

Third Annual Design Summit

SUTD-MIT IDC

January 14-16, 2015

Venue: UE Convention Centre, 4 Changi Business Park, Avenue 1, Singapore

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Welcome!!

Welcome to the Third Annual SUTD-MIT International Design Centre (IDC) Summit. The Summit is held in January each year and brings together SUTD and MIT PIs, external partners, researchers, and students in Singapore for a two-day, off-site workshop and sharing session. Each year the Summit includes a theme with clear objectives to advance the IDC, speed-networking sessions, short vignette presentations of research, and breakout group sessions to plan for strategic, “da Vinci” and pinnacle

design ideas for the IDC. The first two summits were highly successful in integrating efforts across the IDC and in arriving at mutual understanding of the concept of design as experienced across multiple disciplines.

We will build on the success and momentum of the last two Summits with this year’s theme of Advancing Design Science and Research: Convergent Research, Design Research Methods, Partners in Practice, and Pinnacle of Design. This

theme is critical for the next steps in growth of the IDC, especially in creating a hub for design in Singapore, the Southeast Asia, the U.S., and globally. Sessions in this year’s Summit are designed to engage the multiple facets of this theme, especially in cementing deep partnerships and dialogue.

Enjoy the Summit and seek to innovate together!!

The SUTD-MIT IDC Honors Our Special Guests

While the first two years of the IDC Summit sought to create long-lasting relationships of faculty, researchers and students across the Centre, this year’s Summit is expanded to focus on our international partners from academia, government organizations, and industry.

We are privileged to have Mr. John Lim and Ms. Lee May Gee from MOE, our primary sponsor. We are honored to have Prof Lucienne Blessing from Luxembourg University,

Prof Steve Culley from Bath University UK, Mr. Chandran Nair from National Instruments, and many distinguished leaders from Singapore’s government organizations and multi-national industry.

We are also honored by the participation and support of the SUTD leadership, including Ambassador-at-Large and Chairman of the LKY CIC, Prof Chan Heng Chee, President Tom Magnanti, Provost Chong Tow Chong, Associate Provosts Martin Dunn, Pey

Kin Leong, Lim Seh Chun, and Yeo Kiat Seng, and Heads of Pillar, Aditya Mathur, Jef Huang, and Karthik Natarajan.



IDC sponsored *Making Sense Exhibition*, Singapore National Design Centre, 2014

Design Science— Research and Practice:

- Exploring Convergent Research.
- Engaging Design Research Methods.
- Connecting with Partners in Practice.
- Developing Pinnacles of Design.

The SUTD-MIT IDC

The SUTD-MIT International Design Centre (IDC) is a world premier scholarly hub for technologically-intensive design science, research and practice. It is a multi-million dollar Centre based both in Singapore at SUTD, and in Cambridge, MA, USA at MIT, with academic and industrial partners from around the world. IDC faculty, researchers and students work together to design devices, products, systems, services and the

built environment that address strategic needs of Singapore, the greater Asian region, the US, and the global community. At the same time, the IDC studies and advances the design process and design science, seeking to develop new tools and methods for design practice and education. The IDC is organised and concentrates its efforts on three Grand Challenges: Sustainable Built Environment, Design with the Developing World, and

ICT-enabled Devices for Better Living, in conjunction with six Design Research Thrusts: Experimental Design, Fostering Creativity, Visualisation and Prototyping, Design Computation, Decision Making, and Global Collaboration. Through this concentration, the IDC creates quality research, talent, curricula, and value for the innovation ecosystem.

"...IDC has quickly emerged as one of the world's top 10 research centers in design... The research achievements of IDC so far are excellent in all regards..."
-International Review Panel Report, 2014

IDC Status and Convergent Research

The Third Annual SUTD-MIT IDC Summit kickoffs with status presentation of the IDC and an introduction to the thematic sub-area of convergent research.

Since its inception four years ago, the IDC has generated over 750 publications, 95 international awards and accolades, 30 patents issued or in process, 70 grants totaling tens of millions of leveraged funding, and 50 creations, spanning the range of artefacts, processes,

curriculum, software, installations, and systems.

A primary premise of the IDC is the balancing of traditional disciplinary research and contemporary convergent research, i.e., achieving higher levels of integrative research across disciplines. The unique SUTD structure, culture, and programs, along with the IDC project model, provide an environment for achieving this balance. In the second part of this session, led by

Assoc Provost Martin Dunn, the basic concepts underlying convergent research are discussed. These concepts are cast in the context of dynamic networks of research networks across the dimensions and scales of centres, laboratories, and PI-level projects. The IDC, and more generally SUTD, has the opportunity to explore, prototype, test, and study the mechanisms of convergent research in new and exciting ways.

Partners in Practice: Government Organizations and Industry

After sharing the status of the IDC and discussing convergent research concepts, PIs will present their IDC research projects during two parallel presentation sessions. Participants will engage in dialogue across the projects, Grand Challenges, and

Design Research Thrusts of the IDC.

These presentations will be used as a springboard and foundation to discuss relevant opportunities with our partners in practice, both government organizations and industry. Mr. Chandran

Nair will catalyze the discussion with a keynote of design from an industry perspective. Prof Kevin Otto, Associate Director of the IDC and Associate Pillar Head of EPD, will then moderate a dynamic panel discussion with distinguished leaders from across Singapore.

