EPCA

THE EUROPEAN PETROCHEMICAL ASSOCIATION

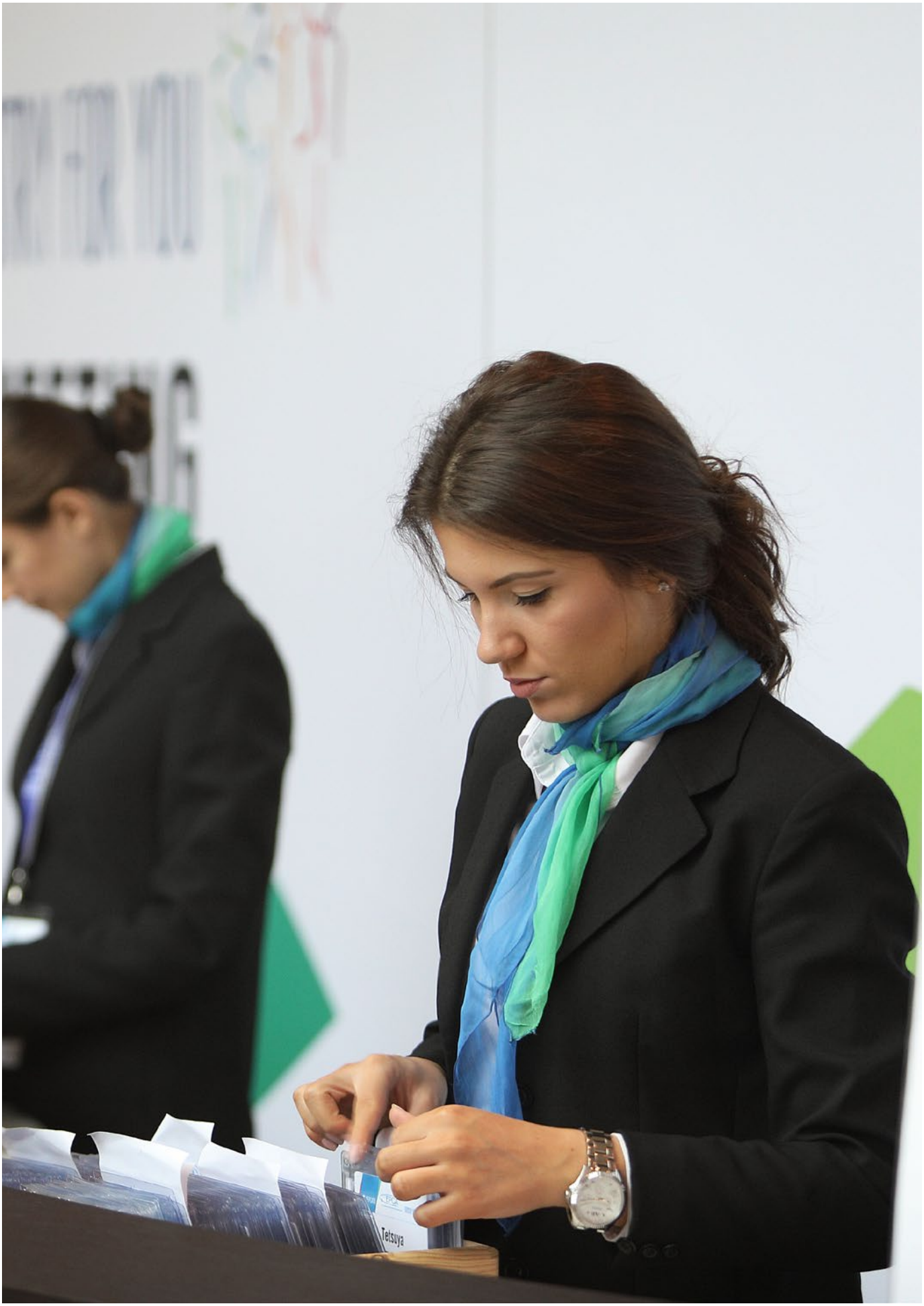
CHEMISTRY FOR YOU

REPORT OF THE EPCA 2017

51ST ANNUAL MEETING

"THE CHEMICAL INDUSTRY AND THE 4TH INDUSTRIAL REVOLUTION: PEOPLE, PLANET, PROFIT IN THE DIGITAL AGE"

30TH SEPTEMBER TO 3RD OCTOBER 2017 IN BERLIN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EUROPEAN YOUTH DEBATING COMPETITION (EYDC)

For the second year running, EPCA hosted the European Finals of the European Youth Debating Competition (EYDC). 24 young participants, aged between 16 and 19, from across the EU gathered in Berlin with the delegates of the 51st EPCA Annual Meeting, directly contributing their thoughts and ideas to the theme of the EPCA Annual Meeting during their debate, which was themed: "People, Planet, Profit in the Digital Age: With or without petrochemistry and plastics?"

During a breathless, ninety-minute session, the 24 debaters, who were selected from over 400 students who took part in the 2017 EYDC - which was held in 7 countries (France, Germany, Italy, the Netherlands, Poland, Spain & the UK) - offered a wide range of arguments as to why this sector should or should not continue to make a contribution to our economy, society and the environment in the 'digital age.'

Over four quick-fire rounds, contributions were limited to one minute, with warning bells at 45 and 60 seconds. Consequently, speakers were forced to make their points quickly and convincingly, which they did. Overall, the petrochemicals and plastics sector received resoundingly positive approval from its young observers, many highlighting the benefits petrochemistry is continuing to contribute to global science and technology, health, wealth and global standards of living. Indeed, the industry was recognized as a key enabler of digitalisation and the 'digital age.' But criticism was also forthcoming, particularly in terms of the sector's impact on health and safety, and on issues relating to waste, particularly plastic waste, resource over-consumption, greenhouse gas emissions and the environment.

Opening the session with a slightly longer but succinct speech in favour of the industry, the "pro-speaker" Mark Williams, member of the EPCA Board and SABIC VP for Europe, pointed out that the world we live in today is sustained by the sector's products, services and technologies. "Where would we be in a world without petrochemistry and plastics?" he asked. Materials made by the industry are essential ingredients in almost everything that sustains our quality of life, from our IT and communications technology, to furniture, appliances, healthcare, cars, packaging, food production and distribution, lubricants and propulsion for transportation, and construction.

Looking ahead, Williams said with the world's population set to increase from 7.4bn today to 9bn by 2050 and 11bn by 2100, and rapid increases in urbanisation, the sector will remain a key enabler for economic growth and for the provision of food, health, housing, industry and transport. Further, petrochemicals and

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"Materials made by the industry are essential ingredients in almost everything that sustains our quality of life"

MARK WILLIAMS
Member of the EPCA Board and Vice President Europe
SABIC

plastics would help many more people – perhaps 5bn up by 50% - reach levels of prosperity enjoyed today in the more developed countries of the world.

Williams said the industry can also make a significant contribution to the development of a 'circular economy,' in which the emphasis will be on energy and materials efficiency, and reuse and recycling will increase exponentially. He also noted how petrochemicals and plastics are playing a significant role in achieving global climate goals by helping to reduce CO_2 emissions through light-weighting in transportation, food preservation, insulation in buildings, and the specialty materials used in solar panels and windmills to generate renewable energy.

Jürgen Stellpflug, the chief editor of ÖkO-TEST, as "con-speaker" offered a more critical analysis of the industry and its products. While acknowledging the huge and beneficial contributions made by the sector, he argued that the challenge today is to make sure that petrochemicals and plastics are used in the right way, in the right quantity, and then reused or recycled. But he questioned the use of plastics in many applications. For example, have synthetic fibres used in cheap, rarely worn clothes helped destroy the wool, cotton, silk and natural fibre industries in some less developed countries? Are agrochemicals damaging the environment? Do we need to use micro-plastics in cosmetics or toothpaste? Why are we packaging mineral water in plastic bottles, which are then transported thousands of miles generating CO_2 in the process? Why aren't we using reusable bottles or recyclable glass bottles? Why don't we ensure water consumption is local or regional? And what about marine pollution by plastics? Not only are there "islands" of plastic waste floating around but fish are also being contaminated. "Do we want oceans with 100m tonnes of plastic but no fish," Stellpflug asked.

As the young debaters got into their stride, many of the arguments raised by Williams and Stellpflug were revisited, and in more detail. One contributor received particularly loud applause for delivering his comments in a one-minute rhyming rap! Overall, the contributions were excellent, which gave the judges a very difficult challenge in selecting the winners. However, after much consideration and deliberation, 10 winners were awarded, with the prizes of the top five winners handed out by Ban Ki-moon, Secretary-General of the UN (2007-2016), Tom Crotty, President of EPCA and Director of the INEOS Group and Karl-H. Foerster, Executive Director of PlasticsEurope, partner organiser of the EYDC, during the closing lunch on Tuesday 3rd October 2017.

This competition was, once more, an excellent initiative for the industry to connect with a new generation, and to listen and learn about each other's views. And the young debaters did not disappoint. They expressed mature arguments, demonstrating an insightful comprehension of the synergy and collective responsibility between industry, consumers and society at large. Their perspectives provided food for thought, and their visions of our shared future certainly gave us renewed confidence and energy to face the challenges to come!

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OPENING BUSINESS SESSION

Building Sustainable and Inclusive Economic Growth in the Digital Age: The Value Creation Proposition of the Chemical Industry.

PRESIDENT'S INTRODUCTION

Opening the first session of EPCA's 51st annual meeting, president Tom Crotty, Director of the INEOS Group, welcomed over 2,800 attendees, who – once again – had registered in record numbers. As a key enabler of the 'digital age,' Crotty said that the challenge for the industry was to adapt to the changes that the '4th Industrial Revolution' – digitalisation – is bringing about. Not only is it impacting industry's structures and systems, but it is also changing the way people work and the skills that are needed in the petrochemical industry. The EPCA president said he sees the chemical sector remaining at "the heart of this digital revolution," and adapting to its challenges.

Before introducing the session's speakers, conference moderator, Nadine Dereza, now a veteran of 10 EPCA annual meetings, told delegates that this year's question and answer sessions would be facilitated online in addition to questions from the floor. Using a SLIDO.com app, participants were able to submit questions through their smart phones and tablets, and then to see and rank all questions according to importance. It proved a success throughout the meeting.

KEYNOTE INTRODUCTORY ADDRESS:

MARTIN WOLF
Associate Editor and Chief Economics Commentator
FINANCIAL TIMES

"THE PETROCHEMICAL INDUSTRY IN THE 4TH INDUSTRIAL REVOLUTION"

We are living in an era of deep transformation and profound economic stresses, with rapid and uneven technological change, and slow growth in productivity in most industrialized countries, which are facing social upheaval, economic changes and a rise in populist politics, Martin Wolf told the audience. Industry, he continued, must address three key global challenges – convergence, possible de-globalization, and greenhouse gas emissions – while also tackling low rates of innovation, and change brought about by digitalisation. In the face of these challenges, the petrochemical industry needs to adapt to change while grasping the advantages of new technology.

On convergence, Wolf said: "We are seeing the transformation of the world economy and the end of western dominance," noting that in 1980 the US and Europe with other developed nations accounted for two thirds of global GDP, whereas today they account for less than 40% as a consequence of dramatic growth in China, India and developing Asian nations.

