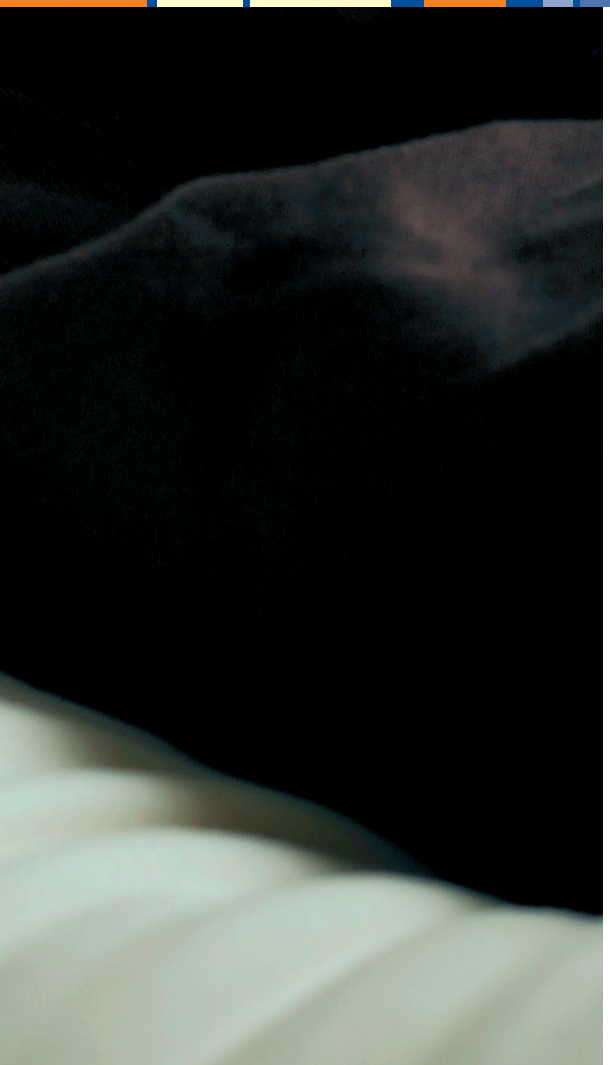
TNO | Knowledge for business



Interested in TNO?

Are you seeking a solution to a knotty problem? Would you like to know if TNO can help you? If so, get in touch with the TNO Infodesk. The TNO Infodesk will put you in touch with the right person at TNO to help you. That will also give you the opportunity to experience at first hand our expertise, our enthusiasm and our dedication.

Would you like to know more? Click on **TNO.NL**. You can request our quarterly magazine, TNO magazine, via the website. We are also happy to send you our brochures.

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TNO.NL

Focused on people

TNO's research is focused. On virtually every conceivable aspect of human existence: from physical health to the quality of the environment in which we live and from employment to public safety. And people need products and communication resources for these things. TNO is also geared to these needs. All our research has a common denominator: making scientific knowledge applicable to boost the innovative capacity of business and government so that the products, services and solutions that businesses and government generate actually offer something that makes a difference to people. Consumers, citizens or employees – people are at the heart of everything we do.

Our work concerns five core areas:

TNO Quality of Life

TNO Defence, Security and Safety

TNO Science and Industry

TNO Built Environment and Geosciences

TNO Information and Communication Technology

Realistic fire-fighting exercises

A sophisticated new training centre for fire-fighting personnel became operational in 2008: the Fire Service Training Centre for Amsterdam-Amstelland Schiphol (BOCAS) located near Amsterdam International Airport. The centre offers unparalleled and highly realistic education and training opportunities. And TNO has a permanent site there, too. At our fieldlab we carry out mainly real-time research into the work of emergency response staff involved in fire-fighting and technical assistance operations.

