SIEMENS Healthineers

White paper

Addressing healthcare needs with Innovation Think Tank global infrastructure and methodology

December 2021

Addressing the healthcare needs with Innovation Think Tank global infrastructure and its methodology

Prof. Sultan Haider, Founder and Head, Innovation Think Tank, Siemens Healthineers Erlangen, Germany

Abstract

There is a growing need for self-sustaining innovation infrastructures on healthcare providers and medical device manufacturers to meet their customer centric requirements. Innovation Think Tank (ITT) addresses this with its global footprint and innovative framework methodology. The purpose of this paper is to firstly outline the value propositions derived from best practice ITT implementations at Siemens Healthineers, universities, and hospitals and secondly to describe the ITT methodology developed and optimized based on experiential learning. A total of 150 projects from R&D, product definition, lab designs, and co-creation programs at 20 ITT global activity locations were selected for this paper. Projects and locations were chosen to represent ITT's global footprint, portfolio, and programs. Further, project outcome data was analyzed and clustered to optimize and validate the ITT methodology. The database of ITT co-creation programs and lab framework consisting of best practices from various locations was updated, which can be used to plan, build, and operate ITT locations and projects. The global ITT infrastructure with its portfolio provides opportunities for healthcare system stakeholders to engage in a sustainable way. The ITT methodology is independent of the type of projects and is applicable across the innovation lifecycles and industries.

Keywords: Innovation Think Tank, ITT Methodology, innovation lifecycle, co-creation, product and portfolio definition, Siemens Healthineers

Introduction

Healthcare systems globally continue to increasingly face highly complex challenges. In addition to generic solutions, e.g. in the field of digitalization and automation, there is a trend that healthcare institutions worldwide are looking towards establishing their own innovation and incubation structures locally to create tailored solutions to the needs of their patients and workforce **[1]**.

ITT **[2]**, founded in 2005, is a global infrastructure incorporating 72 activity locations (co-creation programs conducted/ established and labs) at Siemens Healthineers (SHS) and several of its partner universities and hospitals e.g. **[3-8]**. ITT methodology has been developed based on the experience of implementing and managing ITT locations and corresponding projects. Over the past 16 years it has evolved and applied to accelerate healthcare innovation lifecycles.

ITT empowers partner healthcare institutions to re-invent themselves and find customized solutions to their challenging problems. The ITT Labs offer a sustainable co-creation environment to work on 1) the deep dive projects e.g. disease pathways **[2]**, radiology workflow optimization **[9]**, digital twin **[10]**, etc., and 2) ITT Certification programs focus on engaging stakeholders and open innovation projects **[2, 4, 11]** 3) for developing patent and invention disclosures e.g. **[6]** etc. and 4) generating savings due to synergies, and 5) creating additional revenue potential stemming from new product offerings. ITT programs have been progressively transforming into incubation centers funded by joint public funding programs.

Materials and methods

Inputs from 150 project outcomes from 20 ITT activity locations in Erlangen, Kemnath, Forchheim, Magdeburg, Munich, Wuxi, Shanghai, Princeton, Gurgaon, Bengaluru, Dubai, Abu Dhabi, Cairo, Riyadh, Cape Town, London, Houston, Columbia, Istanbul and Ankara have been analyzed for this methodology overview. The projects ranged from designs of the ITT labs, product definition and R&D to co-creation and ITT Certification Programs **[Table 1]**. Table 1 also illustrates the consolidation of different backgrounds ranging from students and fellows to experts and physicians. Employees, projects and locations from these different backgrounds were chosen to represent ITT's global footprint, portfolio and programs. The projects and their life cycle stages were clustered to identify synergies and

improvement potentials to maximize the business impact. The best practices were added to the ITT database and the ITT methodology was refined for guidance to the teams. The value propositions were revised.