Wolf also noted that globalization and the process of economic integration, which continued apace up to the financial crash of 2008, seems to have slowed down and might even be reversing. Are we about to see de-globalization in the face of rising protectionist sentiment, he wondered? The third big challenge, which to date the world has done little to address, is CO_2

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> "The challenge for the industry is to adapt to the changes that the '4th Industrial Revolution' – digitalisation – is bringing about"
>
> **TOM CROTTY**
> *EPCA President and Director*
> INEOS GROUP

emissions reduction. In fact, Wolf added, emissions are likely to increase as a result of industrialization in developing nations.

Another major challenge relates to low rates of innovation and poor productivity. Using total factor productivity growth measures for the US since the late nineteenth century, Wolf showed how innovation has occurred in waves, with the biggest increases being achieved in the periods between 1920-1970, driven by electrification, and 1994-2004, by the explosion in information technology. However, the period since 2004 has seen a marked slowdown in US innovation. A similar picture emerges in Europe and in Japan, where productivity rates have slowed significantly since 2006. His final example related to the price of semi-conductors, the hardware driving the digital revolution, which has collapsed since 1970. So are we now in an age when software rather than hardware is driving change, he asked?

Before addressing the 4th Industrial Revolution, Wolf quickly reviewed the first three: "The 1st Industrial Revolution was water-and-steam powered manufacturing. The 2nd was electricity-powered mass production, which I think was the most profound. The 3rd was automation using electronics and IT, and now the 4th is digitisation, where the internet and cyber networks and physical systems are integrated. But all these revolutions are products of one ongoing revolution – the integration of competitive capitalism with science and technology."

So what are the changes associated with the 4th Industrial Revolution? Wolf said we are seeing the emergence of new industries, so now 7 out of 10 of the world's most valuable companies are now in IT. He pointed to new capabilities, such as data analytics, artificial intelligence, robots, Internet of Things and global communications. And Wolf also referenced new products and services, devices, driverless cars, and new financial technology. "What is also revolutionary, however, is the speed and scale of change in mature industries, such as media, entertainment, distribution, and all aspects of manufacturing."

So in this new world, what are the opportunities for petrochemicals, Wolf asked? "The first big opportunity is to digitize the industry! The industrial Internet of Things, automation, sensors, 3D printing, cloud computing, data analytics and AI will transform the operations of your business as they have in every other sector. Areas being transformed are R&D, manufacturing processes, and supply chain management. This has huge implications for staffing. It means there is an urgent need for new staff with new, valuable and scarce skills and upgrading of capabilities of current staff."

The second big opportunity is to create and use new products and services, Wolf said. Examples include electric vehicles, drones, smart phones, a faster internet, more powerful micro-processors - all of which are reliant on chemical industry products and technology. Wolf also noted opportunities for the industry to help decarbonise the economy, and enhance sustainability, through enhanced resource use and management and recycling. "We need a more circular economy."

The third big opportunity is in collaboration, Wolf continued. "We need to find new ways to collaborate and compete with suppliers, customers and competitors. And to enable adjustment to this new business environment, corporate culture and management processes will need to be changed profoundly."

But there are also risks associated with the 4th Industrial Revolution. For example, will new entrants come into the market? What about the risks of organizational disruption, of failures of cyber and operational security, and the challenges of protecting intellectual property, data, and privacy? Will there be specialized skills shortages?

In conclusion, Wolf said: "We're in an era of deep transformation, with profound political and economic stresses, and rapid and uneven technological change. The 4th Industrial Revolution is really the evolution of science and technology driven capabilities."

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JIM FITTERLING - *President and Chief Operating Officer,* THE DOW CHEMICAL COMPANY *and Chief Operating Officer, Materials Science Division,* DOWDUPONT

TWO INDUSTRY RESPONSES:

JIM FITTERLING
President and Chief Operating Officer,
THE DOW CHEMICAL COMPANY
and Chief Operating Officer,
Materials Science Division,
DOWDUPONT

"Despite the hype we hear about the 4th Industrial Revolution, there are actually three great forces – not one – that increasingly impact inclusive growth for the people, planet and profit and our industry's ability to create value," Jim Fitterling began. "They are globalization, sustainability and digitalisation."

Globalization has seen setbacks in both sentiment and reality, Fitterling said. "The economic winds that propelled globalization are blowing decidedly in the other direction. It's not just Washington's policies at work here. A Bloomberg story from May noted that the movement of manufacturing from West to East is largely complete. The next globalization trend will likely centre on IT-heavy companies as they search for talent regardless of geographic boundaries."

Sustainability is the second force, the Dow president continued. "As the world becomes more populated, hungrier and thirstier – not to mention more resource limited – I think we can agree that sustainability will only increase in importance for the planet and therefore also for industry. Keep in mind that the world's population is growing by about 83 million people every year."

The third force is digitisation, which Fitterling described as the backbone of the 4th Industrial Revolution, which is doing far more than helping us communicate easier and faster. It is accelerating the first two trends exponentially, and helping spread a more inclusive economy by shifting technology opportunities and work globally. "But it also has the potential to dramatically change our industry's value proposition. And if you thought digitalisation has been disruptive, just wait. The natural extension of digitalisation is artificial intelligence and we've only taken the first small steps down what could be a long, winding, and sometimes unpredictable pathway. It's a trend that will have an enormous and possibly turbulent impact on our value proposition."

Fitterling's second observation built on his previous thought: "The idea of the triple bottom line – as a guiding principle to build sustainable and inclusive growth – hasn't changed much in the past 25 or 30 years. But the broader impact of digitisation – as a catalyst for the 4th Industrial Revolution - is dramatically changing our approach." Using Dow as an example, he said: "Think about this: At Dow, we've been pursuing the triple bottom line since the 1980s. We started with a lot of EH&S work and the implementation of Responsible Care. We started reporting EH&S information publicly in the 1990s. Around the same time, we did a lot of what I call 'cheque-book philanthropy' as we shifted from a shareholder model to a stakeholder model, and we formed foundations to help us

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"The globalization has changed the economic structure and made protectionism more difficult to rationalize"

MARTIN WOLF
Associate Editor and Chief Economics Commentator,
FINANCIAL TIMES

funnel resources to external efforts that dovetailed our own."

For Dow, Fitterling said, the real breakthrough came in the 2000s and later as the company finally began to integrate the triple bottom line into its business models. "That was when we began to see that the ability to positively impact some of the world's greatest challenges intersected with our desire to grow and thrive as individual companies. In other words, we realized we could make a difference and make a profit through two integrated approaches."

Internally, Dow set about reducing waste, recycling water, making its operations more efficient and safer, and reducing greenhouse gas emissions. Externally, Dow began to address the world's greatest challenges not just as philanthropic initiatives, but also as business opportunities. "In other words, going into the labs to develop real, marketable solutions that are of benefit to mankind. That, at its heart, is the triple win." So, seeing cars need better mileage, Dow set out to develop lightweight materials and adhesives. Seeing a thirsty world, the company designed better, more energy efficient reverse osmosis technology.

"It's what our industry does best. Finding solutions to problems," Fitterling added.

He said the great promise of the 4th Industrial Revolution is that it will give us even deeper connections and deeper insights, and different perspectives on old problems. This will be enabled by our ability to use big data analytics to target distinct issues and opportunities in reduced time cycles.

"Who could have foreseen our ability to bring additional value to agriculture by using better analytical tools?" Fitterling continued. "At farm level, we understand how weather, soil quality, pests, plant diseases, and even erosion patterns all come together at one point in time to impact yield of a specific crop. And we're designing custom solutions, and putting that in the hands of farmers in their tractors and in real time.

"Yet we still have a farm-to-table problem. There isn't enough food being produced in the world and much of it is wasted because the supply chain is inefficient. This means hungry people, and extra and unnecessary environmental costs. How many greenhouse gas emissions could we avoid if we reduced food waste by 25%? How many more people could be fed?" Fitterling said the chemical industry with its wealth of material and packaging technology is uniquely positioned to tackle this problem, directly impacting the triple bottom line.

"If we could track every product through its life cycle with as much ease as GPS units track vehicles, how much more quickly could we move to a circular economy?" he asked. "It's an evolution rather than a revolution, and it's not just about technology. Survival is not predicated on being the biggest or fastest. It's the most adaptable."

He urged companies to also engage their employees in targeting the triple bottom line. Fitterling underlined the importance his company attaches to engaging its employees in common purposes and common goals, and enabling them to participate in their definition. He said he thinks of it like "weaving a ribbon all the way through the organization – connecting everyone with common information and common goals." The Dow president also emphasised the need to focus employees and strategies on the triple bottom line: "If you don't pursue it, someone else will and that's where your talent will go. The triple bottom line is not a nice to-do: it's mission critical."

Fitterling also urged the chemical sector to remember and act on the fact that it is not immune to new technology and new entrants. "There will be the Ubers, the Lifts, driverless cars, electric cars, a Spotify, a Pandora. Competitors who will try to do things better, faster, cheaper, safer and more sustainably. Value will migrate to those making best use of technology."

DR. HARIOLF KOTTMANN
CEO of CLARIANT*, President of* CEFIC (EUROPEAN CHEMICAL INDUSTRY COUNCIL) *and Chairman of* ICCA (INTERNATIONAL COUNCIL OF CHEMICAL ASSOCIATION)

THE DIGITAL TRANSFORMATION OF THE CHEMICAL INDUSTRY

"Today's topic is a matter of specific significance to the whole of our industry," said Dr. Kottmann. "And even if chemicals is not top of mind when people are talking about digitisation,

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"Most of you may remember that 15 years ago the industry had a similar debate about e-commerce"

DR. HARIOLF KOTTMANN
CEO of CLARIANT, *President of* CEFIC *and Chairman of* ICCA

we all know it will change the way we do business and the way we operate."

Explaining that he "is not a digital specialist," the Clariant CEO said: "I've been a technology driven chemist for 35 years now, and I'm very cautious talking about revolutions, and I think what Martin has just said is true. Most of you may remember that 15 years ago the industry had a similar debate about e-commerce. We were seen as part of the bricks-and-mortar world that was out of fashion, and about to become irrelevant. Some people thought the 'tekkies' would intermediate themselves by squeezing between our customers and the producers of chemicals. However, it didn't happen. E-commerce has not really played a role in our industry, and since that time our industry has enjoyed some of its most prosperous years. So the question about digitisation is: What's different this time?"

He suggested several key differences. First, there is much more data availability, and there are new analytical capabilities and technology to process it. The costs of analyzing data have also fallen dramatically - perhaps by as much as 95%, and the growth rate for "smart things" has accelerated, while increased connectivity has led to increased manufacturing. Kottmann noted that digital technologies are also evolving, with the advent of robots, driverless vehicles and similar developments. And last but not least, our lives have become digitized and our acceptance of technology has therefore increased.

The combination of the huge amount of data produced by today's connectivity opens new analytical capabilities that were not accessible in the past, Kottmann continued. New technologies are also enabling new ways of working and we are also experiencing change in end-customer industries.

