collections of musical heritage belong to the same culture, but are only separated for institutional reasons. Sound & Vision wishes to make these musical archives accessible for the general public in an integrated way. Meertens Institute wishes the same, to enable musicological research on the evolution of popular songs. Driven by these demands, COGITCH's objective is to develop generic techniques and an interoperable system to index distributed sources. Collaborative research cutting across the boundaries between music cognition and computer science resulted in the development of generic techniques for relating music from different collections. A top-down approach to developing retrieval methods was taken, working from musical knowledge and cognitive psychology towards the identification and processing of audio features. Citizen science anno-



►PROF.DR. REMCO VELTKAMP is full professor of Game and Media Technology at the Faculty of Science, Utrecht University. His research topics are the analysis, recognition and retrieval of, and interaction with, games, 3D objects and scenes, images, video, and music. He has written over 200 refereed papers in reviewed journals and conferences, and supervised 20 PhD theses.

Lingo.

► Music Information Retrieval
Interdisciplinary field of retrieving information from and about music.

► Citizen science
Public (non-professional) participation in scientific research.

► Game with a purpose
Game which is fun to play, but developed to solve a problem or collect data.

► Other terms for Cognitive Itch:
Brain Itch, Auditory Itch
Earworm, Ohrwurm
Musical Hook
Involuntary Musical Imagery
Sticky Tunes, Sticky Songs
Music Memes
Humbugs
Song In My Head, Tune In My Head, Head Song
Obsessive Musical Thought
Tune Wedgies
Aneurhythms
Repetunitis
Chiclete De Ouidio ('Ear Chewing Gum')
Music Virus, Sound Virus, Viral Music
Stuck Tune Syndrome, Stuck Song Syndrome, Last Song Syndrome
Melodymania
Humsickness
Haunting Melody

tations provided by listeners help to establish the relationships between hooks (perceptually salient musical patterns) and music.

►The Project Results

The practical results of COGITCH are an interoperable search infrastructure and a workflow for the extraction of music thumbnails. The scientific results are models of music cognition, cognition-based similarity measures, and ground-truth data. These will enable future music cognition research, musicological research, and music retrieval benchmarking.

►The Game

The interactive game *Hooked!* was developed as part of the study with the goal of unlocking the secrets of what makes music memorable. Working with 14,000 song fragments, corresponding to the first 15 seconds of the major structural sections (verse, chorus, bridge, etc.) of popular songs, the game recorded how long it took participants to recognize a fragment or to be confident that they did not. The experiment yielded 130,000 responses. People who played the game were asked if they recognized a song, which was randomly selected from the NPO Radio 2 broadcasting Top 2000 playlist. The game collected an amount of data that is unprecedented in the field of music information retrieval. For the record, the Spice Girls' debut single *Wannabe* was the most quickly recognized song by participants.



The Top 10

The top ten of songs that were recognized fastest in the *Hooked!* game (with the average time in seconds):

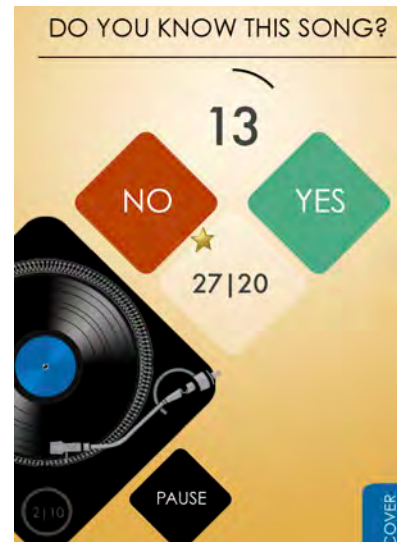
1. Spice Girls: *Wannabe* (1.78 s)
2. Aretha Franklin: *Think* (1.856 s)
3. Queen: *We Will Rock You* (1.86 s)
4. Christina Aguilera: *Beautiful* (2.00 s)
5. Amy Macdonald: *This Is The Life* (2.01 s)
6. The Police: *Message In A Bottle* (2.08 s)
7. Bon Jovi: *It's My Life* (2.16 s)
8. Bee Gees: *Stayin' Alive* (2.16 s)
9. ABBA: *Dancing Queen* (2.17 s)
10. 4 Non Blondes: *Whats Up?* (2.20 s)

More.

- PROJECTS.SCIENCE.UU.NL/COGITCH
- WWW.HOOKEDGAME.NL

FUNDED BY THE NETHERLANDS ORGANISATION FOR SCIENTIFIC RESEARCH (NWO), THE NWO-CATCH PROGRAMME.

PROJECT MEMBERS:
UTRECHT UNIVERSITY: JAN VAN BALEN, DIMITRIOS BOUNTOURIDIS, FRANS WIERING, REMCO VELTKAMP. **UNIVERSITY OF AMSTERDAM:** ASHLEY BURGOYNE, HENKJAN HONING. **THE NETHERLANDS INSTITUTE FOR SOUND AND VISION:** MAARTEN BRINKERINK, JOHAN OOMEN. **THE MEERTENS INSTITUTE:** MARTINE DE BRUIN, LOUIS GRIJP



PLAYING THE ARCHIVE

In early 2016 the Netherlands Institute for Sound and Vision received an important collection of early Dutch video games from developer Radarsoft, an active publisher on the 1980s Commodore 64 platform. The collection not only includes entertainment titles, but also early educational games.



During the Let's Play exhibition at Sound and Vision, the research project set up a dedicated Let's Play recording booth. Visitors were invited to record a play session of old Dutch games while commenting on their gameplay.

Old games don't play on modern equipment. To retain this part of our cultural heritage, we took action.

By: René Glas, Jasper van Vught, Jesse de Vos

Bio.

► DR. RENÉ GLAS

is assistant professor at the Faculty of Humanities, Utrecht University, specializing in the field of game studies. Both within and outside of academia he is involved in projects dealing with video game culture and its history, play as a method of investigating this culture and history, and game literacy.

► DR. JASPER VAN VUGHT

is assistant professor at the Faculty of Humanities, Utrecht University, also specializing in game studies. His focus is on game theory and methodology, video game ethics, and the history and preservation of games as art forms.

► JESSE DE VOS works at the Netherlands Institute for Sound and Vision as a curator and researcher of new and interactive media. His current topics of interest cover the preservation and presentation of games and websites. He was the lead curator of the Let's Play exhibition in 2016.

Between 2015 and 2017, a collaborative project between Utrecht University researchers and the Netherlands Institute for Sound and Vision set out to create the first unified effort between game research, cultural heritage institutions and the Dutch game industry to preserve Dutch games as national cultural heritage. What started out with a Focus Area seed money grant eventually turned into a larger NWO Museum Grant project with the name *Game On!*.

