The Chemical Industry: OVER 95% of the World around Us

EPCA
THE EUROPEAN PETROCHEMICAL ASSOCIATION

Global partner to
the International Year of Chemistry

International Year of CHEMISTRY 2011

# REPORT of the 45th ANNUAL MEETING

INTERCONTINENTAL &
PULLMAN SCHWEIZERHOF HOTELS
**BERLIN**, GERMANY
**1–5 OCTOBER 2011**

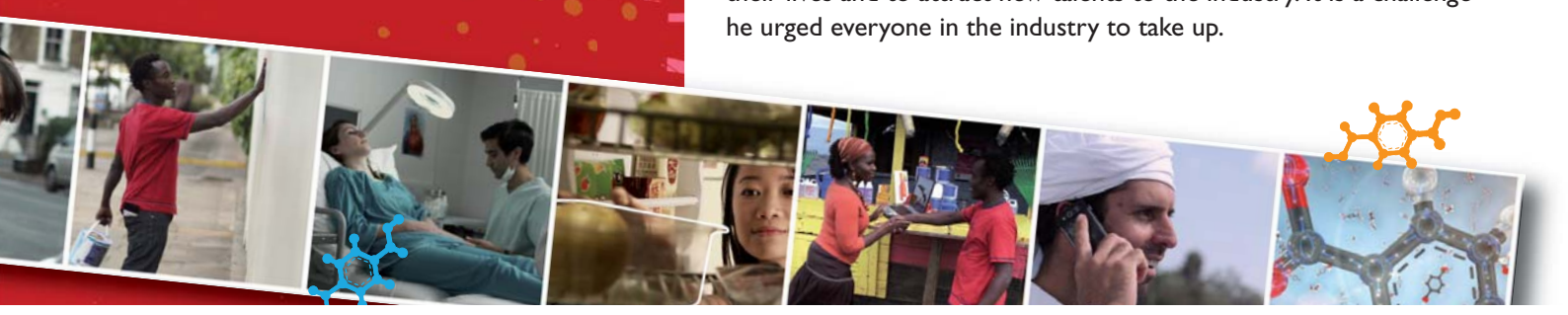
**Tom Crotty**
*Director, Ineos Group*
*EPCA President*

*The paradox is that an industry so central to the lives of people has to work so hard to be recognised as a force for good, not bad.*

*"It's fitting in the International Year of Chemistry, that this Meeting's theme – The Chemical Industry: 95% of the World around Us – links us and our industry to the lives of people all around the world,"* said EPCA President Tom Crotty, welcoming a record-breaking 2,500-plus delegates to Berlin, at the opening session of the 2011 Annual Meeting. It provides a timely reminder of the positive contribution our industry's products and processes continue to make to our standards of living, health and the environment, he continued.

Yet the "*paradox is that an industry so central to the lives of people has to work so hard to be recognised as a force for good, not bad,*" Crotty noted. Despite being a key supplier to almost all industries, and helping to transform the delivery of potable water, food, clothing, healthcare, education, transportation, industrial production, communications and entertainment, the chemical industry is still viewed in a negative light. "*Our successes go unnoticed and our failures get shouted from the rooftops. Yet without us, people wouldn't have the aspirins that cure their headaches or the toothpastes that clean their teeth, and their mobile phones wouldn't work. So we need to speak out, to get them to realise how critical chemistry and this industry is to all our lives!*" said the Ineos executive.

Holding a positively themed meeting in Berlin was entirely appropriate, Crotty told delegates. *"Germany's chemical industry has done brilliantly in conveying its [beneficial] contributions. This is the only country in Europe where our industry and our products have a positive image."* Speaking immediately after the audience had seen the short EPCA-sponsored film *Chemistry: All About You,* the Association's President outlined how EPCA and UNESCO are working together to promote the industry among younger people. The aim is to help them understand the importance and contribution of chemistry to their lives and to attract new talents to the industry. It is a challenge he urged everyone in the industry to take up.



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# GENERAL BUSINESS SESSIONS

## INTRODUCTION

**Nadine Dereza,** *Moderator*

Conference moderator, the financial journalist and commentator, **Nadine Dereza**, said, *"The challenge of promoting the chemical industry to the world is finding a way to talk to the public in a language they can understand and identify with."* Currently, the chemical industry – the industry of industries - remains a mystery to most people, particularly young people who will shape our future world, she suggested.

With this in mind, Dereza welcomed a group of students – all invited for their outstanding exploits at the 2009 *Chemistry Olympiad* - to the 2011 EPCA meeting. Sponsored by EPCA, these youngsters were in Berlin to meet the industry face-to-face, get a better understanding of how industry works and to help EPCA to promote the film "Chemistry : All About You". Hopefully, they will be inspired to join the industry and even become future leaders. The moderator also noted that one third of the students were young women, whose presence was appropriate in the *International Year of Chemistry,* which is also promoting women in science and industry and targeting a gender balanced workforce.

*The challenge of promoting the chemical industry to the world is finding a way to talk to the public in a language they can understand and identify with.*

# KEYNOTE SPEECH

## Jeroen van der Veer details 6-point focus for industry reputation enhancement

**Jeroen van der Veer,** *Chief Executive Royal Dutch Shell (2004-2009)*

**Former Royal Dutch Shell chief executive, Jeroen van der Veer, opened his keynote speech with a very optimistic long-term outlook for the industry: *"Between now and 2050, the use of chemicals will at least double. Why? Because of growing demand from the world's increasing population – from 6 billion to 9 billion – and the increasing size of the middle classes. This will be a very big industry. It will be innovative and offer high-quality jobs."***

Between now and 2050, the use of chemicals will at least double.

Van der Veer's verdict on the EPCA film – *Chemistry: All about You - was: "Excellent! It shows how you have to make clear to people what our industry is all about."* And while the petrochemical industry will remain based on oil and gas, the former Shell chief said society needed to understand that through the products it makes, the sector not only stores $CO_2$ in its products, but also helps reduce $CO_2$ emissions and energy use.

Referring to the leadership model he used when leading both the Shell Group and its chemicals businesses, the group's non-executive director said it was important to understand current status in order to plan ahead, but also to see business from a long-term perspective. *"Today, the bottom line is OK, and maybe even better than we expected. The first and second quarters of this year were OK, although it's a bit too early to assess the third quarter. But seen in context, it suggests we are learning to manage through the cycles. If you look at reputation using a long-term axis, 50-60 years ago, this industry had a good reputation. But by the 80s and 90s, its reputation was poor. Today, on balance, I think that while we're not back to the situation of the 1950s, the industry's image is a lot better than 20 years ago, although we still have a lot of work to do."*

Van der Veer credited significant improvements in the industry's relationship with its neighbours and local communities to the efforts made through Responsible Care and similar initiatives. But he urged EPCA members to keep improving transparency and openness. Frustrated by media coverage of the industry - *"where chemicals mean toxic and cancer"* and *"we are accused of using up scarce resources like crude oil"* – the industry veteran challenged his audience *"to do a better job in explaining our useful role."*

Accepting that fires and explosions, while rare, catch public and media attention, van der Veer said industry should continue its efforts on product stewardship, and incident and accident prevention. It is important to help the public understand that this industry has a good record on managing hazardous materials and the risks associated with their production, distribution and use, he noted.