So, what impact are these developments having on the chemical industry? The Clariant CEO suggested these can be defined on two fronts: internal and external.
Within the sector, the way business is executed is changing, which is related to the idea of operations excellence. "For example, we don't use all the data we collect, but we can use it to improve yields, improve energy efficient and throughput. But this only works if we get this data back into the control room and the operators have the capability to use it."

Kottmann also noted the potential and ongoing impact of robots: "They have become an integral part of automotive manufacturing in the last 30 years, and there's no reason why robots shouldn't play an increasingly significant role in chemical manufacturing in the near future." He noted how similar use of data mining and analytics can also support marketing and sales, procurement, back office functions, and supply chain management. Innovation and R&D are also affected. For example e-lab technology is increasing the speed of research and development faster, and even making some aspects of this work redundant. We're entering an age of the digital factory, digital supply chains, digital services, and digital R&D, he suggested.

Technology is also having an impact indirectly due to the changes in end-use customer industries, Kottmann noted. "Take self-driving cars, for example. With self-driving cars there will be significantly fewer accidents? And if so, what does that mean for insurance companies? And do these cars present new opportunities for the chemical industry? Could plastic chassis become new product opportunities? And what about 3D-printing of car parts?"

Agricultural developments could also impact the chemical industry, the Clariant CEO suggested. Echoing the comments of Dow's Jim Fitterling, he said while 'precise farming' could offer opportunities, it might also impact the quantities of molecules sold into the sector, perhaps even bringing about a fall in consumption of fertilizers and pesticides. "What impact will internet sales have on packaging?" Kottmann wondered. "Will it become purely functional without any marketing or promotional element, and what will that mean for our industry?"

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It is likely that changes brought about by digitisation will be sudden and unpredictable, Kottmann suggested. "For this reason, the industry needs to remain aware of changes and their impacts along the value chain. Examples are demands for increased customer services and benefits, and accelerated commoditization, which is already a problem today. There's a need to rethink product design. We'll need fewer people, but more highly qualified people will be needed, and cutbacks will increase. And the need for organizational transformation and capability building will rise. At the same time we will need to deal with new challenges such as new data infrastructures and security, faster product lifecycles and an increasing need for HR innovation."

In conclusion, Kottmann said the changes he described "will not change our industry overnight, but they will change it fundamentally over time. This is what we have to be aware of because investment in the chemical sector is long term. But digitisation will happen anyhow, and each company and individual will need to find a way through."

PANEL DEBATE

Martin Wolf was asked, have we just scratched the surface of digital disruption for the chemical industry?
Wolf: "It's incredibly difficult to understand the significance of a transformation you're living through, and it's easy to exaggerate and it's easy to underestimate. But it's worth remembering that when there is a technological revolution it is usually exaggerated in the short run, but underestimated in the long run. Electricity is perhaps the best example. It was revolutionary, but it took 50 years to work through." He said that the speed and quantity of data that we are now distributing worldwide, allied with ongoing technological development will in time change everything, but not overnight.

Jim Fitterling was asked to elaborate on his "ribbon" analogy.
Fitterling explained that historically companies have been divided into departments – manufacturing, R&D, supply chain, etc. – and may use different systems, which means they are not always interconnected. The idea of the "ribbon" is to connect all parts of the corporation, thereby increasing transparency, removing inefficiencies, and enabling real-time manufacturing to meet demand. He also stressed the need to connect with customers, and cited the examples of Amazon and Pepsi, which can deliver very specific items to individual customers in tightly defined timeframes, while also providing transparent tracking of that delivery process. "So if you are a procurement manager in a major manufacturing company and you order a pump or a valve and you don't know for two weeks where that part is, until it magically turns up, at what point are you going to demand the kind of transparency you get from Amazon? If Pepsi can track a 39-cent bag of potato chips to a Walmart in Harlem, maybe I can track a container load of polyethylene from Texas to China! Maybe, just maybe, there's a value proposition in there?"

Is the chemical industry a lot less exposed to innovation because it mostly operates on a business-to-business basis rather than a business-to-consumer basis? Is the supply chain element of the industry more responsive to these pressures than the manufacturing parts?

Fitterling said he believes that the industry is catching up and connecting its supply chain to those of its partners. Accepting Martin Wolf's comments about productivity drop-off, the Dow president said that most companies are now making heavy investments in IT. "They're figuring how to best use it, and how to turn on the capabilities, and employ them throughout the supply chain."

Martin Wolf was asked to unravel the "productivity puzzle"
Wolf: "A big point is this: many people don't understand how transformed the structure of our economy is. Today, manufacturing in France, Britain and the United States is about 10% of GDP. Agriculture is about 1%. We are very good at improving productivity in manufacturing and agriculture. But 4% productivity improvement in 10% of the economy doesn't do much. In 1970, manufacturing was about 20% of GDP. So what are the sectors where productivity is stagnant? In the US and in other western countries, it's health care, which is around 17% of GDP or 50% bigger than manufacturing. It's education, which is another gigantic sector. Tourism and government services, too. They're all bigger than manufacturing. But because they are people- and content-heavy, we seem to find it almost impossible to improve productivity in these sectors. Think about looking after children and older people. We're good at making and moving stuff, but transportation is a disaster. So IT will only make a difference to productivity if it can generate improvements in these sectors."

Thinking in terms of creativity and productivity, does the 4th Industrial Revolution enable faster progress?
Jim Fitterling said he thinks it does. "As Martin noted, there are some sectors which are not very productive. But we are seeing

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"Globalization, sustainability and digitalisation are the three great forces that increasingly impact inclusive growth for our industry's ability to create value"

JIM FITTERLING
President and Chief Operating Officer, THE DOW CHEMICAL COMPANY *and Chief Operating Officer, Materials Science Division,* DOWDUPONT

changes. Take health care, and the move from mass health care to personalised medicine. DNA testing may transform bench-to-bedside healthcare. It may not be much more productive, but it's likely to be much more effective, lengthening life spans." Technology is disruptive in the currency and financial services markets today, the Dow president noted. "It's also helping to track, with the use of blockchain technology, transactions and helping combat fraud and money laundering. We have to keep our eyes on it, to see where we can use it in our industry."

Hariolf Kottmann was asked what advice he had for anyone starting the digitisation journey, and if Clariant could share any examples?
Dr. Kottmann answered: "There are hundreds of examples when you go through the value chain, starting from R&D, the work in the lab is changing with e-systems, then going into production, trying to increase yield and productivity, and then a very strong impact in the supply chain. It could be that all the members between you and your customer will just disappear, and we'll deal directly with customers."

Moving to the SLIDO.com interactive Q&A app, the first question from the audience was: What will the long-term impact be of low interest rates on the capitalist economy capacity to generate innovation?
Martin Wolf's response was that it would be zero! But he said that low interest rates were restricting creative destruction and enabling companies that otherwise would have gone to the wall to stay in business. But he said it begged the question whether we can manage more mass bankruptcies? He also said many banks, particularly in Europe, still needed to clean up their balance sheets, and said more pressure from regulators is needed to achieve this. Wolf also suggested that, according to most economists, long-term real interest rates are likely to remain low.

Are we seeing a renaissance of protectionism, and if so, what will the impact be for chemical supply chains?
Jim Fitterling said he hoped not, and suggested that because the global economy is so interconnected it would be unlikely. However, in his view it is the growing wealth gap that's driving calls for more protectionism. But in an age where businesses are more trusted than governments and politicians, it is incumbent upon industry leaders to argue against protectionism and in favour of free trade. "We need to explain the negative impacts of protectionism, and show that it won't solve the problems people face," he suggested.

Martin Wolf suggested that protectionism was unlikely to increase unless there was another major financial crash or great recession. He noted that in the 1930s economies were national, not global, so the impact of protectionism was limited. But globalization has changed the economic structure and made protectionism more difficult to rationalize.

What effect is globalization having on the wealth gap, and can the chemical sector do anything about it?
Clariant's **Kottmann** said that globalization is having a very strong impact on the wealth gap. "For example, in Switzerland or Germany, you can buy T-shirts manufactured in India for €5, and never ask about the origin of the product. At the same time you buy a TV for €350, but it's not German-made, which means the German manufacturer will go out of business because they can't match the costs. Then on Monday morning, your boss tells you that you are being made redundant because your job is moving to India or Poland because workers there can do the same job as you but for 20% of your salary." There are two sides to globalization impacts, and the realities are harsh and can be hard to understand.

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TALENT & DIVERSITY SESSION

Talent & Diversity: Success Factors in a Technology-Driven Environment

APRIL RINNE - *Advisor & Pathfinder, Head of the Sharing Economy Working Group & Member of the Urbanization Advisory Board,* WORLD ECONOMIC FORUM

INTRODUCTION

Before handing over to the speakers, EPCA President and INEOS Group Director, Tom Crotty opened the session by noting that to thrive in the digital age, the chemical industry needs to embrace age and gender diversity, and to optimise the talent pool available in an inter-generational workforce. "One of the key issues in an age of digitisation is: how do we attract and keep new talent while ensuring knowledge transfer from an older generation to a younger generation in the workplace?" For this reason, Crotty said he was pleased to be followed by April Rinne Advisor & Pathfinder, Head of the Sharing Economy Working Group & Member of the Urbanization Advisory Board at the World Economic Forum, who would explore the new talent landscape facing the industry, and Mark Wolstenholme Executive Director at EY, who would offer some early insights from a joint EPCA and EY study into talent and age diversity that is currently being completed.

APRIL RINNE
Advisor & Pathfinder, Head of the Sharing Economy Working Group & Member of the Urbanization Advisory Board,
WORLD ECONOMIC FORUM

THRIVING IN THE NEW TALENT LANDSCAPE: THE 4TH INDUSTRIAL REVOLUTION AND THE FUTURE OF WORK

April Rinne began by asking the audience three questions. The first was: "Who here has grown children in the workforce and how many of them have struggled to find a job they love?" Many hands were raised. The next was: "Who here is under 30, and how many of you would like to start your own business?" About half of those under 30 raised their hands. Last was: "Who here is over the age of 50 and has worked at not more than three organizations in your entire career?" To those whose hands were raised, Rinne said: "You have lived a life that is probably going away." Her point was to illustrate how careers and ambitions are changing radically in the digital age.

Rinne said she would explore the consequences of the 4th Industrial Revolution for humans and technology. "Everything is changing: who can work, how we work, where we work, what work looks like, and how we think about work, period. It's beyond any company's control, and it's unprecedented."

Recapping the impacts of previous industrial revolutions, Rinne noted that: "The first took farmers from their farms, craftsmen from their trades, and lots of people moved to cities. The second focused on machines and technology for mass production. The third was all about digital: computers and mobile devices that wired people and businesses together. We also saw the rise of mass consumption and mass marketing. The third, as we heard this morning, is still underway. We've built the infrastructure

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For the Q&A session, **APRIL RINNE** and **MARK WOLSTENHOLME** were joined on the panel by BRENNTAG AG's *Chief Executive Officer and Chairman of the Management Board,* **STEVEN HOLLAND**, and **ESTER BAIGET**, *Business President of Industrial Solutions at the* DOW CHEMICAL COMPANY.

for new markets, new platforms and new business models."

