

White paper - Innovation Think Tank, Siemens Healthineers Turkey, Acibadem Mehmet Ali Aydınlar University, Acibadem Labmed Clinical Laboratories and Acibadem Healthcare Group

Shaping the Future of Laboratory Diagnostics with Acibadem Healthcare Group

An overview of the first “Laboratory Diagnostics” themed ITT Certification Program

June 2022

Shaping the Future of Laboratory Diagnostics with Acibadem Healthcare Group

Prof. Dr. Ata Akın¹, Prof. Dr. Mustafa Serteser², Sultan Haider³, Gürdal Şahin^{4,5}, Ercan Arslan^{4,5}, İdris Ahmet Erdoğan⁴, Yağmur Efe^{4,5}

¹Acibadem Mehmet Ali Aydınlar University, İstanbul

²Acibadem Labmed Clinical Laboratories, İstanbul

Innovation Think Tank, Siemens Healthineers, ³Erlangen, ⁵Turkey

⁴Siemens Healthineers Turkey, İstanbul

Abstract

In-vitro diagnostics is a very niche sub-department inside healthcare which plays a critical role throughout patients' health journeys. Interventions using in vitro diagnostic (IVD) technology are essential for patient treatment plannings. It was observed that laboratory diagnostics settings are often left untapped with innovative approaches. In collaboration with one of the leading healthcare providers of Turkey, Acibadem Healthcare Group, Siemens Healthineers Turkey together with the expertise of Innovation Think Tank hosted the first laboratory diagnostics-based innovation certification program and project competition: Future of Laboratories (FOL) Certification Program. This paper outlines the best practice examples of the program structure, the project outcomes, and the evaluation of the responses from Laboratory Diagnostics Trends questionnaire.

Keywords: Innovation Think Tank, Acibadem Healthcare Group, Siemens Healthineers, Future of laboratory diagnostics

Introduction

Future of Laboratories (FOL) Certification Program was born out of a need to spread the innovation culture among the laboratory diagnostic world. The laboratory environment, which is very niche in its own pathways, is often left untapped within disruptive innovation processes.

The ability to better target treatments to the underlying genetic and molecular biological reasons is provided by this In-vitro diagnostics (IVDs). Hence, in-vitro diagnostics (IVDs) are a vital part of personalised medicine. These also include diagnostic laboratory tests that enable therapy to be customised for the particular tumor. IVDs are part of www.siemens-healthineers.com/careers/innovation-think-tank

healthcare innovations from which patients who are covered by the government's mandated health insurance should be able to profit as soon as possible. Appropriate and quick testing through invitro interventions enables early diagnosis, which lowers the cost of treatment at later stages. The in vitro diagnostic sector is integrating innovations at every level, from the preclinical to the clinical for improving disease management, reducing costs and decreasing times associated with drug development. New technologies and information systems are needed in the lab to boost productivity and integrating different data techniques. However, these innovations must come at the expense of quality and safety while considering financial factors. [1][2]

Siemens Healthineers, with a leading role in invitro diagnostics, is strongly committed to shape and enable the future of healthcare through accurate medical diagnosis, exceptional patient care and treatment monitoring [3]. Through the guidance of Innovation Think Tank's experienced understanding on spreading adaptable innovation methodologies and creating innovation ecosystems and cultures among partner institutions, FOL is a program carried out to pave the way for new project concepts that can be accomplished both on a global scale and as a pioneer in Turkey.

The program is hosted by Siemens Healthineers Turkey and carried out in partnership with Acibadem Mehmet Ali Aydınlar (M.A.A.) University, Acibadem Labmed Clinical Laboratories, and Acibadem Healthcare Group.

