GEOGRAPHICAL INFORMATION & IT

WE MAP THE WORLD

COWI

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Based on world class competencies and many years of experience, we create value for our customers and partners by delivering mapping services, geodata products, cadastre and land management, aerial surveying, terrestrial and aerial laser scanning, mobile mapping, GIS- and IT development and 3D city modelling.

360 DEGREE APPROACH

We approach the challenges set by our customers from a 360 degree mindset and thanks to our global experience and local precense we have done projects within mapping, surveying and cadastre all over the world, among others in the Middle East, Africa and across Europe.

NEWEST TECHNOLOGY

The cornerstone of our business is high quality products and services, which is based on world class specialist knowledge combined with heavy investment in new technology within large format digital cameras, LiDAR – and a mobile mapping system.

We maintain our competitive position through mapping units in UK, Spain, India, Norway and Poland and we are represented from project offices in Africa and the Middle East. We are one of the ten leading mapping companies in the world.

360° GEOSPATIAL SOLUTIONS

MAPPING AND SURVEYING
- Aerial photography
- Terrestrial and aerial laser scanning
- 2D/3D vector mapping
- Mobile mapping
- Thermographic mapping
- Traditional surveying
- Hydrographic surveying
- Deformation surveying

DIGITAL MAP PRODUCTS
- Orthophotos
- Oblique photos
- Digital terrain models
- 3D city models
- Web map service

GIS, IT AND LAND INFORMATION SYSTEMS
- GIS and IT development, application management and operations
- WebGIS solutions
- GIS products – sales and support
- Cadastre and land information systems

CONSULTANCIES
- Geodata management
- IT and management consultancy
- Consulting services for property registration systems
- Capacity building
- 3D data architecture

MAPPING

ONE OF OUR CORE COMPETENCIES

Based on aerial photography, COWI carries out mapping projects all over the world. We have many years of experience in optimising and adapting specifications and data structures to provide digital maps that meet our customers' requirements.

COWI's orthophotos are one of our core products which are known for their superior quality and very high resolution.

Internationally, we have produced nation-wide orthophotos in several countries including Denmark, England, Serbia, Lithuania and Namibia.

Our mapping-related services encompass aerial photography, terrain models, 2D vector mapping, orthophoto processing, thermographic mapping, mobile mapping as well as production of 3D city models.

We have a large in-house production unit in India that supports the global mapping activity with high quality production at competitive rates.

MAPPING SERVICES

- Aerial photography
- 2D/3D vector mapping
- Orthophotos
- Oblique photos
- Laser scanning (LiDAR)
- Digital terrain models
- 3D city modelling
- Thermographic mapping
- Mobile mapping

TECHNOLOGY

IT TAKES LEADING TECHNOLOGY TO BE AMONG THE BEST

Our products and services are based on leading technology. We combine world class project management with state-of-the-art technology, such as large format digital cameras for airborne photography, mobile mapping systems for asset management, 3D terrestrial laser scanning for surveying projects and terrestrial and airborne LiDAR systems for collection of large-scale 3D-data.

Leading technology combined with our specialist knowledge makes us one of the ten leading mapping companies in the world.

MOBILE MAPPING

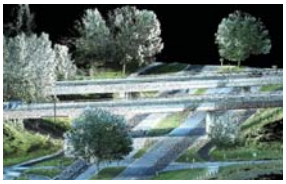
COWI MULTIPURPOSE TECHNOLOGY

The idea behind COWI's new mapping technology is straightforward:
A vehicle equipped with a laser scanner and a camera taking pictures and capturing data when moving.

The 3D High Defintion (HD) laser scanning and 360º pictures are used for:

- Road and asset management
- Documentation and identification of objects such as traffic signs and lights, safety barriers, marker posts and other assets for maintenance purposes
- High-speed road and rail HD survey
- 3D city modelling

Roads and railways are surveyed at speeds of up to 80 km/h with the same accuracy and precision as traditional surveying. Surveying can be done during night time and without closing roads. The high-resolution 360º pictures can be applied as facade textures to create photo-realistic 3D city models.



