

Title: "New dimensions... better information"

Dear ladies and gentlemen,

A warm welcome to Delft. A city renowned for its Technology University. It is an honour for me to kick off here today on stage at the 3D Geo Conference. I don't know how many of you international researchers and students have been here in Delft before, but I would like to take the opportunity to highlight the importance of one of its famous painters; Johannes Vermeer.

Johannes Vermeer was born in Delft in October 1632. He painted mainly interior scenes and portraits. Think about "the Milk Maid" or "Girl with a pearl earring". Paintings that you undoubtedly know.

He also painted "Het straatje van Vermeer", a street scene that inspired many. Like street artist Leon Keer who re-painted the scenery as a 3D image on the street. The paint may have vanished but the idea of 3D, is more alive than ever.

Vermeer had a strong relation with the academic and research disciplines. And he liked maps, like you. In this context he made two beautiful paintings: "the astronomer" and "the geographer".

When looking at "the geographer", Vermeer emphasizes the relevance of research and science. He uses perspective and depicts tools like a calliper and a globe. And maps. Maps, perspective and tools are today still relevant. The need for overview and insight to draw conclusions and enable sound decision making are now more relevant than ever. Not much has changed since the painting was made, 350 years ago.

Ladies and gentlemen, in my presentation I would like to give an overview of some developments related to these maps, 3D perspective and tools. I will start with some national examples, fitting the subject of this session "Best of the Netherlands". Then I continue with a short international overview highlighting the United Nations Global Geospatial Information Management Initiative, also known as UN-GGIM.

We stay in Delft and we zoom in at the railway station. As Delft is expanding as a city, the density between and in buildings increases. Delft station is an excellent example of a complex multilevel designed building with many different users and owners.

As Kadaster we register ownership. Usually a 2 dimensional representation indicating ownership, is sufficient. However in this case, to provide transparency in this complex building, overview and insight regarding multilevel ownership and related rights was required.

So the need for a 3 dimensional registration of multilevel ownership and related rights was a logical consequence. In 2016 the station had its premiere, being the first 3D registered object in the Netherlands.

We expect that in the future the need grows for 3D perspective and 3D registered buildings. With the purpose to optimally service overview and insight in the real situation. You want to know how rights and components in buildings are linked.

Of interest is that the 3D depicted legal boundaries were obtained from the physical boundaries as normally used by architects, meaning: via Building Information Modelling (BIM) data. We see a growing connection between the data for design and construction of buildings *and* data that are being used to model and analyse the outside or environment; in fact the terrain of geographical information systems. Bringing architects and geographers closer together.

That enables improved answers to certain questions. Think about questions like: "Is the building constructed below the maximal building height?" or "How exposed is the building to noise?"

As a result, building permission procedures would become faster and more reliable. In addition, 3D city buildings can be more detailed and up to date. Design of a permitted construction or building is a source for the 3D city model. By adding information, like for example the types of building materials and energy related

attributes, the model develops itself and becomes a pillar for future development. Its about overview plus insight.

Another development related to the 3 dimensional realisation of the Netherlands is currently ongoing. Kadaster is developing and testing a technical production street to automatically reconstruct a 3D city and landscape model from point clouds and 2 dimensional mapping data.

The open source 3D reconstruction software, is developed in close cooperation with the 3D Geo-Information Research Group at the University of Delft.

The points can be obtained from laser scanning or generated point clouds from dense image matching; images that are collected every year. So as a result the constructed 3D model of the Netherlands is at most only one year old.

A proof of concept will soon be available on the leading open platform for high quality geodata, Public Services on the Map, also known as PDOK.

Partnerships are a strong enabler regarding the realisation of the Netherlands in 3 dimensions. Close cooperation with the research sector as well as the private and public sector, leads to promising results.

Also involvement of the public, adds value to the improvement of our maps. We opened a website under the name: "Improve the Map", regarding the Key Register on Topography. It is open to everyone and easy to use. It provides professional parties as well as the public the opportunity to indicate omissions or errors on the map. By adding a sketch or picture, the real situation is directly clear and visible.

It is very transparent: You send your remarks to the register holder who will announce if the suggested improvement is accepted and when it will be changed on the map. So far, results of this feedback system are very positive; there are almost no notifications of errors rejected.

Ladies and gentlemen, to conclude these national developments, I like to add one more word and that is "innovation". When we are talking about our key registers,

linked data and Application Programming Interfaces, also known as APIs, are used more and more. Recently the way *how* our APIs are designed, proved to be so robust that it resulted in a national standard. That is great news.

More partners, like the Statistics Office, use our data linking it to their data. As more linked data sets appear, the potential and added value are growing as well, generating interest for other parties. Maps, perspectives and tools change over time; better information is the result.

