



# Development concepts for future Imaging and Image Guided Surgeries - Exponential Technologies and Reverse Innovation

**Feb 8 to 14, 2019**

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## Overview

***LEARN, PLAY, PARTICIPATE, INNOVATE, VERIFY, ADAPT, STARTUP — a seminar on successful concepts for Medical Technology developments employing Exponential Technologies, Design Sprints, Innovation Games, and much more.***

Exponential technologies are generally described as something that will—in a given time period—double data generation/evaluation and/or half the associated cost with it. The terminology is actually only proven for the Information and communication technology (ICT) segment at the moment, where according to Moore's law the complexity of processors and the cost per transistor follow that path for many decades now. An example from Medical technology is the cost of genome sequencing that has dropped from millions to thousands and now to under USD 100 within a little more than a decade. In many other areas there are potential and hope that certain technologies could lead to significant clinical knowledge gains and procedure improvements combined with cost reductions. But is this just a hype or something that in combination with other emerging technologies could really provide solutions for the problems that we will face in present and future healthcare delivery? Specifically, the increasing life expectancy and the ageing societies in combination with less and less available healthcare staff, ever increasing cost associated with healthcare delivery/products and services, or the inequalities between rural and urban areas particularly in developing nations that need to be addressed urgently.

This program will present the potential impact of these technologies — dedicated to Medical Technology product and service ideas — on the future challenges of healthcare delivery with a particular focus on reverse innovation, where new technologies and delivery approaches will be first implemented in developing nations before being accepted and adopted by the developed world. It will also point out some changes that need to be implemented by universities for the education of future medical technology developers and the effect that could have on entrepreneurial opportunities.

The I3EME approach — Identify, Invent, Implement by Engineers, Medical Staff, and Economists — developed by the lecturer will be used as base concept.

Course participants will learn the topics through lectures and hands-on work combined with team assignments, an introduction into design sprints, agile thinking, and several other innovation games.

This will be an intense lecture series - be prepared to invest the entire day plus a little bit on every lecture day. You will also be asked to prepare a presentation and poster of a relevant assignment that will be discussed and improved during the lectures.

