

# CAPITAL PROJECTS

A close-up, low-angle shot of a man wearing a red hard hat and safety glasses. He is looking upwards and to the right with a slight smile. The background is a clear blue sky. The man is wearing a blue button-down shirt. The overall tone is professional and optimistic.

BEST-IN-  
CLASS  
ENGINEERING  
despite of  
upheavals  
during Arab  
Spring pg. 76

- OPPORTUNITIES IN ASEAN MARKETS
- INFORMATION SECURITY MANAGEMENT

# SECOND SPRING IN EGYPT

Thyssenkrupp Industrial Solutions (TKIS) has supplied and recently commissioned Egypt's largest nitrogen fertilizer complex, located in the Damietta free trade zone, some 160 km north-east of Cairo. The project was developed by the Egyptian Nitrogen Products Company (ENPC), a joint venture between Canadian Agrium and Egyptian MISR Fertilizer Production Company (MOPCO), who will operate the plant. No doubt, this capital project is a success story, however, its processing was by no means straightforward, writes

**BERNHARD D. VALNION**



Picture: TKIS



At the time the client awarded this turn-key contract to Thyssenkrupp Uhde (Essen, Germany) in May 2007 this contract was the biggest contract in the company's 80 year history, comprising a total investment volume of some 1.2 billion US dollars. Running at full capacity, the new ammonia-urea plant is capable of producing more than 2 400 t of ammonia and 3 850 t of urea per day. The TKIS subsidiary Uhde Engineering Egypt provided engineering services such as PDMS (provided by Aveva, Cambridge) modelling, drafting, and site services. The plant is based on Uhde's proprietary ammonia process while the urea plant uses Netherlands-based Stamicarbon's synthesis technology. MOPCO is selling the urea fertilizer production to both domestic and export markets.

### From the logbook of an adventure trip

**May 29, 2007.** Egyptian Agrium Nitrogen Products Co. SAE (EAgrium) has commissioned Uhde, a company of Thyssenkrupp, to build a turnkey fertilizer complex in Damietta. This was the fifth contract for Uhde in three years for a fertilizer complex in Egypt.

**End of April 2008.** Egypt Agrium (EAgrium) responded to the Egyptian Government's request to suspend the Agrium-Damietta ammonia-urea plant in response to the public consensus from Damietta citizens about the possible environmental impact of the project on the community.

**Mid-November 2008.** EAgrium entered into an agree-

ment with MOPCO whereby MOPCO acquired the project, and Agrium shareholders obtained an equity interest in the combined entity.

**Mid-December 2009.** Agrium secured local financing of 1.05 billion US dollars that allowed ENPC to proceed with the next steps of the construction of the second and third production trains at the existing MOPCO nitrogen fertilizer facility in Damietta.

### The rest of the story

The course of the project is particularly exciting, but not in a technological sense, because Uhde had already built many similar types of plants in the world. However, the attentive reader knows that economic and political conditions have changed considerably since 2011 as a result of the so-called Arab Spring in North Africa and the Middle East.

The contract was signed in May 2007. The engineering for the selected site started, construction site preparations were made, and first foundations were poured. One year later in April 2008 the project was suspended as it appeared that the selected site is not going to be approved by the local authorities. The work was therefore interrupted and it took until December 2009 until a relocation agreement was concluded with the result that a redesign of the plant layout for a site 1.5 km away from the original location was necessary – this first project suspension due to relocation led to two years of delay. As a result of the fi-



Picture: Wikimedia

A series of protests, insurrections and revolutions in the Arab world, which began in December 2010, is referred to as the "Arab Spring" (according to the Prague Spring of 1968). This unrest, starting with the revolution in Tunisia, was directed against the authoritarian regimes and the political and social structures. The rebellion in Egypt began on January 25, 2011, with the so-called 'Day of Wrath'. On the following February 11, long-time President Hosni Mubarak resigned and a military council took over the power. This ensured democratic elections for the demonstrators as well as the repeal of the Emergency Law, which had been in force for 30 years. In the elections between the end of 2011 and mid-2012, the Muslim Brotherhood, together with other Islamic parties, obtained a majority in Parliament and in the Constitutional Assembly. Their then party chairman Mohammed Mursi won the presidential elections. As a result, protests by liberal, leftist and secular forces escalated at the end of November 2012. At that time, the Constitutional Assembly also adopted the draft new constitution, which refers, inter alia, to the principles of Shariah. This led to new demonstrations, which ended with a military coup. In the new elections, Abd al-Fattah as-Sisi was elected president.



financial impact of this relocation the initial 50-percent share of the Canadian shareholder within the Canadian-Egyptian joint venture was reduced down to 25 percent. During construction at the new site, the first political disturbances occurred in February 2011. Repeated occurrences of increasing seriousness were posing severe threats to security of TKIS as well as TKIS' subcontractor personnel in Egypt. The occurrences in question comprised riots, civil disobedience and insurrection and other similar events in large areas of the country. In consequence, the security situation was reported extremely precarious throughout the country, despite heightened security force presence on the streets. Large-scale demonstrations with the potential for violence continued in several areas of Cairo, Alexandria, and other parts of the country, with the police and army using tear gas, rubber bullets and live ammunition to disperse demonstrations. There had been a number of deaths. There were also reports of gangs, sometimes violent, looting properties, shops and warnings of thousands of inmates escaping from prisons. Rail and road travel has been disrupted between cities, and between city centres and airports. The Government had also issued curfew times. On the construction site work activities slowed down as a result of the uprising, temporary road blockages and strike.

The aggression turned not only against foreigners, it was against everyone — mainly Egyptian workers were working on the construction site. On November 10, 2011 the project was suspended again arising out of the decision of the Supreme Council of the Armed Forces to close down the fertilizer plant at Damietta. Within a short time, the construction site had to be evacuated. All expatriate engineers were brought to safety on a special chartered airplane. The security situation was too critical as to perform any conservation or maintenance to the installed plant equipment. The situation further escalated in 2012 and 2013, when the main supplier's offices and local staff camp were devastated by vandalism, and a fire destroyed the TKIS site offices completely, including the entire paper documentation. During this time many of the equipment on site, such as the largest tanks, had been filled with water to perform pressure tests. Owing to the suddenly necessary evacuation, there had been no time to drain and preserve the systems. This period, referred to as the "second project suspension", characterized by a force majeure during the revolution, continued until February 2014.

