Health2Innovation

D2.1 Consolidated report on the needs mapping and state-of-the-art of in Health Innovation

Institute of Entrepreneurship Development – iED

Co-funded by the European Union

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Contents

Table of Figures

Table of Tables

Document History

Version	Date	Contributor
0.1	29/4/2024	All partners
0.2	30/5/2024	All partners

Call: ERASMUS-EDU-2022-PI-ALL-INNO

Topic: ERASMUS-EDU-2022-PI-ALL-INNO-EDU-ENTERP

Title: Health2Innovation

Number: 101111300

WP Number: 2

WP Title: State-of-the-art analysis and Health2Innovation Training Course Structure

Deliverable Number: 2.1

Deliverable Title: Consolidated report on the needs mapping and state-of-the-art of in Health Innovation

Deliverable Leader: iED

Due Date: M9

Executive Summary

Health2Innovation represents a pivotal initiative that strategically aligns European educational institutions, small and medium enterprises (SMEs), and technology experts to spearhead the digital and green transformation of the healthcare sector. The project is aimed at catalysing the sector's adaptation to cutting-edge technologies, thus enhancing its overall resilience and sustainability. By bridging the gap between academic knowledge and real-world application, **Health2Innovation** aims to prepare students and recent graduates from diverse fields such as Life Sciences, Medicine, Business, Engineering, and Information and Communication Technology (ICT) to excel in a progressively digital and environmentally conscious healthcare environment.

The initiative is underpinned by hands-on experiences integral to learning, exemplified by a Health Innovation Bootcamp and an Apprenticeship program in Sweden, Denmark, or France. These components are critical to the project's broader strategy and goals to bridge the current educational gaps and align learning outcomes with the continually evolving needs of the labour market, facilitating significant contributions to the sector's sustainable and digital transition. The Health2Innovation educational program are enhanced with advanced learning resources for real-world applications in the healthcare domain, ensuring a comprehensive training regime that equips new generations of professionals in healthcare entrepreneurship to lead and innovate.

Recent advancements and emerging technologies such as Telemedicine, Electronic Health Records (EHRs), Intelligence (AI)and Internet of Things (IoT) technologies have been pivotal in the evolution of the healthcare industry, significantly enhancing patient care and operational efficiencies. Notably, nations like Poland, Greece, Sweden, and Cyprus have integrated AI to refine diagnostics and patient management, aligning with a data-driven healthcare model. These technological strides are coupled with sustainability efforts, where the integration of the Green Competence Framework (GreenComp)[1] which promotes environmentally friendly practices within healthcare settings, reflecting a holistic approach to modern healthcare challenges.

Despite this progress, the rapid deployment of these technologies has revealed substantial gaps in technological literacy and interoperability skills among healthcare providers. Addressing these gaps, robust telemedicine services and digital platforms have been implemented, enhancing access and system efficiency through e-prescriptions and e-referrals. These efforts are bolstered by comprehensive training programs aimed at elevating the digital competence of healthcare entrepreneurs , preparing them to effectively utilise these new tools.

The transition towards full digital integration in healthcare must address significant challenges and overcome several barriers. Issues such as financial constraints, limited technical support, cultural resistance to new technologies, privacy concerns, and the complexity of health regulations constitute lurking dangers. These challenges are being addressed through a coordinated effort across all participating countries, with each contributing uniquely to the collective solution, ranging from Portugal's integration of remote care solutions to Lithuania's advancements in digital health platforms that enhance patients' data accessibility.

Critical insights collected within this project, derived from focus groups across Europe, have significantly informed the adaptation of training structures to better meet identified needs. Enhancements proposed include the development of curricula that emphasise entrepreneurship, advanced digital skills such as cybersecurity, data management, regulatory compliance, and the integration of soft skills training. Establishing robust support systems including mentoring, professional networks, and funding opportunities is deemed essential for encouraging entrepreneurship and skill development within the healthcare sector.

[1] https://joint-research-centre.ec.europa.eu/greencomp-european-sustainability-competence-framework_en

By embracing these comprehensive strategies, **Health2Innovation** aims to cultivate a skilled and adaptable workforce capable of leading the ongoing transformation in healthcare. This executive summary underscores the Project's commitment to creating a dynamic, educational, and operational environment that fosters innovation, enhances professional capabilities, and ensures sustainable growth in the healthcare sector. The project not only aims to prepares entrepreneurs in the healthcare sector to face current and future challenges, but also positions them as leaders in a digitally evolving landscape.