Category	Locations and project examples	Participants, project teams	Projects content analyzed	Impact KPIs # = Number of
ITT Co-creation and Certification program	Western University, Ontario, Canada, NYU - Abu Dhabi, SHS South Africa, ITT Texas A&M, Acibadem University, SHS Saudi Arabia, Baskent University and Hospitals, ITT University of South Carolina, SHS ITT India in collaboration with SHS ITT China, Georgia Institute of Technology, ITT Magdeburg in collaboration with Technical University of Munich, ERA Lucknow Medical College and Hospitals etc.	465 interdisciplinary participants, 60 institutions, 95 project, 30 countries	Business models, technology, disease pathways, presentations and feedback, challenges, and breakthroughs in digital hospital of the future, theragnostic and molecular imaging, robotics and interventional radiology, and technological advancement in medical imaging, healthcare system of the future	# Institutions engaged # Key Opinion Leaders engaged # Projects # Revenue potential due to new product offerings # Public funding applications # Savings and cost avoidance # Number of inventions and patents filed # Hospital workflows and customer needs analyzed #Time to market
ITT activity locations	ITT Headquarter, SHS Erlangen; Mechatronics Products, SHS Kemnath; Computed Tomography Performance Product Line, SHS Forchheim; Medical Electronics, SHS Erlangen, ITT SHS Shanghai and ITT SHS Wuxi, ITT SHS UAE, ITT SHS Saudi Arabia, ITT SHS Egypt, ITT SHS USA, ITT Bangalore and ITT Gurgaon etc.	60 participants, 40 projects	Customer insights and feedback, Product definition, Product roadmap, strategy workshops, technology development and validation	
Product and portfolio definition	Technologies and business models which can disrupt healthcare; Disease pathway elaboration; Requirement collection and MVP creation for the medical systems etc.	20 projects, 55 participants, 15 ITT SHS teams and partner universities and hospitals	Business models, technology, disease pathways, competitor analysis, presentations and feedback, customer workflow analysis, pain-points, stakeholders, decision propositions, outcome presentations	

Table 1: Example projects content analyzed during weekly project review meetings. The project categories are created by clustering the projects and are selected to represent the global portfolio from the last year. Highly diverse - both interdisciplinary and intercultural teams show a pattern of influencing each other when placed with common goals and examples from the previous projects, shortening on-boarding times and implement cycles. KPIs have been listed cumulatively in the last column for all the categories.

Results

It was observed while analyzing the sample project data for this paper, that ITT infrastructure, methodology and portfolio offerings have further evolved respective to the changing healthcare needs. The new definitions and facts and figures are now included into its global strategy and communication **[2]**.

The key value propositions for ITT labs for addressing healthcare institution challenges were clustered into following: 1) Creation of intrinsic innovation infrastructures to address their particular organizational challenges and needs, 2) Access to international research facilities and databases to position them in the research communities, 3) Innovative organizational change to enable conducting specific research and expertise development programs, 4) Continuous customer insights across the product life cycle to shorten TTM and to meet customer requirements and 5)Key differentiator in strategic projects. **[Figure 1]**

The database of ITT co-creation programs and labs framework consisting of best practices from various locations was updated. The database is used for planning, building and operating new ITT activity locations and co-creation programs e.g. ITT Lab design **[Figure 2]** and 3-D model designs for the customer world **[Figure 3].**

