



GFCC

Global Federation of
Competitiveness Councils

Speed and Leadership

A Report on the GFCC University
and Research Leadership Forum Annual
Meeting in Kuala Lumpur, Malaysia,
on November 30, 2017

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The Global Federation of Competitiveness Councils (GFCC) is an international network of leaders, non-profit organizations, government agencies, universities, and companies working collaboratively to build sustained prosperity through innovation. The GFCC develops initiatives and tools to better understand and navigate the complex competitiveness landscape and disseminates best practices.

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A Message from the GFCC Leadership

In recognition of the central role universities play in innovation and a nation's competitive potential, the Global Federation of Competitiveness Councils established the University and Research Leadership Forum, which brings together leaders of universities and research enterprises from around the world to explore what today's technological and global transformations mean for universities, and their role in regional and national economies. Launched in 2016, the Forum has grown to include 38 universities and research institutions representing 19 countries, and has already proven to be a productive think tank and tremendous intellectual asset for the GFCC.

Today, the role of universities in innovation ecosystems is expanding. They are engaging more broadly with industry in joint research, spinning out and nurturing new technology ventures with financial resources and support to accelerate their businesses, connecting more tightly with regional economic development, and providing students with real-world entrepreneurial experiences. As science, technology, and innovation capacity grows around the world, they are engaging in global research efforts large and small, and co-creating across countries and continents.

In carrying out these expanding roles, universities are adopting and experimenting with a wide range of new and modified models, programs, and practices. These efforts have created a substantial base of experiences

for learning, information exchange, and identifying best practices. Drawing on this rich resource for study, the Forum has produced two new reports filled with insight. *Leveraging Extreme Innovation* takes a look at the university role in big science projects, big research endeavors, and bold technology initiatives. *Optimizing Innovation Alliances* explores the kinds of alliances universities form to transfer their science and technology to the marketplace. The programs and practices captured in these reports, along with disruptive technology and university leadership in an era of rapid change were the subjects of robust discussions at the 2017 Forum meeting in Kuala Lumpur, Malaysia recapped in this annual report.

These analyses and discussions are prime examples of fulfilling the GFCC vision of serving as a platform for collaboration and learning on a global scale. We are confident that GFCC members around the world will be able to use this information to enhance their own efforts to more fully integrate the research and resources of their universities into innovation ecosystems, their networks, and processes of innovation.

We are indebted to the commitment and leadership of Dr. K. Khosla, Chancellor of the University of California at San Diego, who has so ably served as the Forum's Chairman. We also thank our university members and business leaders who are participating in the

Forum, including those who led, and provided key information and insight for our two new studies. We are all benefitting from your insight, experience, and creativity.

As we traverse through an era of disruption and transformation, we will continue to look to the wisdom, experience, and insight Forum members bring to the GFCC.



The Hon. Deborah L. Wince-Smith
President, Global Federation of Competitiveness Councils
President & CEO, Council on Competitiveness



Charles O. Holliday, Jr.
Chairman, Global Federation of Competitiveness Councils
Chairman, Royal Dutch Shell plc

A Message from the Forum Chairman

Universities are responding to a world of accelerating change, technological disruption, demands for new skills, and expectations that they will spur entrepreneurship, regional economic development, and national competitiveness. That's a tall order, and these pressures are driving new ways of thinking, experimentation with new models, and adoption of new practices. But change and adopting new ways of business are challenging.

The Global Federation of Competitiveness Council's University and Research Leadership Forum was formed to address these challenges. The Forum seeks to explore emerging trends and the transformations taking place in universities around the world, strengthen the role of their leaders acting as agents of change, and increase their impact on economies and solving societal problems locally, regionally, nationally, and globally. The Forum carries out its mission through analyses, dialogue and debate, identification of best practices, and co-creation of new ideas and solutions for driving economic growth and competitiveness through innovation.

It is truly an honor and privilege for me to lead the Forum, and collaborate with brilliant thinkers and doers of sterling accomplishment. I have learned so much from my colleagues who face diverse challenges and opportunities in their different countries, and they have demonstrated a strong

commitment and have made an extraordinary intellectual contribution to our cause.

The Forum was launched less than two years ago in 2016 at the GFCC annual meeting in London. At that time, the Forum formed two task forces to conduct two studies, one on Leveraging Extreme Innovation, and the other on Optimizing Innovation Alliances. These task forces engaged many of our members from around the world in their studies, and offered their preliminary findings at our annual meeting in Malaysia just a year later. And, then, in a remarkable feat of productivity, have delivered two groundbreaking studies rich with detail and knowledge.

The first report, *Leveraging Extreme Innovation*, goes behind the scenes of large-scale science projects, big research endeavors, and bold technology challenges. The task force examined 17 of these extreme projects — the players, funding, their management models, and the role universities play. The report offers insight and recommendations on how universities can enhance their role in projects like these.

We are indebted to Professor Edward Byrne, President of King's College, and Prof. Sethuraman "Panch" Panchanathan, Executive Vice President, Knowledge Enterprise, and Chief Research and Innovation Officer, Arizona State University, for

chairing this task force, as well as to the many people who made written contributions and participated in interviews for this study.

Our second new report, *Optimizing Innovation Alliances*, focuses on the kinds of alliances universities form to move their science and new technology into the marketplace. This includes their growing role in industrial, regional, and national innovation ecosystems. The report takes a look at the nuts and bolts of 52 types of real-world university practices involving students and faculty, infrastructure such as global campuses and outposts in innovation hotspots, industry as partners in research and education, efforts to spur entrepreneurship, and much more. As a university leader, I know that members of the Forum and the GFCC will learn much from this analysis as they seek to leverage their knowledge enterprises for greater economic impact and societal progress.

We owe a debt of gratitude to the task force co-chairs Professor Christoph Hock, former Vice President for Medicine at the University of Zurich, and Dr. Hassan Al-Derham, President of Qatar University, and to the 17 universities around the world that provided information on their practices for the study.

The University and Research Leadership Forum concluded a productive year by convening in

Malaysia to discuss the preliminary findings of these task forces' work, how universities can address technology disruption, and the leadership needed for universities to remain relevant and responsive in an era of accelerating change. We also discussed how the Forum can support its members as they develop and implement new practices, and new subjects and challenges to investigate in the years ahead. As I know other Forum members are, I look forward to being part of this ongoing global conversation.



Dr. Pradeep K. Khosla

Chairman, University and Research
Leadership Forum
Chancellor, University of California
at San Diego

A Message from Last Year's Forum Meeting Chair

I had the honor of chairing the Global Federation of Competitiveness Councils' University and Research Leadership Forum Meeting in Kuala Lumpur in November 2017, which saw a convergence of the most progressive, innovative thinkers across the globe. The work of the leadership forum spurred deep and productive discussion on the global grand challenges universities world-wide are embracing in an effort to engage, collaborate, co-create, share best practices and devise transformative avenues to spur economic growth.