Then, the client made the decision to return to the contract. The following negotiations ended up with a mutually acceptable settlement for both contracting parties that included compensation for the damage incurred and extension of time by the O/O. In this difficult situation, the fact that a similar facility had already been erected for MOPCO helped, in that a long-term relationship already existed. Support for the project also came from politics: After the dissolution of the Muslim Brothers by the Sisi administration, the political will was to get Egypt's economy back on track. This project, initially the largest foreign investment project there, was of strategic interest to the government to demonstrate the administration's support for foreign investments in Egypt.

Since frequent findings of defects, malfunctions and corrosion issues made it necessary to coordinate with the



PDMS 3D model of the ENPC plant

## List of suppliers for the ENPC project

### EquipmentVendor

Package Boiler	Hitachi Power Europe (Today Mitsubishi) Hitachi Power Europe AG - Germany)
Compressors (Synthesisgas, CO <sub>2</sub> )	Nuovo Pignone (heute GE - Italy)
Compressors (Natural Gas, Process Air, Refrigeration)	MAN Turbo (Germany)
Turbines	Siemens AG (Germany)
Nitrogen Generation Unit	Linde AG (Germany)
Electrical Power Generator	ABB AB (Sweden)
Ammonia Tank Refrigeration System	Johnson Controls (Germany)
Ammonia Converter (Equipment)	Olmi (Italy)
Catalyst	Johnson Matthey (UK)
Boiler Feed Water Pump	Sulzer (Germany)
HP Ammonia Pump	Peroni
HP Carbamate Pump	Uracca (Germany)
Refractory in Reforming Section	Karena
CO <sub>2</sub> Removal Technology – Benfield Process	UOP (USA – NL)
Only Process Design and Chemicals	

Source: TKIS



client, the project management was challenged all the time. After all, the half-finished plant had been set adrift for two-and-a-half years under extreme conditions with tanks and piping systems filled with water. Basically, the team was in a continuous negotiation mode, proving what the causes were for detected defects and assessing the consequences. There was no patent project handling, because engineering change requests that occurred more or less daily had to be evaluated, e.g. whether a use-as-is was a reasonable option, even under strict safety considerations. Under these circumstances it was a remarkable achievement that the first of two production lines was ready for operation just one year after the construction works were restarted. This evidences the truly outstanding quality delivered by the supplier network.

Commissioning is one of the most exciting phases in the life of a project manager, because, for the first time, many sub-processes have to interact properly. Larger quantities of ammonia are produced before it feeds into the production process of liquid urea solution to finally generate the dried fertilizer product in the urea granulation plant. In June 2015, there was this moment of great excitement, when the first production line went into operation. From one minute to the next the large conveyor belts started shoveling the daily production of almost 2 000 t of a single train from the urea plant to the bulk storage hall. As Frank-Peter Ritsche, Project Director for TKIS puts it: "Nothing is as rewarding when client, contractor's and supplier's staff are lying in each other's arms in such emotional moment". Half year later, the second production train was online.

### Dramatic change in business environment

Despite this success the working atmosphere for the up to 150 expat engineers on the Damietta site was no longer as relaxed as before the revolution. The revolution had trans-

formed Egypt into a strictly Muslim country. Unveiled women walking along the streets of Cairo are no longer apparent in public. To be out for a beer in a bar in the evening is becoming a challenge. Even though in Damietta the situation is safe again, the country is suffering regularly attacks to police stations, infrastructure and increasingly tourist areas and hotels. Special measures were implemented by TKIS to guarantee the safety of its employees. Daily power cuts were affecting the daily life during and after the revolution. Since Egypt is investing in its electric power infrastructure the situation improved, however at cost of frequent interruptions of the natural gas supply that the fertilizer industry relies on. These gas shortages during the plant commissioning and testing caused the project another year of delay until President Sisi inaugurated the fertilizer complex on May 22, 2016 and overall provisional acceptance was achieved in December 2016. Nevertheless there are indications that the prospects of the country are turning to positive. The exploitation of the new gas fields on the Mediterranean coast by the Italian energy company ENI expected by the end of 2017 will eliminate the bottlenecks in Egypt's domestic gas supply. Siemens signed contracts worth 8 billion Euros in June 2015 for gas-fired power plants and wind power installations that will, once completed, boost Egypt's power generation capacity by more than 50 percent. Energy is the backbone of economic development, and thus the motor to generate jobs. Even though the protests of the Arab Spring were driven by pursuit of freedom and democracy and by religious motivations, the root cause of revolutions and unrest is unemployment and poverty of the people. After all these years the population is hungry for political and economic stability. There's optimism that Egypt will be back on the global agenda. There are still capacities for more fertilizer plants to be built by Thyssenkrupp Industrial Solutions in that region.



# ASEAN POWER AND ENERGY MARKETS



*Indonesia is well-known for its geothermal sources (top) and Malaysia is a net exporter of oil and gas (left)*

**Southeast Asia is currently a very vibrant and dynamic market when it comes to EPC opportunities and contracts. Changing economic landscapes, fluctuating global commodity prices and stagnating demands all add to the volatility of the market in Southeast Asia. Volatile markets are synonymous with uncertain markets and uncertainty often affects opportunities negatively. What can EPCs expect for their businesses?**

**BY MARCO DE BOOIJ**

Southeast Asia is still one of the global growth regions. For 2017 the average economic growth of ASEAN (Association of Southeast Asian Nations) is predicted to be around 4.8 percent. Of course, ASEAN and Southeast Asia are part of a much more diverse market than, for instance, Europe. Growth figures differ significantly from country to country but

as a region, it is seeing strong economic development. This in turn results in many opportunities for the large industrial manufacturing plant industries.

Besides a strong surge in EPC projects in the infrastructure construction industry, there are major opportunities in the power industry because of the growing demand for electricity. Besides many planned projects in the traditional power generation such as fuel-fired and hydropower, there are growing EPC opportunities in the renewable energy field especially in solar and geothermal energy.