1. Introduction

Health2Innovation emerges as a pivotal response to the accelerating need for digital transformation within the European healthcare landscape, a shift dramatically underscored by the global COVID-19 pandemic. Practically, it seeks to harness the transformative potential of digital and sustainable innovations, targeting the dual objective of catalysing the sector's technological adaptation and enhancing its resilience and sustainability. By focusing on a strategic amalgamation of academia, industry expertise, and technological insights, Health2Innovation aims to empower a new generation of professionals in healthcare entrepreneurship, students, and recent graduates from fields such as Life Sciences, Medicine, Business, Engineering, and ICT, with the critical skills required in a digitally evolving ecosystem.

The core mission of this initiative is to significantly elevate the talent pool and refine the skillsets of university students and graduates, thereby nurturing an ecosystem ripe for digitalisation, sustainability, and innovation in healthcare sectors. With an expansive partnership network that spans across numerous European countries including Portugal, Cyprus, Lithuania, Spain, Greece, France, Sweden, Poland, and Romania, Health2Innovation is uniquely positioned to implement a broad range of educational and practical strategies designed to foster significant advancements in healthcare delivery systems.

This report serves as a consolidated document that synthesises the comprehensive data gathered through various research methodologies employed by **Health2Innovation.** The primary aim is to provide a detailed analysis of the current state of digital health technologies, identify existing gaps in skills and knowledge among professionals in healthcare entrepreneurship, and outline actionable strategies to bridge these gaps. Furthermore, the report seeks to highlight innovative practices across the partner countries that can serve as benchmarks for driving forward the sector's digital and green transformation.

The methodology of the **Health2Innovation** was meticulously structured to capture a comprehensive understanding of the current landscape and future needs of digital health within Europe. The research was conducted on several fronts to ensure a robust foundation of data from which to draw conclusions and shape strategies. The methodology followed by the Consortium, consists of the following activities:

Desk Research was a pivotal initial phase where a thorough analysis of existing digital health strategies was undertaken. This research spanned international, European, and national contexts, focusing on the alignment of these strategies with broader EU and global health objectives. Partners from each participating country delved deeper into their respective national contexts, utilising a standardised template which facilitated the consistent collection and analysis of data. This allowed for an aggregated view of the developments and the barriers towards implementing digital health initiatives while at the same time provided a comparative insight into various approaches taken across different regions.

Surveys and Field Research were designed to tap into the perceptions, views, and awareness of the target groups and relevant stakeholders such as students and recent graduates from fields directly pertinent to Health2Innovation's focus. This part of the methodology aimed to better understand the specific needs and aspirations of those at the early stages of their professional journey in the healthcare sector. The surveys sought to capture a wide array of data points, including the demand for digital skills, career preferences, and the obstacles these future professionals perceive in entering healthcare entrepreneurship.

Focus Groups (FGs) are an essential element of the research strategy, organised and conducted by the Knowledge Committees set up in each partner country. These sessions were critical in drilling down into the specific local and regional needs. By facilitating in-depth discussions among stakeholders, these focus groups provided nuanced insights into the most

in-demand skills and helped to tailor the design of training structures to effectively meet these identified needs.

Knowledge Committee (KC) Consultations serves as a thread of expertise for the project. Each national KC is composed of experts from a diverse range of backgrounds; Its task is to provide feedback and consultation. Their expert contributions will be integral to refining the training programs that will be developed by the project, to ensure that the educational outputs remain closely aligned with the industry's evolving requirements and are responsive to the detailed findings emerging from both the desk research and field activities. The contribution of this KC has played a pivotal role in the implementation and completion of this report since most of the KC members participated also in the focus groups.

Together, these activities formed a comprehensive approach to understand and address the challenges and opportunities within the digital transformation of healthcare in Europe. They provided a multi-dimensional view that was essential for developing effective, responsive, and sustainable educational and training programs aimed at equipping the next generation of professionals interested in health-related entrepreneurship with the skills necessary to thrive in a digitally oriented environment.

This methodological approach not only ensures a comprehensive gathering and analysis of data, but also enables the incorporation of a wide range of perspectives from the various stakeholders involved in the healthcare sector across Europe. The findings from these efforts are synthesised in this report, which aims to guide future initiatives and strategies for a digitally competent healthcare workforce ready to meet the challenges of the modern world.