<b>Dates:</b>	<b>Feb 8 to 14, 2019</b>
<b>Venue:</b>	<b>B M S College of Engineering, Bull Temple Road, Bangalore-560019</b>
<b>You Should Attend If...</b>	<ul style="list-style-type: none"> <li>You are a research scientist or practicing engineer or industry personal in the field of Biomedical, Medical Electronics, Biotechnology, Electronics, Electrical, Instrumentation and allied area interested to learn how to identify Unmet Clinical Needs and subsequently invent meaningful problem solutions.</li> <li>You are Engineer or doctor or MedTech Entrepreneur interested to learn application of exponential technologies and reverse innovation in your profession or who is interested in learning successful innovation generation concepts</li> <li>You are a student or faculty from academic institution interested in learning how to do research and work on topics with a high social and medical impact</li> <li>You are generally interested in future technologies and their impact on healthcare delivery, as well as on utilising these technologies to work on service and product solutions for specific local, regional or dedicated needs</li> </ul>
<b>Schedule</b>	<p>Day1: <b>(Friday 8<sup>th</sup> February 2019)</b>: Introduction to Healthcare Innovation and Exponential technologies, Business Model and Value Proposition Canvas plus Design Thinking, Assignment, DESIGN SPRINT, Home work.</p> <p>Day2: <b>(Saturday 9<sup>th</sup> February 2019)</b>: Introduction to Healthcare Regulation and IP, Biodesign, Lean Engineering and Disruption, DESIGN SPRINT II plus Biodesign Advanced - Identify, Invent, Implement.</p> <p>Day3: <b>(Monday 11<sup>th</sup> February 2019)</b>: Healthcare Financing and Intellectual Property, Minimal Viable Prototype and Innovation Segments; Innovation Games and Conceptual Blockbusting, DESIGN SPRINT III.</p> <p>Day4: <b>(Tuesday 12<sup>th</sup> February 2019)</b>: Start-Up Basics, Healthcare Business Models, Case Studies about CIME Incubates, DESIGN SPRINT IV.</p> <p>Day5: <b>(Wednesday 13<sup>th</sup> February 2019)</b> Academicians and alumni as Incubates, Summary and last words to FINAL Presentations and Assessment, Student Incubation models and success stories, Case studies of Student entrepreneurs, DESIGN SPRINT V and Final Homework.</p> <p>Day6: <b>(Thursday 14<sup>th</sup> February 2019)</b> Seminar Summary, Final Presentations (DESIGN SPRINT's) and Poster Session, Short Assessment - followed by a joint Dinner with Participants and professors.</p>
<b>Fees</b>	<p>The participation fees for taking the course is as follows:</p> <ul style="list-style-type: none"> <li><b>Participants from abroad: US \$500</b></li> <li><b>Industry/ Research Organizations: Rs.5,000/-</b></li> <li><b>Academicians/ Faculty: Rs. 2,500/-</b></li> <li><b>PhD Students: Rs. 2,000/-</b></li> <li><b>UG/PG Students: Rs. 1,000/-</b></li> </ul> <p>The above fee includes all instructional materials, lectures, tutorials, laboratory usage charges internet facility and food/tea/coffee during the event.</p> <p>Number of participants are limited to 50 only.</p> <p>The participants will be provided with accommodation based on availability on payment basis.</p>
<b>Bank Account Details</b>	<p>Payment to be made through <b>NEFT/WIRE TRANSFER</b></p> <p>Name of the Account Holder: <b>GIAN –ML</b></p> <p>Account Number: SB A/C No: <b>50458452319</b></p> <p>Bank &amp; Branch: <b>Allahabad Bank, Hanumanthanagar</b></p> <p>Branch <b>IFSC Code: ALLA0212011</b></p> <p><b>MICR Code:560010007</b></p> <p>The participants will be provided with accommodation based on availability on payment basis.</p>

# The Faculty



**Prof. Micheal Friebe** has been involved in diagnostic imaging and image guided therapeutic products and services for more than 25 years, as founder / innovator / CEO / investor, and as scientist. After completion of an electrical engineering degree in Germany he spent 5 years in the US as R&D Engineer and Product Manager at MRI and Ultrasound device manufacturer in the Bay Area. In that time, he also graduated with a MSc. in Technology Management from Golden Gate University in San Francisco. In 1993 he returned to Germany to start his first company (Mobile MRI services) and work in parallel on his PhD in Medical Physics (University Witten, Germany, 1995). Since that time, he has started more than 15 companies, 5 of them as major shareholder / CEO and with that is very enthusiastic about teaching innovation generation topics and Medical Technology entrepreneurship. **Dr. Friebe currently is Fellow and affiliated professor with the chair for Computer Aided Medical Procedures (CAMP) at TU München, and a full professor of Image Guided Therapies at the Otto-von-Guericke-University in Magdeburg, Germany ([www.inka-md.de](http://www.inka-md.de)).** He is listed inventor of more than 85 patent applications and the author of numerous journal papers and congress abstracts. Dr. Friebe currently is a Board Member of three MedTec companies, as well as investment partner of a medical technology startup-fund. He is very passionate about nature, mountains, his family, and working with young people. Since 2016 he is a Distinguished Lecturer of the IEEE EMBS and a Senior Member of IEEE.