But each revolution has also had a negative impact on genius or creativity, Rinne said. On the one hand, with each revolution, overall productivity increased, and we became better at making more widgets per hour and working longer hours. On the other hand, however, "In the first [industrial revolution], crafts began to disappear into factory lines, and this trend increased in the second and third. People came to be seen as cogs in machines and as consumers rather than creators. So overall, productivity has increased over time, while individual genius has declined." In this context, she continued, "How can we unlock individual genius within workplace structures and technologies that seem to be dumbing us down, and how can we ensure technologies are a means to an end, rather than ends in themselves?"

Rinne then outlined three themes she would explore: the shift from companies to networks; the shift from jobs to talent; and the underlying tensions about technology's ability to augment rather than replace human labour.

The shift from companies to networks

For the last 200 hundred years or so, companies have tended to be centralized and closed, exerting control over their operations, people and intellectual property, Rinne continued. But today's new technologies enable us to connect with more people and do more things directly with one another than ever before, which includes working together, creating solutions, and earning income. This leads to more decentralized workplace structures, with fewer silos, and people's working lives are becoming less defined by "in company" careers. We've seen many shifts in this regard: from offices into co-working spaces, and from 9-5 work to on and off jobs, and from one-company lifetime careers to multi-company and independent careers.

Today, Rinne noted, 35% of the US workforce is already independent, and by 2030 that is expected to rise to 50%. Furthermore, over the last 10 years 94% of jobs created are not full-time employment positions. In Europe today, around 25% of people working in industry are independents, and the number of people working independently has risen by 50% in the last 10 years. But while companies aren't holding on to their employees for long time periods – and more workers are attracted by the flexibility and greater potential for purpose in independent work – companies are tapping into talent networks, accessing skills when they need them. In some ways, companies are becoming networks themselves.

So what does this new world of work look like? "It looks like Upwork, a network of 14 million talented individuals worldwide, including lots of chemistry, engineering and business graduates who fill over three million posts a year. Already, 20% of the Fortune 500 companies are using Upwork to access some of their talent needs. It looks like Airbnb, which has more rooms than all other hotels combined, and operates in 190 countries – with 3,000 employees, and yet over two million hosts (who are essential for its business and earn income from the platform, but are not employees). It looks like PWC's Talent Exchange, which is attracting tens of thousands of consultants who aren't employees but who collaborate on work projects as if they were. It looks like British Gas, which has run a series of pilot projects staffed 50% with independent workers, including in managerial roles." These companies are building nimble networks that work within or across sectors of industry, Rinne added.

The shift from jobs to work

Turning to the second theme, Rinne began

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"Everything is changing: who can work, how we work, where we work, what work looks like, and how we think about work, period"

APRIL RINNE
Advisor & Pathfinder, Head, Sharing Economy Working Group & Member of the Urbanization Advisory Board, WORLD ECONOMIC FORUM

by focusing on talent and the petrochemical industry, and suggested that the sector faces three key challenges: "First, you have an ageing workforce, many of whom will retire in the next 10 years, taking with them an extraordinary amount of expertise. Second, you need to be able to attract new talent. Third, you want to improve your diversity and inclusion." But Rinne said she believes many of the industry's problems are also its solutions, because the talent is available through new networks, and older people are re-evaluating retirement and may want to continue working part-time.

She also noted that 70% of independent workers have opted-in to this way of working, and 90% say they would never go back. Why is this? "It's because the new ways of working provide greater flexibility, more freedom and much greater control over how individuals work. 78% [of independent workers] say they are happier and more engaged than in a traditional job."

Younger people, Rinne added, are particularly attracted to this way of working. "They are "digital natives," for whom this new world of innovation and connectivity isn't a perk. It's expected… They also expect meaning and purpose in their work: a fancy title and a big salary is not their goal, although remuneration is still important."

The challenge is to tap into the talent – among all age groups, from young workers to retirees – to access the skills and diversity needed, Rinne said. As an example, she described how InnoCentive has a network of 380,000 "solvers" that organizations – "seekers" - can tap into, to find solutions to problems, or help develop new products and services, or bring talent on board for specific projects. Some 40% of InnoCentive's solvers are Chinese, and 25% are retirees, including some of the world's top inventors. Another example is Semco, known as "the company with (almost) no rules," which has enjoyed phenomenal success through the collaborations of its mixed age workers, who are also engaged, consulted and trusted, and have a proven track record of innovation. "Or take Unilever, which is leading the corporate sustainability charge from top to bottom. This is a subject which youth cares about and engages with."

Turning to petrochemicals, Rinne addressed the issue of plastics and the environment: "If you, as an industry, can get ahead of this issue, aggressively recovering and reprocessing plastics and developing smarter materials, you will attract the talent you seek." She urged companies to develop structures that engage, attract and enable talent across the full age spectrum, and to work on "shared memory" – developing talent networks that workers of all ages can participate in, including retirees. She also suggested thinking about these challenges not as hiring problems, but rather as updated knowledge management.

Technology's ability to augment rather than replace human labour

Turning to the final theme, Rinne asked: will the 4th Industrial Revolution replace or augment workers? In her view, there are two scenarios: one where many jobs are replaced by automation and robots, which could precipitate a social crisis; or another where many jobs will be augmented through working in tandem with machines that can enable enhanced speed and performance ("drudge work" would be done by machines, and people would do work with greater meaning). Right now, Rinne is concerned that while there's lots of talk about "augment," most companies' actions are about "replace".

To achieve the second scenario, "We need to build organizations, teams and cultures that 'lean in' to technologies that augment. We can't afford to have a future of work where we have written ourselves out of the script."

Returning to petrochemicals, Rinne noted: "You're a thriving industry. You're not dying. And, you're powering the 4th Industrial Revolution. The risks of automation appear to be relatively less, which makes you relatively lucky compared to many other sectors. But you will face a future talent shortage if you take a strict employee mindset. If, however, you engage with networked models of independent workers, and continue to invest in STEM, this problem should not be chronic." But there is another issue: the industry, while remaining creative and producing good products and services, has an image issue. It is perceived as stale, with conservative workforce structures and culture. But this can also be fixed by focusing on the strategies Rinne had outlined and which others are adopting right now.

Wrapping up, and looking ahead, Rinne offered four challenges. "First, understand the shape of your industry in 2030: these new networks and extended ecosystems, and figure out how to become an amazing collaborator – the organization that all independent workers want to work with."

Second, "concentrate on attracting young talent by focusing on meaning and purpose in addition to flexibility, responsibility and innovation. The more you can lean in to sustainability – being good for people, planet and profit – the more you will solve your talent conundrums, too. What about having a board member under 30?" And, "We all need to boost our 'DQ' – our Digital Quotient – which will be a significant factor in determining success in moving forward."

Third, we need to create 'shared memory,' and create new structures that can embrace older workers in "the long tail of retirement."

And finally, "We need to get really clear on what 'augment' really means, and work to make it happen. As intelligent human beings, we still have the ability to make these decisions and decide what world of work we want to create."

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"Europe has easy access to suitable skills compared to other regions of the world."

MARK WOLSTENHOLME
Executive Director, EY

MARK WOLSTENHOLME
Executive Director, EY

AGE DIVERSITY & INCLUSION STUDY: FIRST FINDINGS

Beginning his presentation, Mark Wolstenholme, Executive Director at EY, set the scene with two figures to illustrate the broader business context in Europe. Firstly, he stated that the capacity of European Petrochemicals was shrinking, noting that between 2010 and 2015, Europe was the only region having a negative capacity growth of -1.5%. Secondly, this figure is in direct contrast to an uptake in demand for petrochemicals, which is expected to be around 4% globally on an annual basis through to 2020.

EY's Wolstenholme said that the challenge facing the industry is to attract and develop a talented and diverse workforce that will enable Europe's chemical sector to compete on the world stage in the future.

Looking at the positives, he said that educational attainment in schools and universities in Europe is high, that the region has a better chemical-related infrastructure than Asia and Latin America, with a high innovation index reflecting high quality research institutes and increased share of company spending on R&D, integrated cost-efficient petrochemical clusters, and growing demand in the emerging and low-to-medium-income countries of Europe.

Unfortunately, accessing Europe's young talent pool may be difficult because of the drop in the younger population's interest in petrochemicals. For example, the EY Director pointed out that currently only 18% of Europe's chemistry graduates are entering the chemical industry. Why? Because, said the EY Director, "it's perceived, rightly or wrongly, in 3-D terms. It's seen as Dirty, Dangerous, and, due to hours worked and work pressures, a cause of relationship breakdown and Divorce." Now, while Wolstenholme accepted this perception is not a true reflection of the industry, but rather more related to its connection to the oil and gas sector and the construction side of the petrochemical industry, it is still defining external impressions of petrochemicals, and the attractivity of the sector.

"So what are the key enablers for a business transformation that can change the industry's image?" Wolstenholme asked. "What new strategies are needed to attract and retain new skills, and foster innovation and enable the sector to differentiate itself from others? What skill mix is needed in 4.0 technologies over the next 10-15 year period? What competencies will the industry need, and where will they be located – in-house or outside in the extended labour market? What about R&D?"

Another issue is the industry's ageing workforce, with lots of employees heading for retirement between now and 2025. However, the EY Director said that the petrochemicals industry has been alert to this issue, and top managers are now prioritising age diversity, with 42% of executives also looking to integrate the 'contingent workforce'- in other words tap into the so-called 'gig economy.'

On a broader employment perspective, Wolstenholme offered some significant statistics: Around 70% of jobs as we know them today will disappear within 20 years, and by 2025 a third of those now existing will be lost. Surveys also show that workers are three times more likely to want to stay in or work with a 'purpose driven' company. Some 70% of workers consider flexible working arrangements as being important for their work life in the next 10 years.

He explained that throughout the summer, as part of the EPCA-EY research study, his team had interviewed key market players to understand inter-generational issues and identify best practices. The survey included the European operations of 15 chemical companies, representing a diversity of size and turnover, who were active in three areas – manufacturing, integrated production and service provision. In all, 25 executives - 14 women 11 men – representing 7 different nationalities were

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interviewed. Of these, 20% worked in sales, 16% in operations, 52% in human resources, and 12% cross-domain. Of the 25 interviewees, 38% were 'generation Y' (born between 1980-2000), 13% were 'baby boomers' (mid1940s-mid1960s), and 50% 'generation X' (mid 1960s-mid 1980s). Management levels surveyed included five top leaders, six directors, eight managers, and six individual contributors.

The survey highlighted five dilemmas in relation to companies and people, Wolstenholme reported. First; can the industry provide workers with dynamic career pathways, provide new opportunities for middle managers, encourage workers to step outside 'silos,' and can companies match their wants and needs with those of their employees? What do younger people want? Second; what talents are needed for tomorrow's world, and how can the industry attract and compete for that talent? Are better graduate training schemes needed, or more flexible ecosystems that enable people to move geographically or through functions? Third; does the industry need to work harder on branding activities - such as building a connection between what it does and how its products, services and technologies have a positive impact on climate change – in order to improve public perceptions and increase its attractiveness to recruits and collaborators? Fourth; are organizational shifts required, such as the adoption of more agile business models and flatter structures as well as inherent digitalisation, to boost innovation and ideas generation? And finally; what is the industry doing about knowledge retention and transfer? Are companies encouraging inter-generational collaboration and employing a range of tools from databases, knowledge banks, video cameras, and mentoring programmes to ensure knowledge is retained and expanded?