2. Mapping the State-of-the-Art in Health Innovation

2.1 European, and National Priorities in Digital Healthcare Transformation: A Desk Research Overview

Digital health transformation is a crucial initiative supported by both international health organisations and the European Union, demonstrating a unified effort to enhance healthcare access and efficiency through digital technologies. The World Health Organization (WHO) advocates for universal health coverage through digital innovations as outlined in its Global Strategy on Digital Health 2020-2025[2]. Simultaneously, the European Union's Digital Single Market strategy[3] aims to improve data interoperability and security across member states, facilitated by initiatives such as the European Health Data Space (EHDS) [4] and Horizon

[2] https://www.who.int/publications/i/item/9789240020924

[3] https://digital-strategy.ec.europa.eu/en/policies/strategy-data

[4] https://health.ec.europa.eu/ehealth-digital-health-and-care/european-health-data-space_en

Europe Cluster 1, especially Destinations 5 and 6 respectively. [5] Readers can find detailed national reports and supporting documents in the annexes of this report, which provide further context and evidence for the priorities discussed.

2.1.1 National Initiatives

Each partner country represented in the project consortium integrates these international and EU frameworks to suit their local conditions, enriching the European collective effort towards enhanced digital health. For instance, Portugal emphasises healthcare accessibility and efficiency through the adoption of Electronic Health Records (EHRs) and telemedicine, bolstered by the EU's Horizon Europe program which supports the integration of AI and IoT technologies. Similarly, Lithuania is developing a robust digital health infrastructure that supports data sharing among healthcare providers, improving patient care coordination. This includes targeted training programs for professionals in healthcare entrepreneurship, reflecting the EU's Digital Competence Framework (DigComp)[6]. Also, Lithuania takes advantage of the Entrepreneurship Competence Framework (EntreComp)[7] to spur collaboration and innovation in medical services.

Greece focuses on raising digital literacy among healthcare providers and integrating digital health strategies into national healthcare services in alignment with the Digital Europe programme [8] and the EU4Health Framework for 2021-2027[9]. Poland extends healthcare services through telemedicine and digital health applications to rural areas, promoting public-private partnerships that align with European health innovation directives. Cyprus implements advanced digital health systems to streamline processes and enhance data management, with a strong emphasis on cybersecurity and data protection, adhering to EU standards. Spain enhances healthcare delivery through digital health solutions like e-prescriptions and digital diagnostics tools and encourages ongoing education and professional development in digital skills within the healthcare sector.

Adding to these efforts, Sweden advances digital health by integrating digital tools in routine patient care and investing in digital infrastructure that helps enable remote patient monitoring and telehealth, aligning with its reputation for innovation and technology adoption in public health services. France has been a front-runner in adopting a national digital health strategy that includes creating a universal health data space to facilitate the sharing and analysis of health data across the country. This initiative aims to improve research capabilities and personalise patient care, closely aligning with the goals of the European Health Data Space.

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[5] https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/cluster-1-health_en

[6] https://joint-research-centre.ec.europa.eu/digcomp/digcomp-framework_en

[7] https://joint-research-centre.ec.europa.eu/entrecomp-entrepreneurship-competence-framework_en

[8] https://digital-strategy.ec.europa.eu/en/activities/digital-programme

[9] https://eur-lex.europa.eu/EN/legal-content/summary/eu4health-programme-2021-2027.html

Romania is focused on upgrading its healthcare infrastructure to support digital transformation, emphasising the importance of digital literacy among professionals in healthcare entrepreneurship. The country is additionally working on integrating digital health records and telemedicine solutions across its healthcare system, funded in part by European structural funds aimed at reducing regional disparities in healthcare access.

2.1.2 European Initiatives

Across Europe, best practices include ensuring the interoperability of digital health systems, developing comprehensive training programs for healthcare providers, and leveraging public-private partnerships to innovate and implement digital health solutions effectively. This narrative now includes a broader spectrum of European efforts, demonstrating a robust alignment between international goals and the health directives of the European Commission with the national strategies of partner countries. Each EU country tailors its approach to meet specific local needs, reflecting a diverse yet united effort in transforming healthcare through digital innovation across Europe. This comprehensive approach provides a rich, contextual understanding that contributes significantly to the collective efforts in digital healthcare transformation.

