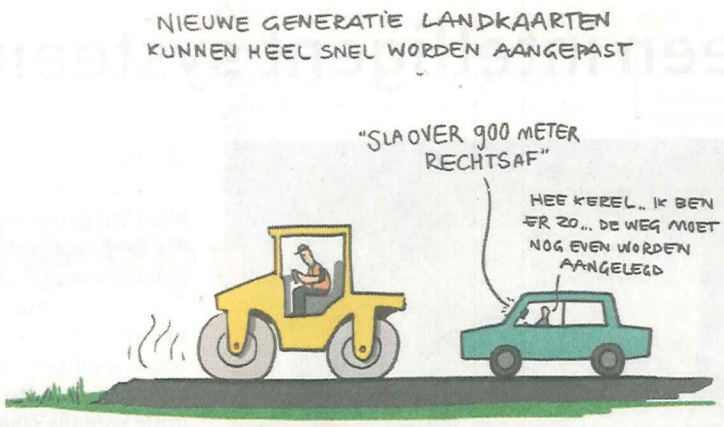


TU DELTA.27

Met een zwembadje vol slootwater op een terrein in Rotterdam wil dr.ir. Olivier Hoes (Citg) bewijzen dat vijvertjes voor veel verkoeling kunnen zorgen in de stad tijdens hete zomerse dagen. Aan een hoogwerker heeft hij een glasvezelkabel gehangen die zigzaggend het luchtruim boven het badje bestrijkt. Door middel van laserpulsjes in de kabel meet hij de temperatuur. Distributed Temperature Sensing heet de techniek. (Foto: Tomas van Dijk)

Lees het hele verhaal op www.delta.tudelft.nl

Mobile maps win innovation award

Technology that automatically scales maps for mobile device users has won a TU Delft team lead by prof.dr. Peter van Oosterom this year's Geo Information Award for science. They received a bronze sculpture earlier this month.

JOS WASSINK

Oops! The heart of Holland just turned into one big blue lake. Fortunately it's only a map on a screen and not a real inundation. Still, this demo clearly shows a difficulty in automatic scaling: the computer must decide how to simplify maps and merge areas when zooming out. Apparently, it doesn't share our interpretation of blue.

Nonetheless, automatic scaling could be very useful for handheld mobile device users, as Professor Peter van Oosterom, of the OTB research institute, explains: "Imagine you're driving through Amsterdam, looking for a place to park. On your mobile device you would actually see how many spaces are still available in the nearby parking garages. Also hotel telephone numbers, information about buses and trams, and even the latest news about a theatre performance in Carré could all be retrieved on the basis of one big geographical information infrastructure."

Deriving all smaller scales from one basic registration is a dream as old as the first digitalisation of maps, some thirty years ago. Once your basic registration was filled in on a 1:1.000 scale, it seemed straightforward to derive smaller scales from it by just zooming out and skipping details. But it wasn't. The confusion became so great that to this day the basic registration is based on geographic surveys using theodolites, while 1:10.000 maps are separately produced based on aerial photographs. The current practice not only means double work, but also leads to inconsistencies. "You might see a new neighbourhood in one scale, but as soon as you zoom in, it disappears if the other map hasn't yet been updated," Van Oosterom explains.