"*Are there enough young people with the talent we need, especially young women, coming into the industry? This is an issue chemicals has been struggling with for over 10 years, and there is more to do, and we have to do things differently,*" the former Shell executive said.

So what about the future? Van der Veer outlined six areas where the petrochemical industry should focus. "*First, we need a zero tolerance world for accidents, because the public may accept complex industries but they won't accept accidents.*" In pursuing this goal of zero accidents, the keynote speaker sees an important role to play for associations like EPCA. Referring to the recent Macondo accident in the Gulf of Mexico, van der Veer said that the response of several of the major oil companies – Shell included – was to invest over $1 billion in a company to prevent and respond to spillage incidents and to provide rapid capping. "*To be honest, [the energy sector] should have done this years ago. But it was a question of who takes the lead. The Gulf incident-related initiative came from the American Petroleum Institute.*" He urged the chemical industry to think along similar lines.

> Bio-based feedstocks and materials are a commercially attractive space that the chemical industry should claim because we are the innovators, we have developed modern materials from hydrocarbons and we can do the same from bio-based feeds. In this field, we can enhance our image with society.

Given that shale gas fields are already proving to be a game-changer for the economics of the petrochemical sector and triggering a round of related cracker investments, van der Veer said it was essential the industry addresses the concerns of the public about the "*fracking*" extraction method. "*We have to be up-front about the chemicals being used in the process and reassure people that they will not contaminate groundwater.*"

His third point related to growth of the bio-based economy. While shale gas discovery and availability might pull focus back onto fossil fuels, van der Veer noted, high oil prices mean that *"bio-based feedstock and materials remain a commercially attractive space. This [are] something the chemical industry should claim, because we are the innovators, we have developed modern materials from hydrocarbons and we can do the same from bio-based feeds. In this field, we can enhance our image with society."*

A fourth area for focus relates to the changing tactics of NGOs, some of which appear to be generally opposed to the expansion of industry, the speaker said. *"Instead of just making lots of noise and gaining publicity, these NGOs are increasingly using the legal process to prevent or delay developments for years and years. Is that a good use of the legal system and public and private funds? As industry, I think we need to work together and talk with governments to explain what is happening and the economic consequences of these actions."*

Van der Veer's fifth focus was on investments. In a time of economic difficulty, he urged industry to use scenarios to help investment decision-making. "*Back in my Shell days, we used scenarios to figure out bottom-line positions in future situations, including lousy conditions. The point was to figure out if we could not just survive – even if we were hurt and could not make a profit – but emerge stronger from difficult situations.*"

Given the recruitment challenges facing the chemical industry, with an ageing workforce and too few appropriate university graduates and people seeking to study technical skills, van der Veer's sixth point focused on attracting new talent. Contrasting the low number of science and engineering graduates in Europe with those in Asia-Pacific, he urged the industry to "*adopt secondary schools, make your young engineers available to them, and invite schools to come and visit manufacturing plants.*" He said the industry must enhance its educational engagement.

Concluding, the former Shell chief executive added two other points to the top of industry agendas. First was the issue of level playing fields in greenhouse gas-related regulations, the lack of which he warned could disadvantage and damage some regional industries. His second, and final issue, related to investment in research and development, the lifeblood of the industry. He urged industry to work with European governments to encourage – not discourage – spending in this field by adopting appropriate fiscal regimes. He pointed out that in the Netherlands today, the tax regime is much more pro-R&D investment than 10 years ago. However, this should not preclude overseas and regional investment, but rather encourage a balanced approach.

Summing up, van der Veer said: *"I'm very pleased to be here. You know as a retired executive you just sit all day on a bench in front of your house reflecting, so it's great to see some normal people like you! I think this is a great industry, as the film shows, but we can still do more to get young people into our industry and let people know we are making a big contribution to a better society. Thank you."*

# PANELLIST PRESENTATIONS

## 2011 IYC and the impact of the chemical industry

**Before moving to a panel discussion, Nadine Dereza introduced three panellists to make short presentations on issues likely to impact the chemical sector and to suggest ways it can both prosper and improve its profile in the future. First of them was Tim Hanley, Global Chemical Industry Group Leader, Deloitte Touche Kohmatsu, who has been advising sector-leading companies for many years.**

Echoing the paradox mentioned by Tom Crotty, Hanley said the industry is a huge contributor to global GDP and at the heart of the global economy. He said economies in Europe, the Americas and Asia all recognize chemicals as a base industry, essential to industrial growth, and a very important employer. But the paradox is that the industry faces challenges relating to supply and demand as its major end markets – such as construction and automotive – are in transition as a consequence of the recession. "*For example, 25% of publicly-held companies in this industry are not returning their cost of capital, and they are facing an ageing workforce. Talent is another issue. There's a war going on out there to find the scientists and engineers needed for this industry, as chemicals and other industries compete to attract new talent,*" he said.

> The future really belongs to those companies that embrace change.
> **Tim Hanley**

Hanley offered insights from a Deloitte study looking into the performance of 250 public companies in the chemical sector over the past 10 years in order to develop scenarios for the next two decades. The study looked at quality of operations, using measures of profit and availability of financial resources (such as cash and ability to borrow, and margins, which will determine ability to invest), and it positions companies in quadrants according to their strategic options.

Strategic leaders include companies like BASF, Dow and Du Pont. Strong option companies include the likes of Solvay, Celanese, Praxair and Air Products. These companies are setting the industry's direction. Many others have strong opportunities, but not the same strategic flexibility of options. Deloitte has also identified a number of "*geo-political deep-pocket disruptive shapers*", such as Shell and ExxonMobil, which have the ability to really move markets. The challenge for all companies is to drive performance and increase financial resources, which in turn create more options in the future.

"*The future really belongs to those companies that embrace change,*" Hanley said. He pointed to this occurring on two fronts, Megatrends and Strategic Drivers. Megatrends - such as resource scarcity and sustainability, and urbanization and demographic change - are creating new growth opportunities for the industry. Strategic Drivers include business models, end markets, talent innovation, portfolio management, feedstock, capital flows and operational excellence.

Hanley noted changes in industry business models, with – for example - companies moving from being liquids and solids producers to being providers of solutions. End markets are in transition, too. "*Where will they be next year, in five years, 10 years time? Where will they be globally?*" Talent is a Top-5 Issue with companies, the Deloitte manager said. "*With an ageing workforce, where will the next round of senior executives of tomorrow come from? Companies may need talent in certain parts of the world, too*".

Innovation remains a key industry driver. "*Over its history, the chemical industry has provided most of the innovations to create a great quality of life today. There are lots of opportunities for this industry to innovate, to offer value chain solutions to megatrends, and I see no industry better suited to do that,*" said Hanley.