During exercises held in the new centre we can check the physical condition of emergency response staff, as well as test new technical developments in practice. This helps us to bridge the gap between research and practice. This approach benefits the fire-fighters who get to work with the very latest gear and receive immediate feedback on their performance and fitness. For TNO, too, this fieldlab is a great solution because it means we can field-test our knowledge development immediately, enabling us to meet the government's wish to ensure that our research is demand-driven.

In addition, TNO does a great deal more research in the field, but that entails risks: measurements are not always reproducible and you are dependent on a chance situation. That's why the BOCAS fieldlab provides a nice compromise: the whole range of exercise scenarios there are computer-driven and controlled and can be reproduced time and time again. That gives the experiments scientific value and makes the research results significant. Which means our work in the fieldlab directly benefits society – and, of course, first and foremost the safety of the fire-fighters themselves.

tno.nl/safety


AMBULANCE

Mid 2008, a large number of babies in China showed health problems following consumption of infant milk products contaminated with melamine. Many babies were hospitalised with kidney problems and a few even died. Since China exports milk products world wide, manufacturers using these products wanted to be sure that their products contained no traces of melamine. Furthermore, governments demanded such proof before granting import licences.

Immediately after the melamine contamination of milk products became known, the Emergency Response Service (ERS) of TNO Quality of Life initiated the development of a reliable melamine analysis which could be used for multiple, milk containing, matrices.

ERS provides subscribers with a calamity service 24 hours a day, seven days a week. The Analytical Research department of TNO and the TNO company Ducares developed on short notice two methods to determine the presence of melamine quantitatively in all kinds of samples, including baby foods.

Following this initial success, we developed an improved method that not only establishes whether melamine is present, but at the same time determines the melamine related compound cyanuric acid.

Ultimately ERS subscribers used this service to guarantee the safety of their products knowing that no milk product related melamine and cyanuric acid contaminants were present.

tno.nl/food

Certainty about food safety

Lubricated ergonomics

ExxonMobil, the world's largest oil company, has entrusted TNO with the ergonomic working conditions of thirty thousand employees. ExxonMobil has involved TNO in the review of the office ergonomics of the entire company in order to create the best work environment possible, one in which everyone has the right to ergonomic support.

A system for this was set up in 2008 and initial training has been scheduled for 2009. Management will receive information on the importance of good ergonomics and this will be followed by training to five hundred 'leads' who will, in their turn, inform and train local managers and employees. This has to ensure that good ergonomics becomes a matter of course and spreads, to use an apt metaphor, like an oil slick through the organisation.

This programme is being conducted from Houston by ExxonMobil's Human Factors Technology Center of Excellence, a centre that is geared to the company assets in North and South America. TNO is responsible for the training and consultancy in the rest of the world, working together with subcontractors in Japan, Malaysia, Hong Kong and the United Kingdom. In brief, TNO's knowledge puts an entire multinational on the right ergonomic track.

tno.nl/work

Operating by feeling

For years the procedure was self-evident: a stomach operation required an incision. That is not very often the case now. Invasive surgery is avoided where possible, with the option taken of a couple of small incisions that allow an endoscope and a couple of tiny instruments, like forceps, to probe.

But the big problem with forceps is that the surgeon cannot feel how hard he is squeezing, with the danger that tissue may be damaged and the consequences that this entails. So TNO has developed a special pair of forceps for EFI BV using haptic feedback. The surgeon can feel the difference between intestinal tissue and Fallopian tubes, which allows him to work more safely. The secret to these forceps lies in intelligent sensors and an extra motor in the handle that simulates the resistance that the jaws feel in the tissue.

There were significant challenges posed in the development of the new forceps. The instrument, a combination of modern fibreglass technology, mechanics and control engineering, must be able to be sterilised and not affect other equipment. The newly developed technology can also be applied on a quite different scale, in all robotics that require something to be retrieved or performed at a distance. On the moon, in the ocean depths, at extreme temperatures – or, if needed, to remove a blockage in the sewage system.

tno.nl/medical

Healthy option creates its own demand

Overweight is a problem affecting more and more children. TNO is active on many fronts combating obesity, especially among children. Overweight children develop problems with their health that affect them for the rest of their lives. Two examples of where TNO works with various partners in this field are the encouragement of healthy snacks and playground improvements.