Providing better information is also an international ambition. Being a co-Chair of the United Nations Initiative on Global Geospatial Information Management, in short UN-GGIM, we strive for underpinning the relevance of geospatial information within society at large. “What happens where?” in a social, economic and environment related context.

GGIM connects the global 2030 Agenda of Sustainable Development to a structure of Member States and experts that could provide direction and prepare an ambitious agenda.

There is a growing interest in the Initiative. Last August at its eighth annual meeting, more than 400 participants attended, representing 88 Member States and about 90 organisations. The private sector and the research community are strongly involved and have their subsequent networks.

Universities are represented in GGIMs Academic Network. This brings essential expertise regarding innovation, use and research on board and increases commitment to the initiative. Around 30 international universities participate in the network, of which the University of Twente is currently a Dutch representative. Relevant as well is the growing diversity and interest by other communities.

Reason? From the beginning and onwards the annual agenda of GGIM has expanded with related developments. So the importance of remote sensing evolved, the marine environment was included, legal frameworks were tabled and land administration and registration of land rights were added. Evidence that geospatial

information embraces inclusiveness and sustainable development in an environmental, social and economic sense.

“Land rights for all” is close to my heart. Imagine, 70 percent of the world doesn’t have a proper land registration. That means no or insecure access to a home, loans and economic prosperity. GGIM is advocating the relevance of Land Administration. To lower this percentage of 70 percent.

A few years ago, the Netherlands tabled “Land Administration and Land Management” as a key factor for sustainable development. The Netherlands’ Kadaster chairs the Expert Group on Land Administration and Management, linking people to land. Principles were established for effective documenting, recording and recognising “people to land” relationships in all their forms and to secure land and property rights for all.

During the 2018 last annual GGIM meeting, the Expert Group was asked to make use of globally accepted concepts and approaches, including standards. And it are exactly these standards that are playing a crucial role. So the International Standardization Organisation (ISO), the Open Geospatial Consortium (OGC) and the International Hydrographic Organisation (IHO) are committed and involved in GGIM.

Regarding these standards I like to mention here specifically the Land Administration Domain Model. It is abbreviated LADM. And a revised version, LADM edition 2, is in the making. This evolvement in standards of Land Administration Domain Models provides strong tooling to enable further progress.

This progress became also visible when the relevance of marine geospatial information was tabled at GGIMs annual meeting. Keypoint was the development of a specification for marine limits and boundaries, allowing the representation of legal aspects of marine areas and their associated rights and restrictions. Here the LADM/ISO standard number 19152 on land was appointed the basis for the development. Connecting the international agreed standards on Land Administration to marine activities is proof of learning agility.

“To further progress” is also an objective of LADM edition 2. LADM evolves and develops itself. It takes into account technology, innovation and requirements from users. So LADM edition 2 includes new moduling, related to for example valuation, crowdsourced information, Building Information Modelling (BIM) and enhanced 3D support. In doing so it stays up to date and guarantees its relevance for the future. It values the experiences and relevance of mapping agencies, land registrations, researchers and scientists. Improving the international standard on land administration.

Strength lies in the involvement and support of many authoritative parties like the World Bank, OGC, FAO, UN Habitat, FIG and the International Hydrographic Organisation. By mobilising all these stakeholders the international standard on land administration improves.

It is the development of documentation, recording and recognition of the relation “people to land” that stays essential. And needed, to lower the 70 per cent of no land registration that is a harsh reality today.

Ladies and gentlemen, the 2030 Agenda on Sustainable Development is being implemented. Our planet will house 7.7 billion people in 2018 and possibly almost 8.5 billion people in 2030. This growing number has a serious impact on the way we live. Our environment, hence our living space, will experience constant pressure. Cities will grow in density, stacking of rights will be a consequence, resources will be scarce. So the need for clever innovation and smart solutions regarding place and space is needed and ongoing. Technology, research and cooperation are essential to realise this. Enabling dimensional information.... Better information: For overview, insight and right decision making.

That was already the case 350 years ago in the age of Johannes Vermeer: Sound decision making. With calliper in hand, bending and contemplating over a reliable map measuring dimensions. Emphasizing the relevance of research and science.

Today’s world is different. Time for contemplation is limited; action is needed. It is our joint responsibility to continue our work on the geospatial and dimensional aspects,

strengthen our cooperation and share experiences. Let us contribute and take this responsibility; for a sustainable future of our environment, our planet, our children. Thank you.

The geospatial and dimensional world are also the main context for the Geospatial World Forum that will take place in Amsterdam from 2-4 April next year. I like to invite you already here at the beginning of this 3D GEO Conference to join us there.