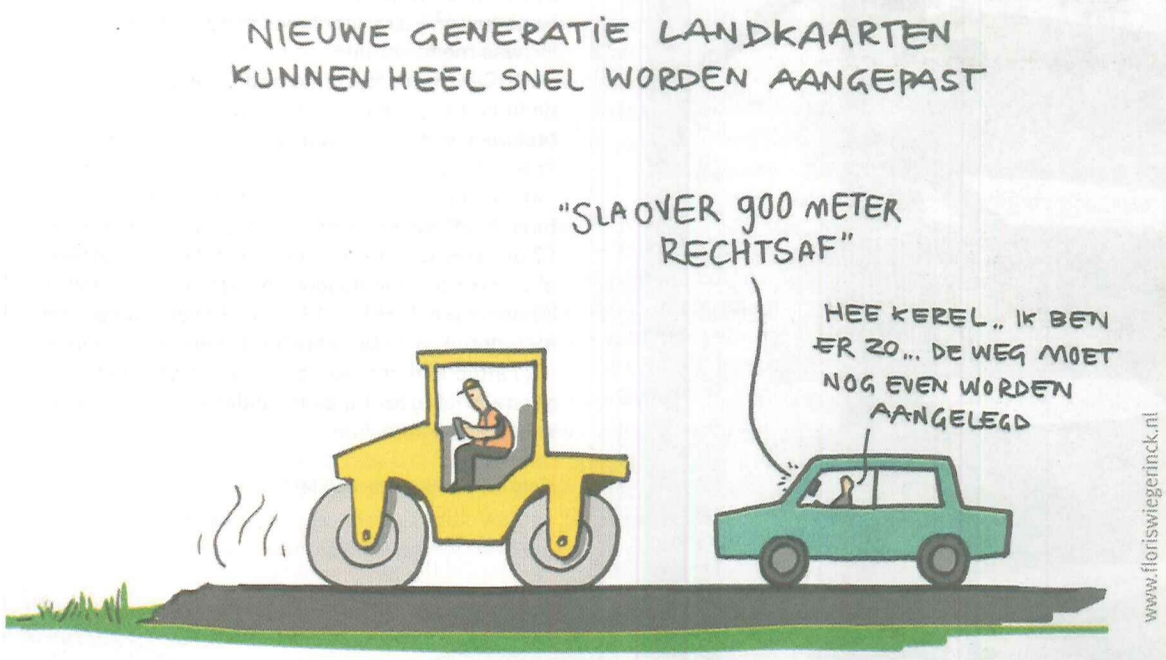
Current navigation systems use a fixed set of maps of various scales. If you zoom in, you might suddenly see more roads appear as the system switches over to the next map.

In contrast, the scale-less system, which Van Oosterom developed with research partners TNO and ITC, presents maps on any scale, but all based on the same basic data set. The advantages include consistent information over all scales, immediate updates on road or bridge closures and the coupling of service information on the basis of a geographical information system.

Among the 100 competitors in the RGI programme (Space for Geo Information), the jury awarded the science award to the OTB project RGI-233 Usable (and well scaled) mobile maps for consumers. Project leader Van Oosterom believes it was the combination of hard science and usability studies that won the jury over. The usability tests were performed by ITC and TNO and consisted of a detailed observation of someone trying to find his way using a navigation device. The hard science part includes the Tgap technology (topological generalised area partitioning), a combination of a data structure, algorithm and communication protocol for the simplification of maps when zooming out. It states what areas should be eliminated first (the smallest usually) and how they should be incorporated in the surroundings. It also defines how boundaries should be simplified. But the really hard part is how to decide which details are of interest and which can be omitted. Taking such decisions not only requires an understanding of the meaning of details ('house' instead of 'red block'), but also of the importance to the user. A cyclist for instance has other interests than a car driver.