Joint studies by TNO, Health Institute (NIGZ) and the Netherlands Nutrition Centre have shown that the availability of healthy products at school encourages children to choose healthy snacks. Making low-calorie snacks and light soft drinks cheaper or labelling them as healthy products works less well. Many schools and snack vendors are interested in the results.

An increasing number of city children exercises too little. This is partly due to the absence of sufficiently appropriate sport and play facilities of the proper quality in their immediate neighbourhood. In response, TNO has used a subsidy from the Ministry of Health, Welfare and Sport to study six existing playgrounds to find out what factors make for a successful play area. The motor skills, integration and exercise fun of primary-age schoolchildren have been studied. This has revealed that children living in the city can be encouraged to exercise more by custom-designing play areas, organising activities and making the surroundings of play areas clean, safe and easily accessible.

tno.nl/prevention

Healthier cows, better results

Cattle breeders are focusing more attention on animal welfare, not only from the point of view of the animal itself but also from a business perspective: by continually monitoring health, disease can be more rapidly detected. TNO helped AGIS Automatisering BV to develop a smart monitoring system: the SensOor (SensEar).
The SensOor continually registers every cow's vital signals like temperature, movement and sound. These values are compared via a computer with previous signals and data of known disease patterns. If a deviation is detected, the system reports it. SensOor thus provides early warning of symptoms like a cow in heat, inflammation of the udder, womb or hoof, blue-tongue and salmonella. The cow can be treated immediately. This improves the life expectancy, health and fertility of the cows and also has positive effects on the pressure of work for the cattle farmer and his business results.
TNO assisted Agis Automatisering BV with the electronics, the casing and system architecture of the SensOor. Together the two companies built and tested a prototype, making some surprising discoveries along the way, such as ear temperature variations being indicative of a cow in distress. This enables the imminent birth of a calf as well as a large number of diseases to be better determined.
The system has now been improved through smarter chips that use little energy and allow transmission over a large distance. The SensOor has already won several agricultural prizes as well as the prestigious Herman Wijffels Innovation Award at the end of 2008.

tno.nl/highendequipment

Mixed reality on the building site

Constructing a building is becoming an increasingly complex process involving more and more specialisations and greater time pressure. The chance is significant that building errors, misunderstandings and lack of clarity will arise. With this in mind TNO has developed a handy aid: a special tablet pc able to project digital drawings directly on to the building site.

The pc is equipped with a camera and locator that enables the computer to calculate which part of the digital drawings have to be projected over the live camera picture, thereby creating a 'mixed reality'. Drawings of reinforced concrete, electrics, sewage system, dimensions, etc. can be projected. And the picture changes automatically to correspond with where you are on the building site. The locator can pinpoint your position to an accuracy of 0.2 millimetres. Plotting contours and instructions for casing and installations, for example, can be effected very precisely within a matter of seconds. This makes the system ideal for on-site inspections and consultation.

TNO already has a successor in mind: semi-transparent glasses mounted on the safety helmet in which the system is built in. Obviating the need for a pc, this makes the system hands-free.

tno.nl/building

Selective fishing

Dutch and European regulations limit the permitted catch of some species of fish and bans entirely the catch of other species. The acoustic recognition of various fish species, prior to netting, could be a valuable tool.

A real problem facing Dutch fishermen is how to distinguish between mackerel and horse mackerel. These two species are very similar but are subject to different quota. Selective fishing nets that allow some fish species to pass through are no help. TNO was assigned by the IMARES research institute in Wageningen and Jaczon BV, a Dutch fishing company, to tackle the problem. Using what is known as bistatic sonar, TNO is making good headway. This is an application that TNO developed originally for the Royal Netherlands Navy. Two high-frequency fishing sonars on two different ships provide a combined image capable of visualising the features of individual fish. Although the differences are sometimes small, each fish species has its own acoustic features. The image can help the fishing crew decide whether to cast its nets.