As we are well aware, universities throughout the world are tasked not only with educating future generations, but with creating master learners with entrepreneurial mindsets capable of entering a fast-evolving work environment that is in a perpetual state of flux. We're also at the forefront in terms of creating public-private partnerships and engaging governmental entities, corporations, non-profits and other institutes of higher learning in solving the global grand challenges of our time. During the innovation summit, we came to recognize, we know a great deal — we're making impressive and meaningful progress — but we still have room to do even more for the greater good.

Detailed in this report, you will find a narrative of the GFCC's ambitious, collective agenda. Key areas of focus include critical efforts to collaborate with stakeholders to construct interconnected alliances that will create dynamic, impactful change in the ways we educate, research and innovate at the university level. A key strategy is in sharing methodologies and approaches to extreme innovation science and technology projects in university settings. GFCC partners share the ways in which they have harnessed multi-disciplinary practices, tapped into conventional and unconventional resources, and set inspired goals for deploying transformative projects that are quite literally poised to positively influence global competitiveness and economic evolution.

This comprehensive report will also highlight another key area of extreme innovation in higher education that has a significant, measurable, global impact - that of empowering faculty and researchers within our respective institutions to tackle pivotal large-scale projects, giving them access to the resources and support they need to participate in grand-scale work. We must engage, nurture and challenge the brightest minds in our institutions to drive transformation at the university level and beyond.

So how do we build on the substantial foundation we've established and continue to accelerate our efforts? How do we turn exemplary ideas and recommendations into concrete, actionable plans?

We embark on this next phase by utilizing the tremendous power of the GFCC as a central hub for harnessing the talents of big, bold, adaptive agents of change to collaborate; to take the ideas, the discussions and the debates and turn them into realistic, implementable solutions that produce tangible results. We continue to share best practices, noting our challenges as well as our triumphs. It is this multi-faceted, collective synergy that will cultivate exponential potential, resulting in far-reaching, paradigm-shifting change for the future of humankind.



Prof. Sethuraman "Panch" Panchanathan

Executive Vice President, Knowledge Enterprise, and Chief Research and Innovation Officer
Arizona State University

Introduction

Universities and research organizations drive the global knowledge enterprise and the advancement of the knowledge economy across nations. They educate new generations of thought leaders, train the workforce, do research, partner with industry, spin-off and nurture new technology ventures, advise government and international organizations, inform the public debate on a variety of issues affecting our societies, host advanced research facilities, provide services to local communities, push the envelope of human knowledge and possibilities, and more, much more.

The GFCC University Research and Leadership Forum is a think tank that connects voices across geographies and cultures. The Forum embodies a principal element of the GFCC vision: global cooperation to catalyze the exchange of best practices and strategies that will boost innovation, enhance competitiveness, and drive prosperity.

Through the University and Research Leadership Forum, the GFCC develops a better understanding of the contributions of global education/research institutions to competitiveness, facilitates new collaborations, and provides global visibility to relevant experiences, emerging models, and original thought in the field.

Through its diverse member base, Forum participants converge to share and analyze experiences, innovative practices, and emerging challenges.

Since its inception in 2016, the Forum has grown to more than 40 university members, representing 21 countries. Building on the initial conversations held in London in November 2016, the Forum launched two task forces in 2017 — Optimizing Innovation Alliances and Leveraging Extreme Innovation.

The task forces involved members in a series of activities over the year and presented their preliminary results during the Forum's second meeting, held in Kuala Lumpur, Malaysia on November 30, 2017. Leaders from more than 15 countries attended the meeting, along with GFCC Board members and a selected group of global business and policy leaders. The following report represents a summary of the discussions at this meeting.

Discussion Themes

- Optimizing Innovation Alliances
- Leveraging Extreme Innovation
- The Future of Universities in the Technology Disruption Era
- The University and Research Leadership Forum in Action

Task Force Co-Chairs

Optimizing Innovation Alliances

Prof. Christoph Hock
Former Vice President for Medicine
University of Zurich

Dr. Hassan Rashid Al-Derham
President, Qatar University

Leveraging Extreme Innovation

Prof. Sethuraman "Panch" Panchanathan
Executive Vice President, Knowledge Enterprise, and Chief Research and Innovation Officer
Arizona State University

Prof. Edward Byrne AC
President and Principal
King's College London

SESSION 1

Optimizing Innovation Alliances

● STAGE SETTERS ●

Prof. Christoph Hock
Former Vice President for Medicine
University of Zurich

Dr. Hassan Al-Derham
President
Qatar University

● MODERATOR ●

Prof. Harris Pastides
President
University of South Carolina

● DISCUSSANTS ●

Prof. Steven Miller
Vice Provost for Research
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Prof. Evilázio Teixeira
Rector
Pontifical Catholic University of Rio
Grande do Sul

Ms. Alison Townley
Sr. Advisor
American College of Greece

Mr. Paul Levins
Chief Strategy Officer
Xinova

Ms. Lori Schmidt
CEO
GO Productivity

Background

Innovation has become an increasingly important factor for competitiveness. Innovation differentiates economies — be they local or national — by creating growth-inducing, high-margin value-added activities that drive productivity, employment, and prosperity. The knowledge economy depends on flows that cut across different branches of society and the economy through networks, connections, interplay, and alliances. Universities and research organizations are integral components of these innovation ecosystems. In successful innovation ecosystems, these organizations engage and work in a variety of ways with industry, startups, government, labs, innovators, media, investors and other stakeholders.

The GFCC University and Research Leadership Forum established the “Optimizing Innovation Alliances” task-force to investigate the models that universities use to engage and work with industry, government, investors, entrepreneurs, and other key stakeholders in innovation ecosystems. In this conversation, task force leaders shared preliminary findings, insights based on their own experiences, and engaged with fellow members in conversation about new and emerging models, exploring opportunities for dissemination within the GFCC member base.



Top: Mr. Chad Evans, Executive Vice President, Council on Competitiveness; Prof. Harris Pastides, President, University of South Carolina; and Mr. Chad Holliday, Chairman, GFCC.

Bottom: Dr. Ted Zoller, Director, Center for Entrepreneurial Studies, University of North Carolina at Chapel Hill.



Top: Dr. Sethuraman "Panch" Panchanathan, Executive Vice President, Knowledge Enterprise, and Chief Research and Innovation Officer, Arizona State University; The Hon. Deborah L. Wince-Smith, President, GFCC; and Mr. Charles O. Holliday, Jr., Chairman, GFCC.

Center: Ms. Lori Schmidt, CEO, GO Productivity.

Bottom: Ms. Alison Townley, Senior Advisor, American College Greece.