The aim of the research project was to think about how the complex nature of digital games informs archival policy and practices for cultural heritage preservation and presentation. To that extent, we were interested in questions like: How can we define and approach the history of Dutch digital games? What should a preservation effort of Dutch digital game heritage include (and therefore also exclude)? What does the selection policy look like to preserve and archive such material? How can the digital game heritage be open up to both the general public and to specialist groups?

Over the course of the project, a lot of these questions converged in our growing awareness

of the need to focus on documenting play as a preservation strategy rather than collecting and presenting games as objects. This aligned with what scholars in the field of game preservation has already pointed out: to preserve games as socio-cultural phenomena, shaped over time by both developers and especially players, will require a focus on preserving play as well.

Authentic experience

This realization led us to experiment with a novel way of documenting gameplay in the form of *Let's Play* videos. Even though there are many styles of Let's Play videos, in most cases Let's Play videos are disorderly, unstructured recordings of play – rather than dedicated play sessions showing off skill – and rely on the often humorous commentary to offer a more free-flowing, “authentic” experience of playing a game. Currently, the Let's Play video is one of the most popular online video forums, with several Let's Play channels ranking among the most subscribed to on YouTube. As such, the Let's Play video has become a prominent way for players to engage with games, both in terms



Anne Bras, the biggest Dutch collector of boxed games, engaged in creating a Let's Play video during the exhibition. Such recordings were collected, archived and published on YouTube, and played an important part in the research project's aim to focus on the notion of play as part of preserving and exhibiting games as cultural heritage.

of creating such videos or by watching others play.

For the purpose of game preservation, we argued, Let's Play videos have the potential to provide a viewer with a sense of playing in a more direct or engaging way than a regular gameplay recording would. We proceeded to create a small Let's Play recording studio in the Museum of Sound and Vision within a larger "Let's Play!" exhibition set up by the project's research intern Hugo Zijlstra. Here, we encouraged museum visitors to record their own gameplay of old Dutch games like Radarsoft's *Eindeloos* (a side-scrolling, maze-like shooter, 1985) or *Topografie Wereld* (an educational game with the aim of learning topography, 1984). These videos then became part of the exhibition and were also put online on a dedicated YouTube channel.

Commodore 64

Within this Let's Play setup, we were particularly interested in seeing how players nowadays negotiate and discuss the semantics and mechanics of older games. In that respect, we intended to move beyond an idealization or recreation of an 'original experience' of playing these games. While the players did engage with the games on an original Commodore 64 console, we wanted to explore the new interpretative frames that players brought to these older games so that we could understand what kind of games they are now. How do players, for instance, highlight or negotiate the social, cultural, and technological significance of older Dutch games from a con-

temporary perspective? And can it help us understand video games as a developing medium by drawing historical connections that can shine a new or different light on this now well-established medium?

History of play experiences

In the end, our project yielded various interesting results with regards to both the preservation and presentation of older games. The Let's Play videos for instance highlighted the potential for creating a history of play experiences, where new encounters with old games provide a renewed understanding of the games' historical significance. They also provided insight into the importance of the materiality of the gameplay experience, with players comparing their experiences with old hardware to contemporary consoles. It also confronted players with their own game literacy, or lack thereof, as they noted how playing these games met or defied their expectations. These results have yielded interesting insights into games as forms of cultural heritage, which go well beyond merely preserving the games as objects themselves.

The results of the project were presented at a symposium the research team organized at the Institute for Sound and Vision called Let's Play Dutch Game History and were subsequently published. While the collaboration between Utrecht University and the Netherlands Institute for Sound and Vision continues, the GAME ON project wrapped up during the summer of 2017.

More.

For a full overview of all the results of the project, including a selection matrix for including games into the archive, user research on potential uses of the archive, as well as video recordings of the symposium's various presentations, go to: BEELDENGELUID.NL/KENNIS/PROJECTEN/GAME-ON

For the LET'S PLAY-videos on Youtube, go to (case sensitive): [BIT.LY/OLD-GAMES](https://bit.ly/old-games)



4 PhD-candidates & their research projects

The Graduate Programme

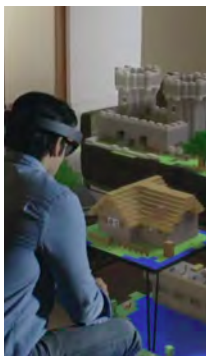
The graduate programme of the Utrecht Center for Game Research offers talented students the opportunity to write their own PhD proposals. In a two-year master's degree phase, selected graduate students learn about different aspects of game research, and write their own research proposals. Four excellent PhD students were selected and they present their PhD research projects on these pages.



1. Nina Rosa: Seeing, Hearing and Touching New Worlds

The Player-Avatar Relation in Multimodal Augmented Reality Games

«This sensation can be more intense when players are absorbed in the game»



When players experience a virtual world through multiple senses, the relationship between players and their in-game avatars may start to feel real. What are the consequences of this for the experience and performance?

The field of game technology is ever changing. One important change we expect is the shift towards virtual and augmented reality techniques. The first allows the compelling experience of a virtual game environment, the latter a game world that is integrated into the real world. Another change is the shift towards multimodal experiences, meaning players will be able to experience the game world through multiple senses, sometimes in ways that cannot be experienced in the real world.

If this were not mind-boggling enough, studies have shown that when we see a virtual game body (a.k.a. an avatar) being touched and we

feel that touch on our own skin, we start to feel as if the avatar is part of our own body. Similar feelings occur when a player is in complete control of the avatar. This sensation can be more intense when players are absorbed in the game.

My research focuses on the relationship between player and avatar during gameplay in multimodal augmented reality games. I want to understand what the consequences of this are for the experience and player performance, by taking into account how we experience our real bodies: is the relationship between player and avatar similar to how we experience our bodies in everyday life?

NINA ROSA is PhD candidate at the Department of Information and Computing Sciences, Faculty of Science. In 2015, Rosa won a national thesis prize with her thesis on multimodal virtual reality experiences.



2. Marries van de Hoef: Why are Games Appealing?

Understanding the variety of reasons why video games are appealing

It's probably the most fundamental question in games research: what makes video games appealing to the billions of players around the world.

There is a lot of research investigating why games are appealing. This question is usually not addressed directly, but disguised as research into player motivation, different types of fun, or emotions generated by games. These different perspectives have not only produced similar results, but also striking differences. It is my hypothesis that all this research is addressing the same underlying question: what makes games appealing? However, these different perspectives each highlight certain aspects while ignoring others.