The system relies on an underlying database of echo signals of known shoals of fish but filling the database is a time-consuming job. Another challenge is to find the most suitable sonar. As soon as a better sonar becomes available and the classification algorithm can be better 'trained', the system's performance will be refined. This is an other step towards preventing unintentional bycatch in drift nets.

tno.nl/maritime

TNO sets the mobile standard

Television and telecommunication are everywhere but TV on your mobile or pda has been available only recently. In consultation with KPN and handset manufacturers, TNO has made a significant contribution in enabling this service on the DVB-H standard: Digital Video Broadcasting - Handheld. KPN is now one of the first operators in the world to offer television based on the DVB-H standard via the mobile phone.

Together with KPN, TNO consulted with major manufacturers of mobile handsets, like Samsung and LG, to identify possibilities and wishes. We then incorporated the wishes of both the operator and manufacturer into the standard for mobile TV. This resulted in everyone having an interest in working on further development.

The result: the consumer now leaves the shop watching TV on the very latest Samsung or LG phone. It may sound simple enough but it would not have been possible without the major contribution made by TNO to the standard.

That standard is now gaining support from the European Commission as well as from other operators than KPN and from other domestic and foreign manufacturers. A nice result indeed: KPN and TNO truly setting the standard.

tno.nl/telecom

Maasvlakte 2: future traffic and transport visions, 2020-2033

The quality and accessibility of the port of Rotterdam is of huge significance to the Dutch economy. This will continue to be so, even when Maasvlakte 2 has been completed. During the construction and finishing phases of the new port site, two issues the project organisation running Maasvlakte 2 will be addressing are air quality and the area's accessibility. Alongside prevailing legislation and regulations, the social relevance of these aspects plays a role in the project. To get an idea of the long-term picture in 2020 and 2033, TNO wrote a number of future visions for the project organisation on several themes, such as future accessibility and air quality. Whereas the environmental impact statement (EIS) is based on current policy, TNO looked at the effects of likely policy developments. According to TNO, innovation, stricter environmental standards and pricing will be among the factors motivating traditional means of transport to operate more cleanly, faster and more effectively. In TNO's view, if the capacity problems of the connections with the hinterland are to be reduced by road, the existing network must be enhanced with alternative routes, especially those that relieve the system of one particular type of road-user. The A15 extension is a good example of this 'traffic disentanglement'; it will appeal to through-traffic and reduce congestion on various other roads.

tno.nl/mobility

Oil and gas production in awkward places

Easily accessible oil and gas reserves are becoming scarce so new methods are needed to be able to produce the reserves that are more difficult to access, and to get more ultimate recovery from existing oil and gas fields. TNO is on top of this. In recent years we have been working on a new method together with four of the world's leading players in the oil sector to make the development and operation of oil and gas reservoirs easier and more efficient.

The BioSil project creates a better map of the 260 million year old reservoir rock in the Netherlands. We have developed a tool to date and describe strata so that more information can be acquired with a view to making optimum use of boreholes. The BioSil method has proved so successful that two new international oil industry partners have put it to use.