Discussion Questions

- What are the key challenges that universities face in building and operating innovation alliances? How does that differ across nations and local contexts?
- How do universities engage with industry, government, and society across geographies? What are the most common solutions?
- What are the new or emerging models for innovation alliances around the globe? Where do they come from?
- What are the key issues for industry? What are some of the most successful models from an industry perspective?

Challenges

While the importance of partnerships is widely acknowledged, their implementation meets obstacles posed by the separations — lack of circulation, common language, approaches, and performance metrics — of public and private sectors, NGOs and non-profits, geographic and/or cultural barriers.

Such divides are increasingly relevant at this critical juncture in history, when advancements in technology have achieved an unprecedented pace, and transformations in business and society are accelerating. Speed has become a crucial performance dimension.

Universities face the challenge of providing timely, high-quality answers to complex business and society demands. Problems are increasingly multidimensional, and require the integration of different knowledge fields and areas of expertise. While research universities are known for their capacity to advance knowledge

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 "Any university that could develop the capacity to get together in 48 hours the right group of people and solve a complex problem involving the practical application of multiple knowledge domains would have a great competitive advantage. Speed is critical for industry."

Charles O. Holliday, Jr.
 Chairman, Global Federation of Competitiveness Councils
 Chairman, Royal Dutch Shell plc

and partner with industry to develop innovative technical solutions for problems, they are particularly challenged when required to react quickly and integrate different disciplines.

The quest for relevance and the types of partnerships required vary across geographies, depending on the economic and institutional realities in which they are embedded. Global relevance and local pertinence should be simultaneously sought.

University faculty are rarely incentivized to pursue partnerships. Universities must work at the institutional level to encourage multidisciplinary, multi-industry collaboration to truly catalyze advancement. They also need to recognize and be ready to engage with an expanding variety of outside stakeholders, as we increasingly have

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 “Our tenure and promotion criteria are skewed toward publishing and getting federal grants. We need to find ways to appropriately reward and/or incentivize professors to work with corporations on economic development activities, giving them credit towards tenure and promotion by doing that.”

Prof. Harris Pastides
 President
 University of South Carolina

intellectual and research capacity disseminated in society, outside of the university boundaries.

Universities need to establish compensation and incentive systems that encourage diverse career paths and value partnerships with outside stakeholders. Mindsets and processes also need to be adjusted.

Solutions

Build internal initiatives to catalyze and support engagement with outside partners.

The University of Zürich has implemented a series of new initiatives to develop the capacity of the university community to engage with stakeholders in the technology-intensive Swiss business landscape — the more sophisticated the environment and the outside

opportunities, the more the university has to prepare faculty and students to engage. “We have complemented our external offer with internal activities that include the creation of a Founder’s Lab, a teaching program on Bio-entrepreneurship, an innovation program at the Life Sciences School, summer camps for entrepreneurs, a scouting team, and a coaching team.”
 — Prof. Christoph Hock, former Vice President for Medicine, University of Zurich.



To read more about the UZH Bio-Entrepreneurship Program, see GFCC’s report *Optimizing Innovation Alliances*.

Co-invest in forward-looking research and technology assets in partnership with local/national stakeholders. Innovation ecosystems present challenges and opportunities that change over their lifecycles; universities should work in concert with leading stakeholders to identify critical needs at each stage of development and co-invest in critical infrastructures. “The Qatar Mobility Innovation Center was established in partnership between Qatar University and Qatar Science and Technology Park as an independent research center that works in IoT, smart traffic, environmental monitoring...it is the first R&D center for industry 4.0 in the whole region.” — Dr. Hassan Al-Derham, President, Qatar University.

Drive integration of disciplines and multidisciplinary via a focus on societal problems. To overcome internal barriers, increase relevance and impact, and develop the processes and speed required to provide timely answers to society, universities should increasingly



Top: Dr. Ayedh Al-Otaibi, Deputy Governor, Saudi Arabian General Investment Authority (SAGIA); and Prof. Evilázio Teixeira, Rector, Pontifical Catholic University of Rio Grande do Sul.

Bottom: Dr. Steven Miller, Vice Provost for Research, Singapore Management University; and Dr. Laoucine Kerbache, Chief Innovation Strategist, Qatar Foundation.

organize their units and centers around societal issues and problems. "We have created new centers at UNC Chapel Hill, centers that bring together a variety of disciplines to tackle challenges like treating AIDS, curing cancer or autism." — Dr. Ted D. Zoller, Director, Center for Entrepreneurial Studies, University of North Carolina at Chapel Hill.

Educate internal and external stakeholders on the templates for IP agreements.

There is a knowledge gap in innovation ecosystems and relationships that needs to be addressed, particularly in those that still are maturing and/or in new industry-university partnerships. Universities should have processes, outreach initiatives, training sessions, and information systems solutions to disseminate well-known templates for IP commercialization and educate users.

Plug into emerging knowledge networks.

Innovation is changing. Research and development capabilities and assets are becoming more widely available in society, disconnected from traditional structures, engaging in a more fluid way with industry. Universities need to clearly understand the transformations in the innovation landscape and develop new connections with such emerging networks. To be effective in connecting with industry, universities

need processes and structures that allow for swift engagements. "Over the course of a year, we have allowed one of our major clients to look at a thousand brand new innovation opportunities in the globe and then reduce those down to 300 that will be taken through to commercialization. In spite of being connected to a number of top universities, they got much faster inputs from a network of independent innovators." — Paul Levins, Chief Strategy Officer, Xinova.

Implement career paths for faculty outside or in parallel of the research-publish track.

Universities should create faculty career paths that recognize the different types of contributions, skills, and assignments needed for the knowledge enterprise and innovation. It is important to create full time positions that account for such diversity and allow professionals to progress without devoting their professional life to publishing. "At the University of Southampton, we have created a new type of full faculty position for an entrepreneur who founded and runs Future Worlds (futureworlds.com), an incubator that is transforming how we do spinouts. It is a full-time position but with a different focus than everybody else, so he is incentivized differently." — Prof. Peter G. R. Smith, Pro Vice Chancellor of International Projects, University of Southampton.

"We are initiating a process of creating a dual career track for industry and research." — Prof. Isabel Capeloa Gil, President, Catholic University of Portugal.

Create mechanisms to support and accelerate teams of students.

Complex problems are better solved by diverse teams, but student education is generally organized at the personal level. Universities should partner with industry to have initiatives to identify, educate, fund, and accelerate high-performing teams of students.

Have central offices curating access to expertise across the university.

Universities have multiple points of contacts with the external world, and it is hard for outside partners to navigate complex university systems. As a cutting-edge practice, universities are offering services to curate access to their different capability pools and also integrate them in service delivery, speeding up project design and implementation.