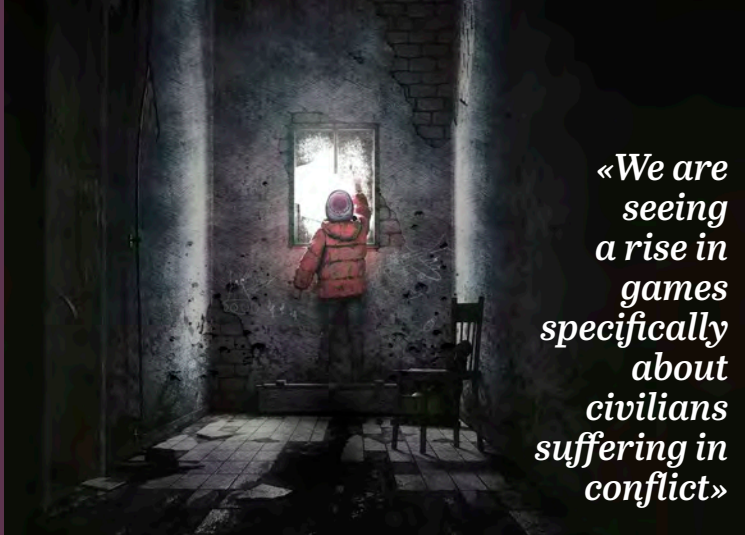
The current situation with all these perspectives is messy: there are a lot of theories about these topics, but each has a different perspec-

tive. This makes it very difficult to compare and combine the knowledge. Identifying the aggregate of the existing knowledge on this topic is my first research goal. Three main appealing factors are currently emerging from my data: challenging factors, social factors and exploration factors.

These factors are portrayed differently in the various perspectives, and factors are commonly added or subdivided. Combining the insights of all perspectives gives a better insight into how games appeal. This insight can be used in game design to understand what parts of the game are appealing and how to improve them.

MARRIES VAN DE HOEF is a PhD candidate at the Department of Information and Computing Sciences, Faculty of Science. He has been awarded with the Science Faculty's thesis prize of 2014. Image: The Witcher III, The Wild Hunt (CD Projekt RED), one of the most popular games this decade.

«Three main appealing factors are currently emerging from my data»



«We are seeing a rise in games specifically about civilians suffering in conflict»

3. Stephanie de Smale: Patterns in Conflict

Mapping Assemblages of Contemporary Conflict in Digital War Game Culture



Video games don't shy away from depicting the horrors of war. How do digital games represent human suffering in war contexts? How are they produced, circulated, and received in contemporary digital culture?

In this dissertation, I explore how digital games represent human suffering in war contexts and how these representations are they produced, circulated, and received in contemporary digital culture. Since 2012 the game industry has seen a rise in war games where the aim is to experience civilian suffering in conflict. Games such as *Spec Ops: The Line*, *Papers Please*, or *This War of Mine* coincide with images seen in the mass media of the enduring Syrian conflict, the height of the European migrant crisis, or the annexation of Crimea. In contemporary, digitally mediated society, global war representations play a large role in shaping our understanding of today's conflicts. Dominant ideas, stereotypes and iconic images used in news media and the humanitarian industry form a social imaginary of war. Using this imaginary,

these war games translate media representations to create fictionalised experiences of human suffering in wartime. However, the media platforms we use and the actors involved also shape this experience and understanding of war. Furthermore, the life of these global media products circulate in online media platforms such as YouTube, extending the life of experiencing the game through playing, to watching gameplay on video platforms.

To make sense of the social effects of these kinds of war representations, I break down its study into four themes: the production of war representations in the design of digital games; humanitarian fundraising on gaming platform *Steam*; the circulation of war narratives in gameplay videos; and lastly, the role of YouTube as a site for meaningful interaction on real world conflicts.

STEPHANIE DE SMALE is PhD candidate at the Department of Media and Culture Studies, Faculty of Humanities. Her interdisciplinary background is in communication and (new) media studies, specializing in: games and play, design, politics, ethnography, and violent conflict.

Image: This War of Mine (11bit Studios)

«Cities have been called Smart, playful, sustainable, hackable and social»

4. Sjors Martens: City-Game Cycle

Fitting the Game to the City Challenge

Think of the best city you know and think of what makes it so amazing. Is it social? Playful? Efficient? Homely? Now ask yourself what kind of interaction with the city would best express your experience to others?

Cities have been called smart, playful, sustainable, hackable, social – all terms that describe the roles of cities and actions of their citizens. Games targeting these citizens are increasing in number. Matching this increase are new and recurring narratives about what the city is. In my research I argue that the city games developed to foster these city ideas are initially informed by (sometimes implicit) values about the city. The subsequent design of the game ensures game mechanics that allow the players to undertake actions that make these values come to fruition. This gives rise to the *City-Game Cycle*: where a game allows a concept of the city to be realized.

As it turns out, many city games are not specifically tailored to the city values that have to come out of it. Games pursuing one set of values suddenly provoke different actions. For instance, *Pokémon Go* was a way to make people go out and spend money, but it ultimately also made city space social. In my research, I develop a method to determine whether and how the game mechanics fit the city values initially intended. By looking at this 'fit' I strive to explain how certain game designs are popular in city games, and dispel often used designs that don't seem to work. Ultimately I will argue that games for cities are only useful for a handful of city values and should therefore not be seen as a panacea for reaching utopia.

SJORS MARTENS is PhD candidate at the Department of Media and Culture Studies, Faculty of Humanities. He graduated from Media and Performance Studies at Utrecht University after graduating from Theatre, Film and Television Studies at Utrecht University (both cum laude).





Body movement
**Detecting lies,
improving games**

Measuring and analysing body movement and posture helps to detect lies. The same technology can be applied to improve serious games.

«We can do a lot more than detect lies»

Imagine: a police officer is interrogating a suspect and that suspect claims he drove from A to B in half an hour. Now, if the distance between A and B is over 100 kilometres, it's blatantly obvious the suspect isn't making any sense. He's lying.

However, some lies, the better ones, are way more difficult to detect. But the more complicated the lie, the more difficult it is to create and maintain. While an increasingly large part of your brain is involved with the lie, an increasingly smaller part is controlling your movements.

Because of this, people who are telling lies are prone to move in a much less controlled fashion. These less than deliberate movements provide important hints for the trustworthiness of their story.

Stressful

Ronald Poppe and his team have conducted a lot of research in this area. "Lying is cognitively demanding and stressful and we're researching how the body reacts to that. We're actually measuring the direction of movements, the distance, the speed. People wear straps with motion sensors on their elbows, wrists and hands. By combining the data these sensors provide, we can accurately measure body movements, even subtle ones.

"Straps with sensors or body suits provide extremely accurate measurements. But, they're very impractical. They're only useful in a lab setting, not in real world scenarios. So, we're



► **DR. IR. RONALD POPPE** is assistant professor at the Faculty of Science, Utrecht University. His research interests include the analysis of human motion from videos and other sensors and the understanding and modelling of human (communicative) behaviour in various, natural settings.

always looking for ways to improve and they way forward is using video.