In an assignment for Shell, TNO has developed a new flowmeter that can enable further optimisation of oil and gas production. It involves injecting water or steam into the reservoir to lower the viscosity and to push, as it were, the oil to the production well. TNO has made a robust instrument based on fibre optic technology to help Shell to achieve this: it is able to measure gas and fluid flows in extreme conditions and can track in real time how much water or steam is being injected in the field.

tno.nl/oil

Diagnosis in the field

Soldiers sent out on military operations may be exposed to a large variety of pathogens or toxic substances: from chemical agents to Q fever, a disease that affects cattle and is also harmful to humans. While various air-borne or surface detection methods for chemical agents exist, often blood samples have to be cultured. This can take hours or even days before a diagnosis can be determined and appropriate treatment begun. TNO has developed a method that can demonstrate within a matter of seconds whether someone or something has come into contact with mustard gas, a chemical weapon. This point-of-care diagnostic set works in the same way as a pregnancy test: swabbing a few drops of blood or any exposed skin and the result appears on the screen. No lab or specialist knowledge is necessary.

TNO is currently collaborating with the University of Leiden on a test that demonstrates exposure to nerve gas. In the future, this method can be used for the quick and easy detection of anthrax, TB and Q fever as well as pesticide poisoning, something that still happens frequently outside Europe. Perhaps soon these tests will be available not only for Defence but also for public health clinics everywhere.

tno.nl/defence

Better assistance for car drivers

In the near future more vehicles will be equipped with an increasing number of sophisticated systems that support the driver. These are safety related systems (such as a forward collision warning system) or systems that provide information such as navigation systems. This increase in in-vehicle systems requires systems not to work independently of each other, thereby presenting the driver with all sorts of messages, including sound and visuals. This will be confusing, and may lead to hazardous situations.

In response, TNO has been collaborating with car manufacturers and research institutes to develop a system that ensures that messages are given only when the traffic situation and the driver's workload permit. What's more, these messages are presented in order of urgency. This system is called AIDE: Adaptive Integrated Driver-vehicle interfacE. It integrates a range of systems into one interface.

AIDE is an EU project that was completed in April 2008. In cooperation with other institutes, it provided TNO with the opportunity to develop a handbook of guidelines for manufacturers to study the effectiveness of their own new in-vehicle systems.

The different components of the AIDE system tested rigorously within the project clearly revealed that AIDE has the greatest impact at critical moments in the vehicle. The three prototypes equipped with the AIDE system (two cars and a truck) developed in the project were evaluated under real driving conditions. One of these evaluations performed by TNO found that when driving with AIDE 'on', drivers look at the road more often and for longer, and less at the dashboard. And, very importantly, most drivers prefer driving with the AIDE system 'on' rather than 'off'.

tno.nl/mobility

Bacteria as medicine factories

Bacteria are often associated with becoming ill. That bacteria can also help people to recover is a less familiar notion. Nonetheless, this is what the Flemish company ActoGeniX is collaborating on with TNO: bacteria as medicine factories. Genetically modified lactic acid bacteria, for example, can correct the dysfunctional immune system of people suffering from Crohn's disease, a severe intestinal condition. This treatment was first established using a number of laboratory animal models and a subsequent initial clinical trial with genuine patients proved successful.

Before a treatment like this can be registered as a medicine, much more testing and certainty is needed. TNO is helping ActoGeniX there, too, carrying out toxicological research to establish more clearly just how safe the treatment is. TNO offers exactly what ActoGeniX is seeking: specialist experience of highly complex molecular analyses in combination with the sophisticated bioanalysis of bacteria strains in the body.

The system TNO is using for ActoGeniX can enable drugs to be developed much more quickly than with 'traditional' chemical methods. And speed is important when the process involves making a choice between 30,000 types of bacteria in the human body.

tno.nl/pharma

Digital storage

More and more people are making increasing use of digital photos and videos. It has become common practice to film something using your cam or mobile phone and then sharing it via YouTube or Flickr. But where are all those megabytes of 'user generated content' stored? How can you ensure that the endless amount of data is safely and reliably stored?
TNO is cooperating with Sun Microsystems for Bank of Data on generating a discrete storage system at an affordable price. The basic version of the Bank of Data storage system has been designed, detailed and tested. By clustering the technology knowledge of the three partners the various stages of the development process could be accelerated and a coordinated effort to produce very diverse design, development and test questions facilitated.
The result is that Bank of Data has succeeded in very rapidly developing a distinctive storage platform for which there is considerable market demand. Of course, the technology does not stand still for a moment; in 2009 Bank of Data and TNO will be continuing the cooperation to develop a consumer application that will use the next generation storage system.

tno.nl/ict

Climate information from space

Increasingly more advanced methods are needed to plumb the depths of the climate problem. TROPOMI, a Dutch initiative that builds on the successes of SCIAMACHY, GOME and OMI, will play a key role in future climate research and air quality measurements. The green light to build TROPOMI was given at the end of 2008.