SURVEYING

SURVEYING ACROSS THE GLOBE

COWI's surveying competencies have been obtained through participation in a wide variety of projects around the world. Our more than 50 surveyors support COWI's global network of companies and we provide up-to-date surveying services every day.

Our technical competencies range from high definition mobile mapping, terrestrial laser scanning and bathymetry to more traditional surveying.

In major projects, COWI's surveying specialists support all parts of construction projects, including establishment of a geoid, pre-construction surveys, staking out and as built surveys, monitoring surveys as well as site supervision.

One important field of work is infrastructure. We are specialised in and certified to carry out surveying for railroads and highways.

We deliver state-of-the-art surveying when needed.

SURVEYING SERVICES

- HD mobile mapping
- Terrestrial laser scanning
- Coordinate systems and geoid
- Hydrographic surveying/ bathymetry
- Deformation surveying
- Volume calculation
- Inspection and site supervision
- Offshore surveying

3D TERRESTRIAL LASER SCANNING

NEW PERSPECTIVES IN 3D SURVEYING

Terrestrial laser scanning is an accurate and efficient method of terrestrial 3D surveying allowing even complicated constructions and geometries to be captured in 3D.

3D terrestrial laser scanning offers significant advantages with respect to time, quality and safety within a wide range of engineering activities and facilitates faster implementation of projects and consequently substantial financial benefits.

3D terrestrial laser scanning captures real scenes with an unprecedented combination of speed, accuracy and completeness. The technology facilitates capturing of all visible objects. Through analysis this is converted to a true to life as-built 3D virtual environment, from which existing component geometries and physical relationships can be extracted within a tolerance of few millimetres.

The virtual environments are optimal for engineering, design and construction project activities, to reduce and even eliminate the inherent geometrical problems associated with new/retrofit design and construction projects.

The virtual environments are georeferenced and adaptable by most CAD applications for analysis, virtual surveys and design purposes.

3D TERRESTRIAL LASER SCANNING SERVICES

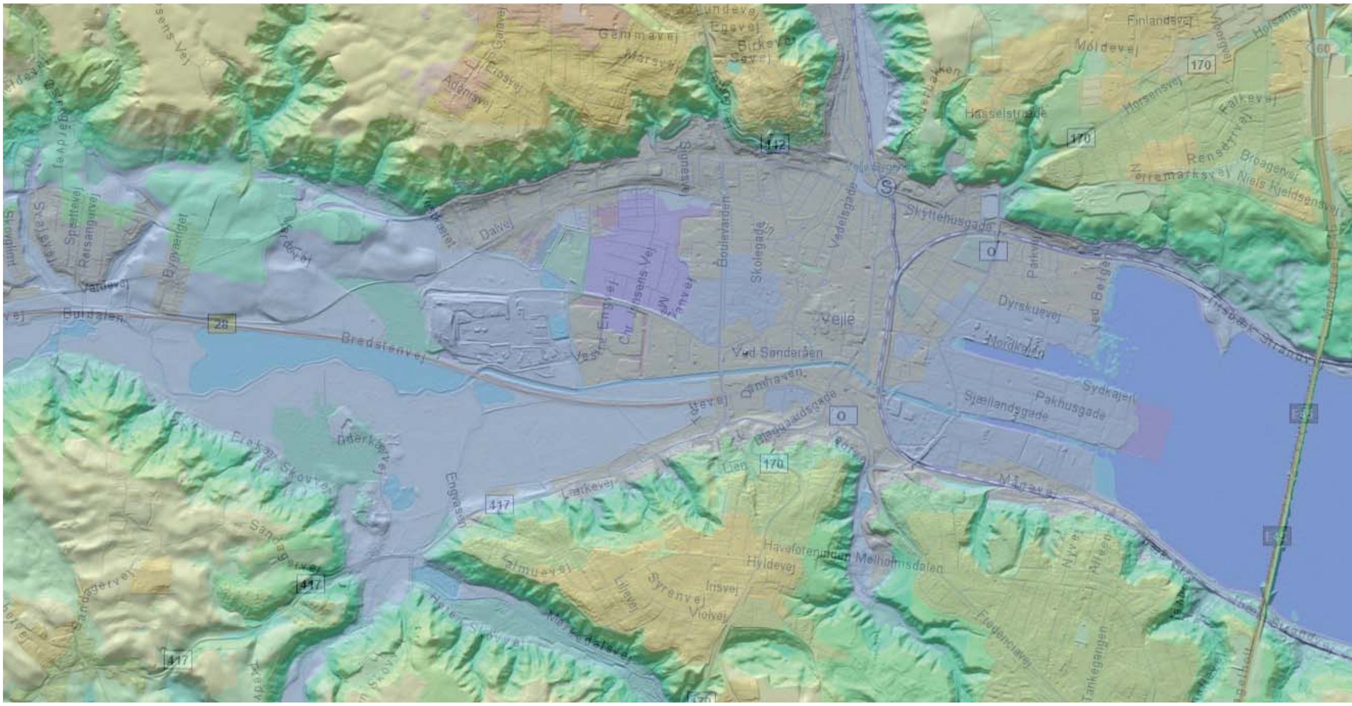
- As is documentation
- Asset management
- Studies
- Topography
- Design/engineering
- Fabrication/dimensional control
- Installation planning and simulation
- Monitoring
- 3D modelling