"The issue is that 3D video is more reliable for analysis than 2D. Luckily 3D cameras are gaining popularity. We've even seen them in smart phones. Currently we're looking at ways to do more, for instance, can we measure and analyse body movements from a distance?"

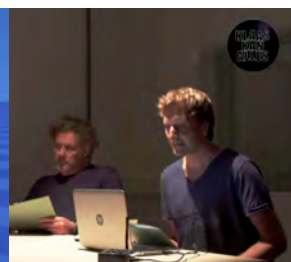
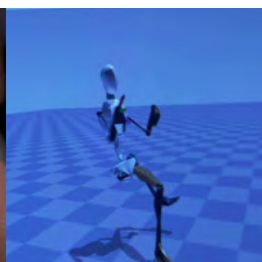
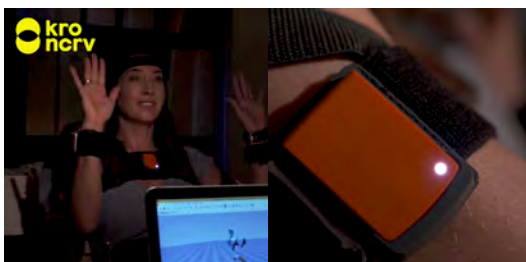
21th century skills

The use of video instead of motion sensors opens up new possibilities for the application of body movement analysis. Poppe: "We can do a lot more than detect lies. We can measure body movements that convey people's abilities in 21th century skills."

Imagine being able to measure the confidence of a participant answering multiple choice questions. That would provide more information about their capabilities than merely a list of correctly answered questions. Poppe: "During simulations, e.g. a role-play, we're able to go beyond judging the decisions the participants make. We can judge how they communicate their decisions.

"A manager conducting a bad news conversation, should say the right things, yes, but they also need to be convincing. That is what we can measure by looking at someone's body movements.

"In the same way, we can help improve serious games. A game needs to see if you are actually learning. With instant video analysis of the player, that would become a possibility." ◀



100% score on national television

The technology developed by Poppe and his team was featured on national television. The system was able to correctly identify all five lies told by the test subject.

Mimicry

One of the phenomena Poppe's team investigated is mimicry. And no, not the biological phenomenon, the behavioural one.

Poppe: "It's an interesting and additional way of detecting possible lies. During a conversation, if somebody is copying your posture, your arm movements, your facial expressions, chances are they're lying."

"This is automated behaviour, it's not con-

trolled. If you're having a nice and relaxed conversation, you are in full control of your body and movements. But lying is cognitively demanding, so your body switches to a more automated movement pattern. It starts to simply mirror the posture and movements of the person with who you are having this conversation. Thus, the amount of mirroring, mimicry, may be a good indicator for possible lies."



RAGE!

Europe's prime ecosystem for applied games.

RAGE, Realising an Applied Gaming Ecosystem, aims to develop, transform and enrich advanced technologies from the leisure games industry into self-contained gaming assets that will help game studios develop applied games more easily, quickly, and cost-effectively. These assets will be available along with a large volume of high-quality knowledge resources through a self-sustainable ecosystem, which is a social space that connects research, gaming industries, intermediaries, education providers, policy makers and end-users. The consortium is composed of nine research institutions, four game companies,

five end-users and one dissemination and exploitation partner. Currently, the project is in its second year. It has already created the RAGE ecosystem with several assets from the research partners and developed games in the areas of job and interview skills training. The RAGE ecosystem is a social space that will be the single entry point for applied gaming. Besides the technology assets developed by the RAGE project, it will realize centralized access to a wide range of applied gaming software modules, services and resources (or their metadata) that have been designed and developed in regional and EU-funded projects.

Partners.

The Open University of the Netherlands (the Netherlands), Universidad Complutense de Madrid (Spain), INESC-ID (Portugal), PlayGen (UK), OKKAM (Italy), FTK (Germany), The University of Bolton (UK), Technische Universitaet Graz (Austria), INMARK (Spain), Utrecht University (the Netherlands), The University Politehnica of Bucharest (Romania), Nurogames (Germany), BiP media (France), The Sofia University St. Kliment Ohridski (Bulgaria), Stichting Praktijkleren (the Netherlands), Gameware Europe (UK), Escola de Polícia Judiciária Portugal), Randstad (France), Hull College of Further Education (UK)

In depth: our RAGE project

Social animations for virtual humans in games

By: Zerrin Yumak

Who are we and what is our role in the RAGE project?

I am Zerrin Yumak, assistant professor of computer science at Utrecht University, leading Task 3.2: Embodiment and Physical Interaction in the RAGE project. The task develops assets that support the easy creation of flexible embodiment of virtual characters. We provide virtual character assets in which motions are adapted by specifying constraints. Constraints affect the joint orientations of an underlying skeleton, but other aspects of characters as well. The constraints can be supplied by the environment, the proportions of the character but also the emotional and social context. Enforcing motion constraints requires dealing with non-linearities in the rotational domain and restrictions on the degrees of freedom of the joints. We view motion on a semantic level, where we can specify the meaning of a motion, which is then translated to a motion of the particular character that performs it. Based on studies on how well emotions displayed by virtual characters are perceived, we support more efficiently production of emotional animations.

What is special about our research?

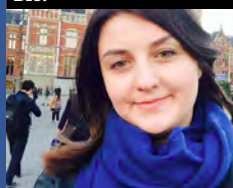
Believability of the virtual human motions is crucial to engage the people and to create an illusion of reality. However, it is not very easy to create believable characters. Motion capture is an effective way to generate real-life motions. Our research is about analysing social and emotional behaviours and turning them into expressive character animations. For this, we first analyse the behaviours of people in real contexts. For example, we capture and analyse how people behave during group social interactions, how often they look away or they look at the other person, and what kind of non-verbal behaviours they display. We also look into their attitudes and roles in the conversation. By learning patterns from data, using machine learning algorithms, we get some insights into real-life behaviour.



More.

► ZERRINYUMAK.COM

Bio.



► DR. ZERRIN YUMAK is assistant professor at the Department of Information and Computing Sciences at the Faculty of Science, Utrecht University, under the Interaction Technology division.

Then we use these insights and motion capture data to generate the animations. Starting with the captured motions as a basis, we generate new animations by modifying and combining the existing ones. That requires motion signal processing and constrained motion graph search algorithms.

What we have done so far?

We developed the Virtual Human Controller asset which is a collection of modules that allows to create virtual characters that can talk, perform facial expressions and gestures. The asset provides a quick pipeline to build conversational 3D non-player characters from scratch. It is built on top of the Unity 3D Game Engine (a popular tool for building games) and provides three functionalities: 1) Creating an animatable 3D avatar 2) Individual animation controllers (speech, gaze, gestures) 3) Multimodal animation generation using the Behaviour Mark-up Language. We successfully integrated our asset with the *Communicate! dialogue manager*. In addition to inter-asset integration, our asset is currently being used by the game developers at BiP Media in Paris and in the interview skills training game for Randstad.