SESSION 2

Leveraging Extreme Innovation

● STAGE SETTERS ●

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Dr. Matthew Johnson
Partnerships Manager
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● MODERATOR ●

Dr. Simon Peter "Pete" Worden
Executive Director
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● DISCUSSANTS ●

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Prof. Peter G. R. Smith
Pro Vice Chancellor of International Projects
University of Southampton

Dr. Michinari Hamaguchi
President
Japan Science and Technology Agency

Prof. Jari Kinaret
Director
EU Graphene Flagship

Prof. Jim Metson
Vice President
University of Auckland

Prof. Dr. Mohamed Ibrahim bin Abdul Mutalib
Vice Chancellor
University Teknologi PETRONAS

Background

The business of science and technology is changing. In addition to an increasing level of specialization and an exponentially-expanding knowledge base with new tools, there is a trend in science toward multidisciplinary research, large-scale projects, and the engagement of new stakeholders — from citizens to philanthropists. In a similar fashion, technology development reaches a new level with bold projects backed by the private sector.

Universities play an essential role in the design, deployment, and operation of large and advanced research facilities — from particle accelerators to oceanography ships, from radio telescopes to research hospitals. They are also key players in exploration, large research endeavors, and in extreme technology projects.

Government agencies are the primary funders for many big science and exploration efforts. However, new funding models and sources are emerging — or re-emerging. Big donations, endowments, grants, and private sector-backed prizes create new opportunities for extreme, path-breaking, transformational projects in areas such as climate, high-performance computing, the human brain, energy and matter, health, nanoelectronics, and outer space. They also open new opportunities for engagement between academia, industry, and philanthropy.



Top: Dr. Andreas Göthenberg, Executive Director, The Swedish Institute for International Cooperation in Research and Higher Education; and Prof. James Metson, Deputy Vice Chancellor, University of Auckland.

Bottom: Prof. Christoph Hock, former Vice President for Medicine, University of Zurich; and Dr. Michinari Hamaguchi, President, Japan Science and Technology Agency (JST).



Top: Ms. Lori Schmidt, CEO, GO Productivity; Dr. Simon Peter "Pete" Worden, Chairman, Breakthrough Prize Foundation; and Dr. Ayedh Al-Otaibi, Deputy Governor, Saudi Arabian General Investment Authority (SAGIA).

Bottom: Prof. Mohamed Ibrahim bin Abdul Mutalib, Vice Chancellor, Universiti Teknologi PETRONAS; Dr. Roberto Alvarez, Executive Director, GFCC; and Prof. Sethuraman "Panch" Panchanathan, Executive Vice President, Knowledge Enterprise, and Chief Research and Innovation Officer, Arizona State University.

Center: Dr. Matthew Johnson, Partnership Manager, King's College London.

The GFCC University and Research Leadership Forum established the "Leveraging Extreme Innovation" task force to analyze and draw lessons from big, transformational science and technology projects, informing university initiatives and strategies. In this conversation, GFCC university members and leaders of globally-relevant technology agencies and research initiatives shared their perspectives and outlined key action areas for universities.

Discussion Questions

- How are big science and technology projects initiated and led? What is the role of universities? How is that changing?
- Are there any trends on funding and engagement in big, transformational science and technology projects? What can be learned?
- Will we see more universities leading transformational science and technology projects? What types of projects?
- What is needed from universities to elevate their participation? What kinds of internal structures, processes, and external alliances are required?

Challenges

As transformational science and technology projects proliferate, new players come onto the stage and funding sources are diversified; even if in a small proportion, industry and philanthropy join governments in investing in this type of venture. New models for projects and types of funders come with new types of risks for universities. Universities need to learn and adapt.

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 "We must strive to demonstrate the value and the impact of large-scale science and technology projects, that we are really working to solve problems. We also need to drive in practice a transdisciplinary natural way of people getting and working together."

Prof. Sethuraman "Panch" Panchanathan
 Executive Vice President, Knowledge Enterprise, and Chief Research and Innovation Officer
 Arizona State University

Society's expectations related to big investments in science and technology projects are on the rise and go beyond the simple expansion of humanity's knowledge — taxpayers aim at broader impacts for economies and life. Also, private sector and philanthropic money come with higher expectations on solutions for real world challenges.

Most transformation science and technology projects come with big tickets. To be implemented, they require public funds, which become available only with the public's support. It is necessary to educate the public about the value of such projects, and build awareness and convince key policy stakeholders such as members of the cabinet/administration and representatives in the parliament.

Complex endeavors in all fields require the engagement of a variety of stakeholders, and transformational

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 “One of the issues with a project like this is that it goes over many countries, it doesn't produce something that you can directly sell. It is for the general good like climate, health, biodiversity, poverty, migration, and so forth. How to raise the money for this?”

Prof. Jouko Väänänen
 Vice President
 University of Helsinki

science and technology projects are no different. A key challenge for such initiatives is to build win-win solutions and engage different partners.

Extreme innovation projects push technical progress and expand the limits of the possible in critical knowledge fields, with numerous spillovers to the economy and society, as highlighted in the GFCC *Leveraging Extreme Innovation* report. The translation of technical and scientific advancements to industry and society is a constant issue and particular types of structures are required for that.

Although capital-light projects that mobilize distributed resources, such as competitions and prizes, can spur innovation, most extreme technology projects are capital intensive. A challenge to be considered is how to leverage new models, concepts, and approaches to drive innovation

at the frontier of well-established and capital-intensive knowledge fields and industries.

The mobilization of massive resources and transformational capacity of extreme science and technology projects needs to occur in the context of tackling broader societal challenges — in health, quality of life, sustainability, etc. Multidisciplinary is essential to do that and has to be embedded by design in extreme innovation projects.

As projects get large scale and challenges more complex, they require global coordination and engagement. Initiatives related to global health, climate, the oceans, access to space, security, and others are global by definition and involve diffuse global rights. Engagement with international organizations — the UN system and beyond — and non-state actors is critical for the establishment, funding, and implementation of such initiatives.

Possibly the greatest challenges of all is to prepare the leaders who will envision, design, build the partnerships, and implement the projects that generate extreme innovation. Universities face the challenge of preparing those leaders for societies at large but, above all, to train, prepare, and nurture such leaders inside their own structures.

Solutions

Connect extreme projects with mainstream university operations to accelerate translation. Societal impact is an important aspect for investments in big research initiatives and infrastructure. Universities can accelerate the translation of research findings into economic value and social good by connecting their participation in such projects with their



Top: Prof. Peter G. R. Smith, Pro Vice Chancellor International, University of Southampton; Prof. Jouko Väänänen, Vice President, University of Helsinki; and Dr. Ted Zoller, Director, Center for Entrepreneurial Studies, University of North Carolina at Chapel Hill.