3D MODELLING

THE WORLD FROM ANOTHER DIMENSION

3D technology is impressive and is used for urban and infrastructure planning and development. Furthermore, 3D is a strong communicative tool that supports the sharing of visions and ideas. COWI produces large-area 3D city models and performs 3D visualisations.

COWI has the experience, know-how and capacity to perform large-area 3D city models of high-quality. We have worked with 3D for many years and have been awarded a number of prestigious 3D projects among others the 3D city models of Doha, Geneva and Monaco.



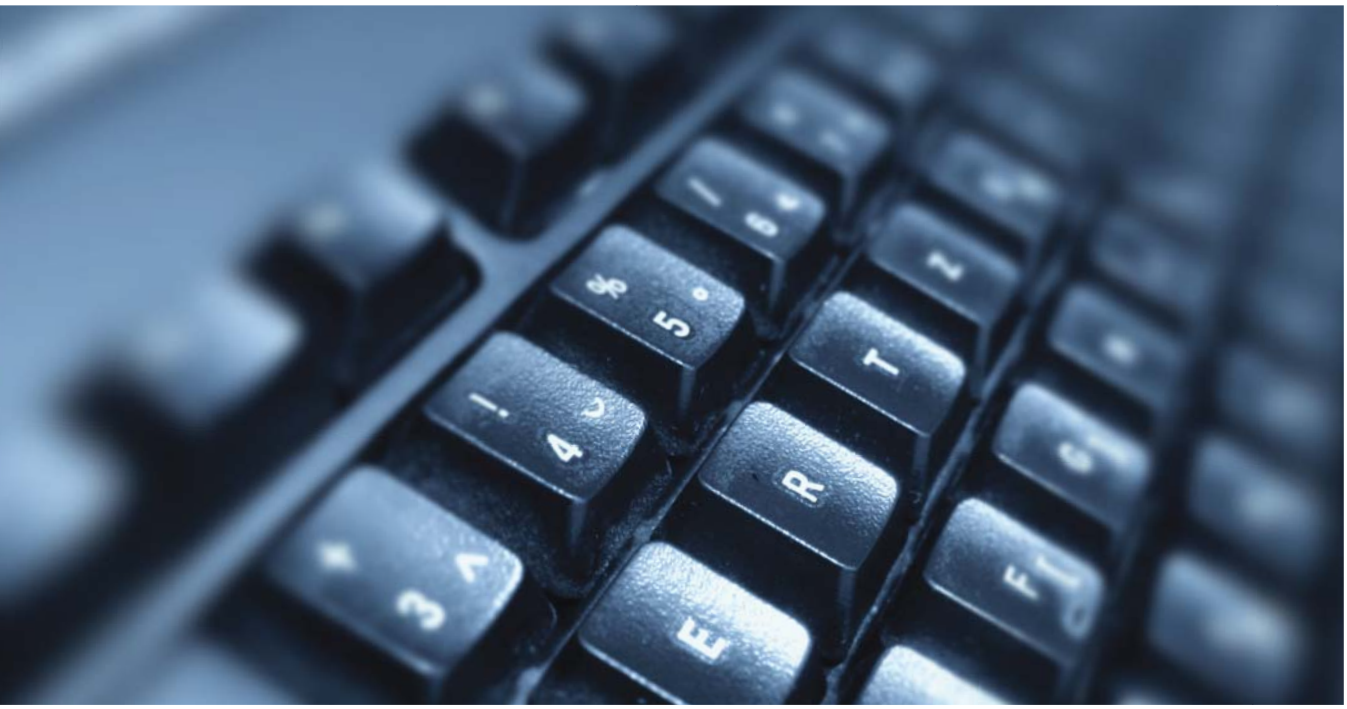
AIRBORNE LASER SCANNING

A POWERFUL TECHNOLOGY FOR PRODUCING DIGITAL TERRAIN MODELS

Airborne laser scanning (LiDAR) from aircraft is a powerful and cost-effective technology for the acquisition of highly accurate elevation data of the landscape to produce digital terrain models for infrastructure and development projects.

The digital terrain models describe the elevation of the earth's surface and contain detailed information about the terrain and man-made structures like buildings and vegetation. These models are useful for analyses covering forest and other valuable resources, as well as flood prevention, road design and line-of-sight.

COWI has worldwide experience in large-scale laser scanning projects. Current projects include nation-wide laser scanning of Lithuania, Sweden, Finland and the Netherlands.