What is next?

Currently, we are working on three research projects. The first one is generating lip-sync animation based on the analysis of linguistic cues and emotional speech given real human audio as input. Another project aims to generate believable gesture motion for non-player characters, based on conversational attitudes such as friendly and conflictive styles, and drives the behaviour based on the pitch and amplitude in the audio files. Last but not least, we are also working on automated social behaviour in group casual conversations by analysing a motion capture database of real human interactions. We look at how people take turns, give the floor and interrupt each other and use these insights to generate synchronised gaze and gesture behaviour. ◀

Virtual Worlds for Well-being

VIEWWW

Virtual worlds play an increasingly important role in our lives as places where people meet and make friends. Moreover, they influence the way we live, learn, communicate, heal, and entertain. When designed and applied appropriately they will have a strong positive influence on our well-being. Well-being, or vitality, has at least three components: the physical body, the perception in the mind and the emotional state of the person. Current virtual worlds, however, exhibit poor affect and, therefore, do not offer a rich, emotional experience. VIEWWW aims to improve the sense of well-being in virtual worlds, including the emotional perspective.

On these pages you'll find the most interesting VIEWWW projects and results.

This project was part of the national program COMMIT.
COMMIT-NL.NL



Affective Body Animation

In many current systems, 3D player avatars can only be controlled through very basic means such as a small set of pre-recorded motions or a few different facial expressions. To create more involved experiences in virtual worlds it is essential that virtual characters can express their emotions (such as happiness) and physical state (such as tiredness) much more convincingly. In order to achieve this, not only the visualization of these aspects should be realistic, but also the way users control their avatars: in an easy and natural way.

Within this work package an integrated framework is being developed in which motion and emotional expressions are combined into a generic approach for affective character animation. This includes the development of new algorithms to automatically compute synchronous facial and body motions that can express a variety of emotions and physical states, with a focus on stronger expressions like laughing, crying, shouting and heavy breathing.

Another development is a mechanism with which users can steer the animation of their avatars through a simple interface such as a few sensors placed on the user's arms and legs, which will drive an animation engine that translates these signals into similar avatar motions.

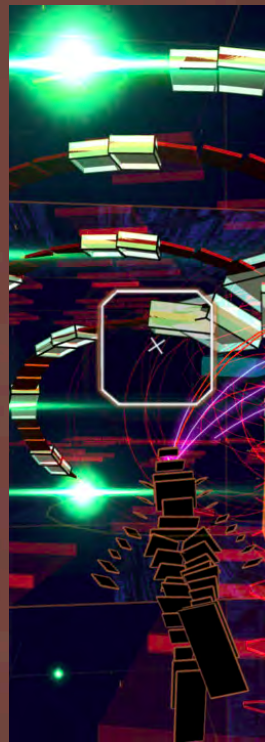
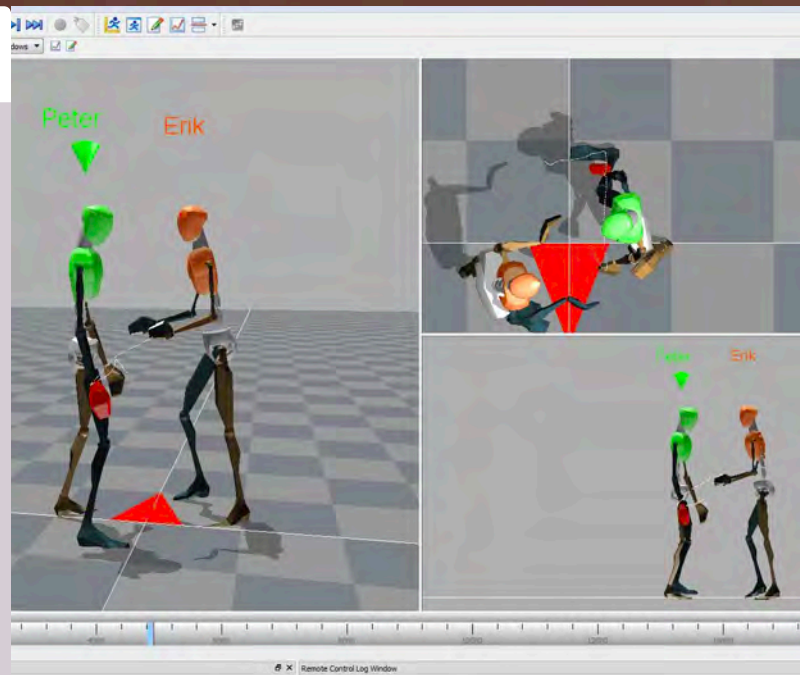
PROJECT LEAD:
DR. IR. ARJAN EGGES, FORMERLY OF UTRECHT UNIVERSITY

Social Animation

Since one of the main goals of virtual environments is to create a social experience, it is crucial that animated characters and avatars in these environments move according to established social rules. In this work package new techniques are being investigated for computing realistic movements and animations for such socially-driven multi-character animations.

PROJECT LEAD:
DR. ROLAND GERAERTS, FACULTY OF SCIENCE,
UTRECHT UNIVERSITY

For more on this subject: read the article Control the crowd and save the day, starting on page 16 of this magazine.

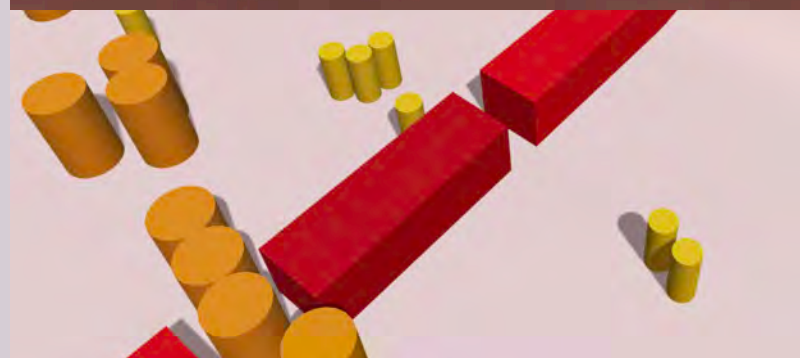


Sensing Emotion in Music

Music has considerable emotional impact on people. This work package in Virtual Worlds for Well Being copes with the musical aspects of semantic and emotional information in personal communication.

Music has been analysed statistically in many ways on the basis of low level features, counting pitch classes, beats per minutes, etc. This gives a broad categorization, but still provides little semantic or emotional information, which is much more personal, and less statistical. Research within this work package focused on identifying the relevant parameters, and creating computational models, implementations, and prototype systems.