> The challenge is to team technology with talent.
> **Tim Hanley**

But can the industry make a Quantum change? The Deloitte executive thinks it can, over the next two decades. "*Shell is looking far out into the future. Other companies are doing the same, looking ahead 20 years from now. Technology has a big role, too. But the challenge is to team technology with talent.*"

Futurist and trend forecaster, **Anne Lise Kjaer**, founder of Kjaer Global, offered a vision of how changing consumer demand will impact the chemical industry's supply strategies. Kjaer, who has extensive experience working with leading brands in the food, fashion, automotive, electronics and retail sectors, is a proponent of multidimensional thinking. Her company develops

*The search for happiness and quality of life, health and well-being, "why they get up in the morning" – are the keys to understanding people.*

***Anne Lise Kjaer***

future concepts by analyzing scientific research in conjunction with social, cultural, emotional and spiritual shifts in society.

"*Anticipating the future is key to any industry,*" Kjaer began. Her company has developed a 'Trend Atlas', which Kjaer described as a "*periodic table of macrotrends*" looking at society from the outside in. Segmented into four key society drivers – science, social, emotional and spiritual - the trend atlas is designed to help visualize and decode society's broader cultural context and complexity, and enable scenario and concept building.

Kjaer argues that this four-dimensional methodology adds significant additional texture to the "*PESTEL*" analysis of the macro environment. While PESTEL focuses on political, economic, societal, technological, environmental and legal aspects, it neglects the emotional and spiritual aspects of human life. These additional dimensions – the search for happiness and quality of life, health and well-being, "*why they get up in the morning*" – are the keys to understanding people.

Kjaer's system, she says, is based on integrating left- and right-brain thinking. The previous century, she argues, was driven by left-brain thinking only, focusing on facts, logic and pragmatism. But in the 21st century, we need to embrace whole brain thinking, and include right-brain thinking and values – feelings, imagination and possibilities - with left-brain concerns. This means accommodating diversity, contrast bridging and balancing it with visionary holistic thinking.

"*In today's society, we are constantly bombarded with contradictory data – such as fast versus slow, disposable versus sustainable so it's no wonder people feel confused,*" Kjaer noted. For example, we may desire a fast-moving world associated with efficiency and material improvement, yet also crave a slower pace of life in order to achieve greater happiness and more meaning. Are they "*me*" people or "*we*" people ? Are they rational or emotional in their responses, focusing on "*functionality*" or "*feel*" ? These are the customer complexities that any business organization must grapple with. However the key is to strike the right balance.

"*The measure of a 21st century company is how it sees and treats people – both inside and outside the organization - and the planet,*" Kjaer suggested. That means embracing a "*Triple P*" – people, planet, profit – approach to the bottom line, incorporating the key trends of total transparency, a caring culture and diversity. We are, she said, in the "*cloud culture*" age, in which dialogues are driving society, fostering collaboration and shaping a culture of customer-driven business models. This is also an age of online business reputation management, where social media offer companies a direct line to people. "*But don't just talk: listen!*" Kjaer said.

Embracing radical transparency and cloud culture is a great way to attract talent, the futurist added. "*Young people today are very demanding. They want to have access to lifelong learning;*

*be it new cultures and communities or social participation by helping people and saving the planet. Volunteerism is on the increase. For the Global Workforce 3.0, the schools of tomorrow will be 'learning laboratories' for global citizens.*" Industry should consider if they can offer young people career and corporate goals aligned with their citizenship participation.

Kjaer also echoed the call for greater focus on attracting female leaders into industry. Globally, women are excelling in education and industry ignores this talent at its peril, she said. In the *International Year of Chemistry*, which is also the centenary of Marie Curie's Nobel Prize for Chemistry, this focus is particularly appropriate. "*Getting women into science will boost GDP, according to McKinsey,*" the futurist suggested.

Concluding, Kjaer returned to the "*Triple P*" bottom line. "*In today's world of meaningful consumption and universal value - from politics to work and family - happiness and meaningful experiences are very strong drivers. You may have heard of the "happiness index"?* That is an approach to economies in which people and the planet matter. The chemical industry should look at itself from the outside in - in order to understand how the world views it – and communicate with society in an open and inclusive manner. Future success requires a clear focus on empathic leadership and engagement to empower people and enrich their lives.

Completing panelist presentations, Cefic President **Giorgio Squinzi**, who is also CEO of Mapei, talked about Cefic's vision for the industry and its initiatives to improve engagement with the public and to broaden understanding of the sector. Summarizing its 200 year-history, Squinzi argued chemistry has been at the root of all major scientific discoveries over the period. It has, he said, fostered understanding and transformation of the earth's organic and inorganic materials.

Chemistry has given us access to the properties of materials, and chemists have always been copying and expanding the properties of natural compounds, the Cefic President said. By making technical improvements to natural compounds, the chemical sector has developed revolutionary applications and products ranging from inks and dyes, detergents and adhesives, to synthetic rubbers and plastics – our modern, high performance

materials. *"Chemistry and the chemicals sector are continuing to deliver the building blocks and solutions for long value chains of industries, manufacturers and consumers, delivering modern materials and technologies at affordable prices,"* Squinzi said.

But the industry is only half way along its learning curve, Squinzi suggested. *"We now have to learn how to make modern standards available to 9 billion people by 2050."* And since the 1970s, we have come to understand that our world does not have infinite resources, so we need to adjust our economic and business models.

*"During the last 30 years, [the chemical] industry has continually invested in health, safety and environmental measures,"* Squinzi noted. *"Since the early 90s, our industry has reduced its energy consumption and emissions per unit of production by almost 30%, and optimized its productivity and reduced its use of raw materials often by over 50%. But it has forgotten to tell society about its performance and sometimes has not anticipated long-term impacts of applications. Now, more than ever, the industry must take up the challenge of sustainability: less energy-intensive processes, biodegradability, recycled products and renewables, and better raw materials efficiency are important elements of the sustainability equation. But we have to consider the social and economic elements as well."*

Cefic wants to position the European chemical industry as a high-tech sector at the roots of innovation and providing solutions to all the challenges of sustainability. Innovation today has to occur within and through value chains and stimulating frameworks are needed, Squinzi said. The EU Commission has put private-public partnership at the cornerstone of its innovation strategy and it's up to Europe's manufacturing industry to take the lead, he continued.

*Summarizing its 200 year-history, chemistry has been at the root of all major scientific discoveries over the period.*
***Giorgio Squinzi***

Cefic is also promoting industry transparency, the association's President said. Good current examples are the industry's implementation of the REACH initiative - for registering products, and managing chemical-related risks and product stewardship - and the adoption of Responsible Care.

*"If we want new insulating materials, fuel cells, nano-coatings, light composites, low energy lighting, dedicated fertilizers, food and water conservation and treatment, low energy production processes, catalytic conversion, waste treatment and biomass to happen in Europe, we need innovation, and yet more innovation!"* Squinzi insisted. And we have to speed up if we want to stay competitive against emerging economies: In the decade from 1999-2009, Europe's market share of global chemicals fell from 32% to 24%, while China's increased from 6% to 22%.


