TOMORROW'S WORLD

OPEN INNOVATION UNLOCKS THE FUTURE

For decades, the world's largest and most successful corporations jealously guarded the secrets of their research and development departments, fine-tuning their innovations far from outside eyes until launching them into the marketplace.

In the digital world, where ideas and information flow freely and new technologies are disrupting entire industries, that model of R&D has all but collapsed. In its place, enlightened companies in all sectors are embracing a vision of open innovation, opening up to the outside and sourcing knowledge and ideas from beyond the organization.

"No matter how big a company is or how good its internal R&D capabilities are, it cannot do it all alone anymore," says Professor Henry Chesbrough, the main academic driving force behind the open innovation concept and faculty director of the Garwood Center for Corporate Innovation at the UC Berkeley-Haas School of Business.

Enel's Open Power launch in Madrid

"Getting more people to collaborate with you is a very powerful way to advance your own organization," he says. "There is a lot of great stuff going on outside. With open innovation, companies can also share the burdens, overheads and costs of R&D more efficiently: it's good business and it's good economics."

By working together with partners from different industries, technology startups, university researchers and business schools, corporations that have embraced the open innovation revolution have found ways to transform their business models and secure their future, at a time of unprecedented uncertainty.

Italian electricity company Enel has been one of the early adopters of open innovation and is the focus of the Chesbrough case study "From Monopoly Power to Open Power." Faced with the deregulation of the European electricity industry and the rise of renewable energy, the former state-owned monopoly decided it needed to reinvent its business. Enel started on a journey toward "open power," developed close research links to strategic universities and spun off a new subsidiary to capitalize on opportunities in the renewable energy sector. Today, that subsidiary, Enel Green Power, is one of the largest renewable energy companies in the world. Its first CEO, Francesco Starace, is now the CEO of Enel itself,

where he is working with outside partners to make the company a global leader in technology that turns electric vehicles into mini–power plants feeding national grids.

"The open innovation model helped Enel grow its management skills, accelerate its decision-making and collaborate more with other companies," Chesbrough says. In March this year, the company opened the Enel Innovation Hub at Berkeley. "Thanks to open innovation, Enel is successfully transforming into a dynamic, entrepreneurial contributor to green and clean energy futures for us all," Chesbrough adds.

In other industries, leading corporations are also using open innovation to seize the opportunities of new technologies. By teaming up with hospital customers, Royal Philips is harnessing the Internet of Things to bring healthcare into patients' homes, personalizing care at a dramatically reduced cost. Car manufacturers such as Nissan and SEAT are partnering with technology startups to tackle the challenges of urban mobility, developing predictive traffic software and autonomous driving technologies that will change the role of cars in city transport forever.

"Open innovation was always a very powerful idea. In the digital world, it's absolutely fundamental to success."
Professor
Henry Chesbrough

Technology strategist and entrepreneur Salim Ismail says that companies need to radically rethink the way they do business if they are to prosper in a very different future. "Technology is about much more than a cute opportunity at the edge," he says. "Many companies don't understand the enormous displacing impact of today's technologies. They will have to reinvent themselves dramatically, and that takes skills from outside the company." ■

WHEN **MORE EQUALS LESS**

I fear that a common misconception continues to linger in certain corporate circles that long hours increase productivity and create value. But the executive warrior culture of doing 13- or 14-hour days is more often damaging for companies, sapping away value by shutting employees off from the real world.

Employees are forced to give up their interests, spend less time with their families and end up intellectually understimulated when businesses believe that quantity matters more than quality time.

OECD data from 2015 revealed that employees in Europe's richest countries by GDP per capita spent the least amount of time in the office. Germany, the continent's ninth-richest nation, worked the fewest hours at 1,371, followed by the Netherlands (1,419; sixth-richest), Norway (1,424; fourth-richest) and Denmark (1,457; seventh-richest). France and Luxembourg weren't far behind. Conversely, countries below the Eurozone average often worked longer: in Italy (15th), 1,725 hours, while those in 27th-richest Greece worked a whopping 2,042 hours.