### EPC playing field

All the major international players in the EPC arena have a presence in the Southeast Asian region. In the conventional power industry, well-known companies such as Siemens, ABB, Alstom, and General Electric have played a dominant role for decades, but times are changing. First of all, there have been some consolidations such as GE and Alstom, and secondly, there have been new entries into the global and regional markets.

In every sector of the EPC market there is a growing number of local companies aiming for a piece of the overall pie. These local companies initially team up with more established and experienced players, but eventually will be able to work independently. There is also a strong push by the Asian powerhouses China, South Korea, and Japan in the region to carve up a larger chunk of that market. Especially in the nuclear power field, geothermal and solar projects, the regional players have a strong chance of success.

### EPC and the electrical power industry

The demand for electrical power in Southeast Asia is expected to rise by 83 percent from 2011 levels. A fast-growing population and a growing demand per capita are driving this demand. The overall population in the ASEAN region is expected to grow from 615 million in 2014 to 715 million in 2025. Most of the ASEAN countries, with



the exception of Singapore, are on the road to becoming developed nations. The more developed the country becomes, the higher the energy demand per capita.

Many of the proposed projects still focus on fossil-fuel-powered electricity generation. Especially coal-fired plants are still projected in significant numbers in the coming years. How-

ever, there is a shift towards more clean and renewable energy sources. This will also result in a shift in the EPC contracting world as there is a number of EPC contractors specialised in renewable energy solutions that have stepped up their activities in Southeast Asia. According to an OECD/IEA report in 2015, the total amount of electrical power generated in 2012 in ASEAN was about 756 TWh. Of this, approximately 17 percent was generated through renewable energy. It should be noted that most of the renewable energy comes from hydropower and geothermal sources. Other forms of that energy type such as solar, wind, and bio-energy are still marginal. This, however, is changing rapidly. In the region, the potential of solar energy is especially high and expected to grow significantly in the near future.

From an electrical power perspective, it is challenging to see the ASEAN region as a homogeneous market. The member countries, Brunei, Cambodia, Lao PDR, Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam, vary significantly in size, population, politically and economically. It therefore makes sense to look at the member countries individually as well as collectively.

### Detailed look at the ASEAN region

Although **Brunei** is by far the smallest member of ASEAN both in geographical size and in population, the electrical power consumption per capita is easily the highest at

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*City of Hanoi, Vietnam*

around 3 000 kWh. This is partly because 97 percent of its population has access to electricity in their home. Most of Brunei's power is generated with natural gas as the country has an abundant supply of this natural resource. The country has begun with some initiatives in solar energy. The first relatively small solar power facility opened in 2011, supplying power to approximately 200 houses.

The main focus is to strengthen its sub-transmission grid and to develop regional grid connectivity especially with Sarawak and Sabah, two Malaysian states on the island of Borneo, thus reducing its reliance on natural gas for its electrical power generation.

**Cambodia** is still a relatively untapped market with regard to electrical power. In 2012, it was estimated that only 35 percent of the country's population had access to electricity. This partly explains the relatively low demand but it also indicates that the demand will increase strongly in the near future. Cambodia aims to achieve 70 percent household electrification by 2030. This will be realised in two ways – through significant interconnections with neighbouring countries such as Lao and Thailand and by increasing domestic power production. In 2012, oil-fuelled generation made up 55 percent, hydropower provided 39 percent, while 6 percent came from coal and biomass. This country also aims to become a net exporter in the future. The main current projects centre on thermal power generation and hydropower projects.

As **Indonesia** has by far the biggest population of any ASEAN country with roughly 250 million people, it is the biggest power consumer in the entire region. Added to this is that Indonesia consists of a large number of islands, it becomes clear that the electrical power market in Indonesia is highly complex. In 2011, 88 percent of its fuel mix came from fossil fuel sources (48 percent coal-fired, 31 gas-fired, and 13 diesel-oil-fired power plants). The remainder is made up of hydroelectric (7 percent), geothermal (5 percent) and other renewables (1 percent).

Currently the electrification of Indonesia is around 75 percent. In urban areas this is significantly higher while in

rural areas it is much lower. The aim of Indonesia is to reach an overall electrification of 90 percent by 2020. In order to achieve this and because of short-term power demands, the country has put into place ambitious programmes to add a total of 35 GW of power to its capacity. This initiative seems to be struggling to stay on track.

An area specifically of interest is geothermal power generation. Because of its location on the so-called ring of fire, the country has a large number of volcanoes and geothermal activities. A good example of this is the 330 MW Sarulla geothermal power project that is undertaken by a consortium consisting of Ormat, Medco, Itochu and Kyushu.

**Lao PDR** is a very special case in ASEAN. 97 percent of its power generation comes from hydropower with the remainder coming from fossil fuel. The electrification rate is still low at 78 percent, with the rural areas much lower than that. The government plans to increase this percentage to 90 percent by 2020.

Lao has several agreements with neighbouring countries such as Thailand. In dry seasons with low hydropower potential, Lao will import power and in wet seasons export power. The country has further interconnection projects planned with Thailand, Vietnam, and Cambodia in the coming years.

**Malaysia** has an abundance of natural resources such as oil and gas, coal, and renewable energy sources. The country is actually a net exporter of oil and gas. There is, however, a significant difference between Peninsular Malaysia and the two states Sabah and Sarawak on the island of Borneo. While overall power generation capacity is higher than demand, Sabah has suffered from power shortage owing to the rise in demand and aging power plants.

The country's electrification rate is close to 100 percent. Most of the power is generated by government-linked companies, but there is a trend to use more independent power producers (IPPs). The current IPPs already supply a portion of the overall power into the network.

In line with the global trend, Malaysia is attempting to reduce its dependence on coal for power generation in fa-



vour of more clean and renewable solutions such as hydropower or solar.

Of all the ASEAN countries, **Myanmar** has by far the lowest electrification rate of around 32 percent. Myanmar is also burdened by inefficient power plants and grid efficiency losses. The power sector is fully controlled by the government and heavily subsidised. Even though IPPs are allowed, the market conditions are still a strong deterrent. The country is planning to more than double its capacity in the coming years and through interconnection agreements is eyeing exporting electricity to countries with higher prices and greater demand.