Bottom: Prof. Isabel Capelo Gil, Rector, Catholic University of Portugal; Dr. Jari Kinaret, Director, EU Graphene Flagship Project; and Ms. Yasmin Hilpert, Director of Policy and Engagement, GFCC.

Top: Dr. Simon Peter "Pete" Worden, Chairman, Breakthrough Prize Foundation.

daily operations. "The Francis Crick Institute is a £650mi flagship research center in which King's College London invested £40 from its own money. KCL has linked the Institute's agenda to the work of the hospitals the university manages, in order to get products and medical research out as fast as possible into the marketplace." — Dr. Matthew Johnson, Partnerships Manager, King's College London.

"Institutes are very important as translators of research to the economy and society, in the sense of they don't have the same conflict for the role of professor that universities have. In some countries the institute sector is very well established like Germany and Finland, for example." — Prof. Jari Kinaret, Director, EU Graphene Flagship.

Provide project management training and infrastructure to university leaders involved in extreme projects.

Complex projects are demanding by definition and universities should have internal structures, processes, and services to support faculty leading these initiatives. "At ASU, we are working to have more professional project management people surrounding faculty members so that they don't feel burdened. In industry this is a natural thing, in universities we are learning how to do these things but are making progress steadily." — Prof. Sethuraman "Panch" Panchanathan, Executive Vice President, Knowledge Enterprise, and Chief Research and Innovation Officer, Arizona State University.

Create dialogue infrastructure and engage in public debate.

Publicly funded extreme projects are typically multi-agent, involve several stakeholders, and demand the support

of various levels and branches of governments and, ultimately, the public. University and research leaders need to actively engage in and inform public conversations. The UK Government has invested more than £370m in quantum technologies. That investment resulted from dialogue initiated and led by an academic, Prof. Peter Knight, who initially engaged with the Defense Science Lab to create a roadmap of quantum technologies, and subsequently with politicians, the Royal Society, senior people in academia, the Chancellor [head of Treasury], and the finance industry. "The whole process led to the creation of quantum technology hubs that involve 16 UK universities, Southampton is part of two of those, and 130 companies from around the world." — Prof. Peter G. R. Smith, Pro Vice Chancellor of International Projects, University of Southampton.

Organize university-industry big collaborations around "solve for x" approaches.

Large-scale university-industry collaborations to tackle societal challenges require new models of collaboration and co-location of resources, and should be oriented towards the realization of relevant, sustainable future visions. Following this logic, Japan Science and Technology Agency is implementing the Centers of Innovation (COI) Program focusing on smart life, quality of life, and sustainability. The COIs start with the definition of a 10-year future vision, the achievements needed for its realization are defined, and the whole project is planned; joint industry-university teams are brought under the same roof for implementation. Each project has a project leader from industry and a research leader from academia. Currently, there are 18 sites

across Japan. "We are four years into the program now, and 4,200 people from 400 organizations including 287 companies joined the project. So far, 22 companies were created, more than 800 patents filled, and USD163m were contributed by industry." — Dr. Michinari Hamaguchi, President, Japan Science and Technology Agency (JST).

Create internal structures and tracks that value performance across a broader set of metrics.

People's behavior is strongly influenced by performance metrics. University faculty engaged in technology and large-scale projects should be measured, recognized, and progress in their careers according to the impact they are having and not just based on participation in teaching and publications. Universities should create structures and evaluation processes to reflect that. "While we have the traditional structure governing our academic operations, we then formed another parallel structure to support our research. We also sort of scaled the key performance indicators, such that, as you move to a professor position, you are more measured by your contribution to research, project management, fund raising via grants, etc. and less on teaching." — Prof. Dr. Mohamed Ibrahim bin Abdul Mutalib, Vice Chancellor, University Teknologi PETRONAS.

Bring people from outside university who can serve as role models.

Universities have strong and ingrained sets of values and beliefs. Cultural change is needed for new behaviors to be incorporated, and participation in large-scale projects that impact society and involve outside partnerships to be valued. This is particularly relevant in homogeneous and very structured societies. One

Large projects to tackle global issues require global funding and governance solutions

The University of Helsinki leads a massive atmospheric research project that aims at understanding phenomena that take place in the Northern atmosphere, such as the aurora borealis, and their implications for global climate, health, telecommunications, and beyond. The project involves Nokia and another 100 companies from around the globe, 50 professors, and 250 researchers. Its implementation will include the installation of 200 measuring stations costing €6m each, across several nations, from the Northern countries to China and Mongolia. Some of the technologies developed so far, such as sensors, already have commercial applications in other domains, for instance, in luggage inspection in airports. With profound significance for pressing global issues such as climate and facilities distributed across nations, the project has important challenges related to funding and governance, and brings an additional layer of complexity to its management.

“Our Starship at Breakthrough Starshot will be attached to a LightSail about four meters in diameter pushed by a huge laser with about 100 gigawatts of power. That’s a policy issue by the way, so we began to engage with the UN.”

Dr. Simon Peter “Pete” Worden
Executive Director
Breakthrough Initiatives Foundation

solution to encourage change is to create new types of assignments and career paths, and bring people in from the outside. “We introduced people who survived tough businesses or experiences, like astronauts, into the universities, and make them work together and collaborate with faculty in a way they can be role models to have smart ideas and the brave heart to take high risk projects. We need this kind of staff inside universities in order to catalyze involvement in big projects.”
— Dr. Michinari Hamaguchi, President, Japan Science and Technology Agency (JST).



See the GFCC *Leveraging Extreme Innovation* report for more information on groundbreaking bold and transformational projects like Breakthrough Starshot.

Large-scale projects extend their influence far beyond the original knowledge domain

The University of Auckland Bioengineering Institute leads the international Physiome Project,¹ which will provide a comprehensive framework for modelling the human body using computational methods that can incorporate the biochemistry, biophysics, and anatomy of cells, tissues, and organs. The technology developed through the project was used in the Academy Award winning motion picture *Avatar*; Auckland’s professor Mark Sagar was part of the team and also is the founder of Soul Machines, the world’s leading company in avatar technology.

¹ <http://physiomeproject.org/>.

SESSION 3

The Future of Universities in the Technology Disruption Era

● MODERATOR ●

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The Hon. Jerry MacArthur Hultin
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Global Federation of Competitiveness
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Dr. Raduan Che Rose
Chief Executive Officer
National Council of Professors

Dr. Nkem Khumbah
Co-Coordinator
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Background

Technology has become a massive transformative force in today's world. Developments in artificial intelligence (AI), robotics, materials, sensors, synthetic biology, computation, solar energy, etc. promise to reshape businesses, industries, the economy, and society. If businesses are not transformed, they will be disrupted. If institutions and policies are not updated, countries, regions, and cities will waste resources and be left behind in this new production era. The exponential growth of technology goes hand-in-hand with changes in the nature of innovation itself. Advances in technology bring about large and continued decreases in price points for critical assets, democratizing access to capabilities in additive manufacturing, prototyping, DNA sequencing, computation, and knowledge in general.