2.2 Analysing the Impact of EntreComp, DigComp, and GreenComp Frameworks on Bridging Skills Gaps in Healthcare

The EntreComp, DigComp, and GreenComp Frameworks offer structured approaches for embedding essential competencies in the healthcare sector across Europe. These frameworks address entrepreneurial, digital, and ecological skills, respectively, filling critical gaps and enhancing service delivery within healthcare systems.

EntreComp is vital for fostering innovative and proactive approaches among healthcare entrepreneurs. It encourages not only traditional business entrepreneurship, but also takes the initiative within the healthcare sector to develop new services and improve the pre-existing ones. For instance, Spain leverages EntreComp to inspire professionals in the healthcare sector to invent new business models and innovative solutions that enhance patient care. Lithuania echoes this approach with healthcare pre-accelerators and boot camps designed to spur collaboration and innovation in medical services.

DigComp defines the essential digital skills necessary for effective work in healthcare, ensuring professionals can navigate and utilize digital tools and technologies in today's digital-first environment. In healthcare, these competencies are crucial for EU countries to adopt and effectively utilize digital health technologies. For example, Romania focuses on enhancing digital literacy among its healthcare providers, facilitating the use of digital health records and telemedicine solutions. France also aligns with DigComp through its universal health data

space initiative, requiring robust digital competence to ensure effective data management and security.

The GreenComp Framework focuses on reducing the environmental impact of healthcare operations and promoting sustainability through better resource management. Cyprus utilis es GreenComp principles to minimis e the environmental footprint of its healthcare facilities by reducing paperwork and encouraging the use of digital health records. Sweden integrates these principles into its digital health initiatives to not only enhance healthcare delivery but also promote environmental sustainability.

These frameworks are instrumental in addressing specific skills gaps identified in the European health sector. There is a noticeable deficiency in entrepreneurial skills among professionals in the healthcare sector, critical for fostering innovation and developing new health-focused enterprises. Portugal is addressing this gap by incorporating the EntreComp Framework into its training programs, which encourages professionals in healthcare entrepreneurship to develop these critical skills.

Similarly, the rapid digitalisation underscored by the COVID-19 pandemic has revealed significant digital skills gaps in countries like Poland and Greece. These countries are responding by structuring their digital skills training programs for professionals in healthcare entrepreneurship according to the DigComp Framework, ensuring effective use of emerging digital health technologies.

Moreover, as healthcare systems strive to reduce their carbon footprints, skills for implementing sustainable practices are increasingly in demand. The GreenComp Framework helps guide the integration of these skills into healthcare practices, as seen in Cyprus and Sweden's strategies.

By embedding these frameworks into national health strategies, European countries are not merely addressing current competencies shortfalls, but are also preparing their healthcare systems and workforce for future challenges. These comprehensive efforts are critical for creating a healthcare environment that is innovative, more digitally advanced, and sustainable, perfectly aligning with broader European and global health objectives.

2.3 Strategic Educational Priorities and Innovative Pedagogical Approaches in Healthcare Training

As Europe progresses in its digital transformation of healthcare, the focus on educational and training priorities, coupled with innovative pedagogical approaches, is crucial. These priorities are not only essential for implementing the frameworks discussed earlier (EntreComp, DigComp, and GreenComp) but also for ensuring that healthcare entrepreneurs across Europe are equipped to handle the demands of a digitally evolving healthcare environment.

In Portugal, a comprehensive strategy has been developed that encompasses training programs aimed at enhancing digital literacy and the effective use of EHRs. These programs target professionals in healthcare entrepreneurship at all levels, ensuring widespread digital competence across the sector. Similarly, Spain is committed to a dual approach to education, blending traditional learning methods with digital training modules, particularly emphasising cybersecurity to safeguard the burgeoning digital health infrastructure.

Greece is advancing its healthcare education through workshops and seminars in collaboration with tech companies and academic institutions, providing practical exposure to the latest technologies in healthcare. This hands-on approach helps integrate theoretical knowledge with practical skills, fostering a more robust understanding of digital tools.

France is at the forefront of pedagogical innovation, incorporating simulation-based learning into healthcare education. This method utilises virtual and augmented reality to create realistic medical simulations, allowing students to gain practical experience in a controlled environment. This is crucial for developing critical clinical skills without the risks associated with real-life procedures.