Like Indonesia, the power sector in **Philippines** is complex owing to the size of the population and the fact that the country consists of more than 7 000 islands. The power generation mix is relatively balanced between coal (28 percent), hydropower (21) and geothermal (24).

The major islands have close to 100 percent electrification but if the smaller islands are taken into account, the overall electrification drops to 80 percent. Although the government has set itself the goal to lift the percentage to 90 percent in the coming years, this is facing severe challenges because of the complex geography. Any interconnection with other countries will require major investments in sub-sea cables. The nearest connection would be with Sabah, Malaysia.

Given the fact that **Singapore** is a developed country with a mature electricity market with a very stable population, the demand growth is very limited. The city-state however has to rely completely on imported resources for its power generation. More than 80 percent of its electricity is produced from gas-fired generation. Because of its limited land area and features, Singapore is not able to develop a large capacity in alternative and renewable energy. This significantly restricts the state's search for supply diversification.

The city-state has 100 percent electrification through a single grid. Currently there is an interconnection with Malaysia's national grid and further interconnection with Indonesia is planned.

**Thailand** is heavily relying on natural gas as the main fuel for its power generation. Approximately two thirds of the country's generated power is gas-fired. As Thailand does not have any significant natural gas resources, it is both vulnerable to market price fluctuations but more importantly is also very vulnerable when it comes to power security. The majority of power (47 percent) is generated by the government-linked Electricity Generating Authority of Thailand, but IPPs are pushing for a bigger market share. In total, electrification in Thailand is roughly 99 percent. Because of its vulnerabilities, it is expected to be a driving force behind more interconnection in ASEAN.

**Vietnam** is the country in ASEAN with the fastest growing electricity demand. This is due to an increase in population, overall demand per capita and industrialisation and urbanisation.

Because of this growing demand the country is planning to

develop more than 10 GW of nuclear energy by 2030. Current electrification is 99.6 percent with plans to reach the full 100 percent by 2020.

The country is opening its energy market and is strongly promoting domestic and foreign IPPs. The country is currently connected to Lao and Cambodia and purchases electricity from China through transmission lines. By further interconnection within the Asia/Pacific Group (APG), Vietnam aims to reduce its dependence on fossil fuels by importing low-cost hydropower.

### EPC opportunities in the conventional power industry

Since the total amount of power generation is expected to double by 2025, many opportunities are available in the conventional fossil-fuel-driven power generation industry. A large number of new power plants are being built in the coming years. Furthermore, almost all ASEAN countries are dealing with ageing power plants which either need to be replaced or refurbished. Both the new plants and refurbishment of older ones will lead to significant EPC opportunities.

The plan for the coming years is to realise an ASEAN Power Grid with interconnectivity between the different member states. It is expected that this will lead to a number of EPC projects. Some of the member states are also integrating regional grids into one national grid. Again, this will generate opportunities for the EPC industry.

Some countries in ASEAN are seriously considering adding nuclear power to their energy mix. The expertise for this will either need to come from the western EPC contractors such as Areva, GE, or Westinghouse, from China or from Russian and Japanese firms (however weakened after the Fukushima accident). Relative newcomers with strong potential are EPC contractors from South Korea, which are becoming very strong, e.g. winning projects in the Middle East.