TROPOMI (Trospospheric Ozone Monitoring Instrument) is an observation instrument that will make daily measurements from space with unprecedented precision from 2014. Every day the instrument will be able to give us a picture of the Earth with a pixel size of 7 x 7 kilometres, scanning the atmosphere between the clouds and distinguishing the air pollution generated by cities and suburbs. This will provide scientists with valuable information and can also determine whether particular environmental measures are having the desired effect.

TROPOMI is the result of a collaborative effort between TNO, KNMI, SRON and Dutch Space. The customer is the NIVR (the Netherlands Agency for Aerospace programmes). TNO is making an important contribution to the design, manufacture and calibration of the instrument. The development of TROPOMI sees one of the major objectives of Dutch space policy being fulfilled: Earth observation and commercial use of Earth observation data.

tno.nl/space

Smart insole

Assisting sports coaching, helping rehabilitation and research, monitoring patients remotely and studying the field of sport and health: it's all possible with just one device, the TNO Runalyser.

The Runalyser is actually no more than a high-tech insole that was originally developed to analyse running technique. The insole contains pressure sensors that are able to measure the pressure, contact time, rhythm and direction of the pressure of the foot on the sole up to a thousand times per second. This information is sent remotely via a microprocessor in the anklet directly to a receiver and can then be forwarded, also remotely, via internet.

The Runalyser enables a person's running technique and performance to be tracked live in real time. A more extensive version of the Runalyser can also measure the body's pulse and core temperature, information that is particularly crucial in sport, for instance, to create training programmes. In last year's Eindhoven marathon, the device enabled spectators to follow the progress of the city's mayor in the event.

The data can be stored for analysis later. In this way the Runalyser information can help in recovery from injury: the orthopaedist can monitor the body's performance between consultations. A session using the Runalyser can also help determine which is the most suitable shoe for a particular running style. Applications extend beyond this. For instance, we are also developing a version to assess the risk of falling among older people. A smart insole can thus help prevent unnecessary injury.

tno.nl/sport

The interactive citizen

How can the government adjust to the new citizen? The active citizen that uses internet to express his opinions and publish them. The vociferous citizen that increasingly encroaches on government terrain when it comes to policymaking, enforcement and implementation. TNO advises how the government can make use of 'Web 2.0' in its interaction with the citizen: internet applications for shared online debate and cooperation.

The Ministry of Internal Affairs and Kingdom Relations asked TNO to investigate Web 2.0 behaviour and what requirements this makes of a modern government. The study makes clear how the public domain is changing due to new social networks made possible by Web 2.0.

In 2008 TNO also investigated for the European Commission the implications of 'social computing' for the future of public services. What are the effects of using interactive web applications? And, more particularly, what opportunities do they offer to achieve European goals in respect of care, education, social cohesion and government?

tno.nl/telecommunications

Hybrid technology for Chinese cars

China does not have a good environmental reputation. Powerful economic growth has made China the world's second biggest producer of CO_2 after the United States. But things are changing thanks to the Chinese car industry focusing attention on the development and production of hybrid vehicles, an initiative being encouraged by the government and being assisted by TNO.

Hybrid cars use less fuel and therefore emit less CO_2. Moreover, hybrid vehicles will give the Chinese car industry easier access to the European market with its strict environmental legislation. However, it is not so straightforward to use hybrid technology; intelligent software is required to allow the components to work together in the right way. This is a field in which TNO has plenty of expertise.

