Health Technology Innovation Generation (+Translation + Entrepreneurship = Disruption) with Exponential Technologies (ExO HTI-TED)

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5 ECTS interdisciplinary Lecture (Online weekly Intro Lectures (2h each x 4) - 2 days On-Site (6h each) - Online weekly Follow Up Lectures (2h each x 4) - 2 days On-Site (6h each) with Individual and Team Assignments / Project Works + a final Exam for maximum 30 students (Bachelor / Master / Doctoral) from Engineering / Computer Science / Medicine / Health Economics

Exponential technologies (AI, Big Data, Deep Learning, advanced sensors / wearables, robotics) will cause a paradigm shift in healthcare delivery and eventually not only lead to different development value propositions, but will also see different roles for different stakeholders (e.g. an empowered patient) - see Figure 1 for more details.
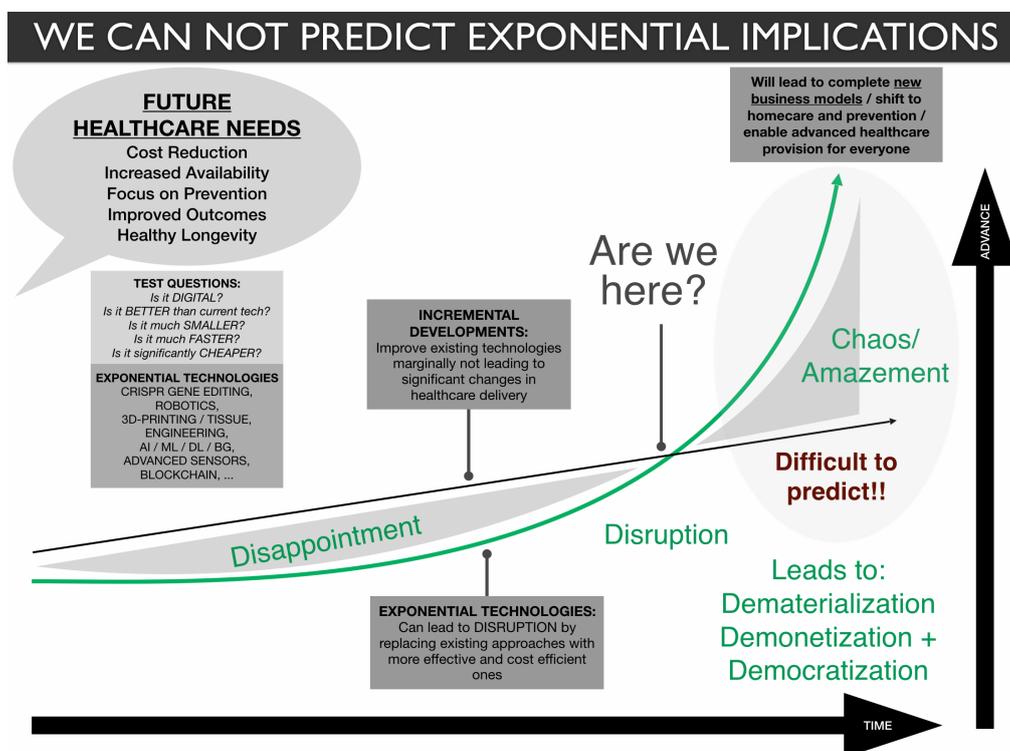

Figure 1: Exponential Technologies will disrupt healthcare delivery (copyright Prof. Friebe)

Healthcare is in need of INNOVATION and technologies for the digital transformation will cause unpredictable, but most likely very significant, workflow changes in healthcare delivery and associated business models and will also need to follow different development criteria and value propositions - see (6, 7) and Figure 2.

All health related stakeholders (politics, patients, clinical providers, health insurances, …) will need to adapt to these changes. New products will be needed for the shift from SICKCARE to actual HEALTH PROVISION, new business models will be developed and employed, and global challenges and concerns (equal and affordable healthcare provision) will need to be addressed.

This unique lecture will use an adapted Stanford BIODESGN approach of IDENTIFYING UNMET CLINICAL NEEDS, IDEATE solutions for these needs, iterate with the stakeholders and subsequently work on IMPLEMENTATION as start-up companies (1 - 5).

This will be combined with other VALIDATION models and experiments (PURPOSE LAUNCHPAD methodology, Alexander Osterwalders Value and Business Model Canvas, Exponential Canvas and Massive Transformative Purpose approaches) to properly understand the problem, the future opportunities and to create and validate ideas through Minimal Viable Prototypes.

Research in general is future oriented and in the particular field of HEALTHTEC INNOVATION should consider the effects and possibilities of new technologies and their effect and needs to work on TRANSLATING the results of research into clinical practice.

As INNOVATION is a combination of technical solutions with identifying the clinical need it is also necessary to understand regulatory issues and health-economics. The Future of healthcare will be data driven and will combine personal health records with a more comprehensive data and management structure requiring integrated devices, forensic information, advanced learning tools, and many more to eventually provide a digital twin that will then be able to manage, predict, and recommend personalized health related procedures and actions.