Workaholism not only impacts health and increases stress, but it can also reduce imaginative capacity, meaning that people are less likely to come up with the innovative solutions necessary for progress. Only by living a full life away from the office can we cultivate the creativity to enrich business.

If companies were more respectful of personal time and promoted possibilities for people to prioritize their individual goals, I'm convinced that employees would bring greater creativity, productivity and a more flexible mind-set to the office. This is, after all, what every business wants. ■

Ernesto Ciorra,
Head of Innovation and Sustainability, Enel

DIGITAL INNOVATION RESHAPES **HEALTHCARE TECHNOLOGY**

Apart of everyday life since ancient times, the catheter has evolved over thousands of years along with the technological development of mankind, first made of rolled-up reeds and stalks, then precious metals, rubber, latex, plastics and polymers.

Now this ubiquitous medical device is on the front line of a new revolution in healthcare. Equipped with miniature imaging technologies, today's intravascular catheters are guiding clinicians through a patient's body and helping them successfully treat heart disorders and cardiovascular diseases without the need for surgical procedures that can be both traumatic and expensive.

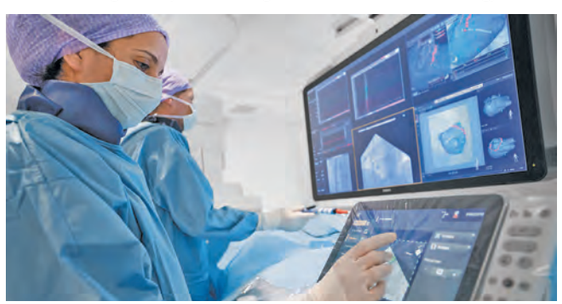
"By innovating in imaging, software and catheter design, we are making the catheter smart," explains Henk van Houten, chief technology officer at Dutch healthcare giant Royal Philips. "For example, by using miniature audio sensors around the catherer tip, clinicians are now able to image the heart from within."

In early 2017, Philips launched an image-guided therapy platform, Azurion, which harnesses the power of these new technologies for clinicians. It combines real-time images from sensors on devices such as catheters with information from patient health records and other sources, all on one intuitive user interface. Azurion makes it easier for specialists, who cannot directly see and feel the organs they are working on, to visualize target organs and tissues and carry out the procedures necessary for successful treatment.

It is not only in the treatment stage that new technologies are transforming the processes and economics of healthcare. Philips has also developed powerful software to help pathologists interpret huge volumes of clinical data from sources such as X-rays, biopsies and genomics, leading to faster and more accurate diagnoses of diseases before they take hold of a patient.

"Research and innovation have always been able to ride the waves of disruption and lead Philips to the future."
Henk van Houten,
Chief Technology Officer,
Royal Philips

What Van Houten calls the industrialization of care is making clinical processes more efficient and effective. Innovative technologies are also enabling new levels of personalized care away from hospitals and in the home. "Philips is committed to ensuring that the quality of life is optimal," reveals Van Houten. Connected health devices such as ear thermometers, blood pressure monitors and scales synchronize information with apps in real time, empowering consumers to take care of their own health and manage any existing conditions. "Thanks to the technology of the Internet of Things, you can combine information from different sensors with disease models and smart algorithms to interpret the condition of the patient," Van Houten explains. "It means you can prevent any deterioration rather than making expensive and invasive repairs after the event."



Philips' Azurion image-guided platform optimizes interventional procedures

Connected devices are now making rapid inroads into the healthcare markets for vulnerable segments of the population such as infants and the elderly. The Philips CareSensus home monitoring solution helps seniors maintain their independence thanks to discreet, non-camera-based sensors placed strategically around the home. At the other end of the spectrum, the uGrow parenting platform captures data from connected devices, such as smart baby monitors and thermometers, combines it with information such as feeding and sleeping patterns and provides personalized feedback, advice on what to expect and assurance that development is on track.