To take the lead on innovation, stay competitive and meet society's challenges, the European chemical industry is proposing that pan-European authorities should prioritize pilot projects in four areas, the Cefic President said. These are:

1) A water efficient Europe, via technologies to reduce consumption, and improve fresh water resources and wastewater management.

2) Raw materials for a modern society: developing new technologies for more efficient extraction, use, recycling and substitution.

3) Smart cities: using new concepts and materials for energy generation, storage and efficiency, along with new properties, hybrid materials, and environmental technologies.

4) Sustainable process industries: integrated resource efficiency strategies along the value chain, considering all input-output and recycling options.

Squinzi concluded that the *International Year of Chemistry* is the perfect time to talk about these things, noting that throughout Europe many events and activities have taken place to raise and improve the profile of the industry. *"But in my view, the most important goal is to reach out to the young people, and to attract them to study chemistry and join the chemical industry. This is a 'must' to boost research and innovation. We have to instill enthusiasm for the chemical industry and show that the chemical industry holds a future for them in terms of job opportunities. By developing long-term partnerships with academia, thinking along the whole value chain from research to consumer, and thinking in terms of products, product lifecycle and sustainable development, we can continually increase the value and visibility of our industry. Educational programmes, public open days, opinion surveys and the use of social media can also enhance our public engagement."*

# PANEL DISCUSSION

**Introducing the panel discussion, Nadine Dereza said the aim was to review the *International Year of Chemistry* and increasing public awareness of the industry. Panelists were asked to focus on talent, innovation, end markets and customers. Kicking-off the session, the moderator asked what impact the *International Year of Chemistry* would have on the industry's reputation and how success could be measured.**

Giorgio Squinzi said the industry deserved broader positive recognition in view of its huge contribution to health, wealth and standards of living. *"We are a solution provider for every manufacturing sector, and I'd like to remind everyone that it is only thanks to chemistry that over the past 150 years average life expectancy in Europe has risen from 25 to almost 80 years. Chemistry is our life!"*

Anne Lise Kjaer said the 4-G (four generations) workplace already exists. *"To attract new talent, we need to open up to 21st century culture, which means better communication and [relationship]'chemistry'. Gender equality is also an important goal, not just for political correctness, but because it makes business sense. That's why it's good to see so many women among the students group here. I believe women are critical to the 21st century business, not just through their ability to do multi-tasking but also because of their teamwork, inclusiveness and preference for flatter organizations."*

> It is only thanks to chemistry that over the past 150 years average life expectancy in Europe has risen from 25 to almost 80 years. Chemistry is our life!
> **Giorgio Squinzi**

Kjaer also urged the industry's leaders to have a higher profile and introduce chemistry to a wider public audience. She referenced the *'brilliant"* BBC television series *Chemistry: A volatile history*, which conveys the excitement of chemistry and the role it has played in transforming our world. Kjaer also described how the former rock musician Brian Cox has resumed his early career as a physicist , becoming both a university professor and the "*rock star*" of British science television with his series on the universe and the solar systems. "*Brian Cox has made science sexy. The chemical industry needs its own rock stars!*" she suggested.

Tim Hanley urged companies to be less modest about its achievements, and to take credit for the innovations it has fostered. *"Given all the great developments that have taken place over the past 50 years, chemistry hasn't shouted very loudly about its contributions, which have been more than in most [other industries]."*

Asked whether the industry could change the language it uses to communicate, Hanley said: "*Some of the language that gets attributed to the industry – as Jeroen van der Veer pointed out – is not necessarily positive. So meetings like this, with talent in the room like you have here, are the opportunities we need to take advantage of, to raise industry visibility in a really positive way."*

> As a general rule and to get an optimal society, we need about 40% studying and working in science and technology.
> **Jeroen van der Veer**

Jeroen van der Veer noted that, "*In most European countries, only 20-30% of 16-20 year olds go into science and industry careers. Is that bad? Well, in the baby-boomer generation almost 50% went into science and industry. In the Netherlands, it dropped to just 1.5-in-10 and has climbed now to 2-in-10, with an increase in the number of women. In the UK it's 2.5-in-10, in Germany a little higher. But in the Far East, it's usually 50% or higher. I think as a general rule and to get an optimal society, we need about 40% studying and working in science and technology. But to attract these young people we need to go beyond secondary school into the primary schools, which is why these films [like the EPCA-sponsored film] are so important. Bring young people into our factories and get young engineers – not old people like me – to talk to them and show them around."*

Tim Hanley suggested collaborative innovation between industry and academia was an important way forward, and encourages co-operation on research and development projects that could provide links between universities, suppliers and their customers. Giorgio Squinzi said his company was very focused on building R&D capability because innovation

*People don't always relate to facts and figures, but if you can weave in a good story, it gets right to people's hearts.*
**Anne Lise Kjaer**

remains the key to growth, and for that reason it emphasized the need to attract young people into the R&D discipline to maintain a strong talent, innovation and applications pipeline.

Anne Lise Kjaer urged companies to think in terms of "*people*" rather than "*consumers*": *"People don't always relate to facts and figures, but if you can weave in a good story, it gets right to people's hearts. Go out there and engage!"*

Nadine Dererza wondered if R&D in the European chemical industry is being underfunded. Jeroen van der Veer, said *"the Lisbon Treaty targeted investment levels equivalent to 3% of GDP, with 1% funded by government and 2% by industry. Most European countries are seeing industry investing 1%, and the 1% shortfall equates to about €80-100 billion. Most economists say that the highest multiplier effect for investment can be achieved through R&D. So for me, the best way is for governments to use fiscal policy to encourage R&D."*

Looking at changing business models, Tim Hanley said transformations were only happening slowly, but the move to become solutions-providers rather than simply product suppliers is underway. However, he said that better understanding and links between chemicals producers and end-users were opening up new solutions and enabling faster delivery. Margins for the producer improve, and solutions for the end-user are also enhanced, the Deloitte consultant explained.

*Looking at changing business models, the move to become solutions-providers rather than simply product suppliers is underway.*
**Tim Hanley**

A delegate asked the panel why European companies were not investing in R&D and collaboration in other non-European countries such as India, particularly as R&D was a key route for women into industry. Jeroen van der Veer responded that Shell, for example, has invested in India and is collaborating with academic institutions around the world. Shell has sited its geophysics research centre in Bangalore, India and recruited on a meritocratic system, which has brought in many women. He feels this is a good way forward: "*Shell is building an international research community working in many R&D centres. This global network of hubs will allow R&D people both to network and to compete, which will drive innovation. But they won't always be sitting on airplanes, which is a good thing.*"

Asked about language, and the problems the industry has in terms of engaging with the broader public, Anne Lise Kjaer suggested the chemical sector might look at a way of collaborating with academia. By way of example, she pointed to *GoodGuide*, an online supplier of information on the health, environmental and social performance of products and companies. Set up by a global supply chain expert and Berkeley University professor Dara O'Rouke, the *GoodGuide* is funded by venture capital and through the sale of advertising. Its panel of scientific and technology experts collect and assess lifecycle product information to assist in consumer choice.