Romania's response to the digital skills gap includes the development of online platforms that offer continuous professional development for healthcare entrepreneurs. These platforms are accessible remotely, offering courses in data management, patient privacy, and digital health ethics, tailored to fit various learning styles and paces.

Lithuania taps into its strong IT sector to offer interdisciplinary programs that meld technology and healthcare. This approach encourages a holistic view of healthcare delivery, where technological innovation plays a key role in patient care.

Cyprus focuses on integrating environmental sustainability into healthcare training, teaching methods to reduce waste and energy consumption in healthcare facilities. This aligns with the GreenComp Framework, and emphasis es the role of sustainability in modern healthcare.

Poland enhances its telemedicine capabilities through specialised training programs designed to prepare professionals in healthcare entrepreneurship for delivering remote care effectively. This is increasingly important as healthcare systems around the world shift towards more remote and digitally assisted care modalities.

Sweden, known for its innovation in healthcare, incorporates advanced technologies such as AI and machine learning into professional training. This preparation enables healthcare entrepreneurs to utilise these technologies to improve patient outcomes, reflecting Sweden's commitment to leading in healthcare innovation.

These educational and training initiatives across Europe reflect a significant commitment to preparing professionals in healthcare entrepreneurship for the future. By integrating innovative pedagogical approaches such as blended learning, simulation-based training, and interdisciplinary programs, European countries are not only addressing current skills

shortages but also preparing for a future where digital health solutions are integral to patient care. This comprehensive educational strategy ensures that the healthcare workforce is well-equipped to leverage digital tools effectively, leading to enhanced patient outcomes and more efficient healthcare services.

2.4 Challenges in Digital Health Deployment

Implementing digital health technologies across Europe involves overcoming a matrix of interconnected challenges:

1. Technological Infrastructure

In countries like Poland and Romania, rural areas lack robust technological infrastructure, which restricts the reach of advanced digital systems such as telemedicine and undermines the effectiveness of real-time health data management systems necessary for modern healthcare services.

Sweden, while being more advanced, faces challenges in the consistent deployment of its digital infrastructure across all healthcare providers, affecting the seamless integration of health data systems.

2. Cultural and Organisational Resistance

In Greece and Cyprus, there is significant resistance among professionals in healthcare entrepreneurship who are sceptical of new technologies. They fear digital tools might replace traditional patient care methods and compromise data security.

Spain also reports resistance to digital transition, mainly due to concerns about data privacy and the impersonal nature of digital interactions replacing traditional caregiving.

3.Regulatory and Data Protection

France deals with stringent data protection regulations that complicate the digital transformation process. These regulations demand significant resources and slow down the implementation of new technologies.

Similarly, Sweden's long history of working with privacy laws and comprehensive regulatory frameworks, such as GDPR, MDR, IVDR, and EHDS, can delay the introduction of new digital health solutions and require extensive compliance efforts.

4. Economic Constraints

Financial limitations in Portugal and Lithuania slow down the acquisition and integration of cutting-edge digital health technologies. These constraints limit the scope of digital initiatives and the scaling of innovative solutions.

Spain, while investing in health technology, struggles with funding allocation, affecting the breadth of technology deployment across its national health system.

5. Innovation and Adaptation

Sweden stands out for its proactive approach to digital health, with significant investments in e-health initiatives and having a strong focus on integrating digital health records and telemedicine. However, the challenge remains to keep pace with continuous technological advancements and maintain system-wide compatibility.

Spain's approach includes leveraging AI and big data to enhance healthcare services, but it requires ongoing adaptation to rapidly changing technologies and ensuring these are accessible across the entire healthcare system.

2.5 Skills for a Digital-First Healthcare Environment

As European healthcare systems transition towards digital maturity, equipping healthcare entrepreneurs with specific competencies becomes crucial. In Sweden and France, emphasis is placed on fostering skills in advanced data analytics and the application of AI in healthcare. These capabilities are essential for managing complex health data, enhancing diagnostic accuracy, and customising treatment plans through predictive analytics.

Lithuania and Spain have recognised the necessity for comprehensive IT and data management training, which ensures that entrepreneurs in the healthcare sector will be able to effectively contribute to the optimisation and security of digital health systems. Similarly, Romania has identified a significant gap in digital literacy among its older healthcare workforce, prompting initiatives aimed at enhancing these fundamental skills to better align with modern healthcare demands.