In this lecture the student will be

- involved in several future oriented innovation tools;

- will work in interdisciplinary teams on actual innovation projects in the concept and validation phase and prepare a prototype of a disruptive health innovation;

- will receive information about the status of healthcare, future developments, and the effect of exponential technologies;

- will be introduced to the PURPOSE LAUNCHPAD, Ethics and Exponential Canvas, Massive Transformative Purpose, Blue Ocean, Innovation Segment Concept, Exponential Technology Canvas, Value Proposition and Business Model Canvas, and associated entrepreneurial tools;

- will be detached from the focussed in-depth training and will learn to think out of the box and apply innovation methods to identify, create and validate exciting ideas and concepts;

- and will learn greatly needed 21st century soft skills (problem solving, empathy, team work, entrepreneurial and forward thinking, and many others).
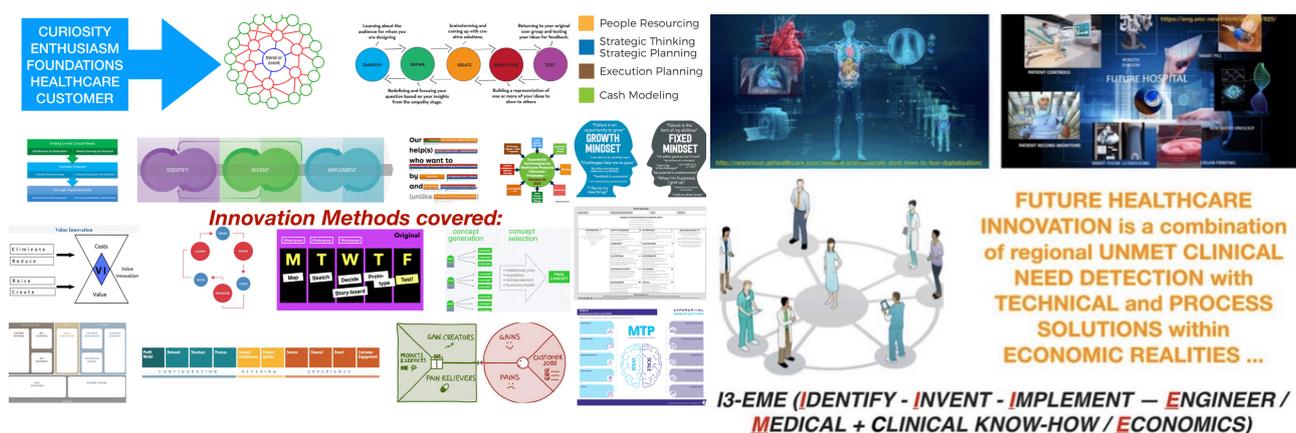

Figure 2: Innovation Tools covered in the lecture for a changing healthcare environment (6)

Teaching References:

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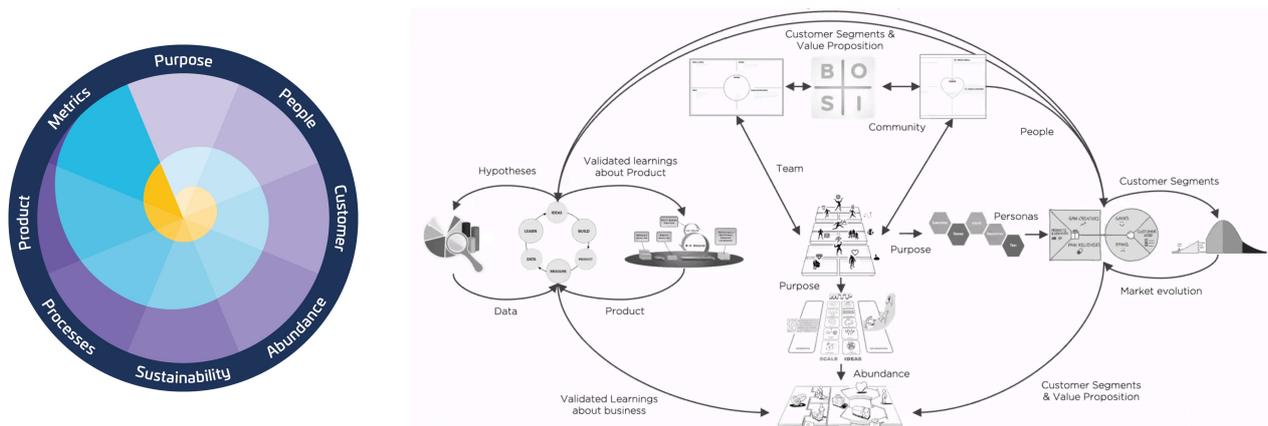
Figure 3: Purpose Launchpad Methodology for Healthcare Innovation Identification, Validation, and exponential growth concept — from www.purposelaunchpad.com

Keywords: Exponential Technology, Sickcare, Healthcare 4.0, Prevention, Engineering Education, Biomedical Entrepreneurship, Healthcare Innovation, Healthcare Start-Up, Scaling-Up, Ethical Design, AI Ethics, Exponential Organisations, Exponential Attributes, Scaling Up, Biodesign, Purpose Launchpad, Healthcare Democratization

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