An early commitment to open innovation has helped Philips emerge as a leader in this new healthcare landscape; the company has long-term partnerships with major hospitals and universities including MIT and is investing in a series of promising startups to access their ideas and technologies. "Open innovation is increasingly about creating an ecosystem of partners that leverage your platform," Van Houten says. "In this competitive world, collaboration is the key to success." ■

AUTOMAKERS GO **BACK TO THE FUTURE**

Harnessing the power of digital technologies and emerging alternatives to the internal combustion engine, automakers are rising to the challenge of urban development in the 21st century and reinventing their industry in the process.

Automobile manufacturers are seizing a once-in-a-lifetime chance to reboot urban mobility and rethink the role of the car in contemporary society. The need for action is urgent: in 2016 the average speed of a car in London hit a new low of under 8 mph—less than the speed of a horse-drawn carriage in the same streets in the Victorian era. In many fast-growing Asian cities, it would now be more practical to cycle or even to walk than to drive—if it wasn't for the noxious levels of air pollution caused partly by cars and trucks pumping out fumes from never-ending traffic jams.

Car manufacturers, policymakers and technology companies are now racing to develop an alternative model that will embrace electric vehicles, connectivity, ride sharing and autonomous driving and that will transform urban transport forever. In this race, Nissan has emerged as an early leader; not only does it manufacture the world's best-selling electric vehicle, the LEAF, but as part of the Renault-Nissan Alliance it has also forged close partnerships with tech giants such as Microsoft and specialists in on-demand services such as Transdev, helping the carmaker steer a path toward a future that is personalized, autonomous, connected and electric. ■

SEIZING THE OPPORTUNITIES OF THE DISRUPTIVE TRIANGLE

Q&A WITH
CARLOS GHOSN,
Chairman of the Board,
Nissan

How has Nissan's technology leadership in electric vehicles (EVs) positioned the company for the future?
Nissan was the pioneer in EVs and battery technologies. We introduced the first mass-market, affordable EV, the Nissan LEAF, in 2010. At the time, our competitors didn't believe in EVs. Now they are trying to catch up to us. We fully intend to keep our advantage as other automakers begin to announce their own plans: we have already announced that a new LEAF will be coming soon, with autonomous drive capabilities; we are developing low-cost electric cars in China; and we have electric vehicles coming in different segments of the market, in addition to the LEAF.

"We'll see more change in our industry in the next 10 years than we've seen in the last 50."
Carlos Ghosn,
Chairman of the Board,
Nissan

When will we see EVs making real inroads into the market?
The situation today is much better than it was five years ago. Progress has been slow, but it's now accelerating as batteries are getting better and cheaper; competition and knowledge in the sector are improving, infrastructure is expanding and more countries are putting in place incentives that support electric cars. At this pace, some industry analysts are predicting that EV sales could be anywhere from 20%-30% of the urban market by 2030—a jump from less than 1% in 2015.

What sort of interest are you seeing in autonomous driving from consumers?
We are starting to see customer acceptance evolving. Last August we introduced ProPILOT technology on the Nissan Serena minivan in Japan. ProPILOT is a paid, optional autonomous drive system for use in a single lane on highways. When activated, it keeps the car centered by reading lane markers, measuring the distance between your car and the vehicle in front of you, and controlling the steering.

More than 60% of customers who have purchased this model have already chosen this option in Japan, at an added cost. Many have told us that they cannot imagine owning a vehicle now without this functionality.

How do you think connected cars will improve quality of life?
In the U.S., the average driver spends around an hour in the car per day with hands on the wheel, eyes on the road. The connected car revolution—linked with the rise of autonomous drive—will enable drivers to use this time more productively. Together, connected vehicle technology and autonomous drive are about giving drivers more choices and less stress because the car is working as your partner in the same way you rely on your mobile phone today.

How will major disruptions in technology change the automotive industry?
We are already seeing the "disruptive triangle" of autonomous drive, electrification and connected vehicle technologies changing how vehicles are powered, driven and integrated into society.