Wolstenholme ended by announcing, on the occasion of this session, a research survey, sent to all the official representatives of the EPCA member companies, with the purpose of adding to the research study on age diversity and inter-generational collaboration currently being conducted. He informed the audience that the final report of this study would be published at the end of the year or at the start of 2018.

PANEL DEBATE

For the Q&A session, April Rinne and Mark Wolstenholme were joined on the panel by Brenntag AG's Chief Executive Officer and Chairman of the Management Board, Steven Holland, and Ester Baiget, Business President of Industrial Solutions at the Dow Chemical Company.

To kick off the session, Steven Holland was asked: How is your company responding or adjusting to achieve its digital transformation?
Holland started by saying that he was more optimistic about the outlook for his business than the study's results were showing for the industry as a whole. He said Brenntag's business was vibrant and still attracting talent, and has a digital incubator business in Berlin and a DigiB lab in Amsterdam, staffed by people with a range of digital skills.

Ester Baiget was asked: Tell us about the transformation underway at Dow?
"Transformation is a reality, and volatility is increasing the dynamics of competition, and across the world people's demands are changing," Baiget replied. "A key enabler, apart from assets, products, tools and solutions, that will influence the success of a company in the future is talent." She said that whoever can attract the best talent, will be successful. Dow is "competing everywhere," and trying to track, recruit and retain talent. "But to do this," Baiget said, "you need a purpose!" Today, 47% of Dow employees are 'millennials,' Baiget said. She believes that the chemical sector needs to highlight the link between sustainability and its value propositions, and its use and development of technology. "It's a sexy and attractive industry!"

Steven Holland was asked: Does Brenntag use 'contingent workers' and outsourcing?
Holland replied: "We're an employer, offering good careers. But we do bring

STEVEN HOLLAND - *CEO & Chairman of the Management Board at* BRENNTAG AG

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"The chemical sector needs to highlight the link between sustainability and its value propositions, and its use and development of technology"

ESTER BAIGET
Business President of Industrial Solutions at the DOW CHEMICAL COMPANY

contingent workers on board if we need a specific skill set."

Mark Wolstenholme was asked: How should companies manage knowledge transfer?
One way, which is already used by many companies is to hire in people Wolstenholme described as 'consultants.' These could be part-time retirees with specific skill sets and specialist knowledge who are hired back in to impart their knowledge or mentor their successors or younger generations of workers.

Girls are doing better than boys at STEM subjects, but they are still not coming into the industry. How can this situation be changed?
Ester Baiget said that today 54%[1] of hires are women. She said the key is finding and nurturing female talent, and then enabling cross-fertilization with experienced workers. But she also stressed the need for companies to have a clear purpose that encourages women. At Dow, for example, there are mentoring programmes for young employees, with some being allocated to a mentor while others may request to work with their chosen mentors. Baiget said her company also facilitates motivational dialogues that are designed to encourage women in their careers.

April Rinne said that if the industry wants to encourage more women it should establish more flexible careers paths and a vision for women in the workplace.

In a related response about private sector involvement in public education, **Mark Wolstenholme** urged the chemical industry to look for opportunities to further educational engagement both to encourage talent and to extend young people's and educators' knowledge about the careers on offer and the positive contributions the sector is making to society, the economy and the environment. Ester Baiget echoed Wolstenholme's comments, adding that the industry needs to raise its voice about the skills it needs and the careers it can offer. It also needs to look where it has competency and capability gaps and influence policymakers and educators to address them. But the sector also needs to embrace talent development and extend this into the education system.

Steven Holland was asked about networks in his company.
He offered the example of a dynamic "ideas lab" an online global interaction the company uses to address problems and opportunities. "For example, a US problem encountered in the evening and shared across the group may have been solved in Singapore by the morning." Holland also said that "eastern engagement is very high," which says something about the positivity and collaborative spirit of the company's Asian demographic.

Mark Wolstenholme was asked: How's the chemical industry doing on diversity?
The EY Director replied: "Well, I think the industry has a way to go in diversity. But the good thing is that chemical companies have recognized this is an issue and are already addressing or starting to address it. But I have to say that there's no single solution, and one size won't fit all shapes."

How important is the digital economy for the chemical industry?
Making good decisions requires big data, big data analytics, and great data management. In the view of Dow's Ester Baiget: "Data is the lubricant of smart decisions and solutions."

How will families be impacted by the 'gig economy'?
April Rinne said that many families are benefiting from the flexibility and control over working times that independent workers are able to enjoy. She also suggested that there was something of a myth about the stability of careers (the average tenure of a typical job today is only 1.5 years) and the impact on families because work situations are constantly evolving. However, she did recognize that the digital economy and automation are likely to cause disruptions, and particularly for those with low and outdated skills. There is a looming question about whether these workers will have sufficient work prospects in the future. For this reason, Rinne said she sees this challenge as a broader societal issue, and that society needs to think about how we update social safety nets in relation to economic transformations.

[1] 2016 McKinsey report, Women in the Workplace

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LOGISTICS AND SUPPLY CHAIN SESSION

Supply Chain 4.0 and the Chemical Industry: Are we on the Right Track?

JOHAN DEVOS - *Sales Director Europe,* BERTSCHI. AG *and EPCA Supply Chain Program Committee (SCPC) Chairperson*

Opening the day's proceedings, Johan Devos, EPCA Supply Chain Program Committee (SCPC) Chairperson, welcomed delegates to what he expected to be "a challenging session" exploring the impact of digital technology and its use in supply chain and logistics. Devos, who is Bertschi's Sales Director Europe, later amused the audience by reflecting that in his career he has seen the transition from telex to the internet, and wondered if younger attendees even knew what a 'telex' was! But clearly, technology has already and will continue to bring about significant change, he said.

ANN VEREECKE
Professor and Faculty Dean,
VLERICK BUSINESS SCHOOL

"DIGITISATION IN THE PETROCHEMICAL SUPPLY CHAIN"

"You've probably heard the term 'data is the new oil.' Well, since it was first said in 2006…it has proved prophetic, because today the top five public companies by market capitalisation are all data-driven companies," began Professor Ann Vereecke. "Yet just ten years ago, only one – Microsoft – ranked in this category," she continued. "All of us today, know how digitisation has changed how we communicate, live and do business." And now, she added, "data and oil are joining forces in the petrochemical industry!" Vereecke explained that her presentation would provide a sneak preview of the survey Vlerick and the EPCA have undertaken to gauge the extent and impact of digitisation in the chemical industry, and how it can add value in the supply chain.

"Starting out we didn't know what to expect. But we were pleasantly surprised by what we found," Vereecke said, adding that the survey report, due at year end, will contain case studies with best practice

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examples of technology implementation, including drones, tablets, sensors, driverless vehicles and cloud solutions, and also highlighting how some companies have created a "culture of innovation" to drive digitisation forward.

Digital awareness is high, the survey shows, with three out of four top managers recognizing the significant impact digitisation will have on supply chain management and on internal company processes. The biggest impacts are on information flows, particularly ordering, planning, and control, and on financial flows, mainly accounting and payments, Vereecke said. Currently, the impact on physical flows is seen as much less significant. Half of managers surveyed expect business models, especially those for manufacturing and logistics, to be changed by digitisation, which, the professor added, is also likely to alter the competitive landscape.

However, 73% of those questioned believe the petrochemical sector is lagging other industries in terms of digital transformation. Some 23% saw the industry on par with others, and just 4% identifying the sector as a "pioneer." However, the overwhelming conclusion – 95% - among the industry's customers is that petrochemicals sector is a digitisation laggard.

The pressure for the industry to digitize is primarily external, Vereecke noted, with the biggest pushes coming from changing customer demands for more transparency and new solutions. There is also pressure from start-ups with new technologies and solutions, from IT giants and retailers such as Google, Apple, Amazon and Facebook, and from companies in other sectors. Currently, the push from regulators and within the petrochemical sector is very low.

There is, however, considerable ambition within the industry to digitize, with 52% aiming to be early adopters or innovators. The survey's "barometer of ambition" has also identified different paces of adoption in different sector segments, which increase the closer each gets to the final consumer. While only 28% of upstream producers hoped to be early adopters or innovators, 41% of chemical producers shared this ambition. Among users (who are also producers), this rises to 50%, and to 58% for logistics services providers. Some 65% of traders expect to be early adopters or innovators.

But the survey also showed that companies are some way from achieving their digitalisation ambitions. Almost half said they had just started (with 5% of these saying they were far off!), while almost 40% reckoned they were halfway to their goals. Just 13% said they either had or were about to achieve the levels of digitalisation they wanted. Breaking these figures down, Vereecke noted that 29% of upstream producers had more or less reached their goals, whereas this was the case for 35% of the chemical producers, 60% of the users 53% of the traders and distributors, and 60% of the LSPs. Overall, the survey shows high awareness of the impact of digitalisation, and the industry is "off the starting blocks, but collectively isn't yet at the halfway stage," she said.

Turning to "digital savviness," Vereecke said the survey identified six key innovation capabilities required to make digitisation a success, and the companies surveyed were asked to rank their readiness or achievements for each on a scale of 1-5. Modest progress – between 3.3 and 3.2 – has been made in strategy, governance and processes. The respective keys to these are leadership, management commitment and investment.

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"73% of those questioned believe the petrochemical sector is lagging behind other industries in terms of digital transformation"

ANN VEREECKE
Professor and Faculty Dean,
VLERICK BUSINESS SCHOOL

At 2.8, talent remains a priority issue, with industry competing against other sectors for new recruits and needing to focus on existing staff development. "Savviness" ratings were also modest for technology (3.3), and culture (3.2). In terms of all-round "digital savviness," LSPs rated higher than both supply chain and manufacturers.

In terms of investment in digital technologies, the survey showed that companies are mainly investing in those technologies they expect to have high immediate impact. The main current investment is or has been in cloud computing, big data and advanced analytics, IT platforms for shared logistics, digital identifiers and low-cost sensor technology. Among the technology investments under consideration are Internet of Things, control tower solutions, robotics and automation, social media, and self-learning systems, such as machine learning, artificial intelligence, and cognitive computing. Investment items in the "maybe later" category include self-driving machines, augmented reality and blockchain, Vereecke continued. Niche technologies include 3D printing, bionic enhancement, and unmanned aerial vehicles.

Concluding, Professor Vereecke underlined that digitisation pays off, and is providing significant improvements in internal processing efficiency, customer service, staff productivity and co-ordination and collaboration with suppliers. But gains are slower in asset utilisation, procurement and inventory costs, and sales. However, realising the gains takes time and commitment over several years. Offering some closing advice for the digitisation of the petrochemical sector, she urged: "Dare to experiment, build a culture of innovation, set up pilots and scale them up, and look for partners and create ecosystems that will let you make major leaps forward."

LUQ NIAZI
Global Managing Director, Chemicals & Petroleum Industries, IBM

"SUPPLY CHAIN 4.0 AND THE POWER OF DIGITAL TRANSFORMATION."