Acibadem Healthcare Group is a Turkish healthcare organization that offers medical care in 22 hospitals and 18 clinics in 5 nations. Through linked businesses for supported services and Acibadem M.A.A. University, the organization implements an innovative "360-degree" service strategy in all facets

Shaping the Future of Laboratory Diagnostics with Acibadem Healthcare Group 06-2022 – White Paper

of healthcare. Acibadem Healthcare Group's goals are to

improve overall societal well-being and contribute to the advancement of medicine. [4]

The Acibadem Health and Education Foundation established a health-related thematic university in 2007. Through a strong academic staff and cutting-edge technological infrastructure, the university strives to educate healthcare professionals who are qualified and open to continuous improvement, reflecting the Acibadem Culture, which is based on a quarter-century of experience and knowledge in healthcare to higher education. [5]

Acibadem Labmed Clinical Laboratories, established in 2002, provides thorough clinical laboratory services to Acibadem Healthcare Group Hospitals as well as commercial and public institutions both domestically and internationally. By providing clinical laboratory services and fostering strong working ties with all

healthcare institutions, the leading institution aims to enhance the general health and welfare of patients. [6]

The Future of Laboratories Certification Program was created with this collaborative partnership between Siemens Healthineers, ITT and Acibadem Healthcare Group. This structure ensures that the participants can get the opportunity to observe each and every step inside the laboratory diagnostics settings and creates a strong foundation for innovative projects.

Being the first of its kind globally, the program not only brought focus to the areas of improvement inside the laboratories, but also built a bridge between the innovative nature of university students and this very crucial yet often unmet world of laboratory diagnostics.

Materials and methods:

The FOL Program is a multi-layered program with a focus on the future of invitro diagnostics. A total of 5 higher education institutions from Turkey was invited in this program (Acibadem M.A.A. University, Bahçeşehir University, Başkent University, İstanbul Medipol University, Yeditepe University). These

institutions were affiliated with hospitals and had leading medical faculties. Multidisciplinary participants were selected from these 5 education institutions. A dedicated website was created for this program. Participants submitted applications for the program through this website [7].

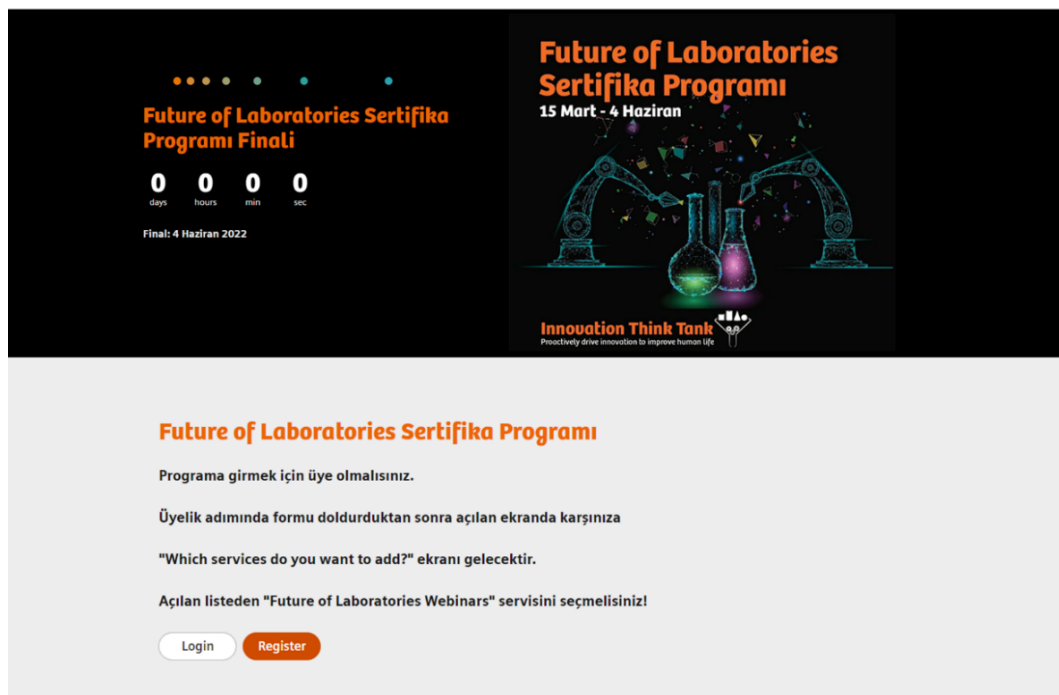


Figure 1: Dedicated website page created for the FOL certification program.