In the spring of 2008 TNO and its partners, PDE and Horiba, organised a successful symposium in Shanghai where we presented a comprehensive solution to the question of how to give hybrid technology a boost in China. TNO not only develops innovative hybrid technologies but together with its partners also offers solutions for the entire process: from concept development through prototyping to producing and testing.

tno.nl/automotive

Urban climate

How will climate change affect our coast, low-lying rural and urban areas or an airport like Amsterdam International Airport, for instance? To answer that question, TNO has joined up with other parties to launch the National Programme for Climate Knowledge. This programme identifies the effects of climate change per region and indicates what has to be done.

TNO has the task of focusing on the effect on towns and cities. Since these built-up areas generate and retain more heat than non-urban areas, the liveability of cities can be significantly worse than average. Temperatures can increase by up to seven degrees, air pollution can get worse and the impact on health is evident: higher mortality, disrupted sleep and lower productivity at work. TNO is investigating how cities can be made more liveable despite such conditions. For instance, by taking climate effects into account in spatial planning – like climate-conscious and climate-proof buildings, cooler green zones and water gardens.

tno.nl/built-environment

Cross-pollination in the greenhouse

In the recently opened Greenhouse Horticulture Fieldlab growers, researchers and suppliers are cooperating closely on new technology for use in the greenhouse. This will enable the Dutch greenhouse horticulture sector to consolidate further its position as a world leader. TNO is the prime mover behind this Fieldlab and is working with DLV Plant, Fytagoras and Hogeschool INHolland as partners.

The Greenhouse Horticulture Fieldlab makes 'open innovation' a possibility. This means that rather than working on a one-to-one basis with a client, a conglomerate of parties works together, each party bringing its own particular questions and making its own unique contribution. In this way, the Greenhouse Horticulture Fieldlab is a meeting place for researchers and users who come together to work on marketoriented innovations in a cross-pollination of knowledge and practice.

One of the successful projects that the Greenhouse Horticulture Fieldlab has given rise to is the multilayer system of cultivating roses using LED lighting. This enables rose growers to improve their profitability: the multilayer system boosts production while the LED lighting reduces energy consumption. The roses circulate across two layers, one of which is illuminated by LED lamps. This means twice as many roses for less energy. And there's another benefit: the heat from the lighting is used to heat the greenhouse.

tno.nl/greenhouse

Algorithms for the safe submarines deployment

Since the beginning of the 1990s the Netherlands Royal Navy has had four Walrus class submarines. Not only does the navy want to ensure that these submarines can serve until 2025 but it also wants to modify them in line with their new operational tasks. The submarines have to be able to comply with various new requirements to allow them to be more safely and effectively deployed in shallow and coastal waters and they also have to be able to operate more safely in areas where there is a threat of mines.

To be able to prepare the submarines for their new, safe future, it was necessary to make drastic improvements to their on-board sonar. Hence the Sonar Safety Modification (VAS) programme involving the German sonar company L3-ELAC-Nautik and the American ISL as principal contractors. They requested specific components from TNO's sonar department.

The result: the four Dutch submarines will soon be sailing the world's seas more safely, thanks to new algorithms that interpret sonar signals better. TNO's sonar expertise has enabled the American and German defence industry to add the new functionality to their products, faster and with reduced risk. On the basis of the knowledge of sonar processing that we have built up for defence purposes, we were able to quickly convert our algorithms from the research environment to a fully reliable and robust practical application.

tno.nl/defence-industry

Gas transfer from ship to ship

Liquid natural gas, LNG, is transported by ship at a temperature of -164°C. Production of LNG and preparation for transport has been done via land pipelines for many years but in recent years ships have been developed that are capable of the production and conversion of LNG at sea. This means that off-shore gas fields can produce LNG without the need for it to come ashore.