New organizational and management models are also emerging, turbocharged by digitalization, globalization, and economic sophistication. Companies increasingly operate in small, 'skunk works-like' innovation units and teams, mobilize resources outside their organizational boundaries for research and development projects, invest in corporate ventures, build industry research centers, partner with players outside their industries, build and operate start-up hubs, etc. Innovation has become more fluid, open, global, and horizontal.

Universities are also being affected in this age of disruption. First, because AI and digital technologies will shake the education landscape — from massive open online courses (MOOCs) to personal assistants — we are likely to see a variety of developments toward the massification and personalization of education. Second, because professions, trades, and job markets will be profoundly transformed, new skills will be needed for makers, doers, and innovators. Third, the role of universities as economic development and innovation agents tends to be highlighted in this context.

Discussion Questions

- How will AI and digital technologies affect universities? What developments should be expected in research and higher education?
- How are universities addressing technology disruption across the globe? What are the emerging opportunities for universities?
- What changes can be expected in the roles of universities? What new strategies are needed? What institutional changes are required across geographies?
- What new models for universities are emerging? What are some of the best examples of innovative businesses models and partnerships for economic development?

“We have to understand that, in some ways, we have become far better in educating a robot than a human.”

The Hon. Jerry MacArthur Hultin
 President and Chairman
 Global Futures Group; and
 Distinguished Fellow
 Global Federation of Competitiveness Councils

Challenges

The role of universities and their methods of producing knowledge have been a true success story for centuries. For the most part, the traditional concept of universities has not dramatically changed and only experienced minimal adjustments. Combining research and education, the Humboldtian approach to university education generated significant spillovers from scientific research to curricula and the education of students; universities, thereby, quite literally reinvented themselves with every new research project, scientific discovery, and invention that transitioned from the drawing board to classrooms.

Today, however, universities face a dramatically different situation: in an era of mass disruption driven by accelerating scientific and technological progress, universities are

“We are being pushed to rethink our mission, to be more entrepreneurial, and to reflect or transform what has been one of the most resilient products in the world.”

Prof. Isabel Capelo Gil
 President
 Catholic University of Portugal

not only challenged to act faster, but their responsibilities have expanded from knowledge creation, science, and research to include applicability and meeting workforce demands of the future. As digitalization redefines educational processes, and employers seek graduates with highly specialized and practical skill sets, universities need to evaluate how best to serve the needs of a world poised for a wave of disruption.

Innovation has assumed a preeminent position in the world's economy, and so an institution's academic excellence will undoubtedly be tied to its ability to embrace innovation in all forms. Leadership within universities needs to examine trends in graduate employment, R&D, and community necessities, and universities need to respond to continue playing a critical and relevant role in society.



Top: Dr. Laoucine Kerbache, Chief Innovation Strategist, Qatar Foundation; and Dr. Michael Cottam, Vice President for Academic Affairs, Webster University.

Bottom: Dr. Nkem Khumbah, Chair, Africa Development Futures Group; and Ms. Alison Townley, Senior Advisor, American College Greece.



Top: Prof. Isabel Capeloa Gil, Rector, Catholic University of Portugal; and Mr. Chad Evans, Executive Vice President, Council on Competitiveness.

Center: Dr. Laoucine Kerbache, Chief Innovation Strategist, Qatar Foundation.

Bottom: Datuk Dr. Raduan Che Rose, CEO, National Council of Professors.

Solutions

Develop flexible education programs that adjust to current needs.

The speed of transformation through digital innovations changes the nature and pace at which skills and training have to adjust. This has a tremendous impact on the workforce; the training of certain professions might only last a few years before becoming outdated. The model of university education has not experienced any significant changes over the last centuries. Now, universities are faced with a dramatically different reality, and need to rethink the delivery of skills and adjust continuously to the new demands of the digital economy. "We are being pushed to rethink our mission, to be more entrepreneurial, and to reflect or transform what has been one of the most resilient products in the world." — Prof. Isabel Capeloa Gil, President, Catholic University of Portugal.

"I am managing a group of 2,700 professors at my council. We will have to make sure that we do not become dinosaurs in this era of change, but that we evolve with our universities, with our students and with the technology and innovation in education around us." — Dr. Raduan Che Rose, Chief Executive Officer, National Council of Professors.

Engage with industry to develop fruitful collaborations and real-world experience for students.

With employers seeking specialized and practical skills from graduates, universities have to shift their educational model from highly structured curricula towards awarding credit based on tasks and non-classroom experience. University education and industry experience

are no longer sequential. Students will be able to gain real-world experience early on in their careers and develop relationships with possible future employers. This provides companies with a pool of talented future innovators and recruitment opportunities, and gives universities the opportunity to adjust quickly to new employer needs for professions and skills, and to create a higher value university education. "Engaging with industry will be important, not only for students and their potential future, but it will also have a direct positive impact on the economy if we connect future innovators with future employers." — Prof. Laoucine Kerbache, Chief Innovation Strategist, Qatar Foundation R&D.



See the GFCC *Optimizing Innovation Alliances* report for more information on university-industry partnerships

Think of education beyond the classroom and democratize education.

Universities exist in an increasingly globalized world. With many institutions of higher education opening branch campuses in distant countries, and nearly all having extensively diverse bodies of international students, finding innovative ways to integrate global components will be a primary challenge (and opportunity) for universities. Forms of digital learning may prove especially useful in this regard, and creating platforms for students to interact with their international peers will deepen the

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 “The world does not lack courses on leadership, but maybe it lacks examples of the particular type of leadership of people who had careers going back and forth between academics, government and industry, and who have managed to do and achieve really interesting and cool projects.”

Prof. Steven Miller
 Vice Provost for Research
 Singapore Management University

value of universities as forums for global integration. “Five years ago we didn’t have any MOOCs. Today, we have blended online and pure online programs. In total, we have 30,000 online students in addition to our 72,000 on campus.” — Prof. Sethuraman “Panch” Panchanathan, Executive Vice President, Knowledge Enterprise, and Chief Research and Innovation Officer, Arizona State University.

Leverage challenges in global South to drive innovation and access talent. New digital tools have made it technically possible to reach future innovators around the globe. Emerging economies, particularly in Africa, have some of the youngest populations and could leverage their potential for development and growth. The notion of global challenges and the U.N.

Sustainable Development Goals (SDGs) framework are important reasons for the inclusion of underdeveloped and developing nations in this remarkable transformation.