The technological disruptions are shaping not just the car of the future, but the car company of the future. Nissan has always been a company focused on innovation, so we will build on that history to adapt. We are going to have to look beyond our core business of car making toward new areas, such as in mobility services and/or ownership models that meet the needs of a range of consumers. ■

DIGITALLY DRIVEN: MARKETING INNOVATIONS REACH NEW SEGMENTS

Q&A WITH JOCHEN SENGPIEHL,
VP Marketing,
Hyundai Motor Europe

How do you expect digital technologies to transform the automotive industry?

In the automotive industry, sales, service, mobility and connected in-car technology need to be integrated to create a seamless customer brand experience. Carmakers need to eliminate silo structures and overcome traditional organizational boundaries. The goal must be to put the customer at the center and not the product.

This is a totally new approach and a new thinking for the industry, and at Hyundai, we have identified five key trends: the first is a product-service hybrid, the fusion of a car and a service, for example car sharing. The second trend is what we call the car as a living hub: the rise of autonomous driving means people will not just be driving a car but living parts of their lives in them. We are constantly working on new communication, information and entertainment opportunities in and around our cars.

The third and fourth trends are customized mobility and what we call neomobility. This means that applications in the car will be increasingly integrated into daily life and work; for example, controlling your home appliances from the car. We are working intensely on the integration of this infrastructure. The last one is the mobility-energy grid. It's the holistic approach of energy use for mobility as well as for households.

What opportunities do these trends offer Hyundai?

Accessible, affordable and aspirational technology is our future. Hyundai has become very strong in Europe in the last 20 years. We have almost doubled our sales in the past nine years by being a budget brand. We now want Hyundai to be perceived as the technology brand we have become, that is accessible for everyone. We are a first mover in electrification and autonomous driving. For example, the IONIQ is the world's first car to offer hybrid, plug-in hybrid and all-electric powertrains in a single body type.

We are convinced: by shifting the brand to a more aspirational and technology-driven level we can attract more and new customers.

How are you using digital marketing to develop the Hyundai brand?

New digital marketing tools are helping to boost the efficiency of our budget spends and the impact of our campaigns. Therefore we have launched our own newsroom and restructured our European marketing team to include digital and PR. For the launch of our new IONIQ family we shifted away from conventional product-oriented ads, following an entirely digital approach around a brand film designed to appeal to a younger, environmentally conscious generation. We firmly believe that we can reach this important target group effectively with data-driven digital storytelling. Furthermore we created a digital IONIQ hub, including a 3D app with augmented reality content to showcase the car's technologies and inform customers about our solutions.

> **"Carmakers need to eliminate traditional organizational silo structures and put the customer at the center, not the product."**
> Jochen Sengpiehl,
> VP Marketing,
> Hyundai Motor Europe

What was the impact of the IONIQ hub on sales?

It has been a major success. The average conversion rate for visitors on the IONIQ hub was 4%. Industry average is below 1%. In some markets, our conversion rate was close to 10%. ■

CONCEPT CAR SETS NEW STANDARDS FOR HYDROGEN POWER

Hyundai's FE Concept showcases next-generation hydrogen fuel cell technology

Already the dominant player in the nascent European market for cars powered by hydrogen fuel cells, Hyundai has laid down a formidable marker for the rest of the industry to follow in the shape of the Future Eco (FE) Fuel Cell Concept vehicle, a next-generation hydrogen-powered SUV.

Unveiled at the Geneva Motor Show in March, the concept car dramatically raises the bar for the performance of fuel cell vehicles. It can travel over 800 kilometers (almost 500 miles) between fill-ups, more than Hyundai's successful ix35, the world's first mass-produced hydrogen-powered vehicle, which has a maximum range of 594 kilometers.

Hyundai says the concept car represents the next step toward fulfilling its ambition of creating a zero-emission society based on hydrogen. Compared with the ix35, the fuel cell technology in the new vehicle is 20% lighter and achieves 10% greater efficiency and a 30% increase in power density.

The cutting-edge technology and design of the car, inspired by nature and water, reflect the increasingly aspirational appeal of the Hyundai brand; by investing significantly in eco-vehicle design and production, the company is attracting ever-greater numbers of technology-aware consumers.