Portugal's approach includes expanding training initiatives to cover the use of digital tools for remote patient monitoring and telehealth - services that are increasingly crucial in extending healthcare access. At the same time, Cyprus and Spain focus more on bolstering cybersecurity and ethical data handling practices in an attempt to safeguard patient information against the growing threat of digital breaches.

Poland and Greece seem to address the need for ongoing professional development in telemedicine and digital health applications. By organising targeted workshops and continuous training programs, these countries are ensuring that their healthcare providers remain abreast of the latest technological advancements and best practices in digital health.

This comprehensive exploration of digital health innovations across Europe illustrates a dynamic landscape where strategic initiatives and targeted training programs are profoundly reshaping healthcare. By addressing both the technological challenges and the skills required to navigate these advancements, the aforementioned European countries are laying a robust

foundation for a more integrated and efficient healthcare system. As we transition from these foundational insights to the field research reports, the forthcoming section will build upon this groundwork by analysing real-world applications and outcomes. This analysis will further elucidate the practical impacts of these digital health strategies, offering a clearer view of their effectiveness in meeting the health sector's needs and advancing patient care across diverse European contexts.

3. Survey Analysis

3.1 Methodology

The survey methodology for the Health2Innovation project was designed to collect uniform data across multiple European nations using a shared questionnaire (Annex 2), which allowed for consistent and comparative analysis of the data across countries. This approach facilitated the exploration of various aspects critical to the future of healthcare innovation. The survey was created by the Institute of Entrepreneurship Development (IED), with all partners providing feedback to shape the final version. Readers can find the original survey documents included as annexes in this report.

The survey incorporated a set of closed and open-ended questions aimed at understanding competencies, perceptions of entrepreneurial opportunities, and barriers within the healthcare sector. Administered electronically via platforms like Microsoft Forms, this method enabled the efficient and centralised collection of a large volume of responses, crucial for the statistical analysis that followed.

3.2 Demographic Analysis

The target demographic for the survey predominantly consisted of current students and recent graduate students from fields relevant to healthcare innovation such as Medicine, Life Sciences, Business, Engineering, and ICT. This group was chosen due to their potential to influence the healthcare sector either through direct involvement, or via entrepreneurial ventures.

The survey was distributed across nine European countries: Greece, Spain, Portugal, Lithuania, Poland, France, Romania, Cyprus, and Sweden, garnering a total of 389 validated responses. Each country aimed for about 30-35 participants to ensure a balanced

representation, with the actual number of respondents varying by country as detailed in Table 1 below.

Sweden	13
Greece	74
Spain	39
Poland	35
Lithuania	52
Portugal	38
Total	389

The demographic data from the Health2Innovation survey across the nine European countries mentioned provided insightful details into the gender distribution, age range, and academic backgrounds of the respondents, vital for assessing the context in which digital health innovations are received and implemented.

Table 1. Number of Validated Survey Responses by Country

3.2.1 Gender Distribution

An analysis of gender distribution (Table 2) among the survey respondents reveals a general trend towards a balanced or slightly female-majority representation across the participating countries. The following table provides a detailed breakdown of the gender distribution in each country, highlighting the proportions of female, male, and undisclosed respondents.

Country	Female (%)	Male (%)	Undisclosed (%)
Greece	55	45	0
Portugal	51	49	0
Spain	69	31	0
Sweden	60	40	0
France	52	48	0
Romania	Slight majority	Slight minority	0
Lithuania	Slight majority	Slight minority	0
Cyprus	40	43	17
Poland	46	54	0

Table 2. Gender Distribution of Survey Respondents by Country

This table illustrates that while some countries, such as Spain and Sweden, exhibit a notable female majority, others, like Poland and Portugal, have a more balanced gender distribution. Cyprus presents a unique case with a significant portion of respondents opting not to disclose their gender.