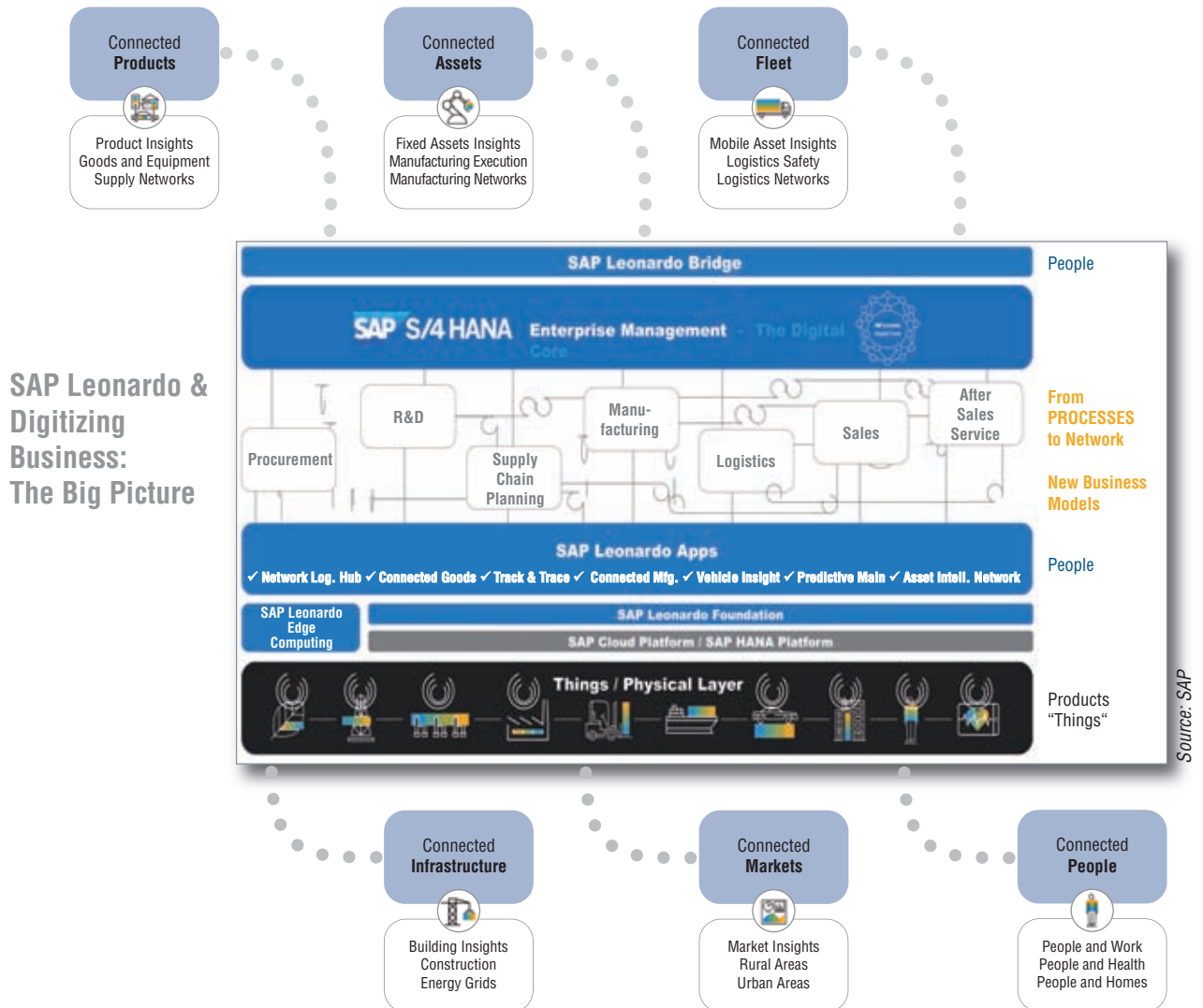
### EPCs and renewables

As all ASEAN countries are trying to move away from conventionally fuelled power generation to renewable energy sources, there will be a multitude of opportunities for EPC contracts. Especially hydropower, geothermal and Solar PV will see strong growth in the ASEAN region.

Depending on the member country, different sources of renewable energy will have prevalence. In Indonesia, there are major opportunities for geothermal projects while in countries like Malaysia and Brunei some Solar PV projects are being planned.

Even though renewable energy projects will be relatively small in the short term, they are expected to grow both in numbers and in size in the foreseeable future.

# LEONARDO AND THE DIGITAL SUPPLY CHAIN



How to go digital in the end-to-end value chain? SAP provides with SAP Leonardo a convincing answer to this comprehensive question. The new brand comprises an innovative solution portfolio that enables companies not only realise the transformation of existing business processes, but also enable them to enter into new business models running exclusively digitally.



Picture: SAP

Thomas Ohnemus

“SAP invested in the next generation business suite solution S/4 Hana running in an In-Memory environment to enable a fast ‘Live Business Environment’ by consuming, evaluating and executing, real-time data from smart products. That’s the business software environment of the future that our customers expect from us to enable the digital transformation journey.”

Sometimes, it is worth taking a look back into the past to understand what’s coming up (according to Helmut Kohl, former Chancellor of the FRG): The founding stone of the later SAP is laid in Weinheim, some five km north-east of Mannheim, Germany. Five former IBM employees are joining forces to form the BGB firm ‘Systemanalyse und (Eg.: and) Programmentwicklung’, the later SAP, including famous Dietmar Hopp and Hasso Plattner. They develop the first payroll and accounting programme, using instead of at that time usual punched cards the very modern way

of keyboard and screen. In addition, they mark their software rather clever as real-time system with an ‘R’.

The first products are called R / 1, R / 2, and R / 3.

What then happened is well-

known. An enterprise and an ecosystem emerged with a world-wide reputation. In

2022, 50 years of history will be written –

or in other words,

SAP has been accompanied its clients with the dig-

itisation of busi-

ness processes

for half a century.

Many may pretend

that digital trans-

formation and the

Internet of Things

are something new,

even revolutionising –

for SAP and its clients it

is definitely not the case.

For example, SAP-Hana-client

Continental has launched con-

nected functions for automobiles

such as E-Call in 1996, telematics systems

for remote diagnostics in 2001, state diagnostics

and turn-by-turn navigation (so-called ‘Digital Network Ac-

cess Device’) in 2003. However, two decades ago, no one

spoke of the influence of linked products on internal busi-

ness processes – not even the term PLM was born (which

took another three years). Networking, as we understand

it today, means the complete digitalisation of the supply

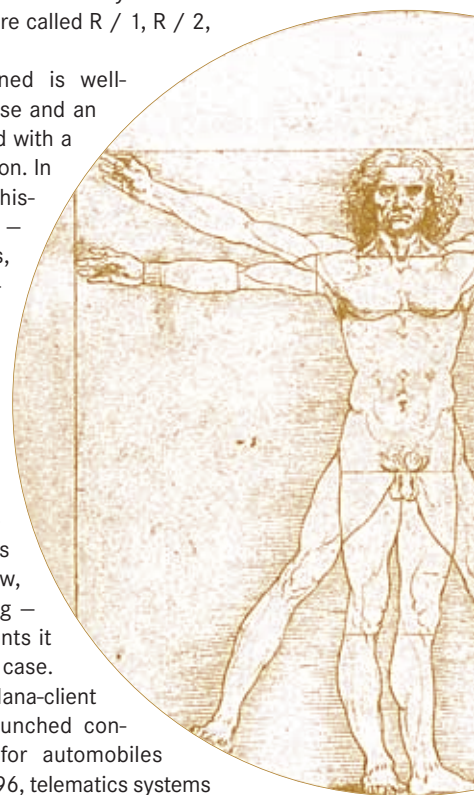
chain including customer touch points, and that is exactly

what SAP Leonardo stands for.

SAP Leonardo is the IoT framework of the German soft-

ware giant (Walldorf) that combines known and new IoT

solutions under one unified brand. The provided basic



**Buenos Aires**, that has almost three million inhabitants in the actual urban area and 13 million in the metropolitan area, once again ranks among the most interesting and best-organised metropolises in Latin America. Founded in 1580 at the mouth of the Rio Plata, Buenos Aires is subject to annual torrential rains. Owing to its ageing infrastructure and dense population, flooding has historically been an issue. After a major flood in 2013, the capital of Argentina needed to rethink its waterworks system. Now the SAP Hana portfolio enables the city administration to manage 1 500 km of rainwater and drainage systems – and notify residents with weather alerts.

Another remarkable example is its lighting infrastructure. End of 2015, an agreement between Philips and SAP started in Buenos Aires, where Philips is refurbishing 91 000 streetlights with LEDs, controlled by Philips’ CityTouch, a connected software platform for outdoor lighting, which interfaces directly with the SAP Hana platform. The city administration is able to manage more than 700 000 assets, including street lights, parks, bus stops, buildings and bridges. Remote management of each individual street light point is possible with the remote management system, which allows remote adjustment of lighting levels, dramatically reducing energy consumption and maintenance costs. As a result, Buenos Aires has been able to increase operational efficiency, realise energy savings of over 50 percent.



technologies are SAP Edge Computing and the SAP Hana/Cloud platform as well as the SAP Leonardo Foundation, to enrich business processes in the application fields

- Connected Products
- Connected Assets
- Connected Fleet

and moreover the markets

- Connected Infrastructure
- Connected Markets
- Connected People.