"The SUV concept car will become our new brand ambassador for zero emissions and advanced technology," says Jochen Sengpiehl, VP marketing at Hyundai Motor Europe. "Hyundai is already the most improved brand in Europe for the values of sustainability and technology."

By 2020, Hyundai expects to launch 14 or more environmentally focused models, including hybrids, plug-in hybrids and electric vehicles. Elements of the new concept car will influence a fuel cell SUV model that is all set to join the roads of Europe from as early as 2018. "Our overarching goal is to make innovation and technology accessible," Sengpiehl explains. ■

SEAT IN THE CITY

THE AMBITIOUS AUTOMAKER IS BUILDING A THRIVING DIGITAL ECOSYSTEM IN BARCELONA

As automakers around the world race to reinvent the car for the 21st century city, Spanish brand SEAT has one major competitive advantage that has put it firmly in pole position: its unique relationship with its hometown, Barcelona.

With all due respect to the likes of Detroit and Stuttgart, no other motor city can match Barcelona for style, creativity and design. By tapping into the thriving startup scene in the Catalan capital and working closely with forward-thinking local authorities, in recent years SEAT has become one of the fastest-growing automotive brands in Europe, with a particular appeal to the millennial generation.

"From next year, our cars will be equipped with the connectivity of the future."
Luca de Meo,
President, SEAT

"Barcelona has one of the highest concentrations of startups, innovative small companies and international talent in Europe," Luca de Meo, president of SEAT, says. "Being based in Barcelona is helping us become a leader in connectivity, enabling us to offer our users a driving experience that is easy, connected and customized."

SEAT and Barcelona City Hall entered into an agreement at the end of last year to jointly address the promotion of innovation and sustainable mobility. As part of this agreement SEAT recently launched the Metropolis: Lab Barcelona, a 100% SEAT digital lab integrated in the network of worldwide laboratories of the Volkswagen Group. Engineers and technology specialists are working to develop mobility-related services for the cities of the future, combining mobile technology with big data. "The lab specializes in digital traffic management and vehicle monitoring systems," de Meo says. "Barcelona is internationally recognized as an innovative city, and the lab is part of our contribution to growing the city and growing along with it."

"By analyzing real-time data from traffic flows, we can make traffic more intelligent and determine which transport method is most efficient," says Jaume Collboni Cuadrado, the city's deputy mayor for business, culture and innovation. "This is the focus of the SEAT project; they are interested in selling not just cars but new mobility services, using both public transport and private vehicles. It is a real change in the paradigm."

The new lab is only the latest addition to a growing network of SEAT research facilities in Barcelona. The company is a founding member of CARNET (Cooperative Automotive Research Network), which brings together industrial and academic partners to research projects in urban mobility. It sponsors chairs in innovation at two of the city's major educational facilities, the Universitat Politècnica de Catalunya (UPC) and the IESE Business School. And last year, to support startups in the automotive sector, SEAT launched a specialized start-up accelerator, SEAT Accelerator by Conector; six startups are currently using workspace at the company and benefiting from weekly training and personalized mentoring as part of the program.

"The automotive industry is currently in reset mode," de Meo says. "We are busy reengineering the business model, catching the technological revolutions and creating new sources of customer demand."

As a direct result of SEAT's close connections to the thriving Barcelona network of startups, the company is currently creating an entire digital ecosystem designed to customize and enhance the driver experience. Accessed using a SEAT ID, the systems that the company is working on will cross-reference traffic data in real time, incorporating factors such as school opening and closing times, weather conditions and the timing of major events such as the Mobile World Congress. Until all these apps are integrated in the vehicle, SEAT will offer these functions via a Dongle, a device that enables older cars to access connectivity services.