**Dr H N Suma** is currently the Professor in the department of Medical Electronics, BMSCE, Bangalore. She holds a UG Degree in Electronics & Communication from MCE, Hassan. Her PG Degree is in Bio-Medical Instrumentation from SJCE, Mysore. She holds a PhD from Mysore University. Her PhD thesis title was "Pattern Recognition Techniques for Regionalizing the Activity Patterns of the Human Brain using functional Magnetic Resonance Imaging (fMRI) data". She has 30 publications to her credit in international and national journals and conferences. She has undertaken collaborative projects with National & International Institutions/Hospitals: Biomedical Engineering school-Stanford University, FOETH-Oxford University, IISc, KIMSH, Raman Research Institute, NIMHANS to name a few. She has executed two funded projects. She is the Principal Investigator for two funded projects from DST and VGST. Her Research Interests are: Medical Imaging, Brain Mapping, Brain Warping, Neural Networks and Pattern recognition. She also serves as Academic Council Member for few autonomous colleges.



**Abhishek Appaji M** is Assistant Professor in the Department of Medical Electronics, BMS College of Engineering (BMSCE), Bangalore, India. He is a graduate from Massachusetts Institute of Technology (MIT) Global Entrepreneurship Bootcamp specialized in New Ventures Leadership and was invited to talk at MIT Beyond Food Bootcamp. He obtained his Bachelor of Engineering in Medical Electronics with University Rank from BMSCE and Master of Engineering (M.E) in Bioinformatics from UVCE, Bangalore. He is pursuing his research in Medical Image Processing from Maastricht University, the Netherlands. He is currently the Chair of IEEE Young Professionals Bangalore Section and Advisor for IEEE EMB BMSCE Chapter. He is co-founder of Glucotek Inc, Australia, a startup in Medtech space. He has also worked as research associate in Centre for Nanoscience and Engineering (CeNSE), Indian Institute of Science (IISc), Bangalore. He has two patents filed and more than 30 International/National journal publications and conferences to his credit. He has been a part of more than 45+ Invited expert talks in various conferences, Forums, and events. He has renowned laurels including International Best paper Award in Malaysia, MGH CamTech Jugadathon Awards, Gandhian Young Technological Innovation Award, Elderly care Hackathon (the Netherlands), Winner of Class 5 Massachusetts Institute of Technology (MIT) Global Entrepreneurship Bootcamp, etc.



Course  
Coordinators:

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B M S College of  
Engineering  
Bengaluru-560019  
[www.bmsce.ac.in](http://www.bmsce.ac.in)  
Course Registration:  
<http://www.gian.iitkgp.ac.in/GREGN/index>





**B M S College of Engineering  
(BMSCE)**



**GLOBAL INITIATIVE OF ACADEMIC NETWORKS  
(GIAN)**

## Development concepts for future Imaging and Image Guided Surgeries - Exponential Technologies and Reverse Innovation.

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**Global Initiative of Academic Networks (GIAN) Programme  
B M S College of Engineering, Bull temple road, Bangalore**

**Report on Conduct of GIAN Course**

<b>Title of GIAN Course</b>	<b>Development concepts for future Imaging and Image Guided Surgeries - Exponential Technologies and Reverse Innovation</b>	
<b>GIAN Course ID</b>	<b>175026H02</b>	
<b>Period of Course</b>	<b>8<sup>th</sup> February 2019 to 14<sup>th</sup> February 2019</b>	
<b>Name and Department of Faculty from B M S College of Engineering</b>		
<b>Course Coordinator</b>		
<b>Name</b>	<b>Dr H N Suma</b>	
<b>Department</b>	<b>Medical Electronics</b>	
<b>Co-host Faculty, if any</b>		
<b>Name</b>	<b>Appaji M Abhishek</b>	
<b>Department</b>	<b>Medical Electronics</b>	
<b>Name and Affiliation of International Faculty</b>		
<b>Name</b>	<b>Prof. Micheal Friebe</b>	
<b>Affiliation</b>	<b>Otto-von-Guericke-University in Magdeburg, Germany</b>	
<b>Name and Affiliation of National Faculty, if any</b>		
<b>Name</b>	<b>NA</b>	
<b>Affiliation</b>	<b>NA</b>	
<b>Structure of the Course</b>		
<b>Duration of course (1 week or 2 weeks)</b>	<b>1 week</b>	
<b>Number of credits (1 or 2)</b>	<b>1</b>	
<b>Total number of lectures in the course</b>	<b>20</b>	
<b>Number of lectures by International Faculty</b>	<b>15</b>	
<b>Number of lectures by Host Faculty</b>	<b>5</b>	
<b>Number of hours of laboratory/tutorial sessions</b>	<b>nil</b>	
<b>Participants of the Course</b>		
<b>Number of student participants</b>	<b>38</b>	
<b>Number of participants from Industry/ Research Organisations</b>	<b>02</b>	
<b>Number of Faculty participants</b>	<b>09</b>	