In the first three above mentioned areas, SAP is traditionally strongly represented with a broad portfolio; the latter three currently contain many new enhancements – SAP plans to invest two billion euros in SAP Leonardo by 2020. However, even in the new fields the vendor has already been successful over the last years, for example in ‘Connected Infrastructure’, as the Smart City project of Buenos Aires demonstrates.

The Leonardo IoT product portfolio is divided in the layers Cloud / Hana platform, Foundation, Edge Computing, and Bridge.

**SAP Leonardo Bridge** combines real-time information from connected things with business processes to turn extended supply chains into live supply chain environments. There is a range of packaged enterprise end-to-end solutions for connected things from products to people across line-of-business and industry use cases.

**SAP Leonardo foundation** (you may say it is PaaS, platform as a Service) includes both best of breed business services that enable users to rapidly build IoT applications by building digital twins, reusable application services, and applying predictive algorithms; and core technical services to process a high velocity of data with the ability to stream analytics and run predictive scenarios. These are delivered on new generation of the SAP Cloud Platform coming from millions of devices.

**SAP Leonardo for Edge Computing** is a compelling bundle of technologies that run at the edge of the network or in the Cloud (agentless), providing Edge processing capabilities for protocol translation. It supports real-time and offline data ingestion with edge filtering rules and streaming analytics. Dynamic edge processing then enables back-end transactions from Edge computing.

**Stara Industria de Implementos Agrícolas**, active on five continents, is one of the largest Brazilian manufacturers of agricultural machinery. After equipping its tractors with sensors, it developed a solution with SAP Labs that hooks these sensors up to SAP Cloud Platform and SAP ERP Central Component to monitor vital farming processes in real time.

[blogs.sap.com](https://blogs.sap.com)

Some additional remarks to SAP Bridge: ‘Bridge’ stands for a command bridge of a frigate or speed boat. SAP is about to design it based on the next generation business software concept Fiori 2.0. It centres on the users and the way they work, offering a clear structure and easy orientation without compromising on flexibility. PLM information can be depicted such as 3D as-designed data of machines and how they perform in the field (e.g. enriched with environmental information), or GPS information of trucks: The user start out with his personal gateway to the daily business allowing him to focus on core tasks but still follow happenings in other areas.

The theme of SAP Leonardo is “Connecting people with things and processes”, as Thomas Ohnemus, Vice President Marketing, IoT and Digital Supply Chain with SAP points out to our editors. Key message is, as Mr Ohnemus further says “that things as they are becoming more and more smart are linked with business processes, also in a real-time manner. It is about directly connecting products with the digital twin and enabling ‘Live Engineering’, manufacturing automation, predictive service, and performing logistics. No doubt, over time, business processes will change considerably.”

#### Clear message concerning business value

The launch of the SAP Leonardo brand has attracted a lot of attention in the market. However, the clients has clear considerations when it comes to digital transformation. “They really want to know about the added value of SAP Leonardo in terms of how it affects their applications and processes in use.” The vendor’s clients ask questions such as: With the help of IoT, do I get closer to my customer? Does it put me into a pole position to submit a more determined offer to my customer?

Sure, the feedback varies with the size of the companies. Larger firms already have appointed a digital transformation officer thus a digital agenda is anchored in their business initiatives. In the smaller or mid-size business market, however, resources for such topics are limited, nevertheless, even there the attention for those topics is high, as Mr Ohnemus ensures.

#### Summary

“SAP invested in the next generation business suite solution S/4 Hana running in an In-Memory environment to enable a fast ‘Live Business Environment’ by consuming, evaluating and executing, real-time data from smart products. That’s the business software environment of the future that our customers expect from us to enable the digital transformation journey,” Mr Ohnemus stated. And that is exactly what the clients wants as Continental summarises its decision in favour of SAP: “The decisive factor for our decision was the business concept and the smooth integration into the existing operating environment [...]”. (bv)

## Plant Design 4.0

# PRODUCTIVE SAFETY for safe production

**Information Security Management Systems provide benefits beyond IT security as they make process definition more precise and thus capacity planning and machinery design more predictive. Avoiding over-specification they lower investment risks and reduce both acquisition and operational costs. Taking stock of the ISMS, it turns out that savings and productivity gains exceed the expenditures on its implementation and operation by far,**  
**writes STEFAN KREMPL**

## The Challenge: Turn security into productivity driver

The planning of machines, assembly lines and plants is driven by functions and financial issues. Yet, these are just two of three key performance factors to be considered. Data and process security in compliance with internationally accepted standards (e.g. ISO/IEC 27 001) might be seen as a third crucial factor in value chain design. Standardization, e.g. in materials and dimensions, has been a key factor in all industrial revolutions so far. Now, standardization also applies to security as 'Industry 4.0' and its closely intertwined production processes require that every partner follows the same safety procedure for data processing and IT operations. Security is therefore constitutive for the definition of all infrastructures and should not be postponed to the assessment of already established facilities. Actually, industry needs to win full transparency over each process in order to ensure that e.g. new machines seamlessly fit into both the value and the security net.

As a result, Information Security Management Systems (ISMS) are getting increasingly important: They are more than just IT tools as they provide management methods of how to outline, implement, and optimise all processes. In doing so, organisations enlarge insights into their workflows and benefit in several ways:

- Standardised information security management provides the necessary trust between organisations and makes it attractive to join 'production processes 4.0'.
- Standardisation reduces cost and efforts in the implementation of e.g. new manufacturing platforms with for-

eign or less familiar partners.

- Security standards like ISO/IEC 27 001 require analysis of all data processing, including the rising information flows which parallel 'Production processes 4.0'. By this, safety-driven analysis enhances process intelligence thus enabling e.g. businesses to avoid fuzzy planning and over-specification of new machinery.
- The management model of ISO/IEC 27 001 empowers continuous process improvements by harnessing information flows both within and between companies.

## Challenge mastered: Safety, savings, and beyond

For an accomplished security and productivity design it is paramount to exercise full control over processes, workflow, and assets (such as machinery, devices). Right from the get-go the ISMS contributes to this with a 4-Steps implementation.