"The objective for SEAT and for the city council is to make transport in Barcelona intelligent and efficient."
Jaume Collboni Cuadrado,
Second Deputy Mayor,
Business, Culture and Innovation

"At SEAT, our goal is to be a front-runner in connectivity and we are fully engaged in making it happen," de Meo says. "We are now ready to move the brand to the next level of modernity." ■

ENEL SUPPORTS V2G STARTUP

To maximize the opportunities of new technologies, companies from across different sectors are increasingly pooling their efforts and working with fast-moving startups, joining forces to develop innovative, high-value products and services.

Enel is helping technology startup Nuvve make V2G a reality

Faced with the rise of the electric vehicle (EV), giant Italian energy company Enel and Japanese carmaker Nissan have partnered with Nuvve, a startup based in San Diego, to develop a new business model based on Vehicle-to-Grid (V2G) technology. The technology aggregates the output of the batteries of large groups of parked EVs, transforming the vehicles into a virtual power plant that provides balancing services, feeding stored electricity back into the grid.

It is a potentially market-changing invention that could revolutionize the relationship between vehicle owners and electricity suppliers forever. Because V2G is a new market—neither car manufacturers nor energy companies have internally developed proper solutions to manage it—and startups lack the resources to test their inventions at scale in the real world, Enel, Nissan and Nuvve decided to work in partnership to bring V2G to market.

"It is crucial for us to have access to the capabilities of startups to innovate and disrupt," says Luciano Tommasi, head of startup activities and business incubator at Enel. "As a big corporation, we have bureaucracy and processes. But by working with startups, we can test and launch new products more quickly."

Whereas Enel and Nissan had already tested V2G technology, the two multinationals had no software platform for controlling the power flow to and from the cars. "We were the missing piece of the puzzle," says Nuvve co-founder, chairman and CEO Gregory Poilasne.

As a result of their groundbreaking partnership, in August last year the three companies were able to debut in Denmark the world's first fully commercial V2G hub. When 10 electric e-NV200 vans from Nissan are not in use, they can be plugged in to the Enel V2G units and either receive energy from or provide energy back to the national grid on demand, turning the vans into mobile energy solutions and powerful ambassadors for the low-carbon society. ■

"Using startups is a very effective and quick way to outsource innovation and tap into new businesses."
Luciano Tommasi,
Head of Startup Activities and Business Incubator, Enel

IT'S ALL **ABOUT DESIGN**

It is a rare concept car that completes the uncertain journey from motor show to factory production. But when Kia unveiled a GT sports sedan at the Frankfurt Motor Show back in 2011, the Korean manufacturer soon realized it had something very special on its hands. "The reaction was so positive that we decided we had to put the vehicle into production," says Artur Martins, VP marketing at Kia Europe.

Now branded the Stinger, and launched at the Detroit Auto Show in January, the car is the brainchild of a crack team of mainly European designers, led by legendary German designer Peter Schreyer. Since Schreyer joined Kia in 2006, he has transformed the brand by introducing sophisticated European styling. The dynamic, aspirational designs created by Schreyer have helped Kia win new segments of consumers around the world. The Stinger, a muscular five-passenger sports sedan, is the culmination of this process: it is the highest-performance production vehicle in the company's history. "The Stinger will be our brand ambassador," Martins says. "It is a bold move that represents what we want to be as a brand, in terms of design, technology and the driving experience." ■

DRIVING **RIDESHARING SUCCESS**

For all the central role that they play in the world's transport systems, cars are surprisingly stationary assets. According to Frédéric Mazzella, founder and executive chairman of carpooling company BlaBlaCar, they are parked 96% of the time on average, are in traffic jams 0.5% of the time and are looking for a place to park 0.8% of the time. "They are only driving 2.7% of the time," Mazzella says. "And when they are driving, three times out of four there is just one driver on board, with three or four seats available."