Shaping the Future of Laboratory Diagnostics with Acibadem Healthcare Group 06-2022 – White Paper

The first 2 weeks of the program aimed to introduce the invitro diagnostics world to the participants. First training day focused on lectures on the technical aspects of invitro diagnostics followed by second training day which consisted of lecturers from established careers who shared their knowledge expertise [Table 1]. These trainings were divided as “information sharing” and “experience sharing” to provide a full understanding of all the workflows, processes, best practices, and pain points within the current in-vitro laboratory settings. Within this

trainings, participants got the insights on the concept of biodesign by Acibadem M.A.A. University Dean of Engineering Prof. Dr. Ata Akin. ITT’s founder and global head Prof. Sultan Haider also gave a lecture on the unique ITT Methodology, combining expertise from the industrial, academic, and end-customer world. This allowed the participants to adopt an innovative mindset and approach to the observed healthcare system, trends, best practices, challenges, and KOL (Key Opinion Leaders) voices.

Trainings modules designed for future of laboratory program	
Information Sharing Training	Experience Sharing Training
<ul style="list-style-type: none"> • Technical Overview of Diagnostic Systems • The Future of Biochemistry Analysis • Aptio Automation & Digitalization and Case Study: Bilkent City Hospital • The Future of Hormone Analyzers and the COVID -19 Antibody • Logistics in Diagnostics (Cold Chain Transportation) • Hematology and the Role of Plasma Proteins in the Laboratory • POC Devices and Its Future • Uninterrupted Service in the Laboratory 	<ul style="list-style-type: none"> • Introduction to Innovation Think Tank’s Unique Methodology & Innovation management • In vitro Diagnostics from a Medical Sector perspective • Central Laboratory Management • Healthcare Consulting Solutions • Biodesign, A method of clinical innovation • Transformation Management and Innovation • DX marketing • Laboratory Economics

Table 1: Following table depicts the topics of training sessions provided to participants. All sessions were held by the support of expertise from academic as well industrial organizations. Through these sessions participants got insightful information and experiential learning which helped them in structuring their innovative concepts for future of laboratory

Over the next 10 weeks of project development phase, a group of physicians from Acibadem Labmed Clinical Laboratories voluntarily participated in the program as mentors. Each team was assigned a mentor where they received guidance directly from a vast experiential knowledge. This knowledge-sharing ensured strong bases for the projects that were created. The teams received the opportunities to arrange private hospital visits with their assigned mentors in different Acibadem Hospitals. The hospital visits allowed the participants to observe the pain points inside the laboratory setting and allowed them to directly communicate with the staff working there. The hospital visits were scheduled jointly with the program mentors and the coordinating team.

Innovation Think Tank’s methodology helped to determine specific trends inside the healthcare system through customized questionnaire for future of laboratories which was integrated during the course of programme[8]. The questionnaire

significantly directed towards Laboratory Diagnostics value propositions and healthcare technology trends, it was shared with participants and mentors. The responses were further evaluated and are presented in this paper.

The finale of the event was organized in-person through poster presentations in an exhibition format. Acibadem M.A.A. University hosted the event where a selected group of jury members from Siemens Healthineers DX professionals as well as Acibadem Labmed Clinical Laboratories physicians observed and evaluated the competing projects.

A guidebook providing summarized information of the projects and each teams’ evaluation forms was prepared and given to the jury members. The outcomes and responses during the program were consolidated and further analyzed for identifying priority projects

Results

The program received over 100 applications which were evaluated by a diverse committee. Among the received applications [Figure 2], 36 participants were selected spreading across 7 different majors. In total, 12 teams were formed, each team consisted of 3 participants.