Rein Willems, an EPCA past President, asked Tim Hanley what Deloitte's research is revealing about the interface of chemistry with other science disciplines in terms of future industrial development and growth. Hanley said a convergence of biology, chemistry and physics is emerging and many of the new developments are occurring where these disciplines converge and collaborate.

Wrapping up the panel discussion, panelists were asked to pinpoint key areas where the industry can take action. Mapei CEO, Giorgio Squinzi said within Cefic the issue of communication was central, so he urged companies to take their messages into the community and to influence public opinion. Anne Lise Kjaer suggested industry look at female empowerment, which is already shaping society and should be reflected in new-style business leadership and business models. She also urged the industry to try new ways of communicating. Tim Hanley said the industry should focus on understanding its customers and on talent to ensure the right combination of talent and technology. Jeroen van der Veer said: "*Focus on reputation and every company should adopt a secondary school!*"

EPCA president Tom Crotty concluded the session by noting that people who joined the chemical industry tended to stay in it, which he feels is a good recommendation. "*There's something about this industry; it's a great place to work. Somehow, we need to communicate this message to society at large.*"

# EVENING ADDRESS

## "Dr. Doom" predicts more financial gloom

**In a doom-laden, thought-provoking yet amusing presentation, Marc Faber - the contrarian investment commentator and fund manager – tells the audience to expect another global financial crash, 10 years of low-to-no growth, the "*Middle East in flames*" and the U.S. and China on a collision course over access to oil in the Middle East and beyond.**

Known for his colourful, strident observations on the global economy and investment, and for presaging the financial crisis of 2008, Faber delivered a shock- and-awe inducing performance, castigating the economic and financial policies of all major western governments, and "*Keynesian*" economists, and warning that he could "*smell something is wrong in China*". He predicted another major economic and financial meltdown between 2015 and 2020 - at the latest.

In Faber's view, current US monetary policy is a short-term, ineffective fix that has worsened financial instability. He said US policies are failing to tackle the problem – shared across the western world – of too much government, corporate and private debt and un-fundable commitments to public spending, such as social and medical programmes, which cannot be covered by current tax revenues. Estimating the U.S. deficit at closer to $2.5 trillion than the official figure of $1.5 trillion, he argued public spending should be slashed, failing banks should be allowed to fail, and quantitative easing – central banks throwing good money after bad – should cease. Commercial and investment banking should be separated by law, and regulated accordingly.

Following the high-profile and mistaken U.S. government rescues of failing finance companies back to the late 1990s, the commentator widely-known as "*Dr. Doom*" (and the creator of the "*DoomBoomGloom*" report) says the "*too big to fail*" view of private sector banks and other financial companies has encouraged reckless lending and investment policies among too many financial institutions. This safety net should be removed, he argues. Back in the "*old days*", Wall Street investment companies were partnerships that risked their own money. But now they have become public companies, which risk other people's money, and leave governments - and taxpayers - to pick up the pieces when trouble strikes. Faber also argued that credit -encouraged by low interest rates – grew too far, too fast in the 1990s and early 2000s, and created a property bubble in the U.S. in which "*housing was being used like an ATM!*"

Moving his focus, Faber said Europe is struggling to accommodate a range of very different economies and polities at different stages of development into a single currency. He describes Greece as a lost cause, which should be allowed to go bankrupt, arguing that this relatively small and insignificant economy is stirring up so much dust that bigger global economic and financial problems are being obscured or ignored.

China is the elephant in the room, according to the financial commentator. Noting a global shift in the balance of global economic and military power from West to East, he also highlighted the massive increase in China's share of global commodity consumption. He is sceptical about GDP growth figures for China, suggesting they may be closer to 5% per year than 10%. Faber suggests that recent downward slides in stock markets are more likely to be the result of concerns about China's economic bubble bursting rather than European woes. "*If China grows or contracts by 3%, that translates into a huge impact, particularly in demand for commodities.*"

Faber also expressed concerns about competition for energy resources, with China being pitted against the West, represented primarily by the U.S. "*Oil is a big priority for China. But the U.S. could seek to contain China by limiting its access to oil in the Middle East.*" He suggested western intervention in Libya can only serve to set alarm bells ringing in China, and pointed to a struggle developing for an overland trade route to the region as China courts Pakistan while the U.S. strengthens ties with India. This is due to the threat the U.S. navy poses to China's shipping lanes, Faber said. The struggle for energy could result in the Middle East "*going up in flames*", he said.

*Buy gold and a farm in the country!*

For the chemicals sector, Faber was pessimistic. Foreseeing poor growth prospects in the coming years as the global economy staggers towards another major crisis, he also cautioned that a China slowdown would inevitably impact chemicals demand.

Questioned about possible remedies and ways to guard against the worst impacts of another crisis, Faber's advice was: *"Buy gold and a farm in the country!"*

# CLOSING LUNCH

*Women have a major contribution to make in energy, science and problem-solving throughout the Middel East region.*

## Arab Spring needs support of science and technology sectors


**Reminding the audience about the Arabic origins of science and mathematics, Jordan's dowager Queen Noor offered a wide-ranging review of the region today and urged the chemical industry to engage with both the countries and particularly the youth of the Middle East to promote capacity building, training and educational resources for science and industry.**

Queen Noor said that today's Middle East suffers from a research deficit, highlighting the fact that industrialized countries spending on R&D is twenty times higher than in Arab countries. She attributed this investment deficit to a history of colonialism, invasion and occupation, but said the regions' new generation of young people have a creativity, dynamism and self-assertiveness that is ready to be tapped.

Across the region, young Arab people share the same concerns as their European counterparts, the Queen said: "*They want economic growth, just and representative governments, and human rights.*" But the *modus operandi* of the Middle East is the antithesis of this: Arabs, like people everywhere yearn for freedom and equity, but the predominant reality is authoritarian government. She also noted a growing divergence between young and old. *"Sixty percent of the Arab population is under 30 and they are facing a future of high unemployment."* Students across the Middle East are exposed to civil rights and to new technology, and are using social media as a catalyst for bringing protest movements together: "*Arab internet use is well above the world average*", the Queen noted.

*In the 7th century, Islam had bestowed social and legal rights upon women that were well ahead of the west…*

*…Their oppression is not mandated by the Koran.*

She also underlined the importance of ensuring the "*Arab Spring*" is not hijacked by extremist groups. While reform must be real, Queen Noor said, the process of change in the region must be one of negotiation: "*Every side must be willing to negotiate.*"

Jordan's dowager Queen said a key change for the region is to harness the creativity and educational ability of Arab women. *"Women's gains need to be protected and nurtured. Women have a major contribution to make in energy, science and problem-solving throughout the Middle East region*", she emphasised. *"In the 7th century, Islam had bestowed social and legal rights upon women that were well ahead of the west",* Queen Noor said. *"Women could own property, run businesses. They had equality under and before God. Their oppression is not mandated by the Koran,"* she explained.