By making that spare capacity available to members of its online community, Paris-based BlaBlaCar is turning cars into more productive assets for their owners. The company connects long-distance travelers to cars with empty seats going the same way; the passengers pay the owners a small contribution to help offset their costs. Such has been the success of the business model that BlaBlaCar has become one of the fastest-growing transport companies in Europe. "Twelve million people now travel with BlaBlaCar every quarter," Mazzella says. "That's more than Eurostar and British Airways." ■

SMART CITY BOOSTS **HAPPINESS**

If there is one lesson that policymakers have learned over the last few years, it is that economic growth and new technologies are not enough by themselves to satisfy the multiple needs of their citizens. That is why in the United Arab Emirates, to make sure that smart city investments reflect the interests and aspirations of residents, the Smart Dubai Office has developed a unique focus on happiness.

"Technology is not the end. This is what differentiates Dubai from other smart cities globally," says Dr. Aisha Bin Bishr, the director general of Smart Dubai. "Technology should always be a means to enable us to be happier. The happiness of our people is at the center of all of our projects.

Smart Dubai focuses on the happiness of citizens

"In Dubai, we are known for taking futuristic ideas and making them happen. With our Happiness Agenda, we are using very scientific methodology and focusing on how to attain and measure happiness."

In late 2014, Smart Dubai began work on a Happiness Meter, an online tool on which users can record their feelings after transacting with large organizations. Smart Dubai initially rolled out the meter on the websites and in the customer service centers of government entities. In a second stage, some of Dubai's largest private-sector companies have also implemented the Happiness Meter; so far, the meter has collected more than 6 million votes.

As well as the meter, Smart Dubai's Happiness Agenda includes projects to discover people's needs, including their emotional and spiritual needs, to educate residents to prioritize their happiness, and to make the policy changes required for their needs to be fulfilled. The organization has also developed a sophisticated algorithm to help measure the happiness of different groups of people. "In Dubai, we have 200 nationalities and communities," Dr. Bin Bishr says. "We need to understand the different needs of all these communities and show them that happiness is not always materialistic. Happiness is measureable and it is attainable." ■

"We don't focus on technology. We focus on happiness."
Dr. Aisha Bin Bishr, Director General, Smart Dubai Office

IS OUR **FUTURE** SECURE?

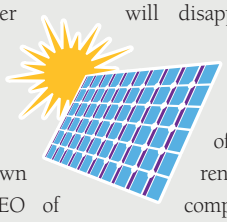
In tomorrow's world everything that is connected to the Net is fair game for an attack. Electricity companies around the world are facing an alarming spike in cyberattacks, sometimes with dramatic consequences. To help energy companies fight back, Swiss startup Nozomi Networks is deploying machine learning to identify any anomalies in a network that could indicate a cyberattack. In contrast to standard anti-virus products and firewalls, which aim to defend against specific threats, Nozomi software tracks the 10,000 variables of a power plant in real time to make sure nothing untoward is taking place.

"The development of the energy sector entails huge security challenges."
Andrea Carcano, Co-Founder and CPO, Nozomi

Nozomi's largest client is Italian energy company Enel, which also provided Nozomi with support from its INCENSe accelerator program for starups. "Startups like Nozomi are very good at understanding technology trends and developing the right products for any gaps in the market," says Luciano Tommasi, the head of startup activities and business incubator at Enel. Demand for Nozomi's services is accelerating rapidly as cyberattacks increase, co-founder Andrea Carcano reveals: "We have gone from one attack per year 10 years ago to one reported attack per day now." ■

TOMORROW'S **ENERGY**

Perhaps nowhere is the challenge of technological disruption greater than in the energy industry, where cheap renewable energy is turning the economics of power upside down.



"Ten years ago, solar cost $10 to install one watt of generation capacity," says Dr. Shawn Qu, president and CEO of solar power company Canadian Solar. "This year you can do it for less than $1 per watt. In some parts of the world, solar power is already as competitive as fossil fuel."

Coupled with the emergence of new technologies for energy storage, renewable energy holds out the almost inconceivable promise of free electricity for consumers. But that does not mean that energy companies will disappear overnight, explains Inken Braunschmidt, chief innovation officer at German renewable energy company Innogy. "At some time in the future, we will no longer earn money with the electrons," she says. "We will earn money instead with the data and the digits, providing the data services and solutions that consumers and communities require." ■

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