Industry Keynote Address

We are honored to have Mr. Chandran Nair as our industry keynote speaker, focusing on Design and Business. Mr. Nair has been the Managing Director for National Instruments Singapore since 2003, where he is responsible for running the National Instruments business in Southeast Asia. Under his leadership, NI Singapore has successfully expanded its business regionally, setting up operations in Malaysia, Thailand and Philippines. With his directives, NI has grown its market share

exponentially in Southeast Asia.

Mr. Nair started his career in National Instruments as an Applications Engineer in 1997. He took on additional responsibilities as a Product Manager in leading the modular instrumentation platforms. In 1998 he successfully led the initiative for a new Instrumentation Standard PXI that became the current industry-standard platform. As a Group Manager for Product Marketing in 2000, Mr Nair was responsible for driving the product strategy and

market positioning for the instrumentation product lines in National Instruments.

Mr. Nair graduated with a bachelor degree in Physics, Mathematics and Chemistry from Bangalore University in 1990 and thereafter obtained two master degrees in Mathematics from Bangalore University and Arizona State University respectively.

Mr. Nair has also served on the board of many industry standardization bodies, including the VXI Consortium and PXI Systems Alliance.

Government Organisations and Industry Panel Discussion

Following the Industry Keynote Presentation, leaders from government organizations and industry will engage in a moderated panel discussion, where exemplary topics and questions include:

- What are the key challenges organization, policy and market challenges facing Singapore and the world?
- What critical technological, process, and design advancements are needed?
- How will sustainability and innovation co-exist in your organization, especially in the context of growing urbanization and an ageing population?
- The PM of Singapore, in recent speeches, has underlined the need for a Smart Nation. How is your organization or industry involved in achieving the goals of a Smart Nation or Smart Cities? What are the essential elements that need to be developed?
- Societal needs, dynamic markets, and the connected world community demand new models for an integrated government, industry, and academic ecosystem. What initiatives are needed to grow and evolve this ecosystem?
- What important skills sets from design are needed by professionals?



Large Scale Prototyping Project, IDC, 2014

Keynote Design Research Presentation I

The IDC is honored to host Prof Lucienne Blessing as our initial Keynote speaker on Design Research during day two of the Summit. Prof Blessing will coordinate an one-hour presentation and discussion on Design Research Methods: Past, Present, and Future. This is a critical topic for the IDC at this Summit, in the context of convergent research and partners in practice. In fact,

according to the recent IRP review of the IDC: "...efforts towards technology development and design science research need to be balanced and well integrated in IDC projects. "...efforts towards technology development and design science research need to be balanced and well integrated in IDC projects..."

Prof Blessing is an internationally renowned leader in design research. Her research interests include: empirical studies into the product development process, design methodology and theory, methods for early design stages, product service systems, user interface design and user experience, diversity, and design research methodology.

Keynote Design Research Presentation II

We are honored to host Prof Steve Culley as the second Keynote speaker on Design Research. Prof Culley is an internationally recognized leader in engineering design, and is Head of Design and Manufacturing at Bath university, having worked in the Steel, Fluid power and

Rubber Industries. His research is centered in the engineering design field, where the focus is on the provision of information and knowledge to support engineering designers. Prof Culley will lead a one-hour presentation and discussion

session on design research, especially as it relates to the full value chain of design and manufacturing. This presentation and discussion will include Prof Culley's vast experiences and perspectives on the past, present, and future of design research.

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*"Undertake the Impossible.
Design the unexpected"*

The IDC staff and leadership, including co-Directors Profs Kristin Wood, John Fernandez and Chris Magee and Associate Director Prof Kevin Otto, wish to extend our gratitude for your participation in this year's IDC Summit. We look forward to the lively conversations, numerous ideas, and forging of new and long-lasting collaborations. The future is bright for the IDC and for the growth and impact of design science and practice.

The IDC gratefully acknowledges the support of the Singapore Ministry of Education, in addition to numerous other government and industrial organizations. We also acknowledge the dedicated efforts of our staff, including Dawn Chia (IDC Program Director), Rosnizawati Binte Sani, Erich Christian Elkins, Ifraim Sofian Faylasuf, and Christina M Morrison, in organizing and preparing the Third Annual IDC Design Summit.

Pinnacle of Design and Keynote Design Presentation III

During the second and third day of the Summit, participants will be engaged in working sessions on convergent research and pinnacle of design projects. These sessions include three sessions on generating pinnacle of design project and initial solution ideas, and one session on speed-networking as a mechanism to enable and discuss convergent research for the IDC.

The pinnacle of design sessions will be led by Prof Jeffrey Huang, ASD Head of Pillar, where the intent is to identify opportunities and initial solutions that represent pinnacle design

efforts from the Centre. Pinnacle design opportunities have the characteristics of being cross-disciplinary, "wicked" in nature (ala Rittel), impactful on society (making a difference and making a splash), recognized and appreciated by one or more groups or communities, and requiring innovative solutions that have not existed previously.

The IDC, along with our numerous partners and collaborators, are in a unique position to undertake pinnacle of design projects, given the IDC's scale, talent base, and range of cross-disciplinary

collaborations.

The third Keynote Design Presentation complements the pinnacle of design working sessions and overall theme of the Summit through a focus on discussing the Impact of Design Research on Practice. We are honored to have Prof Kevin Otto lead this presentation and discussion. Prof Otto will present perspectives on the past, present, and future of design research impact on practice across a number of fields. He will lead discussions on the key mechanisms for transferring and mapping design research to practice.



*Finger Reader, IDC,
2014*