Today, women's rights – or lack of them – are a good indicator for levels of development.

Turning to Jordan, Queen Noor said that since 1979 educational and development initiatives of the NGOs she founded including the King Hussein foundation have implemented a range of initiatives to drive change and progress, encouraging education for its young people regardless of background or sex, and which have produced outstanding female talent in science and mathematics. These initiatives are providing a model for the region, she suggested.

With the Middle East remaining a key centre for hydrocarbon resources and a global hub for petrochemical production, the Queen said it is important that developments keep in mind environmental factors and protect the ecosystem. While the region's scarce oil and gas resources remain a potential flashpoint, Queen Noor pointed to opportunities for the development of renewable and sustainable energy resources. For example, solar power investments could generate energy for export to fund regional growth and development.

Concluding, Queen Noor said that Jordan – and the Middle East region – is producing a new generation of highly educated graduates, but they need opportunities – men and women. "*We alchemy in the Middle East to translate leaden shackles into golden opportunities for all.*"

# SUPPLY CHAIN AND LOGISTICS LEADERS BREAKFAST

## Geographical scope, technology, sustainability, complexity and transparency in EPCA's supply chain spotlight

In lively round table discussions, a mixed group of 80 producers and logistics service providers (LSPs) reflected on EPCA's proposals for four new working groups focused on key supply chain topics: geographical scope; technology; global and more complex sustainable supply chains; and transparency and openness.

Opening the session, EPCA Supply Chain Program Committee Chairman, **Philip Browitt** asked attendees to run a critical eye over the working group plans, and to indicate whether the topics addressed their concerns and if there are additional areas that should be added. Each table, with around 10 participants, was asked to look briefly at all four working group areas, then drill down into one specific, allocated topic.

Joining the group and dispersed throughout the tables were members of the EPCA Students Workshop - 14 young people who excelled at the 2009 *Chemistry Olympiad* – and were invited to the Annual Meeting to get a first-hand experience of the chemical industry of its people and of the way it works.

Before tables set to work, Browitt outlined the broad themes guiding each new working group. The geographical scope working group will look at ways to support member companies in the expansion of their supply chain activities beyond Europe, he said. Technology will be explored as an enabler for sustainable chemical supply chains. Global and more complex sustainable supply chains will look at evolving management issues and how they are impacting members. Finally, transparency and openness in chemical supply chains will look at information sharing – and limits to its extension – and co-operation across the industry. Feedback underscored the close connections and overlaps between the proposed new working groups.

*Discussion on geographical scope highlighted a divergence between regional and global markets.*

Discussion on geographical scope highlighted a divergence between regional and global markets, noting that some producers and rather more LSPs are more regionally focused and already struggle to manage the supply chain complexities relating to Europe. It was suggested EPCA might do more to help and integrate smaller players into the organisation, particularly through information sharing.

However, there is also broad recognition that globalisation is increasing. For example, in the specialty sector a plant located in one region may be a company's only global manufacturing centre for a particular product. There continues to be significant inter-regional movement of product in the petrochemicals sector, particularly from the Middle East to Asia-Pacific markets. This is likely to drive greater demand for intermodal solutions.

In light of globalisation, it was suggested that EPCA works more closely with the Gulf Petrochemicals and Chemicals Association to set up supply chain discussions and workshops, and also looks at opportunities for similar events in China. It was also noted that while transportation costs remain relatively low, chemicals will continue to be exported across long, inter-regional routes.

On a related issue several tables suggested a specific working group might consider supply chain and logistics infrastructure. Issues raised on this topic ranged from concerns about the failure to achieve railway standardisation in Europe, to investment in roads and shipping facilities for future efficiency and growth.

There was unanimous agreement that technology is an enabler for more efficient, safer, more closely controlled and monitored supply chains. But some concern was expressed about the complexity and costs added through some new technologies and related systems, particularly increasing pressures on smaller LSPs. There were calls for standardisation and greater efforts to ensure technology brings logistics costs down. However, there was also an acceptance that new technology often brings competitive advantages for quick adopters, and can disadvantage those slower to react or implement. Assessing, managing and harnessing the potential supply chain options, impacts and benefits available through the developing

*Technology is an enabler for more efficient, safer, more closely controlled and monitored supply chains.*

# day 2 • Supply Chain and Logistics Leaders Breakfast

"*Internet of Things*" is a growing challenge. There was consensus that EPCA has led, and should continue, to lead work and discussions in this area.

There was broad agreement that the supply chain is becoming more complex, and that globalisation – and indeed continuing or expanding regionalisation – may shrink the world geographically while highlighting a range of differing business cultures, practices and standards. Here, organisations like EPCA have an important role to play in fostering inter-regional, industry-wide discussion and co-operation. The complexity, however, should not be underestimated: "*It's tough when the definition of 'on-time delivery' varies around the world*," one table's rapporteur pointed out. Security is another growing concern, and along with market volatility is adding to the complexity of challenges facing the chemicals sector.

*The supply chain leaders agreed that great transparency and openness were good for business and good for reputation.*

Given the importance of sustainability, one table wondered if this topic should have a dedicated working group. Similar queries were raised about "*reputation*", and whether EPCA should dedicate a group to looking at ways to raise and improve the chemical industry's profile.

Both sustainability and reputation are closely linked with transparency and openness. The supply chain leaders agreed that great transparency and openness were good for business and good for reputation. However, questions were raised about conflicts between openness and competition, in both market and legal senses.

While vertical co-operation – between suppliers and LSPs has increased, horizontal co-operation has hurdles to overcome relating to competitive advantage and legal issues relating to anti-competitive behaviour. Initiatives to prevent "*empty*" transportation and promote load optimisation via co-operation are working. But the need for neutral organisations – possibly EPCA – to manage information sharing was highlighted.

While much best practices sharing does take place across the sector, it tends to be focused on health, safety and environmental issues. A suggestion was made to try to broaden supply chain best practices learning through dialogue and co-operation with other industries, such as the automotive and retail sectors. However, there was recognition that these industries use business models that differ from chemicals.

*supply chain best practice should be broadened learning through dialogue and co-operation with other industries, such as the automotive and retail sectors.*

One table suggested lack of transparency and openness continues to cause "*inventory bubbles and speculation, resulting in billions of dollars of value being tied up in the supply chain*". EPCA could look at these issues.

A theme of the EPCA Annual Meeting – the attraction of talent to the industry – was also raised in the supply chain session. It was noted that increasing complexity in supply chain and logistics required increasingly well- and appropriately-educated personnel. Any efforts EPCA can make in fostering better links with educational establishments and increasing the chemical sector's attractiveness to young people, are to be encouraged and supported.

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Concluding the session, Philip Browitt welcomed the input of the group and said the EPCA Supply Chain Program Committee would assess the input and report back on planned actions and responses. He also encouraged those with specific concerns and interests to volunteer to participate in working groups.