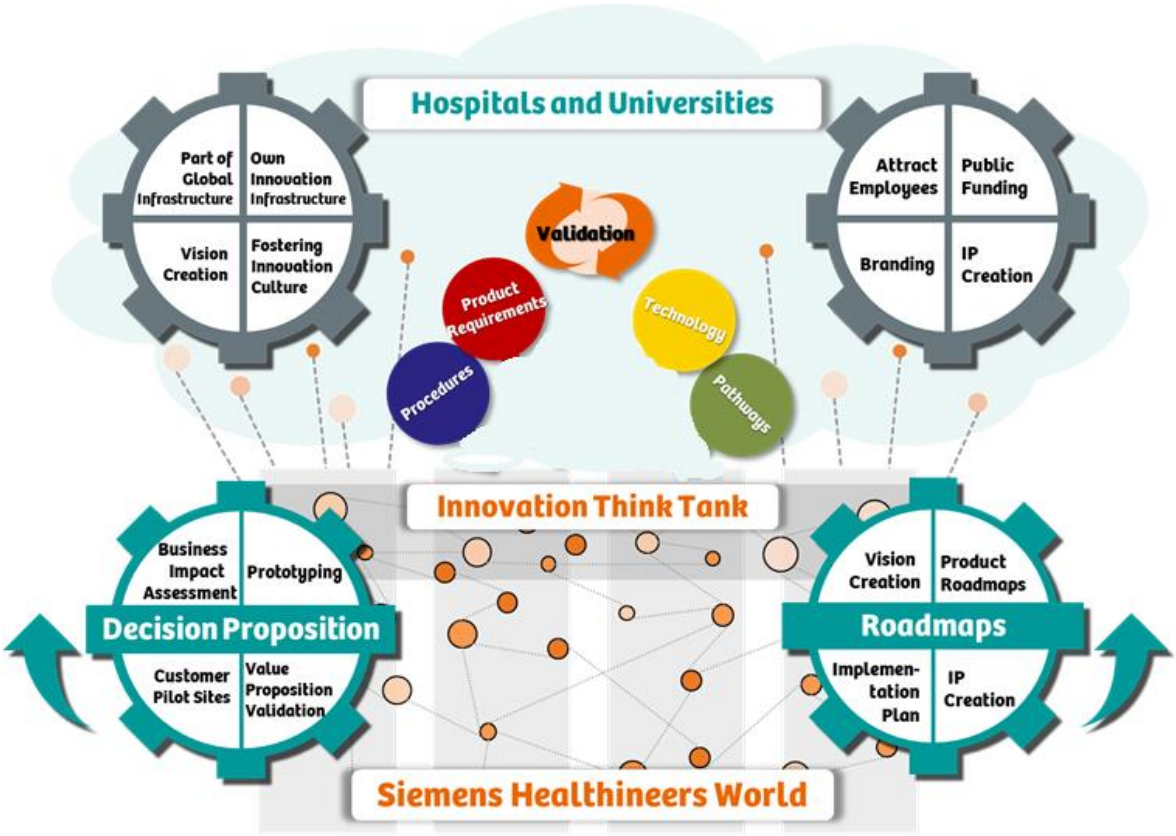

Figure 1: Innovation Think Tank value propositions are presented here for the host organizations. ITT supports different department within Siemens Healthineers by creating decision propositions and thus shaping the roadmaps. For hospitals and universities, it creates an own innovation infrastructure connected to global ITT locations and addressing organizational needs.

Figure 2: ITT lab design tool and database has been built with inputs from various ITT labs and programs worldwide which focus on different scopes and goals and thus need various resources (HW/ SW/ competence) to fulfill them. The labs have a customer requirement zone showcasing the workflow, pain-points and best practices, research and working zone and prototyping and implementation zone. The proximity of the zones is carefully designed to simulate creativity and optimize resource usage.

Figure 3: 3-D Model of the healthcare system stakeholders and disease pathways at ITT Lab in Erlangen, Germany. These models are a key element of the ITT labs and its methodology. During the big picture creation phase, these models support visualization of the customer pain-points, identification of the interdependencies, solution best practices and root cause analysis. Similar models have been built for radiology, labs, hospitals, product life cycles, departments within the hospitals and disease pathways etc.

The ITT methodology is presented into four steps: **A**cquire Mandate, **B**ig picture creation, **C**o-creation on decision propositions and **D**eploy commercialization **[Figure 4]**. The definition of the ITT methodology steps was created based on 1) the importance of the project stages with respect to the KPIs including revenue potential and saving etc. and 2) the simplification of process to ensure tangibility for the users. KPIs **[Table 1]** could be adjusted based on the project goals. It has also been observed in various projects that the steps could be overlapping or unessential due to the organizational maturity and degree of trust with stakeholders.

The project clustering showed the key portfolio elements of ITT that enable host institutions to 1) Create their own innovation infrastructures which address their project requirements, 2)Fashion decision propositions that include business impact assessment, identification of pilot sites and supports shaping of the roadmaps and 3) Fosters innovation culture and expertise development via its ITT Certification program **[Figure 1]**.

