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Thema Creatieve Industrie****Industrie**De Rondon 1
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Inhoudsopgave

1	VP Creatief.....	3
1.1	Introduction	3
1.2	Program execution and results 2015.....	4
1.3	Publications	5
2	Ondertekening	7

1 VP Creatief

1.1 Introduction

TNO has a long track record in the Creative Industry, most notably in the media sector. In the past, TNO held a seat on the board of CLICKNL (a former employee of TNO was director of CLICKNL). Over the last years, media analysis, content delivery, social sensing, user interaction, gaming, and business innovation were focal areas of TNO research projects within the Theme. A specific objective of the research is the creation of crossovers from the Creative Industry to other sectors. From 2016 onwards TNO will not continue this Theme. TNO's research on media content delivery, social sensing and business innovation will be taken up within the Theme P706 ICT and research activities on gaming and user interaction will be continued in other themes within TNO.



Media content delivery concern innovations in (social) media mining and content item orchestration in order to process large amounts of media data to enable the media industry to provide seamless services on and across all devices. Many and heterogeneous actuators (presentation devices) present challenges for data presentation and orchestration, for instance when immersive media is displayed on multiple screens and when it is a combination of professional and user-generated input. Within this field TNO has a strong international footprint with board positions in international fora (HbbTV, NEM), cooperation in European research projects with EU thought leaders (BBC, Fraunhofer, IRT) and contributions in relevant standardization groups (MPEG, IETF, HbbTV/OIPF).

Social sensing and user interaction concern the use and adoption of ICT innovations. The speed of ICT innovations is increasing; the development cycle does not follow traditional TRL's (technology readiness levels). Rather, to gain market share beta versions of services and software are launched. This means that ICT adoption is also undergoing changes. Traditional user interaction research will increasingly focus on very complicated systems or on systems with very strict user requirements (e.g. (real-)time, or with great precision). Social sensing is an upcoming research field that uses big data (e.g. sensor data) to personalize user experiences in, for example, health related apps that have great value on a personal level.

Gaming and business innovation concern innovative ways to use ICTs to create awareness or develop new business models in different settings and in varying conditions. As a result of the use of ICT it is expected that crossovers will emerge, giving rise to a new economy of (start-up) companies that offer interactive services. Furthermore, the rise of this new economy comes with organizational and economic challenges, which may or may not need to be addressed by new policies and facilitated by business models. Therefore, a specific focus of the theme was to stimulate opportunities for the Creative Industry to offer



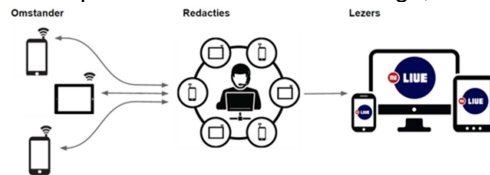
innovative, smart solutions in crossover domains and in different ways of using ICTs, such as in Smart Industry initiatives.

1.2 Program execution and results 2015

Research projects were carried out in a mix of TNO knowledge investment projects, mixed-funding European and national projects, and Topsector Creatief TKI projects. The largest part of the projects was carried out as mixed-funding European and national projects. Particularly in the field of media content delivery, projects were carried out in cooperation with leading industry partners. This allows gaining knowledge close to the applicability of the research. The mixed-funding projects were defined and executed in collaboration with the HKU, Dutch Game Garden, Program Office Smart Industry, CLICKNL, and with the help of the Topsector Creatief for TKI projects. TNO knowledge investment projects were carried out to strengthen TNO's role in the creation of crossovers.

Media analysis and content delivery

Research on media analysis and content delivery was carried out in mixed-funding European and national projects. It aims to further develop TNO's technological innovations in (social) media mining and content item orchestration to process large amounts of media data that allow the media industry to provide seamless services on and across all devices. An example is TNO's Tiled Streaming technology, which allows zooming into specific areas ('tiles') of a media stream. This technology was developed further for social settings, such as combating isolation of the elderly by



enabling them to experience high quality communication from their living room or facilitating interaction between caretakers and their patients. Another highlight in 2015 is the development of the Cameraad app that supports

citizen journalism by allowing citizens to stream footage live on the NU.nl website using their mobile phones.