To enable these processes, which are subject to the most stringent safety and reliability requirements, to be done aboard ships, transfer from ship to ship is necessary. TNO is investigating the options for the reliable, safe operation of a hose system at sea that can make this possible. To this end TNO established a qualification programme for the systems of Gutteling, the Dutch manufacturer of flexible composite hoses, and Exmar, a Belgian shipping company that operates different LNG ships. TNO also carried out a comprehensive test programme. Not only do test methods have to be developed but rules also have to be interpreted and requirements specified as well as account taken of the complex behaviour of composite hoses. Only then can the reliability and safety of LNG at sea be validated.

tno.nl/processindustry

From licence plate to chip

A hundred years after the introduction of the licence plate, the Dutch vehicle licensing authority (RDW) is working on an upgrade for vehicle identification. The licence plate we know won't disappear but clever chip technology will help the RDW better safeguard vehicle identity. Since 2008 the RDW has been working with TNO to develop a system of electronic vehicle identification (EVI), which could help reduce the incidence of licence plate and vehicle fraud. Apart from the prevention of theft and altering the appearance of the car, vehicle identification can be used increasingly as a constraint aimed at those citizens intent on leading the authorities up the garden path, such as permits and charges for urban environmental zones.

TNO has already developed the RFID chip that can be built into cars. Initial trials are set for the spring of 2009. Participants in the current 'Rush-hour Avoidance' trial that regularly drive the A12 motorway between Gouda and The Hague, will have their cars equipped with a chip and reader. By comparing the two trials, a clearer picture will emerge of how EVI works in practice.

tno.nl/strategy

Focus on Planet Earth

The United Nations has designated 2007 until 2009 the Year of Planet Earth, a joint initiative by UNESCO and the International Union for Geological Sciences (IUGS). Seventy countries have already signed up to this initiative, the Netherlands included. The secretariat and executive agency of the National Year of Planet Earth are housed at TNO in Utrecht. TNO has also been coordinating several activities like a forum on the rise and fall of sea level as well as coastal protection attended by the media and different international companies. TNO projects like the Geotruck, Geosites and 'Spiegelzee' support the Year of Planet Earth.

- The Geotruck is a mobile classroom for highschool students that provides information on global themes like climate change, energy issues, over-population and poverty. TNO has developed the Geotruck together with the faculty of Geosciences at the University of Utrecht, among others. The truck has been driving around the country since April 2008 calling in at high schools and festivals.
- In april 2008 www.geosites.nl went online, a TNO website containing all the geological sites of the Netherlands.
- TNO adopted an idea of the students of the Delft University of Technology, the 'Spiegelzee' beach pavilion, and helped get the beach pavilion open July through October 2008 in Katwijk. 'Spiegelzee' visitors could take a look, free of charge, at the past, present and future of the sea level.

tno.nl/subsurface

Detecting stowaways

Now and then there is a news story about stowaways trying to flee their country by concealing themselves in the landing gear of an aircraft. This human drama often has fatal consequences and leaves the aviation industry with considerable safety and liability risks. How can such hazardous situations be avoided? TNO found the answer in a radar system that checks whether there is anyone or anything in the landing gear space before take-off.

TNO's radar knowledge predates the Second World War. Since then TNO has had a prominent international role in improving this observation technology. Not only has the resolution capacity been improved but increasingly new applications have been added, also in non-military areas. Accordingly, Rockwell-Collins, a major supplier to the aviation industry, approached TNO with the question whether a radar system could be incorporated into the landing gear compartment.

This was a tricky job because it is not easy to use radar to detect in such a small space. However, TNO did succeed in developing an initial demonstration device to show what the possibilities are. In 2009 the first fully operational system will be built in to a commercial airliner. A nice example of collaboration: TNO supplies the technology and system design while Rockwell-Collins makes a commercial product that is suitable for a range of aircraft.

tno.nl/space