The first 2 weeks of the 12-week program aimed to provide a full introduction to the discipline through two full days of trainings. These trainings were divided as “information sharing” and “experience sharing” to provide a full understanding of all the workflows, processes, best practices, and pain points within the current in-vitro laboratory settings. The lectures were given live by professionals working

directly in the field from Siemens Healthineers, Acibadem M.A.A. University and Labmed Clinical Laboratories Clinical Laboratories. The trainings were concluded with the introduction of the Innovation Think Tank (ITT) Methodology where the participants were given the necessary tools to learn how to approach their projects from the innovation point of view.

The following 10 weeks were carried out by the teams’ own agendas where they held meetings with their assigned mentors, scheduled visits to 5 hospitals in various locations through which the project concepts were built.

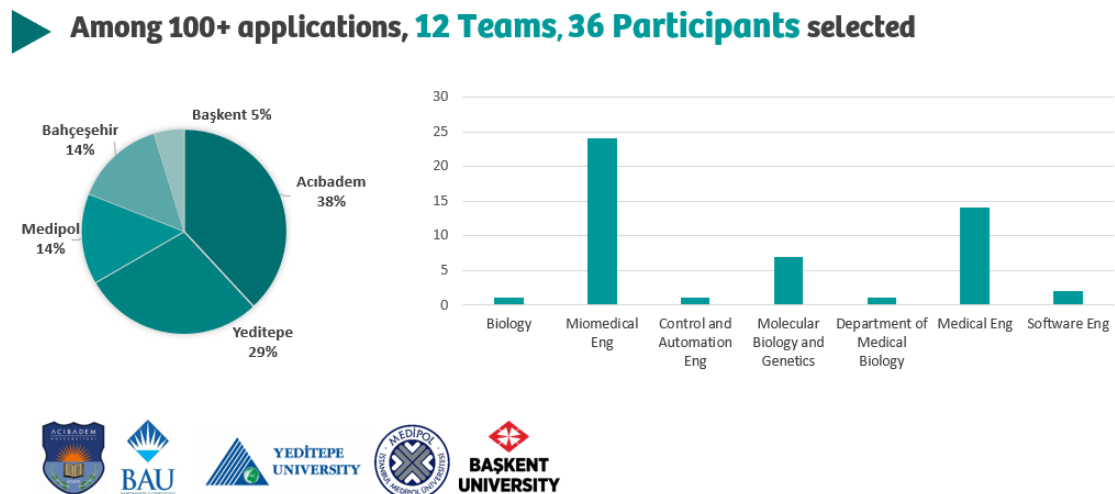


Figure 2: Application details of the programs. Over 100+ applications were received out of which 36 participants were selected from 5 invited institutions.

A “Laboratory Diagnostics Trends” questionnaire was also carried out in parallel to systematically identify the futuristic outlook by both the participants as well as the technicians, physicians, and various stakeholders within laboratory diagnostics. The aim of this questionnaire was to evaluate the priority & difficulty levels of 20 different laboratory diagnostics value propositions.

According to the survey, test results and reports are given very high priority [100%], followed by incident or accident records and actions, calibration function and conversion factors [78.6%], quality control records, instrument measurement and documentation [76.4%]. The lower importance was given by respondents to supplier information and documentation, as well as reagents and material information [Figure 3].