<b>Total Number of participants</b>	<b>49</b>
<b>Number of participants who credited for the course</b>	<b>NA</b>
<b>Course Generated Fund</b>	
<b>Sponsorship, if any (in Rs.)</b>	<b>Nil</b>
<b>Registration Fee Collected</b>	<b>Rs 26,500/-</b>
<b>Total amount</b>	<b>Rs 26,500/-</b>
<b>Interaction with International Faculty:</b> Project scheduling and ideation were discussed. Discussions about Incubations and Innovations in the host institution were presented as a lead for ideation for participants. Innovations under constraint in perspective of the two countries: India and Germany were looked into and considered for validation of project proposal by participants	
<b>Interaction of Host Faculty:</b> Host faculty were also practicing Stanford Bio-design strategy in one of the regular courses, this was presented as a lead to international faculty. Conducted multiple quizzes to get the participants update themselves with the composition of the course.	
<b>Interaction of other faculty from &lt;host Institute&gt;:</b> Some faculty from the host institute are into research and executing funded R&D projects. They could lead their teams with their expertise while the projects by the groups were ideated, discussed and debated	
<b>Interaction of faculty/researchers from other institutes/organizations:</b> The industry person discussed about the industry version of the process followed from ideation to productization. The other participant who was a doctor by profession could give suggestions about the possibility of developing a product: the need and the limitations based on his domain knowledge.	
<b>Signature of Course Coordinator</b>	
<b>Date of submission of report</b>	







A six day GIAN course on “Development concepts for Future Imaging and Image Guided Surgeries- Exponential Technologies and Reverse Innovation” was conducted from February 8<sup>th</sup> to 14<sup>th</sup> 2019. This course instructor was Professor Micheal Friebe, Professor at OVG University Magdeburg, Germany. The course attendees included students, faculty of BMSCE, clinicians and Industry experts from various parts “of India.

The first day began with an ice breaking session where we all participated in different activities and groups were formed. Professor Friebe joined us after lunch. The course began after a small inaugural session.

Professor Friebe began the lecture by speaking about Innovation and Understanding the Healthcare Issues and the Innovation Differences. He also gave us the Daily Course Setup, details about the constituents of the course everyday like the assignments, case studies, theory and the Recap.

Day 2 began by us discussing the day 1 summary in the group and also discussing them with Professor Micheal Friebe. On day 2 he introduced us to the Future HealthCare issues/problems and Innovation opportunities provided by these problems. He also spoke to us about the new technologies of the next decade and how to implement them in medical devices.

Professor Friebe then taught us to construct Alexander Osterwalder’s VALUE PROPOSITION CANVAS and an ELEVATOR PITCH for our Medical Device idea. We then had an activity where we designed a surgical room and cancer imaging+ therapy would look like in 2029 within our groups.

Professor Friebe also included many case studies about devices developed by him in his University. Post lunch Professor Friebe discussed about Exponential Technologies and the 6D’s of Exponential Technologies.

Day 3 also began with us discussing the summary points of Day 2 within the group followed by that with Professor Friebe. Professor Friebe then spoke about different types of thinking processes (Agile, Lean, Scrum, Sprint) and how one should be followed depending on the device being developed. We also created a FUTURE WHEEL for a Medical Device idea as an assignment in our respective groups. We created one for our idea on ‘Programmable Pills’.