IBM's Luq Niazi told EPCA that competitive pressure and customer demand is already driving change and digitisation in the chemical sector. He also underlined how digital transformation significantly improves business performance while also simplifying user experience. However, achieving these benefits requires new leadership thinking and new ways of working. These include a new focus on creating new business models and actionable insights, a shift towards an innovative culture and participative ecosystems, the combination of technology and cognitive capabilities, new investment – often co-investment with partners and suppliers – and enhanced digital operations and technology.

Companies need to move on from traditional tools and methods and apply digital technologies that enable innovation in specific areas, Niazi continued. For example, digitisation can accelerate the time it takes to research, get new products to market at scale, optimize supply chain and capital usage, drive sales via both systematic and unsystematic customer insights, and deliver top-draw customer service via multiple channel experiences.

Niazi outlined four key technology innovations driving these business solutions: cloud data, cognitive computing (or "augmented intelligence"), Internet of Things (IoT), and blockchain.

The cloud is enabling innovation and business transformation, the IBM Global Managing Director continued. An open cloud strategy offers tools for enterprise integration and ecosystem collaboration and a combination of both enterprise private and public clouds will enable greater access to and leverage of data as well as the ability to deliver new business and technology solutions.

Cognitive computing is augmenting human knowledge and expertise by unlocking information from vast quantities of both structured and unstructured data, Niazi said. Combined with machine learning, cognitive computing provides deep-dive analysis and insights at scale.

Building on big data and advanced analytics capabilities, the IoT is enabling access to and integration of vast quantities of real time data from equipment, plant, vehicles and people. This additional connectedness and real time insight is enabling the development of new business and operating models that can improve efficiency and customer focus, optimize asset use, and foster economic growth.

Blockchain, which Niazi describes as "a highly secure, shared and replicated ledger," is enabling businesses to digitize transaction flows and create industry ecosystems that are self-governing secure digital networks. The IBM Global Managing Director says blockchain can cut payment transaction costs by up to a third.

Explaining that his focus would be on two key drivers, cognitive computing and blockchain, Niazi addressed the first. Humans are very good at learning and finding information, while machines are very good at providing structure and process, he continued. Put the capabilities of humans and machines together, and the result is a very powerful tool: cognitive computing and business decision making.

By way of example, Niazi said that IBM Watson, the company's cognitive computing tool, is enabling oncologists worldwide to share and benefit from their combined knowledge, experience and expertise. "It takes 18 years to train an oncologist. It took 18 months to teach Watson to understand the first cancer type. It took nine months to teach Watson the second cancer type. It took us six months to teach Watson the third cancer type." Although Niazi said there is a limit to how efficient this learning process can get, he noted that over 8m papers are written about cancer treatment every year, which would normally be impossible for an

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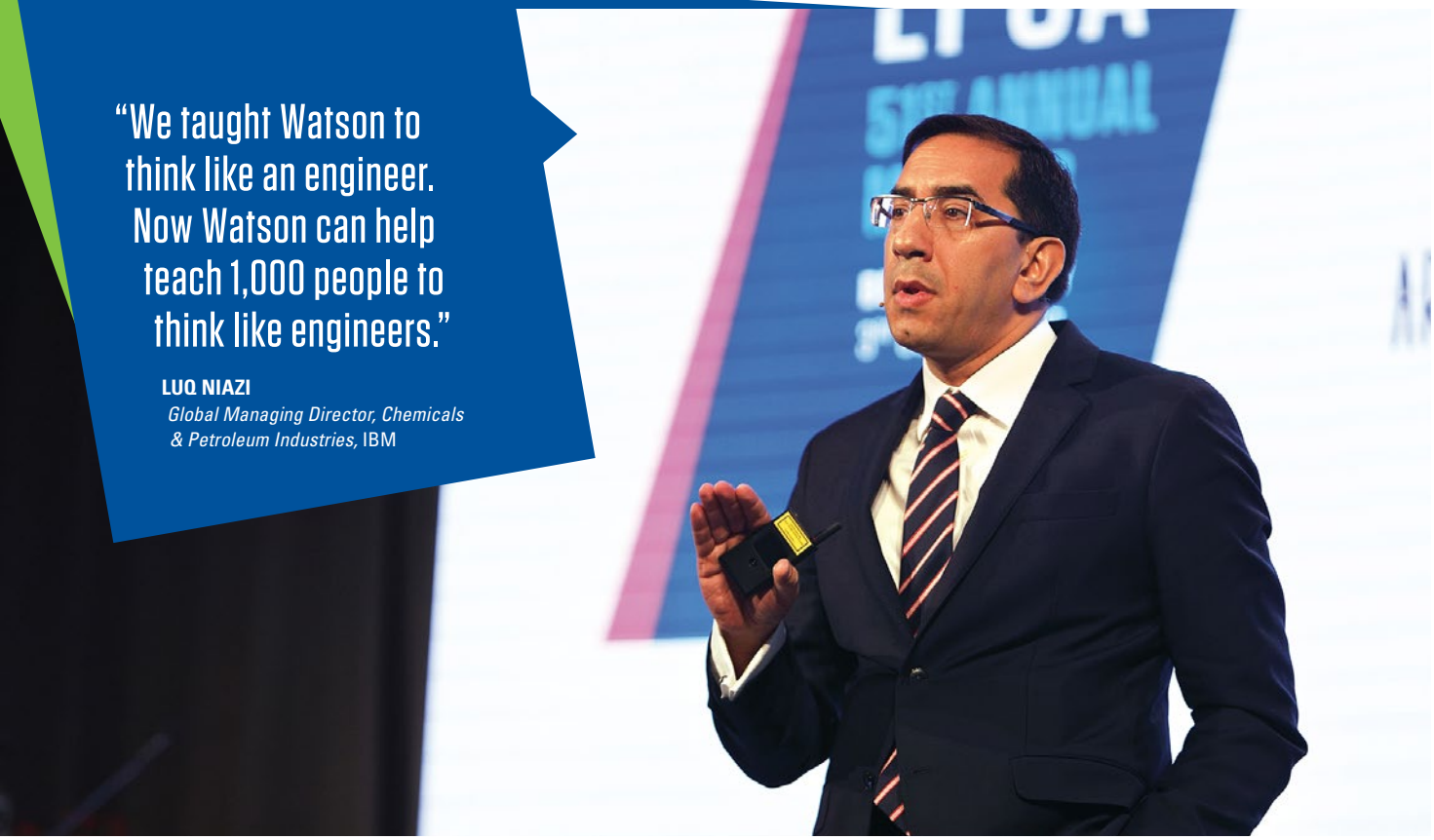

"We taught Watson to think like an engineer. Now Watson can help teach 1,000 people to think like engineers."

LUQ NIAZI
Global Managing Director, Chemicals & Petroleum Industries, IBM

individual oncologist to process. But through Watson, they are accessing and processing information to achieve significant improvements in diagnosis and treatment. "It's not machines replacing humans, but rather augmenting the expertise of specialists and improving outcomes for patients," Niazi explained.

Cognitive capabilities are accelerating convergence between big, unstructured data analytics, artificial intelligence, machine learning, cloud delivery, natural language processing and powerful hardware, he continued. Cognitive technologies are also adding significant value across digital operations, increasing operational efficiency and agility, and boosting innovation to achieve competitive advantage, raise revenue and facilitate entry into new markets.

Niazi described how IBM is working with Evonik and the University of Essen in a €100m digital transformation partnership to accelerate business value focusing on five core capabilities including cognitive and cloud computing, industry 4.0, blockchain and quantum computing. The project provides leadership in overall productivity to leverage data, technology, new business models, solutions and services. As a consequence of an advanced cognitive project, the IBM Global Managing Director said that partner, Woodside Energy, is quoted as saying: "We taught Watson to think like an engineer. Now Watson helps us think like 1,000 engineers."

Cognitive capabilities are already being applied in the chemical industry, Niazi continued. Examples include the provision of competitive intelligence – such as 360-degree profiles, geographic data, feedstock and materials input, and industry and market overviews - on products for business leaders. The benefits include identification of business opportunities, value chain insights, relationships, pricing models, market demand, forecasting, R&D, manufacturing and sales collaboration. For product and market insight, cognitive capabilities can enable real time screening of millions of web documents worldwide to show opportunities, threats and challenges in specific markets.

Blockchain creates new network capability, transforming business processes and shared records of transactions, and full transformation value kicks in when a variety of industries and activities come together, the IBM Director said. Supply chains are great examples of how blockchain can enable transformation that spans several industries. For example, the value derived from something as fundamental as a blockchain-enabled bill of lading ripples out beyond the port of entry to provide timely data to many entities – port authorities, logistic providers, suppliers and customers simultaneously.

Niazi also explained how increased blockchain use will change fundamentals and enable new business models, while reducing transactions to near real-time, saving networks' costs by eliminating intermediaries. It also mitigates risk, as business transactions become verifiable and auditable, it can reduce working capital and opens up new business models by reshaping networks relationships and sources of value.

Blockchain can also enable strategic transformation, the IBM Director said. A survey by IBM of 3,000+ C-suite managers showed 33% are either already active in or actively considering blockchain. Of those already involved, between 50%-60% expect to see increased transactional transparency, enhanced data quality and accuracy, better transactional reliability, better security against fraud and cybercrime, faster transaction speeds, lower transaction costs, and more simplified and automated processes. Furthermore, those already active see customers and industry consortia as key elements to advancing blockchain.

Niazi summarized that the power of Digital Transformation for Supply Chain 4.0 is very real and happening now and companies should be developing their strategies and exploring the potential these capabilities can bring.

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PANEL DEBATE

Dr Frithjof Netzer, *Chief Digital Officer, BASF SE*
Klaus Rud Sejling, *CEO, Damco*
Luq Niazi, *Global Managing Director, Chemicals and Petroleum Industries, IBM*
Professor Ann Vereecke, *Professor and Faculty Dean Vlerick Business School*

To kick off the session, BASF's Frithjof Netzer and Damco's Klaus Rud Sejling were asked about the progress their companies had made on the digitisation journey.
Frithjof Netzer said BASF had started its journey in 2015. As both a customer for products and services, as well as being a producer and supplier of substances, Netzer explained that BASF had experience of both ends of the supply chain, and has adopted a customer-centric approach to digitisation. Based on the categories identified in Ann Vereecke's presentation, he said BASF was not a "first mover," and has been more an observer because, from a petrochemicals point of view, caution is an important attitude given the hazardous nature of products and processes. However, Netzer said he believes the process of digitisation needs to be accelerated. He views blockchain as a powerful tool, "which is fantastic if you are looking for authentication of complex processes, and a serious end-to-end register of hand-offs." He advised anyone not using blockchain to find ways to try it out to sample the potential benefits. Klaus Rud Sejling began by urging companies to be much more demanding towards their logistics partners. He explained that Damco's focus is working with retail and lifestyle companies, which are hugely demanding in search of innovation, co-creation and digital development. "It's important that the chemical supply chain steps up to demand more from its partners, and that it seeks more co-creation, more customer centricity, and a much faster journey in terms of digitisation," Sejling continued. "Some of the technologies are incremental, such as getting more data. But blockchain is revolutionary. So, if you are not on that train, you will be facing some real challenges." While Damco is "on the blockchain train," the company's CEO admitted that alignment with others is not easy because stakeholders are diverse and often include public and private organizations.