Universities that are genuine in attempting to expand their international footprint must not limit their attention to affluent northern countries, and have the opportunity to engage in innovation and research in the global South. That would additionally enable, at the same time, addressing social obstacles at their root, via innovation, and engagement with a growing and partially untapped pool of creative potential. “The next Einstein might be African, because that’s where the youth and the potential for creativity is. [...] The success of the technology transformation will depend on the inclusiveness towards the developing world.” — Dr. Nkem Khumbah, Co-Coordinator, STEM-Africa Initiative.

Innovate the university system while maintaining its values and ethical purposes. While universities will have to adjust and innovate the ways in which they approach education, their teaching methods, their alliances, and beyond, one of the key purposes of universities remains the search for truth. With information — both accurate and inaccurate — being broadly available online, the university has to play a much stronger role in creating the ethical leaders and develop their critical thinking in the available sea of information.



Top: Prof. Sethuraman “Panch” Panchanathan, Executive Vice President, Knowledge Enterprise, and Chief Research and Innovation Officer, Arizona State University.

Bottom: Dr. Laoucine Kerbache, Chief Innovation Strategist, Qatar Foundation; and Dr. Michael Cottam, Vice President for Academic Affairs, Webster University.



See the GFCC *Global Competitiveness Principles* for more information on how competitiveness can be boosted in tune with the SDGs.

Leverage the potential of cities to unleash innovation.

The world is increasingly urbanized, and cities have plenty of problems. Urban challenges can be used to inform research priorities, organize education and university structures, and drive innovation initiatives, in partnership with business and policy partners at the city level, and other academic institutions.

A focus on city issues would give concrete incentives to local stakeholders to partner with universities, build local relevance and engagement, drive multidisciplinary, give students a chance to be fully immersed in the resolution of real-world problems they experience in their daily lives, and unleash innovation potential. ["In New York City, we teamed up with the Mayor and created university-linked incubators and other initiatives all across the city, and it just lit New York alive. We do more venture deals in New York today than in Boston. All that transformation happened in like just seven years."](#) — The Hon. Jerry MacArthur Hultin, President and Chairman, Global Futures Group Distinguished Fellow, Global Federation of Competitiveness Councils.

Implement tools and programs to engage students early on with universities.

A critical need for organizations in general and universities in particular is to fill the talent pipeline. As roles and relationships change in labor markets, and the education enterprise broadens its portfolio, universities should engage with students in new ways and moments. Giving students in secondary education the opportunity to experience university courses and, to some extent, university life, can benefit them in making decisions about future career paths and preparing for higher education, while increasing access to an extended talent pool, building influence, and helping reduce dropout rates. ["We have 400,000 students taking our Global Freshman Academy, free courses that students anywhere in the world can get a sense of what it means to be a freshman student. This is taken by students from 194 countries in all seven continents."](#) — Prof. Sethuraman "Panch" Panchanathan, Executive Vice President, Knowledge Enterprise, and Chief Research and Innovation Officer, Arizona State University.

Speed and Leadership

Universities are fundamental brain trusts for humanity and essential innovation engines for cities, nations, and the global community to overcome global challenges, create value, and build economic competitiveness and prosperity. To accomplish that, they need to partner with industry, government, investors, entrepreneurs, national labs, civil society, and international organizations. As concluded in the inaugural meeting of the GFCC University and Research Leadership Forum, held in 2016, universities "need to engage in an ambitious and kinetic mixing with the outside world" if they want to fulfill their potential as innovation, growth, and prosperity engines. We invite the reader to explore the GFCC Convergence & Circulation Report for an account of these discussions.

The conversations in this second meeting shed light into new ideas and made it crystal clear that universities need to increase the speed with which they respond to outside demands and engage with partners to help solve complex and increasingly multidisciplinary problems. They are required to do that across the board, from localized engagements with industry to large-scale global projects.

Building on the notion that universities have to be entrepreneurial, and engage purposefully and strategically with outside stakeholders, widely explored in 2016, it was agreed that a renewed focus on internal

transformation is needed to enable and catalyze innovation engagements. Universities recognized as innovative and entrepreneurial have been aggressively transforming their processes, structures, careers, and performance evaluation systems. They are also investing to prepare faculty and provide them the necessary business infrastructures — in functions such as project management, finance, procurement, communications, etc. — to effectively engage with outside partners.

Universities are required to engage with more partners and also do new types of things, play new roles, and work in different ways. One emerging trend is universities playing expanded roles in big, bold, transformational technology projects. A renewed focus on leadership is needed for that.

From an internal perspective, leadership is necessary for universities to transform their own strategies, structures, and operations. More importantly, it is a key attribute for different types of expanded engagements with industry and society, including the initiation and implementation of large-scale projects. The capacity of universities to be effective in these endeavors depends on how they attract, prepare, and accelerate leaders in faculty and staff. New practices and renewed attention are needed for that.



Top: Prof. Mohamed Ibrahim bin Abdul Mutalib, Vice Chancellor, Universiti Teknologi PETRONAS; Dr. Roberto Alvarez, Executive Director, GFCC; and Prof. Sethuraman "Panch" Panchanathan, Executive Vice President, Knowledge Enterprise, and Chief Research and Innovation Officer, Arizona State University.

Bottom: Prof. Jouko Väänänen, Vice President, University of Helsinki.



The *Optimizing Innovation Alliances* report includes a variety of practices that universities use to leverage outside resources, including innovation platforms.



Top: Prof. Christoph Hock, former Vice President for Medicine, University of Zurich; and Dr. Michinari Hamaguchi, President, Japan Science and Technology Agency.

Bottom: Dr. Simon Peter "Pete" Worden, Chairman, Breakthrough Prize Foundation.

Various practices related to external engagements were discussed in this 2017 edition of the Forum. A shared understanding was established around the notion that university voices should intentionally and purposefully engage in public debate, but also in collective design efforts in partnership with key local and national stakeholders. Investments in dialogue processes and frameworks are instrumental for universities and important for nations to move forward their technological and societal agendas. They enable universities to shape the context for large-scale technology projects, but also create the relationships that are much needed to build innovation alliances and accelerate the translation of research into solutions for real world problems.

Citizens and politicians around the globe are calling for more visible benefits for the investments made in science and technology. Organizing university innovation initiatives in partnership with industry around real-world problems and humanity challenges — not disciplines — is

a practical way of addressing that, boosting innovation and expanding the relevance and impact of universities in society. Multidisciplinarity is at the heart of the approach and various models can be used: from global grand challenges centers to mega-scale "solve for x" projects in which industry and universities create solutions to realize a certain future vision.

A big topic for the inaugural Forum meeting was the opportunity for universities to leverage outside resources such as capital, expertise, facilities, etc. That would not just boost opportunities for innovation, but also accelerate university transformation. Nevertheless, it should also be noted that universities themselves are complex organizations, and outside partners take time and incur costs to connect, understand, navigate, identify partners, and make deals across university structures. It is in this context that speed was emphasized. Practices to tackle that include having a central office curating access to expertise and resources.