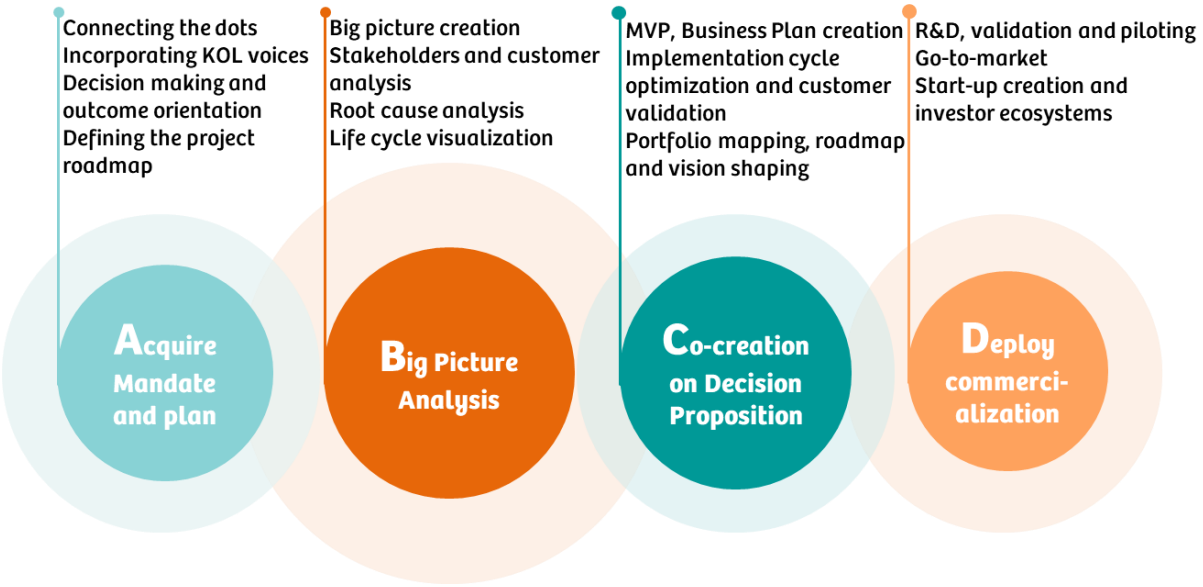

Figure 4: The Innovation Think Tank Methodology - enabling innovation across product life cycle with 4 steps. Acquire mandate as name signifies highlights the importance of defining the right project scope for maximizing impact. It comprises connecting the dots between various events, outcomes of the previous projects, key opinion leader voices, decision making and outcome orientation resulting in achieving project contacts that includes already a project roadmap defined by the team. Big picture creation highlights the importance of holistic view and includes observations of the customers environments and visualization of the lifecycle [Figure 3]. A decision proposition could be an MVP, a prototype or a business plan and results in portfolio mapping, roadmap and vision shaping and acquisition of further contracts. Deploying commercialization step could happen within R&D teams of the host organization or at a supplier or a start-up created out of the organization. The early engagement in investor ecosystem is provided with stakeholders.