Luq Niazi was then asked for his further thoughts on blockchain.
"It's a network of providers, of suppliers, of consumers. There are networks of blockchains already, so it's not always necessary to create one. You can join one and experiment to work it through," Niazi said. "If one works for you, then carry on using it. If not, look for others to join."

Given the increased pressures for digitisation associated with close proximity to the end customer, Ann Vereecke was asked whether those further back in the supply chain should try to learn from those nearer the end-user or risk "missing a trick."
Vereecke said that it was typical across other industrial sectors that those closest to the end-user are digitizing fastest. But momentum starts to build and feeds back down the supply chain, which is what seems to be happening in the chemical sector: "So it's a matter of time." However, Vereecke said

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"Data in the supply chain is vital, and first we have to learn to find and use the data within our own companies"

KLAUS RUD SEJLING
CEO, DAMCO

that on starting to research the extent of digitisation in the sector, she was "pleasantly surprised to find so many examples of ways digitisation was being implemented." There is an impression that the sector is a laggard, but there is a lot happening, and momentum is building, she said.

Frithjof Netzer was asked for his thoughts on where the greatest pressure for digitisation is being generated.
"Today, we all have experience of hand-held digital devices," **Netzer** responded. "So, if you take your private user experience, you can't deny it is shaping our thoughts on industry digitisation. So, when you shop, you want simplicity in the application; you want real-time access; and you don't want to wait long. You will also decide whether you like or dislike an app in less than six seconds, according to studies. So now, when you enter the world of petrochemicals, and you are trying to find your shipping, or a reason for a hold-up, all of a sudden this private user experience meets tough reality. So if you look at an Amazon, they provide you with great transparency and they also manage your expectations."

Klaus Rud Sejling was asked for his thoughts about data sharing and transparency in the supply chain.
Damco's CEO said: "That's a difficult question! Data in the supply chain is vital, and first we have to learn to find and use the data within our own companies. But the transformation comes when we start to share data more freely between participants end-to-end in the supply chain. We need to learn to work with data in real time, not with the historical delay factor, and we need to find ways to apply intelligence to that data. I think especially predictive capabilities are going to be more and more important.

"We're all aware of the experiences we have with data in the digital world, which are based on what I call a 'happy flow' when everything goes according to plan. But we also act in the physical world when things don't go according to plan. There may be a typhoon or an earthquake, or a ship breaks down, or there's a delay at a terminal. How do you predict and plan for those events? If you have alternative options, then you can make a change. I think the way to bring about more predictive capabilities is through co-creation in partnership with others in the supply chain. I'm a strong believer in agility, when it comes to adapting to different situations."

Sejling was then asked to reflect on the cyberattack that brought Damco's parent Maersk group's operations to a near standstill earlier this year, with significant financial impacts.
"Obviously the more you rely on data, the more harmful it is when you don't have access to it," **Sejling** responded. "As you know, at the end of June we suffered this attack, and overnight we lost access to 60,000 laptops, which was a life-changing experience!" In terms of advice based on this experience, the Damco CEO said: "You need to treat cyber security like HSSE. And if there is any industry that's leading in this area it's chemicals. But cyberattacks are here to stay. We're seeing it nation-to-nation with cyber warfare."

"So what lessons has Damco [and Maersk] learned from that experience and what are you doing differently?" Sejling was asked.
"Well, I don't want to go into any technical issues for obvious reasons, as I don't want to provide a hacker's guide to our company! But I can tell you we have learned a lot, that it has cost an awful lot of money, and that it will need significant investment for us - and anyone else - to put safeguards in place to stop cyberattacks," he replied.

The panel was asked what tips they could offer on the issue of co-creation and automation?
Niazi: "There are many aspects to co-creation. For example, if you are looking at customer experience, then it important to co-create with customers to help make their journey as smooth and efficient as possible. But I'd like to address co-creation as it applies to cognitive and augmented technologies. So the reality is that the process of co-creating machine learning and cognitive systems will need engineers, scientists and technology to develop and implement these "cognitive advisers" for all parts of the value chain, from R&D to production, logistics, customer care and sales. Bringing these capabilities together requires a new level of co-creation within and beyond the enterprise. Niazi added that while many of the tasks these "learning systems" can perform are low level and will be automatable, the greater value is in the solving of complex business problems augmenting capability rather than replacing people."

Vereecke: "People will be supported by automated tools and robots taking some decisions, which will make aspects of their jobs easier. But overall, I think that tasks requiring human reasoning and decision-making will become more complicated and sophisticated, and will need to be augmented by digitized capabilities. That of course raises questions about the talent that will be required in the future."

Sejling: "There's a lot of opportunity for co-creation among people rather than between people and machines. But for companies, co-creation is a cultural journey, which involves inviting third parties into the room and sharing data. We used to solve customer problems ourselves. But more and more today we're using the capabilities of specialist companies who have developed certain technology or an algorithm that can help us."

BASF's Netzer was asked whether his company has a vision for the supply chain?
Netzer: "Going forward, I think the vision of supply chain is a system in which there is an ecosystem consisting of partners, logistics service providers, vendors and customers and which can prescribe action. But to get there, we need to work on two areas. One is horizontal integration, which is taking the planning cadences of the partners onto a cloud platform and being willing to share data. That creates a planning platform that provides real-time access to partner data from left to right across the supply chain. But you also need what we call logistics end-to-end visibility to recreate the Amazon experience so it's possible to see where any shipment is at any time and what is happening to it, and make decisions on that basis."

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INTERACTIVE 'SLIDO' QUESTIONS:

Does the increasing degree of digitisation and emphasis on customer focus mean that the industry should focus more on the needs of society and on the customers in the 4.0/5.0 generations?
Niazi: "If you look at the carbon supply chain, the petrochemicals sector is fundamental in terms of making it all work. But there is a lot more efficiency that can be achieved, from extraction to production and ensuring products can be used in a much more effective way. We are only scraping the surface of how digital technology can drive and achieve the sustainable agenda. But to capture these advances will require the skills and capabilities of the younger generations."

What impact will digitisation have on "middlemen" who seem to take a lot of profit out of the supply chain?
BASF's Netzer said that while it won't remove the need for middlemen, it can provide the tools and methods for greater transparency and bridge the gap between producers and consumers, which may impact costs and profitability at certain parts of the supply chain.

Is software running ahead of hardware, and do we need new standards?
In response, **Netzer** offered the example of smart manufacturing, which requires alignment and transparency between operating technology and IT. Optimizing manufacturing requires big data analytics, which in turn requires processing power and data storage power enabled through cloud networks. So, it's a question of getting the OT and IT circles to co-operate.

For his part, Sejling suggested that: "It's not about software running ahead of the hardware, but about the hardware making physical stuff come alive so that we can trace containers online in real-time with tracking devices and data generation to analyse and optimize the supply chain."

Is there a danger for jobs and widening social gaps from technologies such as IBM Watson and artificial intelligence?
Vereecke suggested that there is a risk, so there's a need to manage technology at company and society levels. But increased digitisation will increase the level of capabilities and skills required, which is both an opportunity and a challenge. One thing we need to do is ensure there is not a widening gap between digital savvy youth and experienced operating employees. We need to ensure they work together because their capabilities are complementary.

Sejling: "There is still a physical world out there. There are people who lift the containers and drive the trucks, operate the cranes. These jobs are not going to change overnight."

Niazi expects these new tools to enable better, more informed decision-making based on greater data availability, and more accurate, faster processing of transactional tasks. However, he does see a potential problem with regard to a knowledge and skills gap they may be opening up between those who have the capabilities to operate in the digitized environment and those who do not.

In conclusion, the panel was asked: Are we on the right track, and what should the focus be for digitisation?
Frithjof Netzer: "Yes, we are on the right track. Keep a strong customer focus and dare to put time and money into technology and capabilities."

Klaus Rud Sejling: "I've certainly had a good experience at EPCA, and it's clear the industry is learning and adopting new things. I think there's a need to stay on track, keep an open mind, and try to increase the speed of adoption."

Ann Vereecke: "Speed up! And keep a focus on skills, capabilities and competencies."

Luq Niazi: "Yes. I think the industry is on the cusp of the 4.0 industrial revolution. It's important to focus on culture, providing leadership, developing collaboration, and recognizing that data is a global resource that needs careful management."

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BAN KI-MOON - *Secretary-General of the* UNITED NATIONS *(2007-2016)*

3 OCTOBER 2017

CLOSING LUNCH SESSION - KEYNOTE ADDRESS BY BAN KI-MOON

"We are living in a sea of economic, technological, political and societal change," United Nation's former Secretary-General, Ban Ki-moon, told EPCA. It is an era of disruption and volatility, and, thanks to digitalisation, one also of excitement and opportunity, technology development and innovation. However, he also cautioned that it is a time of great concern for humanity, for jobs and prosperity, and for climate change and the environment. Are we in an age where humans harness the benefits of technology and machines in co-operation, or will we be competing against machines, he asked? We need to ensure that technology is used to harness our "collective wisdom and innate intergenerational memory," and that we leverage responsible innovation for general societal benefit.

In the wake of the Las Vegas killings, the former UN Secretary-General offered his deepest sympathies to the families and friends of those affected.

Pointing out that South Korea and Germany share the same national day, he said: "Ich habe auch die Gelegenheit, Deutschland und das deutsche Volk anlässlich des Nationalfeiertags zu gratulieren." *I also take this opportunity to congratulate Germany and the German people on the occasion of National Unification day. Ban Ki-moon added, "Unification of Korea is an ardent aspiration all Korean People share, just as unification of Germany was a dream of all Germans. Whenever I visit the historically meaningful city of Berlin, I imagine the day

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"We are all global citizens. We may have national passports, but the issues that face us have no national boundaries"

BAN KI-MOON
Secretary-General of the UNITED NATIONS *(2007-2016)*

of a unified Korea." He also praised EPCA for providing industry leadership, examples of best practice, and encouraging education and innovation initiatives.

Recognizing technology's potential for disrupting industries, labour and employment, he wondered would digitalisation and robotics put millions of people currently employed in manufacturing out of work: "We need to make plans to help those people disrupted by artificial intelligence and automation." But he accepted that technology is creating new industries, enhancing energy and manufacturing efficiency, and improving sustainability performance.

Turning to climate change, he lamented the decision of the US to pull out of the Paris Climate Change accord, but noted that many US states and cities have restated their commitment to the agreement in defiance of national policy. Ban Ki-moon also noted: "Some of those areas affected most recently, such as Florida, Texas and Puerto Rico, are part of the world's most advanced nation, which was helpless in the face of nature." In response, he added, "We must step up our collective efforts to address these existential threats." He said climate change deniers remain "politically wrong, scientifically wrong, and economically wrong." Noting how many top company leaders supported the climate change agreement, he urged industry to redouble its efforts to convince a wider public of the need to take action. In this regard, Ban Ki-moon welcomed the efforts made by EPCA and the chemical industry to reduce its CO_2 footprint.

Regarding international governance, the former Secretary-General said the UN continues to grapple with the key issues of peace, human rights, sustainable development, climate change, and gender equality. He accepted that the UN needed to demonstrate that it remains effective, efficient, transparent and relevant. But Ban Ki-moon said the UN remains the only place world leaders can meet to discuss global issues and crises: "If it disappeared it would need to be reinvented!"