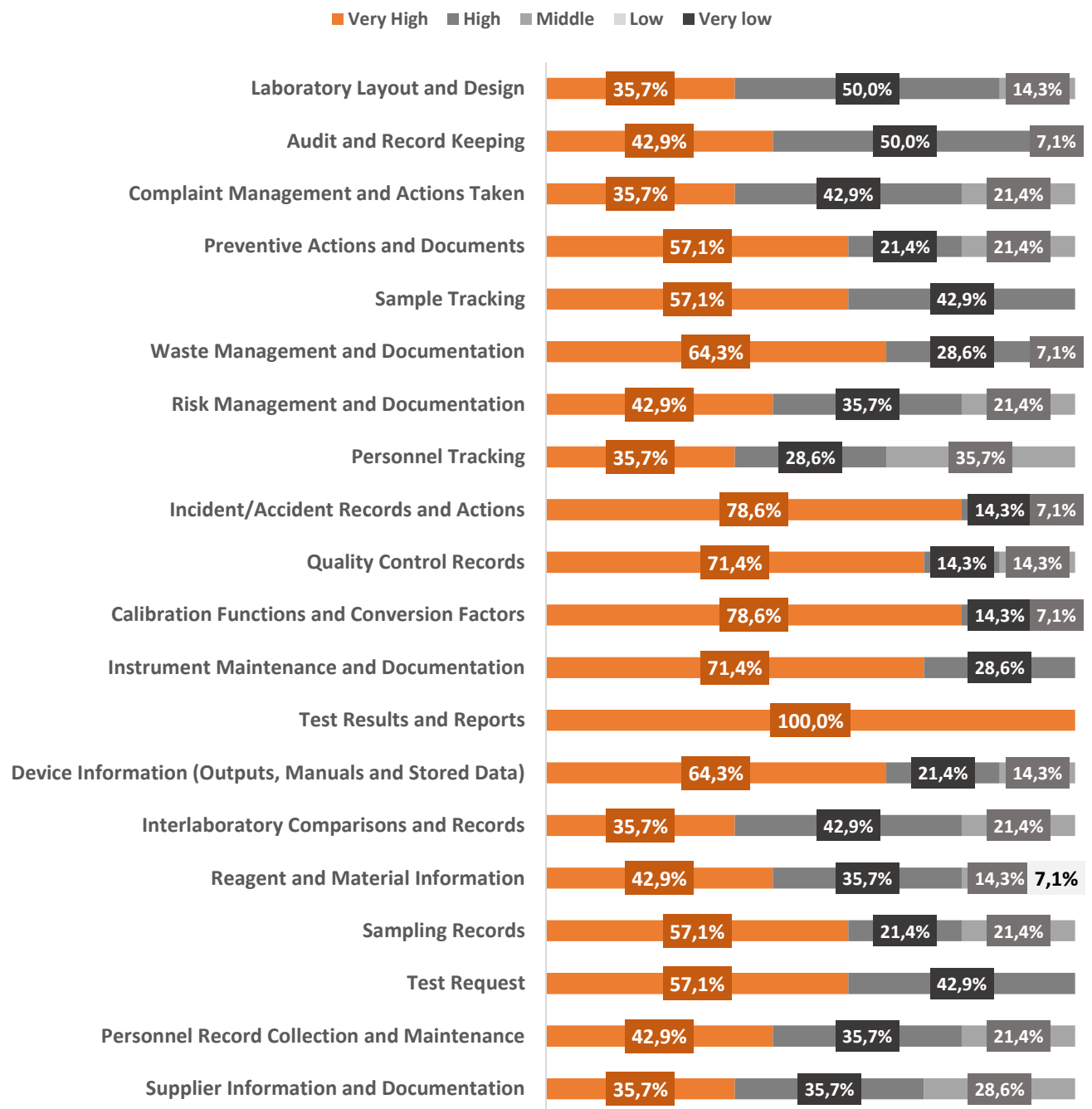


Figure 3: Analysis for Laboratory Diagnostics Value Proposition based on degree of Prioritization

In terms of difficulty rating, the highest rated points were sample tracking, calibration function and conversion factors and instrument maintenance and documentation [35.7%]. Risk Management and documentation [71.4%] was the lowest ranked value proposition followed by reagents and material

information [57.1%], audit and record keeping [50.0%], incident/accident records and actions [50.0%], interlaboratory comparisons and records [50.0%]. [Figure 4]