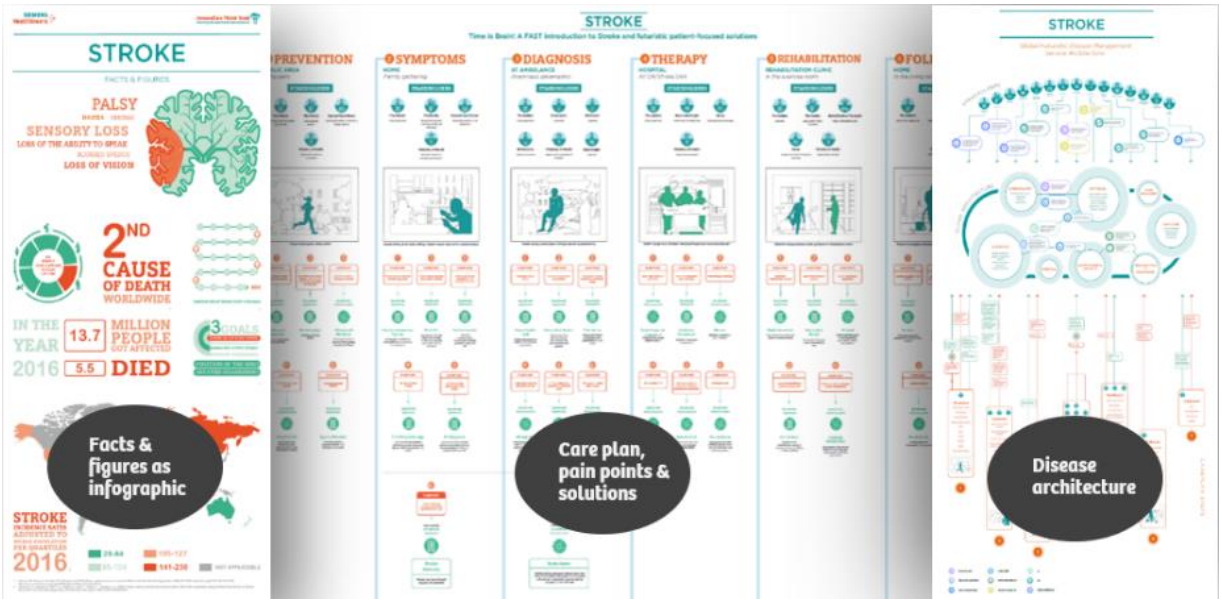

Figure 5: Stroke Disease pathways have been created along with facts and figures and futuristic solution architecture along for other 22 diseases by ITT teams [2]. The diseases have been chosen who have the highest economic burden and mortality rate identified by the World Health Organization. ITT regional co-creation and labs support the adaptation of the disease pathways on global trends and challenges.

Discussion

Oversimplification of the innovation process and structures, without considering the customer expectations and importance of persistent efforts to gain the trust of the stakeholders has been observed as a limitation for their successful implementations. Another challenge is the lack of business models to sustain and deficient measurable KPIs. ITT addresses these gaps with its methodology and global footprint.

Being applied to healthcare projects, ITT intrinsically addresses complexity of the changing environments, customer behaviors, regulatory requirements, etc. ITT methodology is applied to a variety of fields needed to create medical product and solutions for healthcare providers e.g. mechatronics and medical electronics components, medical devices, generating and validating requirements, workflow optimization, operational efficiency, business model development, commercialization etc. The experiential learning during acquiring projects and the location of project implementation together shape the ITT methodology with novel problem-solving approaches in frequent cycles. The long years of R&D projects experience combined with a focus on product and portfolio definition projects and healthcare provider projects have resulted in creating a strong brand value for ITT. The program attracts and develops talents and has been implemented at a number of prestigious institutions with some adopting if into their curriculum and expertise development programs. In the last 12 months, over 1500 participants from over 50 universities, hospitals and government bodies took part in the ITT programs focusing on the *future of healthcare*.

The exceptional presence at both healthcare providers and medical device manufacturers make co-creation of customer centric healthcare solutions possible with more efficient market delivery. This also results in the exceptionally fast implementation of new locations and a continuous innovation value streams between the locations.

The high adaptability of ITT, trusted partnerships and brand perception were observed as the key success factors during the COVID 19 pandemic. In the beginning of the lockdown, most of the demand on engineering and co-creation projects needed to be addressed on the basis of existing knowledge within ITT and virtual engagements with partner institutions. However, in few months this proved to be a very efficient way of working and showed a record growth of 40% in overall project volumes, interactions, and number of invitations to set-up new ITT locations.

The ITT business model enables the activity locations to be self-sustainable: The beneficiary stakeholders, mainly the host institutions contribute resources for the infrastructure, the ITT location customers pay for 1) the usage and 2) products, generating a recurring revenue.

Conclusion

The global ITT infrastructure with its portfolio provides opportunities for healthcare system stakeholders to engage in a sustainable way. The ITT methodology is robust to the type of projects and applicable across the innovation lifecycle. The holistic view on the stakeholders and real time customer insights results in incorporating into the product requirements and shortening time to market. Moreover, ITT supports institutions to adopt an innovation methodology that will allow them to intrinsically identify and approach challenges in their healthcare systems. This will develop a mindset in healthcare workers and institutions that enables them to grow into the contemporary future of healthcare.