# STUDENTS' WORKSHOP

## Introduction

**Recognizing the need for better engagement with young people as the key drivers of global change, EPCA invited, during its Annual Meeting this year, a group of students to get up close and personal with the chemicals industry. In addition to attending EPCA business and supply chain sessions, the students – who already possess CVs full of impressive awards and achievements – were able to meet people helping make the wheels of the chemical industry turn today and also engage with an august panel of EPCA past-Presidents. It was a valuable learning experience for the students and the industry!**

As part of EPCA's outreach activities in the International Year of Chemistry, EPCA sponsored a group of 14 mainly chemistry and chemical engineering students from Europe, the USA, the Middle East, Brazil, Russia and India to visit the Annual Meeting. The aim was to enable them to see for themselves an industry at work, to meet industry people, and to discuss the issues and challenges we are grappling with now and into the future.

*Our aim is to bridge the gap between universities and industry, … and show that we can offer a range of great careers extending beyond research and development.*

Opening a discussion with a group of executives of the Young EPCA Think tank, session chair **Nathalie Brunelle** from Total Petrochemicals, said she and her colleagues Johan Devos (Bertschi), Howard Sellers (Agility), Lucas Angelini (REPSOL), Aniouta Belevitch (Total) and Yvonne van der Laan (Sabic) were starting a three-day process designed to familiarise the students with some key aspects of the chemical industry: "*Our aim is to bridge the gap between universities and industry, explain how the chemical industry acts as an essential supplier to all industries, and show that we can offer a range of great careers extending beyond research and development [into operations and commercial functions].*"

With over 2,500 attendees from hundreds of companies, EPCA's Annual Meeting is one of the key global petrochemical industry gatherings, the Total executive explained. *"It's a place where people come to do business, to buy and sell chemicals and related services, as well as discussing industry-related issues,"* she said.

Brunelle also underlined the industry's focus on the need to balance the drive for commercial success – profit – with the needs of people and the planet. "*The International Year of Chemistry is a great time to celebrate the link between chemistry and industry and to recognize how the daily use of our products continues to transform standards of living for people worldwide.*" From the provision of potable water, to food, energy, transportation, health care, and communications and education, the chemical industry is an essential supplier and enabler, she stated.

One hundred years after Marie Curie was awarded the Nobel Prize, Total's Brunelle said 2011 is an appropriate time to highlight the role women can and should play in the chemical industry and to encourage more women to follow careers in the science based industries. She also mentioned EPCA is already using the European Schools Network to extend the availability of the association-sponsored film, *Chemistry: All about You,* which is aimed to inform 12-16 year olds about the positive impact the industry has on our lives.

*EPCA is using the European Schools Network to extend the availability of the association-sponsored film, "Chemistry: All about You".*

Commenting on the film, Dr. Arvind Natu, from the Indian Institute of Science, Education and Research, stressed the value of using the three-way network between industry, academia and society to spread the messages as quickly and effectively as possible (through social media like Facebook and Twitter for instance). "*There is a widespread perception of chemistry as positive,*" he noted. "*But too many people associate [the word] 'chemicals' with something negative, with burning, smells and danger. We have to change this!*" *"Chemistry: All about You", which at time of writing had over 58,000 hits on You Tube, is helping to change this image".*

# Meeting the industry's professionals

*The industry always needs new leadership, and young people joining its workforce – regardless of the function they are in – should think about building their teamwork and team-leadership skills to progress to senior management.*

Two sessions of the EPCA's student workshop involved small group discussions between students and executives –past and present - on four issues: making the link between school/university and industry; career development; energy; and end consumer awareness.

*Science and engineering graduates could enjoy wide-ranging and varied careers in the chemicals sector, ranging from R&D and operational roles to logistics, sales, marketing and the highest senior management roles.*

Starting these interactive sessions, current industry executives and past-EPCA Presidents outlined their roles and their routes into the industry from a diverse range of degree studies – including chemistry, chemical engineering, law, languages, business and economics – and, in one case, from the merchant navy. After splitting into executive-led units of 3-5 people for the broad discussion, the full group reunited to pull together the key elements of their shared discussions and thoughts.

Leading the session, **Rein Willems**, who spent 38 years with Shell and rose to top management in its chemicals business, told the students: "*You have a combined industry experience of 300 years in this room, so you should make the most of us and don't be afraid to ask questions!*" Other EPCA past-Presidents and Honorary EPCA Board members included, Dominique Cruyt (Total), Jan Hessel Kruit (DSM), Boy Litjens (SABIC Europe), Werner Praetorius (BASF), Olav Tangeraas (Odfjell), Walther Thunker (Veba Oel/ BP) and Theo Walthie (former Dow, now Lanxess).

While students reported limited opportunities to interact with the chemical industry before being invited to the EPCA Meeting, and all of them urged the sector to promote and engage in more outreach activities with schools, colleges and universities, the industry sages urged the students to take the initiative and seek out contacts and opportunities with the industry themselves.

With very diverse academic and early life experiences, the past-Presidents explained that while non-scientists and non-engineers could not move into most technical roles in the industry, science and engineering graduates could enjoy wide-ranging and varied careers in the chemicals sector, ranging from R&D and operational roles to logistics, sales, marketing and the highest senior management roles.

In discussions on energy, the past EPCA Presidents were able to explain that while hydrocarbons remain the lifeblood of petrochemicals, the industry is driven by a desire to do more with less and reduce waste – be it in terms of materials, emissions or water. The students also learned about the contributions made by the industry's products – from light-weight materials in automotive manufacturing to insulating materials in construction – to reduction in energy consumption and in greenhouse gas emissions.

For their part, the students were impressed by the EPCA-sponsored film "*Chemistry: All about You*" and urged the industry to increase its outreach into schools, colleges and universities and with broader public audiences.

In terms of the students' future careers, the industry sages urged them to work hard to promote themselves and to raise their profiles, both to get jobs and progress on the promotion ladder. They were also advised to accept challenges, especially the tough ones, and seize offered opportunities. The industry always needs new leadership, and young people joining its workforce – regardless of the function they are in – should think about building their teamwork and team-leadership skills to progress to senior management. Admitting that in the past women had a tougher route into the industry and to senior management roles, the past-Presidents pointed to increasing numbers of women joining the sector and rising to top executive positions.

# Discovering the Supply Chain and Logistics

Having attended the EPCA Supply Chain and Logistics Leaders Breakfast session, the students had a chance to talk to The Logical Group's CEO, **Paul Gooch**, a supply chain practitioner with over 40 years experience in the chemicals and oil sectors. Thrown into the deep end during the breakfast, as experienced and active professionals discussed some of the key supply chain and logistics issues facing the industry as a whole and EPCA members, the students were keen to hear Gooch outline the process that gets products to customers quickly, efficiently and safely, and which is continually being enhanced. Feedback was very positive, with students reporting the discussion opened a window into an unfamiliar but fascinating aspect of the business.