GIS AND IT

GLOBAL MINDSET AND EXPERT SKILLS

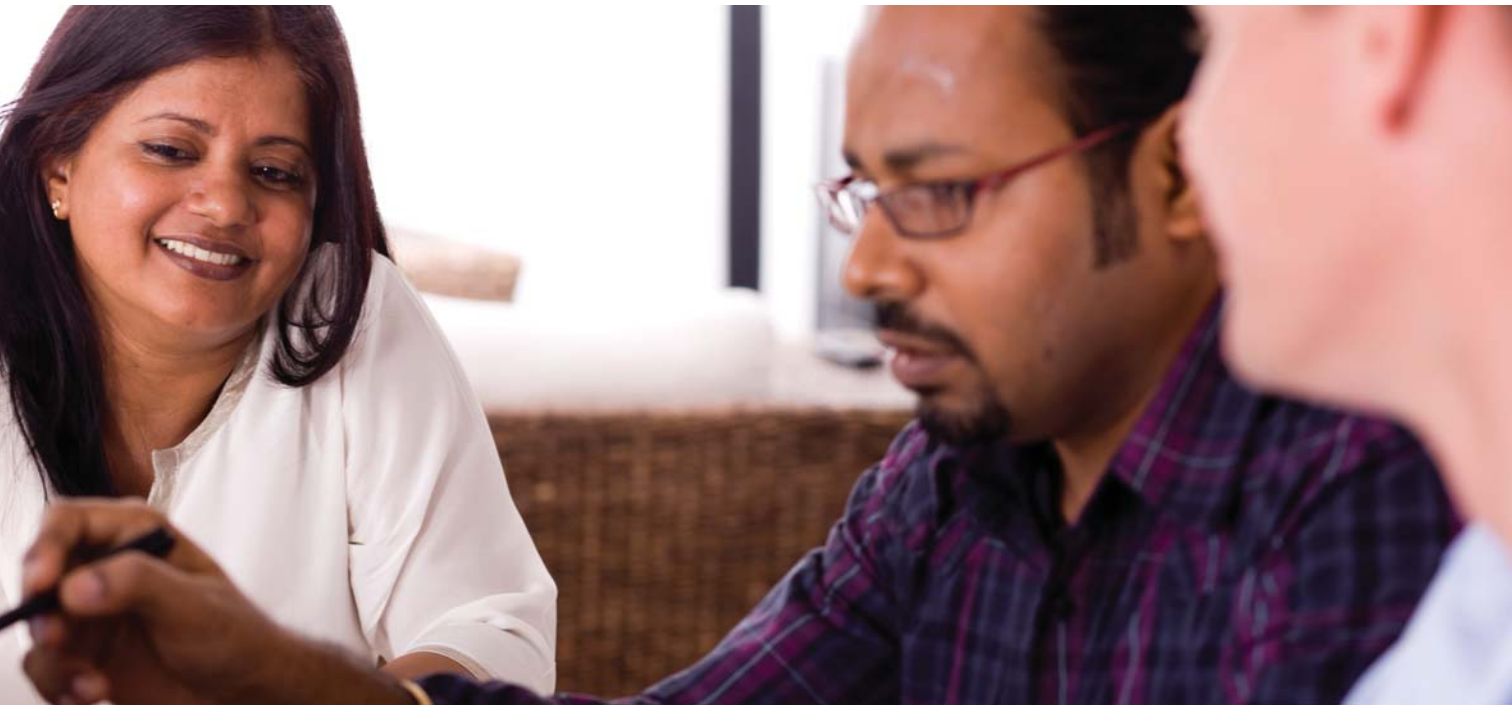
A global mindset and expert skills make COWI an innovative provider of integrated and geospatially enabled GIS & IT solutions.

We support Danish and international clients as well as COWI's global business with core GIS & IT skills that cover the whole project lifecycle.

We engage with our customers to understand their business challenges and we take a holistic approach when we plan GIS and IT projects.

We offer a one-stop-shop by providing unique solutions and applying industry best practices in close cooperation with other COWI business units and outsourcing partners.

We continually maintain our expert knowledge in the most commonly used GIS solution platforms, such as ESRI (ArcGIS), Pitney Bowes Software (MapInfo), Bentley (MicroStation) and Open Source (GeoServer and Open Layers).



GEODATA MANAGEMENT
› Data structuring, processing and conversion
› Adaptation of digital data for analyses

IT AND MANAGEMENT CONSULTANCY
› Business analyses and specifications
› Establishment of spatial data infrastructures in private and public organisations

IT DEVELOPMENT, APPLICATION MANAGEMENT AND OPERATIONS
› Full lifecycle supported for mission critical GIS & IT systems
› Best practices applied in relation to methods and IT frameworks

WEBGIS SOLUTIONS
› Implementation of integrated solutions based on WebGIS
› Commercial as well as Open Source solution platforms

GIS PRODUCTS – SALES AND SUPPORT
› Sales and support of various GIS platforms (e.g. MapInfo)
› Software implementation and training

RIGHT OF WAY

MANAGING PROPERTY RIGHTS IN INFRASTRUCTURE PROJECTS

COWI is involved in managing real property rights and ensuring right of way, particularly in relation to infrastructure development and utility services.

COWI's approach to these services – especially when they are linked to expropriation – emphasises the importance of establishing and maintaining close contact to land owners and reaching conclusions based on voluntary agreements, to the extent feasible.

We contribute to projects within all disciplines and of different sizes by addressing our worldwide expert knowledge in right of way and land acquisition in the COWI Group.

PROPERTY RIGHTS AND LAND ADMINISTRATION

Land administration is a core element of efficient land management and sustainable development and is a focus point in developing nations and among donors. COWI addresses real property rights and land administration issues by creating and operating land administration systems around the world.