He then discussed about Design Thinking Process where Traditional Thinking involves KNOW and DO but where Design Thinking involves KNOW- CREATE-DO. We all put up our idea forms on the board after lunch when dot voting was done and one idea for each group was selected based on the highest number of votes.

Professor Friebe then discussed about the Blue Ocean Strategy where he told us about how we can add to the value proposition that is new to the industry and remove/eliminate from industry’s standard that would make the Value Proposition stronger. We then created an Blue Ocean Strategy as a group assignment for our most important customer. We also created a SWOT for our idea.



Professor Friebe ended Day 3 session by discussing about Medical Directives used in different countries and assigning Homework to be completed for the next day.

Day 4 began with Professor Friebe discussing about Intellectual Property and Intellectual Property Wheel. He also discussed about basic requirements for filing a patent and the Design Sprint Mechanism.

We then had an assignment when we gave a Long term metric and long term goals for our medical device idea. He also discussed many case studies like 'Audio Guidance of Surgical Devices', 'Easy Injector' for dyes.

Day 5- After the discussion of summary of day 4, Day5 began with discussion about Innovation Financing where Professor Friebe told us at what stage stage of our innovation will an investor be ready to invest in our innovation also depending on the type of innovation (like melted, therapeutics, diagnostics).

He later discussed about Business Model Canvas and how to build a better canvas for our idea and how that helps in making a better Value Proposition Canvas. He also gave us Developmental Advice and spoke about Digital Health Future.

He further spoke about MOONSHOT Thinking where he told us that we must always think 10x more and not 10% more. He ended the morning session by talking about Reverse Innovation and how most of the problems in India and other Developing countries. He concluded the morning session by giving a case study on easy imaging technique developed by his team.

Post lunch all of us were given time to work on our presentations and documents for our presentation on the final day of the GAN Course. We also prepared videos depicting our product's function using various video making tools.

Day 6 began with a small lecture by Professor Friebe on Exponential Technologies after the day 5 review. Professor Friebe also suggested us books and blogs to buy/ sign up to relating to medical device innovation and other literature.

He also discussed 10 most important slides throughout his 6 day course on "Development concepts for Future Imaging and Image Guided Surgeries- Exponential Technologies and Reverse Innovation", following which all the teams/groups presented the ideas and got inputs from Professor Micheal Friebe and the teachers and other industry experts present. We then had an online test which was graded which marked the end of our 6 day course.



B.M.S.College of Engineering  
Bengaluru



सत्यमेव जयते

Ministry of Human Resources Development  
Government of India

## GLOBAL INITIATIVE OF ACADEMIC NETWORKS

### Sponsored Course

On

# Development concepts for Future Imaging & Image Guided Surgeries - Exponential Technologies & Reverse Innovation

8<sup>th</sup> to 14<sup>th</sup> February 2019

Organized by

Department of Medical Electronics

You are cordially invited for the Inaugural function

Chief Guest

**Prof. Micheal Friebe**

Professor Catheter Technologies, OVG University Magdeburg, Germany

Guest of Honor

**Dr Ravishankar Deekshit**

Vice Principal, BMSCE  
& Local Institutional Coordinator, GIAN

Presided By

**Dr. B.V. Ravishankar**

Principal, BMSCE

8<sup>th</sup> February 2019 at 2.00PM

Venue: FDC Hall, 1st Floor, PG Block, BMSCE

HOD, Medical Electronics

Dr S.B. Bhanu Prashanth

Host Faculties

Dr. H. N. Suma & Abhishek Appaji



The videos of GIAN ML Course on  
**"Development Concepts for Future Imaging and Image Guided  
Surgeries- Exponential Technologies & Reverse Innovation"**  
held from 8 to 14 Feb 2019 in the link below.

<https://bit.ly/2H7GoIq>