PROJECT LEAD:
DR. FRANS WIERING, FACULTY OF SCIENCE,
UTRECHT UNIVERSITY



Sensing emotion in video

In social settings, people interact in close proximity. When analysing such encounters from video, we are typically interested in distinguishing between a large number of different interactions. Our work focuses on finding models to train interaction recognition and how to detect such interactions in both space and time from video. When considering many different types of interaction, we face two challenges. First, we need to distinguish between interactions that initially appear indistinguishable. Second, it becomes more difficult to obtain sufficient specific training examples for each type of interaction. Our research addresses both issues. We have created a framework that can distinguish very fine differences among interactions. Our method can be refined with body part detectors from non-specific images with pose information. Such resources are widely available. We have introduced a training scheme and a model formulation to allow for the inclusion of this auxiliary data.

TEXT: COERT VAN GEMEREN

PROJECT LEAD: DR.IR. RONALD POPPE



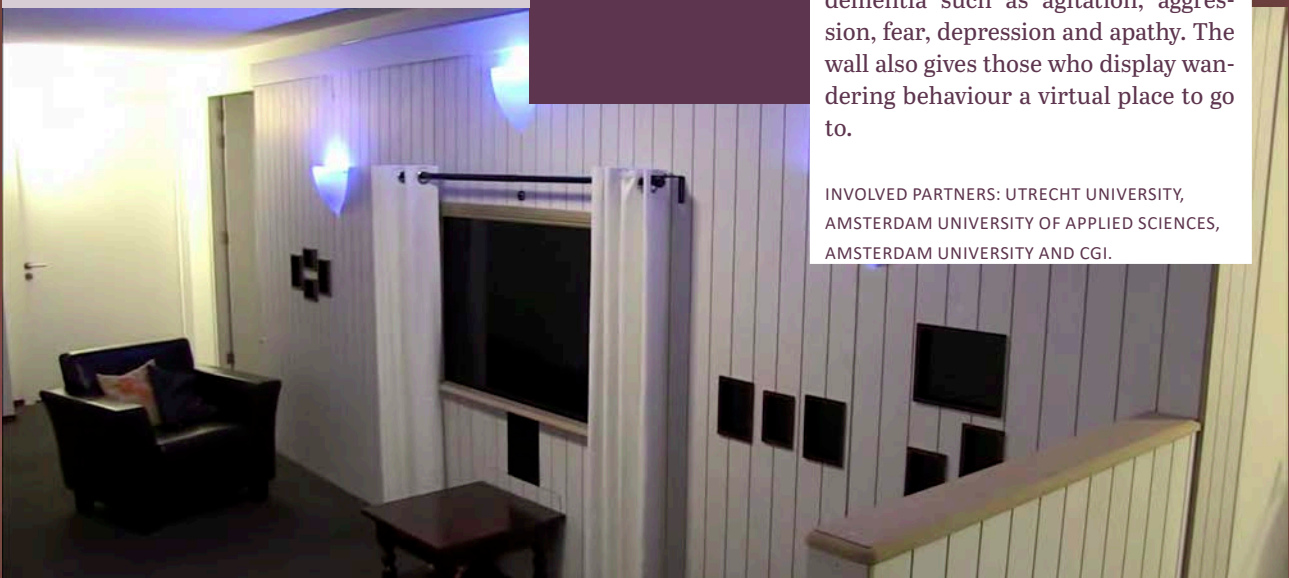
STILL FROM A VIDEO USED TO ANALYSE HUMAN INTERACTIONS.

Project: Personalised interactive wall for elderly with dementia

People suffering from dementia often feel confused and depressed. Some of them also display wandering behaviour. We build an interactive wall for people suffering from dementia. The wall uses computer vision to recognize the person in front of the wall and to recognize his or her behaviour and emotional state. Based on the behaviour detected, the wall then gives a personalized experience using video and music that appeals to that person. Family members can upload content. The interaction with the wall may diminish the behavioural problems of dementia such as agitation, aggression, fear, depression and apathy. The wall also gives those who display wandering behaviour a virtual place to go to.

INVOLVED PARTNERS: UTRECHT UNIVERSITY,
AMSTERDAM UNIVERSITY OF APPLIED SCIENCES,
AMSTERDAM UNIVERSITY AND CGI.

THE INTERACTIVE WALL RIGHT AFTER BEING ASSEMBLED.



STILLS FROM THE VIDEO EXPLAINING THE GAME. 88 YEAR OLD LISA CLARKE IS PARTICIPATING AND BEING MONITORED.



Biomechanical animation

This work package focuses on the study and adaptation of computational methods to estimate a person's physical well-being based upon existing musculoskeletal models. Because of the focus on a low level of restriction, the study uses low-cost devices (such as Microsoft's *Kinect* camera or a set of accelerometers). These methods produce estimated measures of the user's muscular activity to control the characters and drive the characters in the virtual world. Physical fatigue and local soft-tissue deformations is derived from simulating the human motion. As these methods are typically computationally intensive, research will determine the proper amount of optimization and offline computation. Finally the translation of the model outputs to the user through avatars is being investigated.

PROJECT LEAD: DR.IR. ARJAN EGGES, FORMERLY OF UTRECHT UNIVERSITY

Project: Exercise game to reduce the risk of falling

Many older people, especially people with neurological or orthopaedic disorders, experience restrictions in their ability to suddenly change their walking patterns. These people have a higher risk of falling, for example when trying to step over an obstacle. To reduce the falling risk, researcher developed a fun and motivating exercise game.

During an assessment on a walking belt we measure the adaptivity of a patient's walking style. After defining a comfortable walking speed, we present visual feedback of a target step length. The subject then needs to respond by taking smaller and larger steps respectively. The belt speed adjusts automatically to ensure a constant step frequency. Controlled belt speed changes stimulate the patient to change his step frequency by controlled belt speed changes in combination with target step-lengths. Our assessment measures how well the patient performs adjustments in step lengths and step frequencies. The better the adjustment, the lower the risk of falling.

PROJECT LEAD: ZERRIN YUMAK

PARTNERS: MOTEK MEDICAL, UTRECHT UNIVERSITY, AMSTERDAM UNIVERSITY OF APPLIED SCIENCES, AMSTERDAM UNIVERSITY, WAAG SOCIETY, DIGIFIT AND CGI.

Utrecht: game city

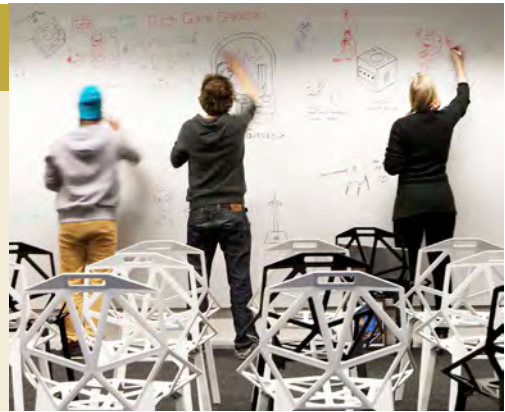
Utrecht is the home and birthplace of many Dutch game studios. For a large part these studios have founders who are alumni of the Utrecht University or HKU University of the Arts Utrecht.