*The students were keen to hear the process that gets products to customers quickly, efficiently and safely. Feedback was very positive, with students reporting the discussion opened a window into an unfamiliar but fascinating aspect of the business.*

Gooch offered the group a quick guide to complexities involved in getting products from plant to customer, by road, rail and shipping, across countries and continents. He highlighted the progress industry has made through the implementation of *Responsible Care* and answered many questions relating to industry advances in product stewardship through collaboration and the introduction of new technology.

The Logical Group manager also explained how customer surveys showed most wanted choices beyond simply low cost when making purchasing decisions. "*Customers want availability, reliability and segmented services. Tapping into these wants and needs enables producers and logistics service providers to add value to their sales propositions,*" Gooch explained.

# Conclusion Session

During the conclusion session with EPCA Secretary General Cathy Demeestere and current industry executives Nathalie Brunelle (Total), Howard Sellers (Agility), Lucas Agnelli (REPSOL), Aniouta Belevitch (Total), Hans de Willigen (VOPAK), Peter Stewart (Shell), the students said they were both surprised and excited by the range of functional experiences that a career in the chemical industry can offer. They were also enthused by the industry's preference for job-rotations and picked up on the value of networking and flexibility, both in terms of day-to-day working and of career progression.

*The students urged EPCA to continue and develop the students programme, which had given them new insights into the chemical industry and opened up new horizons for their future careers.*

The students also suggested the industry consider working more closely with schools, helping chemistry and science teachers to understand how industry works and the jobs it can offer young people. School-level chemistry, the students said, is possibly too theoretical and could benefit from the addition of industry experiences and more information on the use and benefits of chemical products. There was a strong student consensus that industry should look beyond universities, colleges and secondary schools, and aim to engage children in late primary years, too.

Overall, the student feedback from their EPCA Students Workshop experiences was really encouraging. They urged EPCA to continue and develop the student programme, which had given them new insights into the chemical industry and opened up new horizons for their future careers.

# Forging new partnerships between industry and academia

Clear goal-setting and closer collaboration in areas ranging from research, curriculum design and public engagement, can transform industry-academia partnerships, while attracting new industry recruits and building public trust, **Dr. Arvind Anant Natu** from IISER Pune, India told a group of past-EPCA Presidents and students.

Too often, traditional donor-acceptor relationships between the chemical industry and academia under-deliver because clear goals are not set, and tangible end-products are not defined, said Dr. Natu, a faculty member at the Indian Institute of Science Education and Research, which is located in Pune, India. Today, however, new models of co-operation are enabling the complementary skills and knowledge of higher education and business organizations to be combined to better effect to deliver scientific, industrial and social progress, he noted.

While academia's watchword may be "*How?*" – as it pursues knowledge through exploratory work, Dr. Natu said the industry's is "*Anyhow!*" – as it seeks commercially viable implementation of research, technology and products. He urged chemical companies and colleges and universities to pursue collaborative, mutually beneficial projects that have clear, achievable, pre-agreed goals.

The industry and academia can both benefit from collaborative research projects and skills transfers, Dr. Natu explained. He suggests that the industry and academia could jointly mentor both undergraduate and doctoral projects, implement e-learning between both parties, share infrastructure and even make joint appointments. Another suggestion is to undertake site visits – at both industrial and academic facilities – in line with the curriculum for the mutual benefits

Academia, the IISER faculty member suggested, would benefit from the industry's participation in both curriculum design and teaching related to operations. The industry could also offer continuous career counselling, and increase student/academic awareness of issues ranging from HSE and quality to regulatory affairs. For the industry, closer links with academia could provide professional refresher courses or internships in academic institutions before or as part of company inductions programmes.

By way of example, Dr. Natu outlined three partnerships IISER-Pune is developing with the industry. With a major petroleum group, the institute is pursuing joint research with two pilot projects focused on catalyst design and testing, and on processing and analysis. Informal meetings enable both partners to understand each other's capabilities, and training is scheduled within IISER's and the industrial partner's facilities.

Another collaboration has a small group of IISER students and partner company interns working jointly on a pilot research project, which makes use of both partners' labs. Students can submit work carried out in the industry labs for academic review and assessment, and may receive an incentivizing stipend. Based on research results, a major joint research project is foreseen.

IISER in collaboration with NCL and other industries has launched a program on the eve of *the International Year of Chemistry*. It is broader-based and aims to raise student and community awareness of chemistry and encourage more young people to pursue careers in the industry. School students are being invited into IISER for half-day programmes including multi-media presentations, hands-on experimentation, lab visits and meetings with practising scientists. The expected results are long term but far reaching in nature.

However Dr. Natu cautioned that the curriculum should not be tailor made at the cost of basic science and an appropriate balance need to be struck between these two vital arms for the ultimate zeal "Best society through best science".

# Participants of EPCA Students Workshop with her Majesty Queen Noor of Jordan

*From left to right :*

- *Baptiste Haddou, France, ENS (Ecole Normale Supérieur) of Paris*
- *David Rodriguez, Spain, Universidad Autonoma Madrid*
- *Sara Mohammed Al-Dhaheri, United Arab Emirates, Petroleum Institute of Abu Dhabi*
- *Alex Blokhuis, The Netherlands, Eindhoven University of Technology*
- *Daniil Khokhlov, Russia, Moscow State University*
- *Shruti Khatri, India, Indian Institute of Technology, Kharagpur*
- *Aqeel Alrajhi, Saudi Arabia, Ohio State University, USA*
- *Her Majesty Queen Noor of Jordan*
- *Alberto Lena, Italy, University of Pavia*
- *Iryna Barodzich, Belarus, Belarusion State University*
- *Dr. Arvind Anant Natu, India, Indian Institute of Science, Education & Research – Mentor of the students at the EPCA Workshop*
- *Robert Pollice, Austria, Vienna University of Technology*
- *Petra Vizjak, Croatia, University of Zagreb*
- *Levindo Garcia Quarto, Brazil, State University of Ceara (UECE)*
- *Julia Batki, Hungary, Eotvos Lorand University*
- *Martin Strebl, Germany, Ludwig Maximilians University of Munich*

# About EPCA

*The European Petrochemical Association (EPCA) is a Brussels-based chemical industry-led international non-profit association.*

*As legitimate network and platform to meet, communicate, exchange of information as well as transfer of learning for more than 600 international member companies, EPCA operates for and through its members.*

*These are chemical producers, their service providers, their customers and their suppliers.*

*With 45 years' experience, EPCA is a service providers for its member companies.*

*EPCA organizes meetings, seminars, workshops and think tanks for its members and stakeholders. Purpose of these articles is to open debate to the long term sustainable development of the petrochemical industry all over the world and to contribute to the improvement of the public image of the chemical industry.*

*EPCA meeting venues are located in Europe. EPCA also supplies meeting facilities in the format the chemical business community needs and appreciates.*

*Given its large and global membership base, EPCA has never been, nor intended to be, a lobbying organization. As such EPCA does not have any international or national federations or associations in its membership.*

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