ICT with Industry 2017
27 November - 3 December 2017 @Oort

Introduction
Since 2013, NWO and STW (now NWO-TTW) have collaborated with the research schools ASCI, IPA and SIKS in the organisation of the ICT with Industry workshop. The main aim of the workshop is to stimulate contacts and future collaborations between researchers and professionals from industry and public organisations. At the 2017 edition, the steering committee received overall very positive feedback from the participants. The most common remarks were, first of all, that the participants gained a broader view, and learned about new research areas and the techniques used there, which may possibly also be useful in their research work or within their organisations. Second, participants enjoyed meeting new people in a creative setting, yielding useful professional contacts for future collaborations. The workshop also allowed them to showcase their work, and thus gain more visibility. Third, participants appreciated gaining a better understanding of industry needs, and how their research may be useful in practice. The format of the workshop also gave people the opportunity to work on problems that they otherwise would not have the time for. Finally, the industrial case owners appreciated the additional guidance from the steering committee in solving their specific cases.

Experience of the existing workshops, such as Physics with Industry, Life Sciences with Industry, Mathematics with Industry and the previous editions of ICT with Industry, was used as points of considerations for this edition. The Workshop ICT with Industry 2017 took place at the Lorentz Center in Leiden from 27 November - 3 December 2017.

Problems & Outcomes
The industrial partners presented their case study and objectives on the first day. Immediately afterwards, groups of participants began to brainstorm, to program and to look for possible solutions. Each group was guided by an academic team leader and the case owners. The case studies of 2017 were:

1. **Triodos bank: An ecosystem for a multi-company blockchain with an alternative currency**. The United Economy is a group of companies who want to pay each other's invoices in Uniteds, in order to keep the money in their own circle where possible. The Uniteds can be considered as an alternative currency to the Euro, but is only valid in the group of participating companies. It allows a participant to pay for a service provided by another participant, and enables to manage currency-related issues by the group itself rather than a central bank. The sustainable Triodos Bank and the University of Twente executed a successful pilot in November 2016, showing the feasibility of using the Hyperledger blockchain technology that facilitates the exchange of the alternative currency called "United". A key problem is how to put this blockchain into operation, specifically with respect to the required eco-system. However, on the long term, strategies need to be developed which allow the United group to operate the blockchain independently from Triodos Bank, and thereby hosting the nodes itself. Understanding the eco-system requires a thorough knowledge of the chosen technology, for example with respect to the used consensus mechanism. Additionally, once the eco-system is better elaborated, the technical solution (now Hyperlegder) might change to better meet the eco-system requirements.

2. **Blendle: Challenge of finding quality news**. This case took on the challenges of filter bubbles and recommendation bias. A balanced, diverse, and relevant selection of news clearly helps with discovering quality journalism. With data from Blendle, two recommender system experts from industry and academia, and the participants, the participants worked on a better way of finding news. One that doesn't reward fake news, filter bubbles and an endless stream of cat videos.

3. **TNO ESI and Océ: Architecting support using system architecture knowledge graphs and expert systems**. Researchers and industry experts meet to find directions for co-innovation. This case aims to find innovative directions for research to exploit the knowledge graph to support the system architect: e.g. notification for inconsistencies or incompleteness, suggestions for analysis, generation of relevant questions, suggestions for 'thinking tracks', analysis or synthesis elements using expert system reasoning. These options

should be of great value to system architects, and are intended as an add-on (not replacement) to the 'human way' of working.

4. **Eagle Vision: Deep learning for visual verification**. This case involved visual verification of objects. Current deep learning methods focus on object recognition, which detects the presence of existing objects. Instead, here, we already know the object that will be present, yet we want to verify their quality. The scientific question is visual verification versus object detection. The participants have brainstormed about the scientific state-of-the-art in deep learning, and practically explored existing deep-learning frameworks to get to a prototype.

For all of the case studies, the workshop resulted in new collaborations and research ideas, which have the potential to be further developed into research proposals. A more thorough summary of the outcome will be made available as a separate report (see Visibility below). Funding possibilities are presented by NWO, in the domains *Science* and *Applied and Engineering Sciences*.

Visibility
Attention to the workshop was drawn through the following channels (besides numerous emails over the mailing lists and personal networks of the Steering Committee members):
- NWO newsletter: https://www.nwo.nl/en/news-and-events/news/2017/ew/ict-with-industry-call-for-case-proposals-2017.html
- The Dutch Research Schools IPA, ASCI and SIKS
- Workshop web site: http://ictwithindustry2017.nl/

The following post-workshop reports are planned:
- On 21 March 2018 there will be a session dedicated to ICT with Industry 2017 at the ICT.OPEN 2018 (http://www.ictopen.nl/), which is the main ICT research conference in the Netherlands
- A more extensive workshop report will be distributed through NWO and the other contacts mentioned above.

Governance
The steering committee consisted of:
- Dr. Ana Oprescu, University of Amsterdam
- Prof. dr. Arend Rensink, University of Twente
- Dr. Claudia Hauff, Delft University of Technology
- Prof. dr. Patricia Lago, Vrije Universiteit Amsterdam
- Prof. dr. Remco Veltkamp, University of Utrecht

Future plans
Future ICT with Industry editions will be organised under the umbrella of IPN (http://www.ictonderzoek.net/), though NWO will graciously continue to support the workshop. The Steering Committee will seek out organisers for each next edition, who are responsible for that year only, rotating over the institutional members of IPN. For the 2018 edition, that role will be played by
- Susanne Verberne, University of Leiden
- Lynda Hardman, CWI

At the time of writing this report, IPN is discussing with the Lorentz center a new event arrangement by which the workshop is guaranteed on a yearly basis. This will allow us to plan longer in advance, for instance announcing the actual workshop dates together with the Call for Cases.

Remco Veltkamp has stepped down from the Steering Committee (as per the internal rota) and has been succeeded by
- Dr. Paola Grosso, University of Amsterdam

Contacts
- Steering Committee: Arend Rensink, arend.rensink@utwente.nl
- NWO: Marijn Hollestelle, ictwithindustry@nwo.nl