Social sensing and user interaction

A range of mixed-funding national projects on social sensing were carried out. Social sensing is an upcoming research field that uses big data (e.g. sensor data) to personalize user experiences examples include the measurement of emotions while reading, cooking, or dancing that can be further developed into, for example, health related apps. Related research focuses on the development and improvement of algorithms that are used for processing the data that is gathered via sensors, and visualization techniques displaying the processed sensor information. An example is the measurement of stress levels of individuals and visualizing them as fishes in a fishtank (Fishualization project).



Gaming

Over the past two years, TNO has participated in various initiatives of applied gaming, including the setup of an Applied Gaming Value Center (a collaboration between the Hogeschool voor de Kunsten, Utrecht and the Dutch Game Garden). However, the collaboration with the AGVC will not be continued in 2016 due to a lack of participation of game developers. Furthermore, a mixed-funding high impact gaming and education program on maths education was set up together with WarChild in Sudan. This project has gained great international acclaim, and it has, amongst other follow-up projects, obtained a 4.5 million euro grant from the IKEA foundation. The gaming activities will not be followed up within this Theme or the

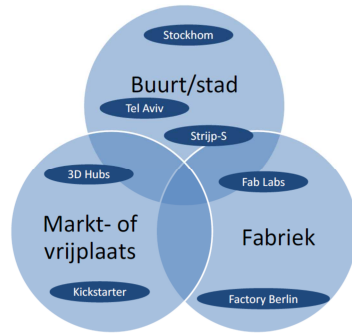
Theme ICT in 2016, but will be incorporated into other research projects within TNO.

Business innovation

Most projects are carried out as mixed-funding national projects. A large project in this field is the MOBS project that analyses outbursts of social media responses to

corporate actions and develops strategies to address the (negative) consequences. Within the field of business innovation the CONCRETE TNO knowledge development project was carried out. This is a participatory research project into crossovers between start-ups and the high-tech sector to gain insight into start-up acceleration, defining a typology (shown below) and identifying success factors and challenges. It contributed to the program 'Creative meets Smart Industry' for CLICKNL and the Strijp-S TKI project. This project facilitates the creation of crossovers from the

creative industry to the high-tech industry in the field of smart lighting in the Eindhoven region.



1.3 Publications

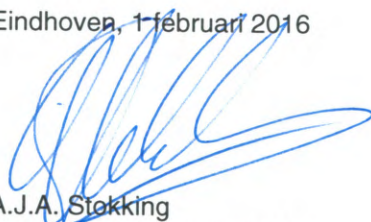
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- Emmanuel Thomas, M.O. van Deventer, Thomas Stockhammer, Ali C. Begen, Jeroen Famaey, "Enhancing MPEG DASH performance via server and network assistance", IBC2015, Amsterdam, 11 September, 2015 (link: <http://xref.tno.nl/bibliotheek/sv-015068/TNO/Publicaties/2015/thomas-2015-enhancing.pdf>). Geselecteerd als "best of IBC", de top 9 van de ingezonden 300 papers.
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- Stubbé, H., Badri, A., Telford, R., Oosterbeek, S. van der Hulst, A.H. (accepted). Formative evaluation of a mathematics game for out-of-school children in Sudan. *The second Asia-Europe Symposium on Simulation and Serious Games, AESSSG*, chapter in book, Springer Verlag.
- Stubbé, H., Badri, A., Telford, R., van der Hulst, A.H. (2015). E-Learning Sudan, formal learning for out-of-school children. *The 9th European Conference on Games Based Learning ECGBL 2015*. Nord-Trøndelag University College, Steinkjer, Norway. 8-9 October 2015.

- TNO (2015), *Concrete: Connecting Creative Technologists*, TNO-rapport.

2 Ondertekening

Eindhoven, 1 februari 2016

TNO



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