**Step 1: General Requirements and Purpose.** Building a ISMS starts with fundamental questions that are relevant for both CEO and CIO as they link together security and productivity aspects:

- What is the nature and purpose of my business? Precise business description is key to define business requirements and also to derive action plans for enhanced security and productivity designs.
- Which is the legal, political, economical, etc. environment?
- The awareness of controlling limits is crucial for businesses as they mostly operate in heteronomous en-



Pictures: Stock Images

vironments that cannot change right away (if at all).

- Who is interested in or affected by my business? Understanding stakeholder expectations is mandatory for risk analysis, since exposure mostly results from non-compliance with e.g. productivity or business continuity demands of clients, partners, or investors.

Ideally, this Q&A helps organisations to exactly define their business purpose and to list all potential hazards, e.g. organisational shortcomings, environmental constraints or business imponderabilities. This is also a first move towards process improvements in view of business goals and stakeholder requirements. Namely, it is the gap between objectives and commitments on the one hand, and their incomplete or jeopardised realisation on the other, that defines the urgent process optimisation and security tasks for organisations.

**Step 2: Risk management and objectives.** The generation of an ISMS continues with an in-depth analysis of information management vulnerabilities. It starts with a comprehensive recording of assets with substantial value for the organisation, e.g. hardware, software, know-how, and human resources. The result is a structured inventory that allows pinpointing vulnerabilities asset by asset – especially when they undermine business goals and stakeholder commitments as defined in Step 1. Once risks are discovered and documented it is crucial to assess them. In accordance with ISO/IEC 27 001 risk estimates pivot around two components – the magnitude of potential loss and the probability of occurrence. To evaluate the

gravity of incidents organisations can also upgrade risk assessment to full-scale BIA (business impact analysis) which makes it easier to prioritise risks for further action. Yet, before tackling threats organisations have to specify information security objectives and define key performance indicators (KPIs). In doing so, organisations make their achievements measurable and extend control over the entire security engineering efforts.

Rightly done, organisations have here everything handy for safety and efficiency enhancements, i.e. all business goals with corresponding security objectives, a full list of assets and threats, and finally a method of how to reach these goals in a measurable (quantifiable) way.

**Step 3: Planning and Provisions.** Having set the security objectives organisations can move on to the risk treatment planning. In compliance with ISO/IEC 27 001 organisations have to select measures from a list of 114 controls and add individual risk-reducing controls if necessary. Committing themselves to these controls in a statement of applicability (SOA), organisations have at their command an information management desk which is also the nucleus for comprehensive value chain cockpits.

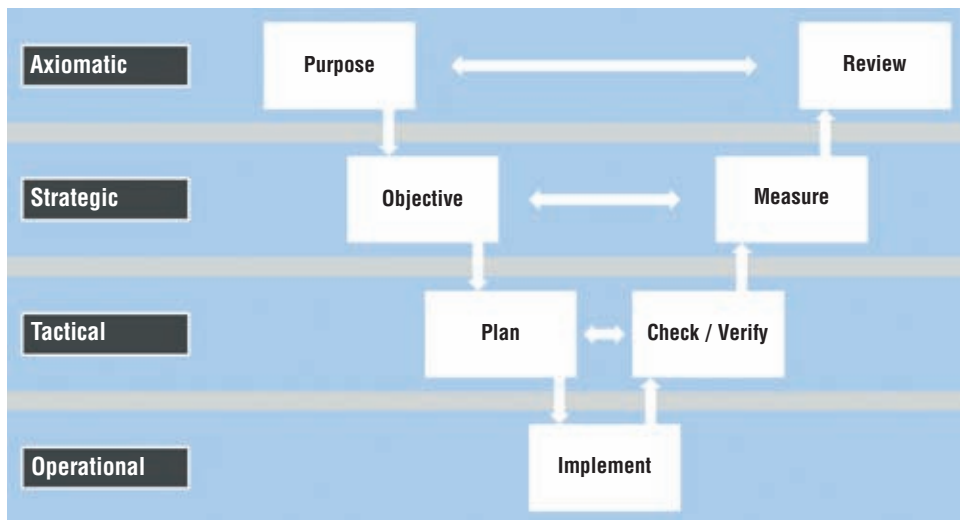
**Step 4: Implementation and continuous review.** Since ISO/IEC 27 001 describes requirements for a management system it does not specify sets of mandatory actions. As a result businesses have more leeway in the ISMS implementation according to individual needs. They are just obliged to lay down and log e.g. their risk mitigation planning and execution. Moreover all activities from Step 1 to 3 should be reviewed appropriately:

- Verifying the completion of all measures from Step 3 ('planning and provisions')
- KPI evaluation and completeness check of risk inventories on a regular basis
- At least once a year: Reviewing the ISMS to ensure that

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*Security briefing:  
Improving instead  
of defending the  
status-quo*

Source: Sid IT 2017

it is still viable for the organisation and stays in line with ever-changing requirements.

These continuous checks are not only meant to increase the effectivity of planning but also to make the ISMS more agile. Permanent revision makes it more responsive to new threats, technologies, and collaboration models in changing Industry 4.0 environments. Consequently, the 2013 version of ISO/IEC 27 001 does no longer refer to the PDCA ('plan, do check, and act') approach. Actually, PDCA is getting more and more replaced by V-models. From most fundamental definitions up to operational details, they add concomitant dimensions of verification, critical scrutiny, and review. Permanent supervision and reflection make V-models indispensable, all the more as full data and process control is never achieved for good: Actually it's an infinite task to be completed anew. Moreover, this goes for information security management and productivity enhancement, alike – as they both depend on full process control. As an ongoing mission both security and productivity are based on continuous amendment and innovation.

## Security briefing: Improving instead of defending the status-quo

The ISMS implementation according to ISO/IEC 27 001 yields a new level of information security that meets emerging business requirements and provides Industry 4.0 processes with the necessary foundation. In doing so, organisations will gain detailed insight into data communication and also into entire value chains as they are based on information processing. Providing standardised methods and a general framework for the management of virtually any business aspect ISMS paves the way to more transparency, cost efficiency, and competitiveness. Enterprises that take full advantage of their ISMS will bene-

fit from enhanced production intelligence – making it easier to pinpoint vulnerabilities, track down bottlenecks, identify uneconomic machinery and specify the real need for infrastructure investments.