On the issue of sustainable development, he said his proudest achievement was overseeing the establishment by the UN of the 2030 Agenda and Sustainable Development Goals (SDGs), which provides a far-reaching and ambitious collaboration framework. "The most important theme is that no-one is left behind." Then challenges the world faces, and the UN is addressing, are to eradicate poverty and hunger, to extend literacy and education, and to seek to achieve and maintain peace while safeguarding human rights. Reaching these goals will require co-operation between countries, intergovernmental organizations, the private and public sectors, civil society and academia, Ban Ki-moon continued. He noted that the UN had led efforts to halve the number of people going hungry, achieved significant success in helping to eradicate preventable diseases, and in reducing poverty.

Another key goal is improving and extending college education, which the UN has been addressing since 2012 under the leadership of former UK Prime Minister, Gordon Brown. It is vital to open tertiary education to more young people, the former UN leader said. It is also essential that there is increased take up of science, technology, engineering and maths-related subjects in a world reliant on science and technology for almost every aspect of global development. Ban Ki-moon said, "I take this opportunity to commend the EPCA's efforts in promoting the importance of STEM Education and Diversity and Inclusion initiatives in this regard."

Concluding his speech, Ban Ki-moon urged his audience to remember that: "We are all global citizens. We may have national passports, but the issues that face us have no national boundaries." He urged that we seek to use technology and the digital revolution to improve the lives of all people, and that idealism continues to be balanced with realism. On a sadder note, the former UN official reminded the EPCA that there is a huge global refugee crisis that must be tackled: "Since I retired from the UN, refugee levels have gone from 11m to 65m – to levels we haven't seen since the Second World War." He blamed individual political leaders for this crisis. Reflecting briefly on Africa, in response to a question from the audience, he said the continent would need support, encouragement and investment to reach its sustainable development goals, and stressed the importance of sustainable energy as a key enabler for broader economic development.

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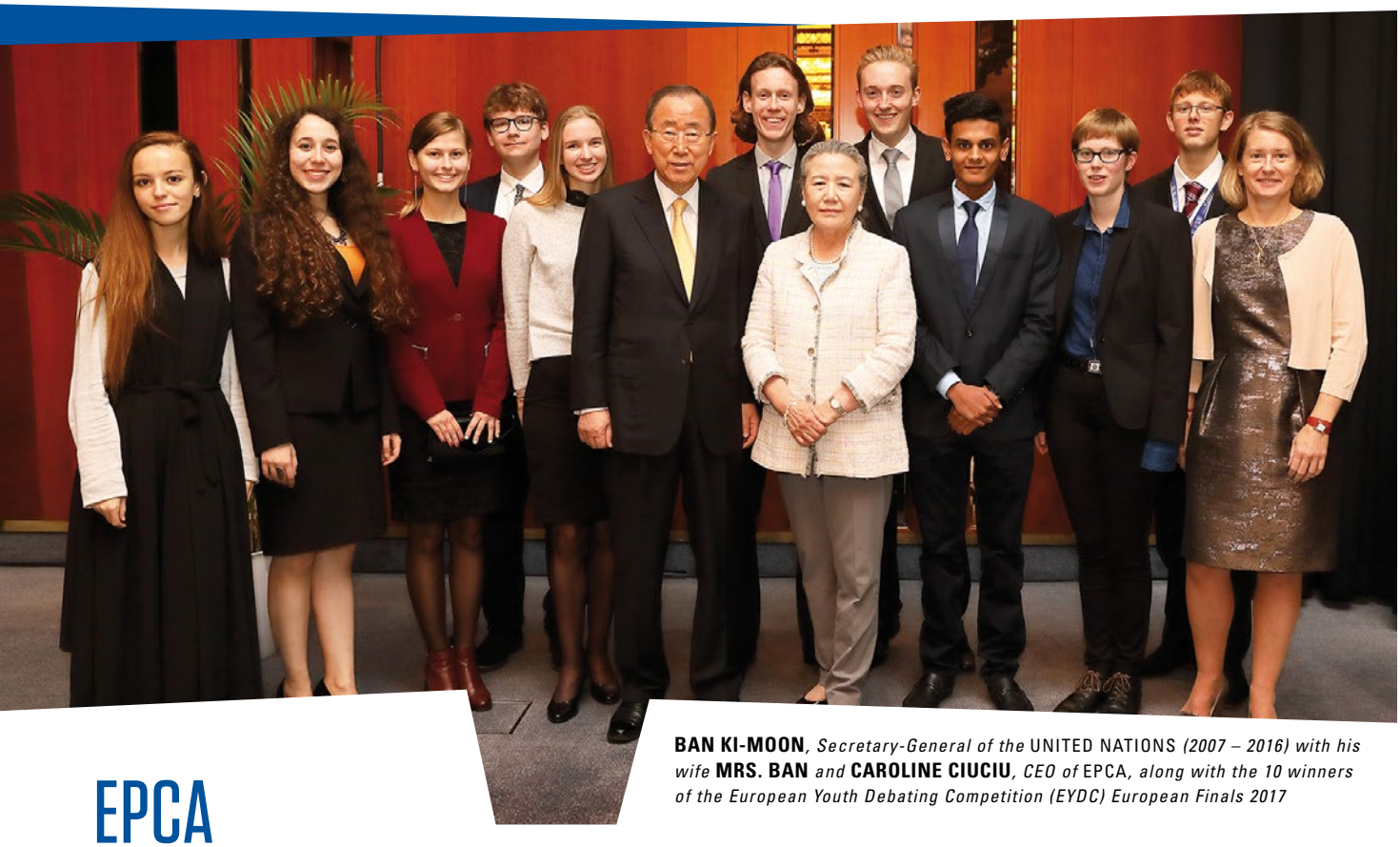

BAN KI-MOON, *Secretary-General of the* UNITED NATIONS *(2007 – 2016) with his wife* **MRS. BAN** *and* **CAROLINE CIUCIU**, *CEO of* EPCA, *along with the 10 winners of the European Youth Debating Competition (EYDC) European Finals 2017*

EPCA PRESIDENT'S CLOSING STATEMENT AND EYDC AWARDS PRESENTATION

KARL-H. FOERSTER, *Executive Director of* PLASTICSEUROPE; **MS. ILSU ARI**, *1st place winner of the EYDC 2017;* **BAN KI-MOON**, *Secretary-General of the* UNITED NATIONS *(2007-2016); and* **TOM CROTTY**, EPCA *President and Director,* INEOS GROUP

Concluding the 2017 EPCA Annual Meeting, outgoing president Tom Crotty thanked Ban Ki-moon for his speech, before remarking on the success of the conference, the outstanding contribution of speakers and panelists in the business sessions, and the record number of delegates. Crotty also announced that the 52nd EPCA Annual Meeting will take place in Vienna, Austria from 7th – 10th October 2018, and introduced his successor as EPCA president, Marc Schuller, Executive Vice-President of Arkema, who began his three-year presidential term on 4th October. Previously EPCA's Vice-President, Marc Schuller is responsible for Arkema's coating solutions and industrial specialties business segments as well as raw materials/energy purchasing.

Finally, Crotty also congratulated the 24 young women and men whose interventions during the final of the European Youth Debating Competition (EYDC) made it such a lively, well-argued and entertaining event. It was, he said, extremely difficult for the judges to select the winners from such a closely fought contest.

Ban Ki-moon then presented the top five Young Debaters with their awards. The overall winner was Ms. Ilsu Ari from the Lycée International des Pontonniers, Strasbourg, France. Second was Mr. Daniel Ternes from Bischöfliches Cusanus Gymnasium, Koblenz, Germany. Third was Ms. Kalina Spławska from XIV LO im. Stanisława Staszica, Warszawa, Poland. Fourth was Ms. Ahlam Oulad Ali from Institut F. Vidal i Barraquer Tarragona, Tarragona, Spain. Fifth was Mr. Nick Krüger from Internationale Deutsche Schule Paris, Paris, France.

Caroline Ciuciu, CEO of EPCA and Karl-H. Foerster, Executive Director of PlasticsEurope, presented awards to those placed sixth to tenth respectively: Mr. Henning Locher from Schlossgymnasium, Mainz, Germany; Mr. Arnav Aggarwal from Notre Dame International High School, Verneuil-sur-Seine, France; Ms. Anne Rother from Christian-Rohlfs-Gymnasium, Hagen, Germany; Mr. Noah Windemuth-Rotteveel from British School of Amsterdam, Amsterdam,The Netherlands; and, Ms. Cecily Ward from Prendergast School, London, United Kingdom.

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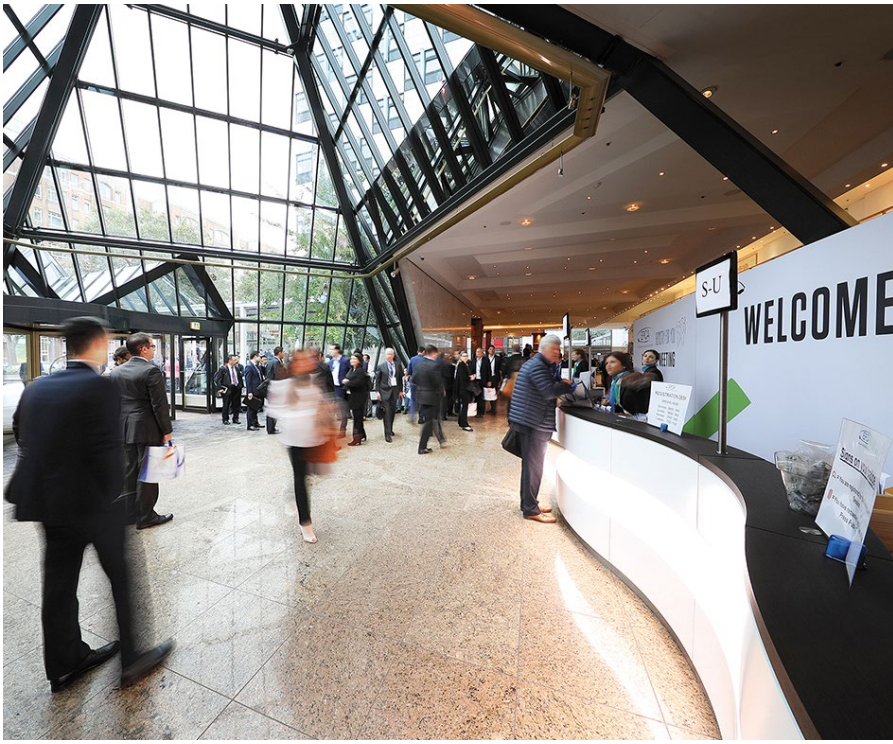
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EPCA is the **quality network** in Europe for the **global chemical business community** consisting of chemical producers, their suppliers, customers and service providers. It operates for and through more than 700 member companies from 54 different countries that represent an aggregate turnover of over €4.7 trillion and employing over 6.2 million people. EPCA serves as the platform to **meet, exchange information and transfer learning,** as well as a **think tank** for its members and its stakeholders.

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