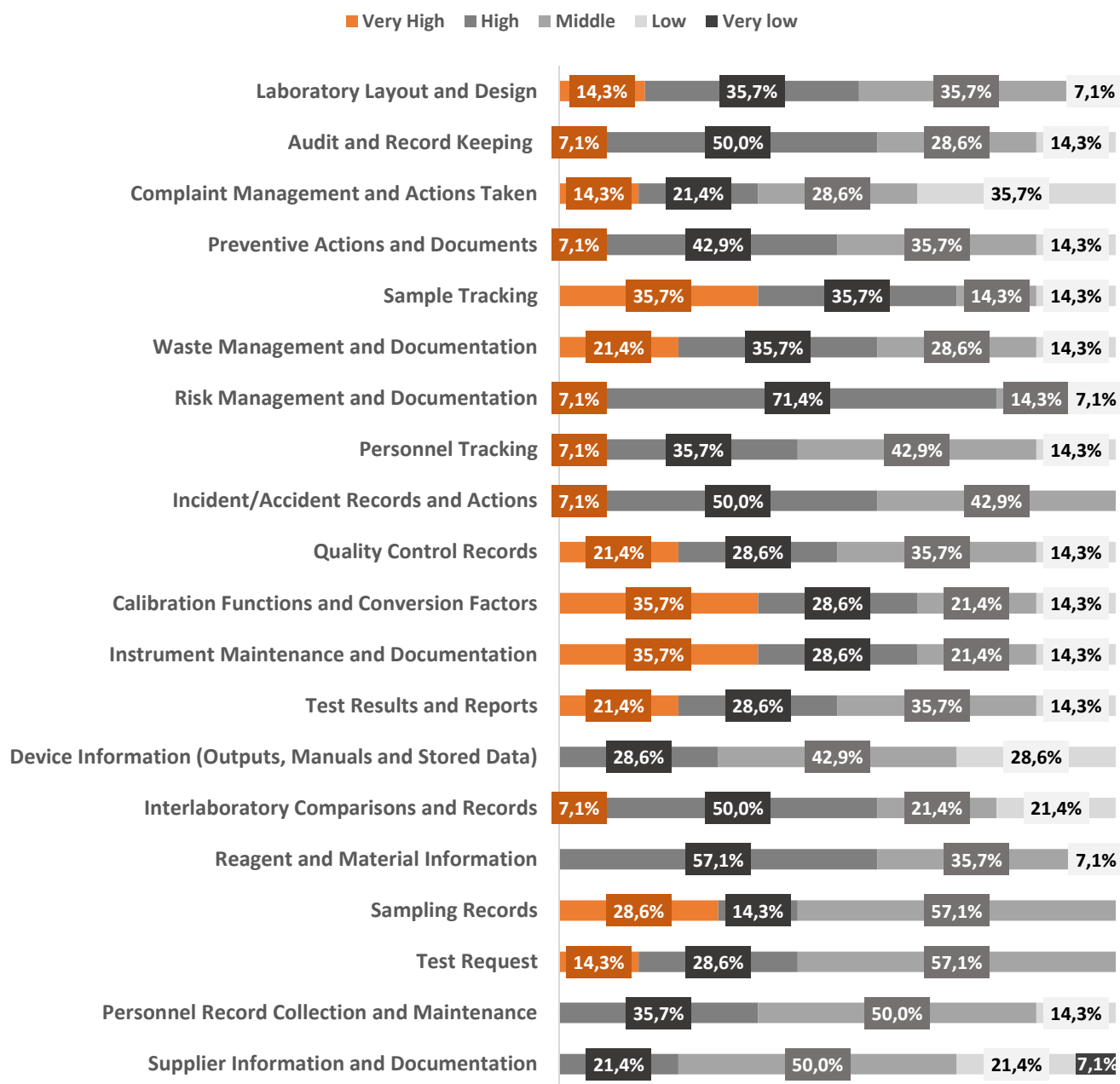


Figure 4: Analysis for Laboratory Diagnostics Value Proposition based on degree of difficulty rating and compliance.