## Road to certification

Before the ISMS is eligible for certification it has to be operated long enough to prove that all obligatory processes are effectively performed as planned and requested. Thus, organisations should expect a time frame of at least nine months from the project start to a successful certification. This goes generally for mid-sized businesses – larger enterprises should reckon with up to two years. The final weeks, however, are nearly the same for organizations of any size:

- First, a mandatory internal audit checks whether the ISMS is appropriately implemented, effectively maintained and fully compliant with all ISO/IEC 27 001 requirements.
- Next, a management review is conducted: Here, the sustained suitability, adequacy and effectiveness of the ISMS must be demonstrated.
- Finally, the organisation can proceed to the two-stage certification process. On Stage 1 the successful implementation respectively operation of all core processes must be verified and documented. Here, the organisation is supposed to have all necessary filings and records handy. Having passed Stage 1 businesses are allowed a reasonable period in which to rectify and improve their status if necessary. Stage 2 foresees the decisive certification audit. If failing organisations will be granted a respite of usually 90 days for amendments.

After passing the audit the certificate will be valid for three years. However, surveillance audits need to be conducted by the certification body each year.

# “Cloud isn’t a product it’s a delivery method”



**During a pause in the cegug proceedings in Darmstadt, Germany, we talked to the new CEO of Intergraph PPM, Mattias Stenberg.**

**Mr Stenberg, congratulations to your new position as CEO of Hexagon PP&M. Can you describe what will change for Intergraph with the new CEO?**

Not too much, because this is not a broken business that needs fixing. Intergraph is a well-running company. I am not here to change things in order to put my stamp on it, saying ‘I have done this and that’. Intergraph in itself is a success story, and my job is making this business grow even faster. It is more about tweaking and tuning than revolution. That is important to say.

As I mention in my keynotes, there are a couple of things I may input: I come from the Hexagon parent company, meaning that from this point of view I have a broader view of what we do in the other divisions. The opportunity of integrating the portfolio of Intergraph with the other ones is now completed. However, when you have a new leadership whether it is me or someone else there is always a chance to re-invigorate. I have done this for the past weeks, going around, meeting employers, introducing myself as well as most important listening to their feedback. I have been talking to customers and try to get new energy into the business.

**What are the key messages to your Central European clients?**

On this trip for the conference I have met a couple of the big clients here in Germany and I am on my way to Italy. My message is introducing myself. Intergraph has a long relationship with these customers and I want to listen, get feedback how they are using our products as well as what their experiences are. So far the feedback is very positive and it is more the question: What can we do more. So my message is: ‘Don’t

worry, we will continue to support you and take care of you'. We will not to anything dramatic in terms of product changes. It is more about evolution than revolution.

### **Are there remarkable changes in that market?**

Yes of course, there are! This is an industry that comes from ten years uninterrupted double digit growth. Now it is going down. It is dramatic in that sense. New technologies starting to make introductions to this industry, such as Cloud computing, and this industry is a bit traditional and slow moving in a certain way. But the technology is coming and there will be a change.

### **Is it a question of age? The digital natives have the pre-suppositions to deal with the new technologies.**

Yes, I think it would be naive to say otherwise. But I don't want to make it an 'age thing'. I see people in Intergraph who are a lot older than me and they are really updated with the latest and greatest technology. So you have to see the individual, some people are more driven and interested than others. We need a mix to grow. We have a lot of people working for Intergraph for a long time, but we also try to recruit young people.

### **How are your Cloud computing offerings appreciated by your customer base? Are you able to address new target groups with that offering?**

Not really new target group. I don't see Cloud as a prod-

uct. I see it more as a delivery method. Whether the customer wants it on-premise or in the Cloud – we can offer both. The response is mixed. Some customers are really pushing us and also driving us in that direction, because they want to go to the Cloud. Some other customers are quite hesitant; they are concerned about security. Five to seven years ago you would be concerned about doing banking transactions via mobile phone, but today it is standard.

### **In which technologies will you invest heavily?**

I want to highlight a few. On top is the owner/operator and the whole operation part of it. We want to invest in construction, for sure, especially in BIM. The construction market is a growing one and we should try to capitalise on it worldwide. We have a good Cloud offering but we should invest more in it. Finally I would say the whole project control and intelligence, predictive maintenance, using more artificial intelligence to recognise patterns.

### **Hexagon markets BIM with Intergraph but equally with Autodesk. How do you plan to manage this potential competition?**

I don't see any competition. They offer software packages, but the uniqueness we offer is the connection to the sensors. We are aggregating different sources of information in particular 3D information, in one Cloud platform. It is a unique proposition. For me I still see a lot of opportunities in the market and in the construction BIM space.

**Thank you very much for your statements!**

Interview: HEIKE MENSINK

**Intergraph PPM** (Huntsville, US state of Alabama) is a leading provider of engineering and geospatial software.

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## Evolution versus revolution

The independent organisation of users of Intergraph PPM products, cegug e. V. (Ofersheim, close to Mannheim, Germany), has invited to its annual conference to Darmstadt, Germany, on March 7 and 8, 2017. The event is usually packed with keynotes, customer lectures and workshops. But the highlight of this year was the introduction of the brandnew CEO of Intergraph PP&M, Matthias Stenberg, done by Günter Mauß, Vice President Intergraph Central & Eastern Europe.

Mr Stenberg background is Hexagon. Since 2008, he has worked in the field of strategic acquisitions and corporate management. Since January 2017 he has changed to Intergraph. Living in London he will move to Alabama with his family.

Mr Stenberg analysed in his presentation the business areas in which Intergraph is involved: the oil and gas industry segment has gone dramatically down and there is hardly any prospect of improvement in the future. Power is constant. Iron Ore and Mining declined as well as shipbuilding. There is an expected long term growth in megaprojects in the infrastructure segment.

The next strategic keynote can be summarized in one word: Industry 4.0. Hexagon has a wide-spread portfolio of tools to obtain integrated data of the virtual asset. Operating a physical asset becomes more visualised at any time for every user by using this virtual asset information.

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