The importance of internally transforming universities can hardly be overestimated. Some of the most critical aspects highlighted in the Forum are related to how careers are designed and performance systems engineered. To cope with the dynamics of today's world, academic careers should allow for diverse paths, and different types of contributions to university work and society should be

incentivized. Leadership is essential to craft new value systems and steer behaviors that recognize such diverse contributions.

A new aspect brought to the conversation was about the unit of analysis on which to focus when optimizing innovation initiatives at universities. It was debated that there is a need and opportunity for university innovation practices to focus on teams in addition to individuals; that is, teams of faculty, staff, and students could be trained, mentored, and accelerated. While this has been widely recognized and done in business, it still is a new in academia.

The lifespan of companies has been reduced, the lifespan of corporations and the shelf life of knowledge was never so short. These are undisputable outcomes of rapid advances in technology. At the same time, the world is experiencing a massive change in demographics. The combination of such transformations converging on society simultaneously creates new opportunities and requires new practices for education, such as having more flexible education programs and leveraging technology for their delivery. It also reshapes the geography of opportunities to source talent and engage in innovation initiatives.

Global challenges are more pressing in fast-growing and population-expanding nations in the global South

than in advanced economies. The gap between the location of research and technology capabilities, and the challenges on the ground has to be closed; new global innovation alliances are needed, and universities can play leadership roles in those initiatives.

On the one hand, universities need to actively engage in global conversation and platforms to find opportunities and connect with partners. The GFCC is happy to be a global tool for multi-stakeholder engagement. On the other hand, large-scale projects in areas such as space, health, security, climate, the oceans, and others require innovative solutions for their governance and funding, and can even require changes in existing international regulations or the implementation of new ones. Universities have to be part of that process, not just represented by faculty, but as entities.

The fundamental takeaway from this Forum's edition could not be clearer: in a fast-paced world of increasingly interconnected realities, universities need to move faster when engaging in innovation and prepare leaders to take elevated roles in large-scale initiatives. Together with the content of the GFCC *Optimizing Innovation Alliances* and *Leveraging Extreme Innovation* reports, the practices highlighted here provide insightful hints on some of the solutions for that.



Prof. Mohamed Ibrahim bin Abdul Mutalib, Vice Chancellor, Universiti Teknologi PETRONAS.

Optimizing Innovation Alliances

- What practices do universities have to engage with outside partners in innovation?
- How are they evolving?
- What are the key trends?
- What do they have to say to university operations?



Leveraging Extreme Innovation

- How do universities take part in extreme innovation projects?
- What are the impacts for society?
- How could universities better engage in extreme innovation?
- What structures, capabilities, and functions are needed?



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Prof. Edward Byrne AC

President and Principal
King's College London

- 8 conceptual categories
- 52 archetypes of practices
- 400 practices reviewed
- 3 generations of practices identified
- 7 key trends

- 17 transformational technology projects
- 80 countries involved
- \$250bi+ in funding
- 7 key findings
- 5 overarching recommendations

The Forum in Review: Collective Work and New Steps Ahead

Following the inaugural meeting held in London in late 2016, Forum members engaged in a series of conversations that led to the launch of two task forces — Optimizing Innovation Alliances and Leveraging Extreme Innovation — in June 2017. The months that followed included dozens of calls and interactions with university leaders and chief executives of globally-relevant large-scale technology projects. Such effort resulted in two draft reports that were initially discussed in Kuala Lumpur, Malaysia, during the meeting here reported.

The effort undertaken by the task forces was only possible because GFCC university members devoted time and allocated resources to the endeavor. The involvement and support of the universities co-chairing the task forces was essential.

The GFCC team based in Washington, DC worked on a constant basis with colleagues at the University of Zürich, Qatar University, King's College London, and Arizona State University in implementing the work plan of the task forces. Two core teams were formed and had biweekly interactions for almost a year.

The GFCC owes a big thanks to the co-chairs — Prof. Michael Hengartner (University of Zurich), Dr. Hassan Rashid Al-Derham (Qatar University), Prof. Sethuraman

"Panch" Panchanathan (Arizona State University), and Prof. Edward Byrne AC (King's College London) — for their guidance and support during the work of the task forces, but also to leaders such as Chris Motthershead at King's College London and Christoph Hock at the University of Zurich, who embraced the cause, secured resources, and were directly involved with the work, taking part in the 2016 and 2017 meetings of the GFCC University and Research Leadership Forum.

In addition to the work of the task forces' core teams, a variety of GFCC members joined calls, provided insights and comments, reviewed documents, and submitted content on university innovation practices that directly implement or enable innovation initiatives. In total, 18 universities informed practices that were analyzed by the Optimizing Innovation Alliances task force and are included in its final report.

The task forces were also supported by many other GFCC members — the Council on Competitiveness, the Brazilian National Confederation of Industry, Japan Science and Technology Agency, Lockheed Martin Corporation, Xinova, and others submitted content — and several outside partners. All of them were fundamental to the Forum's work and development of the content included in the task force reports.

In short, the GFCC University and Research Leadership Forum had an intense agenda between its two initial meetings and continuing in the initial months of 2018. It managed to work and succeeded in creating original content, mostly because the Forum and the GFCC itself leveraged outside resources and mobilized the capabilities of members.

On a personal note, I need say that working directly with Adriana Kuiper (Arizona State University), Mahmoud Abdulwahed (Qatar University), Maria Olivares (University of Zurich), and Matthew Johnson (King's College London) was an honor and an incredible learning experience. In different ways, they made fundamental contributions to this collective endeavor. They and their teams did research, interviewed university leaders and heads of technology projects, created content, submitted information on their own universities, and more. In the particular context of the Leveraging Extreme Innovation task force, it was very important for Matthew to spend a week in the United States working in the GFCC office. To them, I would like to extend the GFCC recognition and gratitude. Above all, I want to recognize and thank Yasmin Hilpert, my innovative colleague for her hard work on this initiative as part of the GFCC team.

The results of the Forum's 2016-2018 work are captured in two reports to be published soon by the GFCC. As we prepare for its 3rd meeting, to be held in September 2018 in Buenos Aires, Argentina, the Forum moves into a new phase. The dissemination of the findings included in the reports, direct engagement with members to support the adoption of cutting-edge innovation practices, and the exploration of new avenues of investigation and action lie ahead.

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Malaysia

Universiti Teknologi PETRONAS

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Mexico

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University of Minho

Qatar

Qatar University

Weill Cornell Medicine - Qatar

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Queen Mary University of London

Ulster University

University of Southampton

University of Warwick

United States of America

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Georgetown University

Michigan State University

Northeastern University

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University of North Carolina at Chapel Hill

University of South Carolina

Webster University

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