We assist governments and donors in all project phases from conceptualisation through formulation and policy development, to implementation and capacity building.

Amongst our key competencies within consultancy are land information system design, assessment of immoveable property registration and legislation, legal advice, land adjudication and regularization, land use planning and management, land valuation and mass appraisal, parcel (index) mapping, procurement, project management, monitoring and evaluation.

We have guided several CEE countries in their transition to market economy and supported the implementation of a number of cadastre and land registration projects in Africa, Latin America, and the Caribbean.

PROPERTY RIGHTS AND LAND ADMINISTRATION SERVICES

- Design of land information systems
- Consulting services for property registration systems
- Capacity building
- Consulting services within land use planning and management

SELECTED PROJECTS

COPENHAGEN METRO

COWI has been the main consultant to Metroselskabet for the management of areas and rights since the start of the Copenhagen Metro project. COWI calculates value of the expropriated buildings and land and undertakes agreements with municipalities and other authorities. COWI will assist Metroselskabet with the survey of new property lines and registration of easements when the construction work has been completed.

ORTHOPHOTO AND HEIGHT MODEL OF LITHUANIA

COWI has produced orthophotos and a digital elevation model for the National Land Service in cooperation with the Ministry of Agriculture of Lithuania. COWI's aircraft has carried out aerial photography and laser scanning of a total of 65,300 km^2 in 2009 and 2010. The nation-wide orthophoto was produced in a resolution of 50 cm and will be used for planning, monitoring and administration.

MOBILE MAPPING IN UGANDA

By use of mobile mapping technology, COWI has performed a 3D scanning and point registration of approx. 70 km road in Uganda, Africa. The mobile mapping surveying project supported road engineering for the Mbarara-Kikagati-Murongo Road Project in Uganda. With the mobile mapping system used for this project we have provided 120,000 points per second compared to traditional surveying methods where approx. 10 points are captured every 20 metres.

NATION-WIDE HEIGHT MODEL/ LASER SCANNING OF SWEDEN (LIDAR)

In 2009 the Swedish National Mapping Authority (Lantmäteriet) selected a consortium including COWI to deliver LiDAR data for creation of a New National Height model of Sweden. The airborne datacollection started in the summer of 2009 and is estimated to be finalized in 2014. COWI will conduct airborne laser scanning of one third of the approx. 450,000 km^2.

LAND REGULARIZATION OF LESOTHO

As part of modernisation of Lesotho, the population of Lesotho will in near future gain property rights to their own land. COWI has won a land regularization project in joint venture with the Swedish company, ORGUT Consulting. The project is financed by the Millenium Challenge Cooperation, which has set a frame for finanzing this land regularization project with the aim to reduce poverty in Lesotho through stimulating economic growth. By use of digital orthophotos, COWI and ORGUT Consulting will register the formal owners of 46,000 parcels by contacting the owners in order to identify their property.

MAPPING OF GREAT BRITAIN

COWI has won a new contract for Great Britain Ordnance Survey, one of the world's oldest and most highly recognised National Mapping Authorities. Since 2002 COWI has been a strategic partner of Great Britains Ordnance Survey, and the new contract sets up a framework for future development of this partnership. Since 2002 COWI has mapped impressive amounts of km^2; aerial photography (155,000 km^2), orthophoto (155,000 km^2), DTM production (120,000 km^2), vector mapping (170,000 km^2). With the new contract for the coming 4 years, COWI will up to 2014 deliver: aerial photography (50,000 km^2), orthophoto (50,000-80,000 km^2), DTM production (50,000-80,000 km^2) and vector mapping (50,000 km^2).