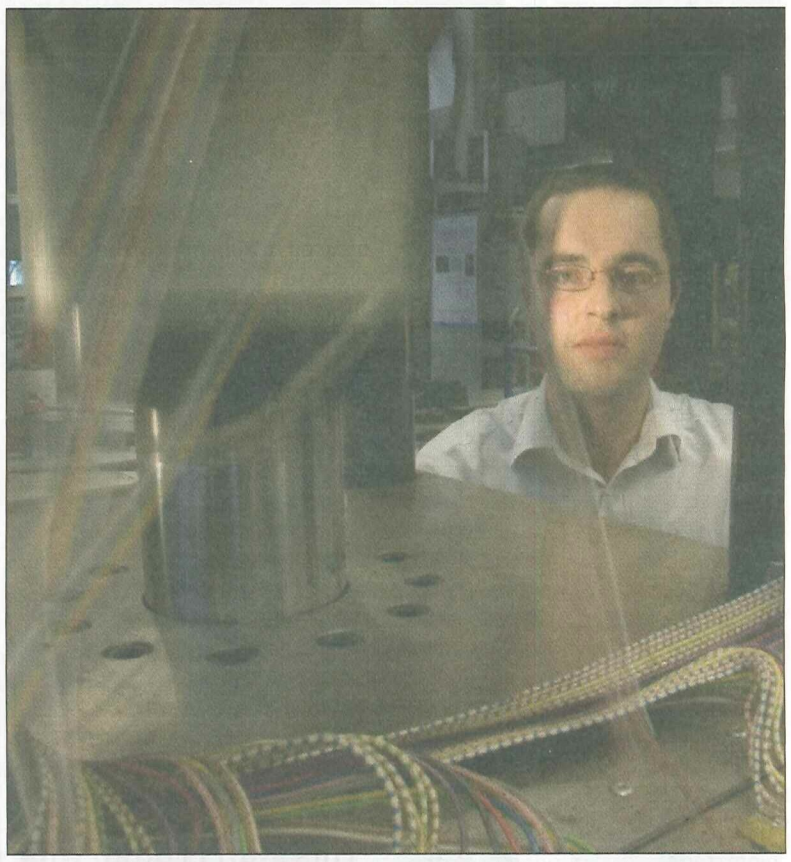
Whether this award-winning technology will lead to innovation is unclear. Map producers, like municipalities and mapping agencies, are generally interested in the technology and have participated in the research. But no telecom provider or mobile phone producer has joined the research consortium, much to Van Oosterom's regret. Although scalable map technology offers potentially interesting benefits, it will require significant investment by the current providers. But as handheld devices are becoming the main medium for using maps, researchers at OTB and other institutes are working hard to make 'maps-to-go' even more powerful.

OTB just started a new minor, '3D virtual Earth' programme, which is open to all students. Check 3dve.tudelft.nl



(Illustration: Floris Wiegerinck)

HALFWAY



By pulling with high frequency at a steel sample, Richard Pijpers investigates the strength of the material. (Photo: Tomas van Dijk)

'I need my trombone'

Name:	Richard Pijpers
Nationality:	Dutch
PhD supervisor:	Professor Frans Bijlaard (faculty of Civil Engineering & Geosciences)
Subject:	Fatigue Strength of Very High Strength Steel Joints
Thesis defense:	One and a half years to go

"From an esthetic as well as an environmental point of view, it would be great if skyscrapers, bridges, cranes and oil rigs could be constructed with much thinner steel structures. My work on very high strength steels will help make this possible.

This steel is three to five times stronger than regular steel. Or, I should say, the yield strength is much higher. This means that if you try to stretch the metal, you need to use enormous force to actually deform the steel.

Compare it with an elastic. If you slightly pull on it, you stretch it, but it will regain its original shape and size once released. If you pull very hard though, the fibers inside the material start moving, causing a plastic deformation that elongates the elastic. The same can happen with steel.

The best ways to use very high strength steel are not yet known. Apart from a few cranes in the Netherlands, it has not been used in engineering structures. The goal of my PhD research, which I'm pursuing at the Materials Innovation institute (M2i), is to set up design and fabrication recommendations.

The problem with the steel is that, although it's so strong, there are lots of weak spots in structures made out of it. Due to notches inside the material, it is sensitive to fatigue. And in a welded structure there are always places where, due to the geometry, tension concentrates. Often these so called stress concentrations are situated at joints where tubes are welded together.

If these points are very weak, there is no point in using very high strength steels. But these weak points can be solved by using cast elements at the joints and by welding the tubes to these castings.

We are going to test the strength of a welded truss consisting of tubes connected through cast joints. This is the kind of construction you can see in cranes or bridges. We will press on it dynamically with 500 tons, the equivalent of 500 cars, with a frequency of once every second. It's a huge set up and it might take weeks before the first cracks appear.

I really like this work. By pressing and pulling with enormous force you get to understand what goes on inside the material.

When I first started in the lab, I once ruined a sample by pressing on it instead of pulling at it. Such things can be very stressful. Luckily, I can work off my emotions by playing trombone. I think everyone needs good music in order to work well." (TvD)