Dutch Game Garden (DGG)

The national game incubator

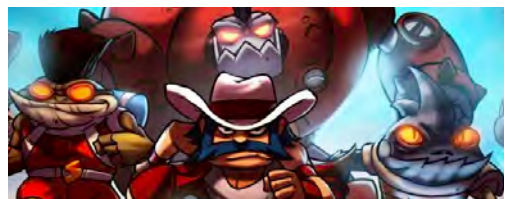
Dutch Game Garden (DGG) is the Netherlands' largest game incubator and business centre, its main location is positioned in Utrecht. DGG's mission is to create economic growth by supporting the Dutch games industry and promote entrepreneurship. Besides providing studio space, events, advice & matchmaking, DGG's incubation program helps promising game start-ups with individual coaching, workshops, and lectures.

DUTCHGAMEGARDEN.NL



Abbey Games

Founded by four Utrecht University alumni, Abbey Games developed two consecutive hits: *REUS* in 2013 and *Renowned Explorers* in 2015. Both games were heralded for their original take on the strategy genre, game design and technical prowess. In 2013 the studio won the *Control Industry Award for Best Game Developed by a Dutch Studio*.



Ronimo Games

Ronimo Games is one of the first game studios founded by a mix of alumni from HKU University and Utrecht University. Their first game, *De Blob*, was sold to a publisher who developed it into a worldwide hit for Nintendo Wii. *Swords & Soldiers* (2009) was critically praised and won the Control Industry Award 2009 for Best Game Developed by a Dutch Studio. Their biggest hit however, was the 2012 *Awesomenauts*. A frantic multiplayer arena shooter, oozing with charm. Like Abbey Games, Ronimo developed their own game engine, the foundation on which a game runs. This is such a technically challenging task, that most studios opt to acquire an existing one instead of developing their own.

A year later, Ronimo ran an extremely successful crowdfunding campaign which netted them over 400 thousand dollar, making it one the most successful Dutch crowdfund campaigns to date.

Activate!

An overview of some of the activities that were organised at Utrecht University.



GALA Conference 2016

In December 2016, the annual GALA (Games And Learning Alliance) conference was held at the Utrecht University. Over three days, numerous guests from all over the world attended various lectures, tutorials and demo sessions focused on games and learning. The conference was held in association with the Serious Games Society.



Intertain 2016

In June 2016, Utrecht University organised the 8th International Conference on Intelligent Technologies for Interactive Entertainment. The conference addresses issues concerning relationships between human-computer interaction and entertainment.



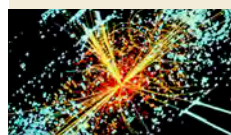
Symposium on Music in Videogames Ludo 2015

On 9 and 10 April, the annual symposium of the research group Ludomusicology about music in video games took place at Utrecht University. The event was supported by the Institute for Cultural Inquiry (ICON), GAP: Center for the Study of Digital Games and Play and the research focus area Game Research.



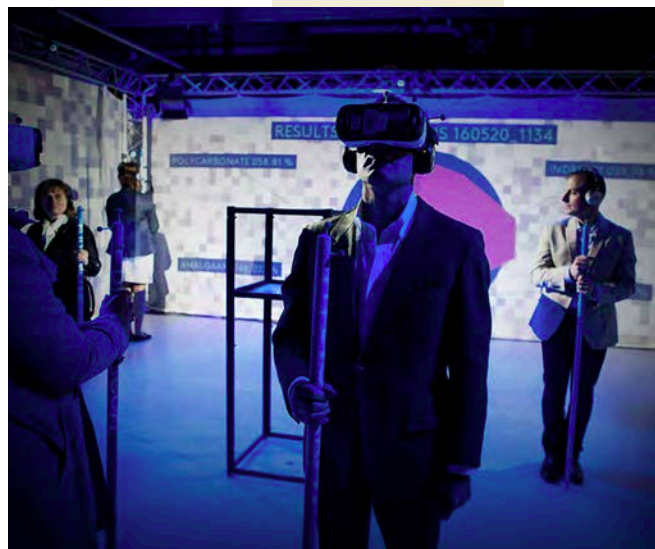
Conference Play/Perform/Participate 2015

In April 2015 the second conference by the International Society of Intermedial Studies took place at Utrecht University. The panels addressed the most important themes and topics in contemporary media cultures in an interdisciplinary way.



Meeting EU Ambassadors 2016

European ambassadors visited Utrecht in 2016 on the occasion of The Netherlands' presidency of the EU. They were introduced to demos by Utrecht University, HKU and UMC Utrecht in the application areas sustainability, health, open, safe and inclusive societies, and adapting to a changing society.



Summerschools

Utrecht University organises Summerschools, courses targeted at university students from all over Europe. The first interdisciplinary European summer school in game and play research took place in 2014 and was an overwhelming success, featuring an impressive list of international lecturers.

Students participated in lectures, disciplinary seminars, practice-based workshops, a game-jam, and were introduced to local game and play companies.

Some 60 national and international students and over 20 game scholars from the Netherlands, Germany, Belgium, Brasil, UK, USA, Mexico, Austria, Sweden, Finland, Poland, and Spain visited Utrecht. Each of the institutions involved brought their own unique (inter)disciplinary perspectives to the programme, providing a rich foundation for discussion on games and play research. Students exchanged and discussed methods and theories from their own discipline, in particular during the lectures and interdisciplinary seminars. Game and play scholars such as Miguel Sicart, Frans Mäyrä, Helen Kennedy, Annika Waern, Mathias Fuchs, and Joost Raessens presented their state-of-the-art research.

While morning sessions focused on theoretical discussions, in the afternoon the programme was much more practice-based. For instance, participants visited game hub Dutch Game Garden and participated in practical workshops, such as the workshop game design hosted by creative cultural institution SETUP.

In 2016 the Summerschool continued in a successful manner, with the course Multidisciplinary Game Research. This year's edition featured another course: Game Design and Development.

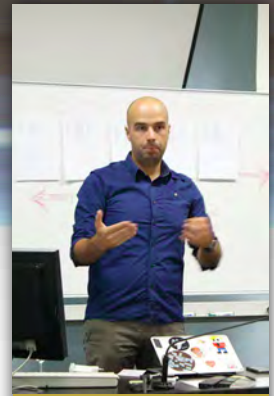
Photo: Joeri Taelman



Mathias Fuchs, Institute of Culture and Aesthetics of Digital Media, Leuphana University Lüneburg, Germany



Frans Mäyrä, Game Research Lab, University of Tampere, Finland



Miguel Sicart, Center for Computer Games Research, IT University Copenhagen, Denmark





DiGRA Pitch Event

The Dutch chapter of DiGRA organised a pitch event in Utrecht earlier this year. Game researchers from across the country gave no less than 25 three-minute pitches for their projects. A great showcase of the current state of game research in the Netherlands.