References

1. Enabling healthcare institutions to establish innovative and sustainable infrastructures, P-10-15, 2021, Healthcare Guide - Partnerships and Perspectives of Arab-German Cooperation, https://ghorfa.de/wp-content/uploads/Health_Guide_2021_web.pdf
2. Innovation Think Tank, Siemens Healthineers https://www.siemens-healthineers.com/en-sa/careers/innovation-think-tank
3. Innovation Think Tank, University of South Carolina https://ittlab.cec.sc.edu/
4. Innovation Think Tank Imperial College London, 2021 https://www.imperial.ac.uk/bioengineering/whats-on/events/siemens-innovation-think-tank/
5. Innovation Think Tank, Baskent University, Turkey 2021 http://itt.baskent.edu.tr/#
6. Innovation Think Tank, Acibadem, Turkey 2021 https://biyotasarim.acibadem.edu.tr/?page_id=20
7. Fakeeh University Hospital partners with Siemens Healthineers to drive greater efficiency and innovation in healthcare

delivery, 2021 https://fuh.care/media-center/fakeeh-university-hospital-partners-with-siemens-healthineers/
8. Innovation Think Tank, Era's Lucknow Medical College and Hospital https://www.erauniversity.in/innovationthinktankeu/index.html
9. M. Mahmeen, S. Haider, M. Friebe, and M. Pech, "Mapping and Deep Analysis of Hospital Radiology Department to Identify Workflow Challenges and their Potential Digital Solutions," 2021.
10. Newrzella, S. R., Franklin, D. W., & Haider, S. (2021). 5-Dimension Cross-Industry Digital Twin Applications Model and Analysis of Digital Twin Classification Terms and Models. IEEE Access, 9, 131306–131321. https://doi.org/10.1109/ACCESS.2021.3115055
11. Fritzsche, H., Barbazzeni, B., Mahmeen, M., Haider, S., & Friebe, M. (2021). A Structured Pathway Toward Disruption: A Novel HealthTec Innovation Design Curriculum With Entrepreneurship in Mind. Frontiers in Public Health, 1300.
12. Method and system to optimize and automate clinical workflow, H Schneider, S Haider, US Patent 7,895,055
13. Imaging modality and method for operating an imaging modality, S. Haider, S Popescu, US Patent App. 4/624,772
14. Positioning of a mobile x-ray detector, A Deinlein, T Dippl, S Dornberger, M Fuhrmann, S Haider, R Nanke, US Patent 10,111,642
15. Rotor with a backplane bus having electrical connection elements to make electrical contact with electrical components in a medical apparatus, as well as rotating unit and medical apparatus with such a rotor, F Distler, S Haider, HJ Mueller, US Patent 9,888,886

Prof. Sultan Haider is the global head of Siemens Healthineers Innovation Think Tank (ITT), which was established in 2005. His inspiring vision of innovation culture formed Innovation Think Tank to become a global infrastructure of 72 activity locations (Innovation Labs, Innovation Think Tank certification programs) in Germany, China, U.K., India, USA, UAE, Turkey, Canada, Australia, Egypt, Saudi Arabia, Portugal, Switzerland, Brazil and South Africa.

Prof. Haider has filed over 500 inventions and patents and under his leadership, ITT teams have worked on over 2500 technology, strategy, and product definition projects worldwide. He is a Principal Key Expert at Siemens Healthineers (SHS), a title awarded to him by the SHS Managing Board in 2008 for his outstanding innovation track record. Furthermore, Prof. Haider has been awarded honorary directorships, professorships and has developed innovation infrastructures and implemented innovation management certification programs for top institutions.

Siemens Healthineers Headquarters
Siemens Healthcare GmbH
Henkestr. 127
Erlangen 91052, Germany

Published by
Siemens Healthcare GmbH
Technology Excellence
Technology and Innovation Management
Innovation Think Tank Global Headquarters
Henri-Dunant-Str. 50,91058 Erlangen, Germany
Contact:innovationthinktank.team@siemens-healthineers.com
https://www.siemens-healthineers.com/careers/innovation-think-tank

---