LASER SCANNING OF THE NETHERLANDS

In January 2011, COWI A/S and Eurosense won a project for aerial laser scanning (LiDAR) and production of a detailed and accurate height model of the Netherlands. The laser scanning started in March 2011 and continued in the winter of 2011/2012 after a break during the summer while the trees were covered with leaves. The data capture is made with the newest technology within laser scanning (LiDAR) by aircraft. A great part of the Netherlands is below sea level, and therefore an updated and accurate height model is of essential importance for many planning projects within infrastructure, environment and physical planning.

TECHNICAL ASSESSMENT TO THE DANISH MINISTRY OF THE ENVIRONMENT

COWI provides technical assessment of the Ministry's strategy for environmental geodata and clarification of a number of technical issues related to the implementation of the set strategy, including outlining a potential future solution in regard to the IT-architecture for environmental geodata. To promote synergy in data application, and to follow national and international strategies such as INSPIRE, the Danish Ministry of the Environment set up a committee responsible for preparing the strategy for environmental geodata.

3D CITY MODEL OF MONACO

COWI was awarded the project to generate a 3D city model of Monaco at a very high level-of-detail, including facade details for the project area of 8 km^2. For COWI's semi-automatic 3D modelling, new aerial images with a resolution of 4.5 cm were used. These high resolution images allowed COWI to model details on the roofs and the facades.

MAPPING OF NAMIBIA

COWI is mapping approx. 320,000 km^2 of the central part of Namibia including the capital Windhoek. The project involves aerial photography, production of a height model and orthophoto in 50 cm resolution. From mid July to start of the rainy season in October-November, COWI's aircraft must fly approx. 220 hours in an altitude of 8,800 m to capture approx. 38,000 images. The project is ordered by the Ministry of Lands and Resettlement in Namibia.
The new contract is a continuation of our agreement with the Ministry, where COWI since 2009 has mapped more than 275,000 km^2.

GIS SOLUTION FOR HANDLING OF EU FUNDING TO DANISH FARMERS

COWI has worked with the Danish Agrifish Agency on the development of a GIS tool for handling of check surveys in connection with the allocation of EU aid to Danish farmers. The solution is called PDgis and is based on MapBasic, .NET and Oracle. The solution is closely integrated with other IT systems at the Danish Agrifish Agency, meaning that data is exchanged and made available to the different systems in a complex work process. PDgis is used by around 100 inspectors and is used both online in the office and through mobile applications in the field. Several mobile survey units with GPS are connected to PDgis.

3D CITY MODEL OF DOHA

Within the "Qatar National Aerial Mapping 2008" project, COWI produces a detailed 3D model of Doha in the Middle East. The project includes the acquisition of vertical aerial images, oblique images as well as mapping and the production of orthophotos. The 3D model covers 650 km^2 and includes a combination of detailed roof structures, photo-realistic landmarks and block models. COWI's high resolution oblique images are used for the texturing of the digital 3D city model. The 3D data will be processed for ArcGIS (ESRI) and visualized with Skyline Software.

SUBSIDENCE SURVEY OF NINE OFFSHORE PLATFORM COMPLEXES IN THE MIDDLE EAST

As part of a monitoring programme for an oil company, a team of COWI surveyors carried out a large and challenging surveying project on nine offshore platform complexes in an oil field in the Middle East. The field is significant, containing 33 platforms divided into nine platform complexes.
The monitoring is required as the sea floor changes as oil and gas are extracted. To be able to counter the potential hazard risks caused by any platform subsidence beyond what is expected, a detailed survey is needed. Results from previously subsidence survey campaigns were also aligned in order to describe the subsidence trend.

ABOUT COWI

COWI is a leading consulting group that creates value for customers, people and society through our unique 360° approach. Based on our world-class competencies within engineering, economics and environmental science, we tackle challenges from many vantage points to create coherent solutions for our customer.

With offices all over the world, we combine global presence with local knowledge to take on projects anywhere in the world – no matter how large or small. At any given moment, we are involved in more than 17,000 projects. We have more than 80 years experience in the business, and COWI is a leader within its field because our more than 6,200 employees are leaders within theirs.

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