The finale of the event was hosted by the program partner Acibadem M.A.A. University. The project concepts were presented to an esteemed group of jury members during a 5-hour poster presentation exhibition. Upon the evaluation of the jury members, the top 3 projects received distinction. The first prize was received by the team working on SSC (Smart

sample carrier), followed by 2nd winning team working on Star of Life drone logistics network and 3rd prize winner AILABTURK were focusing on minimizing the deterioration and error rate in the stored samples. The 1st place holder in the program was granted the opportunity for a project-based internship at Siemens Healthineers Turkey.

Discussion

In vitro-diagnostics (IVDs) are essential within patient pathway to provide early diagnosis and optimize treatment plans. The 12-week program was carried out for identifying innovative solutions for future of laboratories. The training program, mentor allocations and hospital visits were designed to immerse the participants for observing all the phases inside laboratory diagnostics workflows. This immersion allowed participants to locate pain points and elaborate on current best-practices to build innovative projects. Through the Innovation Think Tank Methodology, participants and mentors were able to effectively produce the innovative outcomes.

The feedback received from the hospital visits also provided proof on the emerging need for innovative approaches inside the laboratory diagnostics settings. The environment is often left unexplored specifically inside innovation-based departments' academic curriculums such as engineering.

According to the survey, test results and reports are given very high priority, followed by incident or accident records and actions, calibration function and conversion factors. Also, quality control records, instrument measurement and documentation were seen as having significant priority. Supplier information and documentation, as well as reagents and material information, are given lower importance, with the latter receiving the lowest priority.

While in difficulty rating, the highest ratings were given to sample tracking, calibration function and conversion factors and instrument maintenance and documentation. Risk Management and documentation was seen as having less difficulty among other value propositions followed by reagents and material information, audit and record keeping, incident/accident records and actions, interlaboratory comparisons and records.

According to the analysis made in terms of high prioritization & high difficulty within laboratory settings the teams were directed to build the project concepts. The finale event poster exhibition was organized to provide an environment of collaboration and networking among the participants, program organizers, lecturers, mentors and jury members. Throughout the 5-hour event, the diverse group of participants including universities, technology transfer offices and representatives of governmental

bodies interacted and discussed the collaborative approach to take the outcomes of this program further for innovation possibilities.

Conclusion

Laboratory diagnosis within the healthcare system is the important element for patient journey. It is crucial to continuously innovate and optimize the workflow of laboratory diagnosis for better patient as well as healthcare provider's experience. By nurturing innovative mindsets of university students through Innovation Think Tank Methodology, the Future of Laboratories Certification Program was structured to observe opportunities through hospital visits, necessary knowledge, and tools for innovative approaches. The program trained participants to create and compete with unique projects guided to improve the observed pain-points inside laboratories. Consolidating all the feedback received from various KOLs, it was evident that there was a need to bridge the gap between innovative approaches and the laboratory diagnostics settings. Working collaboratively with the leading healthcare institution Acibadem Healthcare Group, Acibadem Labmed Clinical Laboratories and Acibadem M.A.A. University the program aims to identify innovation possibilities within the laboratory space. The outcomes of the program proved an established interest towards digitalization and automation inside in-vitro diagnostics. The analyzed responses from the survey highlights the topics of prioritization and difficulties. Overall, the program organized by Innovation Think Tank, Siemens Healthineers Turkey and Acibadem Healthcare Group connected multiple stakeholders within healthcare system to boost the innovation culture for fostering future of laboratories.

Acknowledgments

We would like to thank our colleagues at Siemens Healthineers Turkey and Innovation Think Tank for their ongoing support through giving lectures, mentorships and evaluation as jury members throughout the program.