DiGRA (Digital Games Research Association) is the association for academics and professionals who research digital games and associated phenomena. It encourages high-quality research on games, and encourages its members to collaborate and share their work. In 2003, Utrecht University organised 'Level Up', the inaugural conference of the Digital Games Research Association (DiGRA).

During the event, 25 researchers from Utrecht University, Erasmus University, Fontys University of Applied Sciences, NHTV Breda, Delft University of Technology, University of Twente, Eindhoven University of Technology and the Amsterdam University of Applied Sciences presented their current game research in three minute pitches.

Serious gaming course

In 2015 the Department of Information and Computing Sciences organised a Serious Gaming course for university students. The seminar we provided an introduction to the world of serious games, explored their application domains, and examined the key activities that concern the creation of serious games following principled design and evaluation.

Educate-it

The university-wide Educate-it programme supports teachers as they future-proof and enhance their teaching practice. It helps teachers innovate their teaching practice by incorporating blended learning and using the available IT tools to engage students and clear the logjams that obstruct effective teaching.

Game research through the years

Joost Raessens and Remco Veltkamp take a deep dive into the history of game research at Utrecht University.

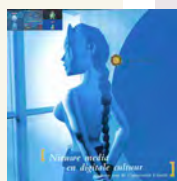
Joost Raessens (JR):
“I think we succeeded in making people see games as a serious subject, worthy of research. Games are an important part of our society; there is so much more to them than addiction or violence. “Game studies started as a course within a single discipline. It quickly became multi- and interdisciplinary and now it’s even transdisciplinary.”

Remco Veltkamp (RV):
“Game technology studies are strongly rooted in education. They kind of came into existence organically. There was a real sense of ‘this is important, we should develop these courses’. To this day, we offer complete programs that are unique to universities in the Netherlands.”



1637: The Maliebaan

In the 17th century the lawn game *Pall-mall*, known as *Malie* in Dutch, was very popular among students. It was so popular that Utrecht University, which was founded in 1636, and the city council created a dedicated alley for the game in 1637, the *Maliebaan*. This is the first example of games being important to Utrecht students and scholars.



1998: First official game courses

The Faculty of Humanities launches its first official game courses, as part of the master New Media & Digital Culture.

JR: *“The official European launch of the first Tomb Raider game in 1996 was the spark that set everything in motion. I was invited to talk about the increasing importance of games, I got to know some people at Eidos, and they helped us with the development of the first game courses in Utrecht.”*



2003: DiGRA conference

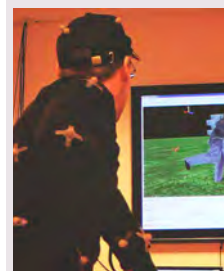
Utrecht University organises Level Up, the first conference of the newly created *Digital Games Research Association* (DiGRA).

JR: *“There had been some smaller events, but we wanted to do something... big. It worked, the conference was a huge success. In 2015 we were able to revive the entire conference archive and make it accessible at digra2003.org.”*

2005: Master programme

Start of the master programme *Game & Media Technology*, a two year research master.

RV: *“We educate students to develop and explore new technologies to build the next generation of games and interactive virtual environments.”*





2005: Advanced Gaming and Simulation

In 2005, Utrecht University, TNO, and the Utrecht University of the Arts (HKU) launch the joint *Center for Advanced Gaming and Simulation (AGS)*, bringing together a unique combination of scientific research, professional skills, and creative talents. Mark Overmars (UU), Peter Werkhoven (TNO), and Jeroen van Mastrigt (HKU) draft a scientific program, ranging from technical aspect of simulations to the x-factor of games. This ambitious program leads to GATE (2007).

2005: Handbook of Computer Game Studies

MIT Press publishes the *Handbook of Computer Game Studies*, edited by Joost Raessens and Jeffrey Goldstein.

JR: *"In 2000 I only knew a couple of good books that covered computer game research. So, when I visited MIT, I wanted to buy all their books on games. To my surprise, they only had one. At the exact same time, Jeffrey Goldstein was in the same place, looking for the same kinds of books. We started to talk and we decided right there and then to edit our own handbook."*



2006: Ludification of culture

Raessens coins the phrase "Ludification of culture" in an article for the first issue of the quarterly peer-reviewed journal *Games and Culture*. Raessens further elaborated on this idea, a sort of extension of Johan Huizinga's *homo ludens*, in his 2012 inaugural lecture, *Homo Ludens 2.0. The Ludic Turn in Media Theory*.



2007: GATE

The GATE project (2007-2012) positions The Netherlands as a strong gaming ecosystem. With a total budget of 19 million euros, Utrecht University coordinates dozens of research projects.

RV: *"GATE had a great impact. It was bigger than the Faculty of Science, or the Faculty of Humanities. It was bigger than Utrecht. It was a national, transdisciplinary scientific effort. Within the projects academics worked alongside game industry professionals. The results were disseminated regularly in relevant publications and symposia."*



Mark Overmars

It's impossible to talk about game research in Utrecht and not mention prof.dr. Mark Overmars. The prolific scientist, programmer and former full professor created *GameMaker*, a toolset for game developers which, to this day, is among the most widely used game development software packages. He received his PhD from Utrecht University aged 24, developed the *probabilistic roadmap method for robotics*, and co-founded and sold several game companies. Before he left the University, Overmars was one of the founding fathers of GATE.

2009: Creative Game Challenge

The first of four *Creative Game Challenges*, a game design competition, tasks high school students with creating their own game. RV: *"The project introduced high school students to game development and computer sciences."*

2013: Persuasive Games

The *Persuasive Gaming in Context*-project launches, a four year project. The research in this project is concerned with the characteristics, design principles, and effectiveness of persuasive gaming.

(More on page 13)

2013: The minor Game Studies

The minor *Game Studies* is being established as a part of the Faculty of Humanities. The focus of the programme lies in the study of digital games and the role of play in our contemporary culture.

2014: Summer- school

The first interdisciplinary European summer school in game and play research takes place at Utrecht University. JR: *"Two weeks, 60 students from all over the world, some of the biggest names in the field, it truly felt like Utrecht was the centre of game research in Europe."*

2014-... Utrecht Center for Game Research

JR/RV: *"We started the Utrecht Center for Game Research to develop an integrated approach to scientific and social questions, by linking academic excellence and fundamental research to the university's societal mission."*



UTRECHT CENTER FOR GAME RESEARCH