We would like to extend a special thanks to Prof. Dr. Ata Akin, the dean of engineering and natural sciences at Acibadem M.A.A. University and the

Shaping the Future of Laboratory Diagnostics with Acibadem Healthcare Group 06-2022 – White Paper

program director of Acibadem ITT program for their continued support and leadership.

We would also like to express our deep gratitude to Prof. Dr. Mustafa Serteser, Chief Executive Officer at Acibadem Labmed Clinical Laboratories and Professor of Clinical Biochemistry for their continued support in the program; as well as our mentor group from Acibadem Labmed Clinical Laboratories Dr. Fatma Hande Karpuzoğlu, Dr. Neslihan Yıldırım Saral, Dr. Semra Solak, Dr. Özlem Demirelce, Dr. Parvana Mikailova, Dr. Arzu Yüksel, Prof. Dr. Sema Genç, Dr. Mehtap Baştuğral for their continued support in the program as well as personal involvement towards the participants.

We would also like to acknowledge the guest jury, for sharing their visions in a collaborative environment. Moreover, we would like to recognize the participants Efe Buyruk, Lara Gieringer, Semanur Özdemir, Aysu Göral, Didem Ceren Öztürk, İpek Nur Gökmen, Abdurrahman Akkoyun, Fahri Burak Nebioğlu, Vahap Can Sarı, Burcu Sivri, Erkan Karaman, Naz Başarık, Ahmet Eren Kesim, Enise Aktürk Aktürk, Hayrun Nisa Şahin, Ayşenur Mine Şen, Gökçe Nur Çitler, İrem Yılmaz, Cemre Arslan, İlayda Karadayı, Neslişah Sözer, Eda Yıldırım, Lara Karşıgil, Servet Bahadır İrmak, Ali Kürel, Şeyma Güniken, Yusuf Alaylı, Bilal Sultan, Onur Çalışkan, Yasemin Köse, Damla Yalçın, Kaan Keşci, Zeynep Ilgın Tozan for their insights and perceptions of the different challenges within the laboratory settings as well as their respective solution proposals.

Authors Statement

AA and MS provided crucial insights and aspirations for creation of the FOL program. SH has established and confirmed the paper's framework as well as guided and initiated the paper's context. YE, GS, EA and IAE supported for organizing the program and structuring the contents. YE collected the data, analyzed the survey results, and added content to the whitepaper. All authors contributed to the paper's drafting and approved the final version. The authors do not state any competing interests.

References

1. "In Vitro Diagnostics: Innovation and Integration", Medtech Insights, Sept 2007. (<https://medtech.pharmaintelligence.informa.com/MT035108/In-Vitro-Diagnostics-Innovation-and-Integration>)
2. "Innovative In-Vitro Diagnostics within the Health Care System", Max planck institute of social law and social policy. (<https://www.mpsoc.mpg.de/en/social-law/research/research-projects/detail/project/innovative-in-vitro-diagnostics-within-the-health-care-system-regulation-of-their-inclusion-from-a-comparative-legal-perspective/>)
3. Laboratory diagnostics, Siemens Healthineers. (<https://www.siemens-healthineers.com/laboratory-diagnostics>)
4. "University Adding Power to Health Force of Turkey", Acibadem Healthcare Group. (<https://www.acibadem.com.tr/en/>)
5. Acibadem M.A.A. University (<https://www.acibadem.edu.tr/en/university/about/university>)
6. "Our Vision and Mission", Acibadem Labmed Clinical Laboratories (<https://www.acibademlabmed.com.tr/en/Our-Mission-Vision>)
7. Website for FOL program. (<https://www.siemens-healthineers.com/tr/future-of-laboratories-certification-program>)
8. Haider, S. (2021). Addressing healthcare needs with Innovation Think Tank global infrastructure and methodology. (<https://www.siemens-healthineers.com/en-in/careers/innovation-think-tank>)

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>
<https://www.siemens-healthineers.com/careers/innovation-think-tank>