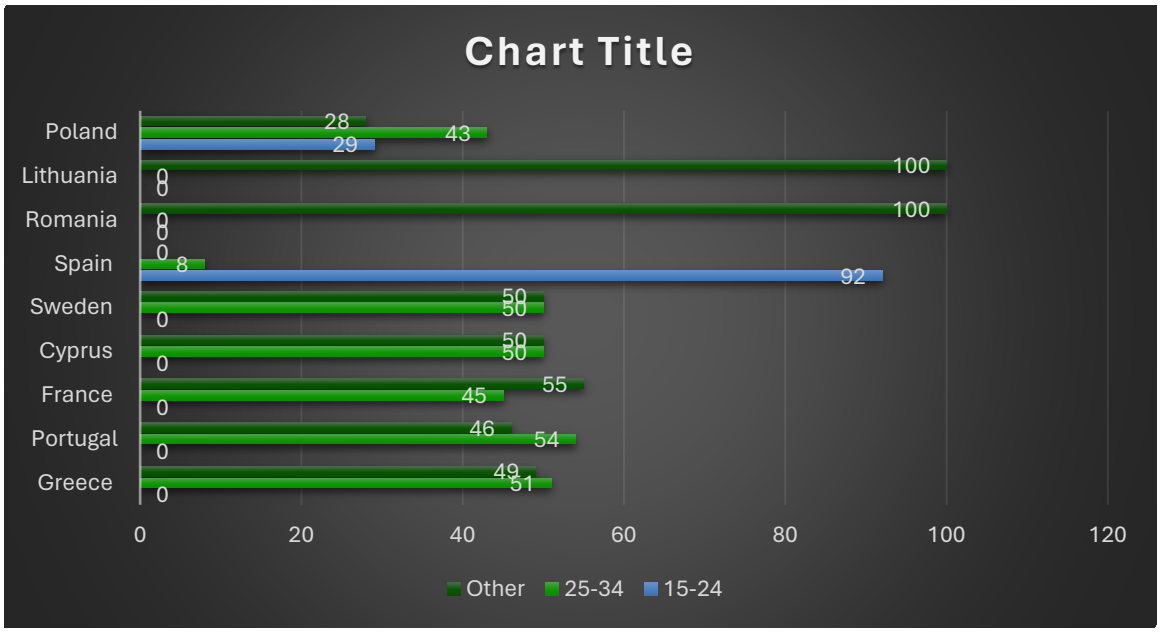

Figure 1 Age Distribution of Survey Respondents by country.

3.2.2 Age Distribution

The primary age group across most countries fell within the 25 to 34-year range, showing the involvement of early career professionals who are integral to the ongoing transformation in healthcare. This age group forms the majority in Greece (51%), Portugal (54%), and France (45%). Cyprus also showed a significant representation in this age bracket (50%), as did Sweden (50%). Spain stood out with a predominantly younger group, 92% of whom were aged 18-24, highlighting a very youthful perspective in their data. Romania and Lithuania showed a diverse age range but with a significant leaning towards younger adults. Poland displayed a broader age range with 29% aged 15-24, 43% aged 25-34, and the remainder spread across older age groups (35 and above). All information is depicted in figure 1 below.

3.2.3 Academic Background and Level of Education

Respondents came from varied academic backgrounds, including Medicine, Engineering, Life Sciences, Business, and ICT, fields crucial to the interdisciplinary approach required for healthcare innovation. Greece showed a strong representation from Engineering (66%) and Medicine (18%). Portugal and France showed diverse educational backgrounds, but with a good number of respondents holding master's degrees or higher (70% in Portugal and a

significant number in France educated to master's level or above). Cyprus showed a mix with 27% at master's level, 33% at PhD level, and the remainder undergraduates. Lithuania displayed broad academic diversity with significant representation from Engineering (33%) and ICT (31%). Sweden had a strong focus on Life Sciences within the respondents, and Spain on Business (85%). Poland featured a diverse academic composition with 34% from Engineering, 29% from ICT, and the rest split among Medicine, Life Sciences, and Business. Romania had a relatively balanced distribution between students and graduates, with most respondents majoring in Business and Engineering, and the majority at the undergraduate level, followed by a significant presence at the master's level.

This detailed demographic breakdown across Greece, Portugal, Cyprus, Romania, Lithuania, Sweden, Spain, France, and Poland provides a nuanced understanding of the survey participants. It highlights the diversity of the respondents and underscores the variety of perspectives that they bring to the table in digital health discussions. These insights are crucial for shaping targeted and effective digital health strategies that cater to the specific needs and conditions of each region, ensuring that the innovative solutions developed are as effective and inclusive as possible. This demographic detail sets the stage for deeper analysis into skills demand, entrepreneurial opportunities, and barriers within the healthcare sector as perceived by these future professionals in healthcare entrepreneurship and innovators.

The academic background distribution of survey respondents is summarized in figure 2 below.

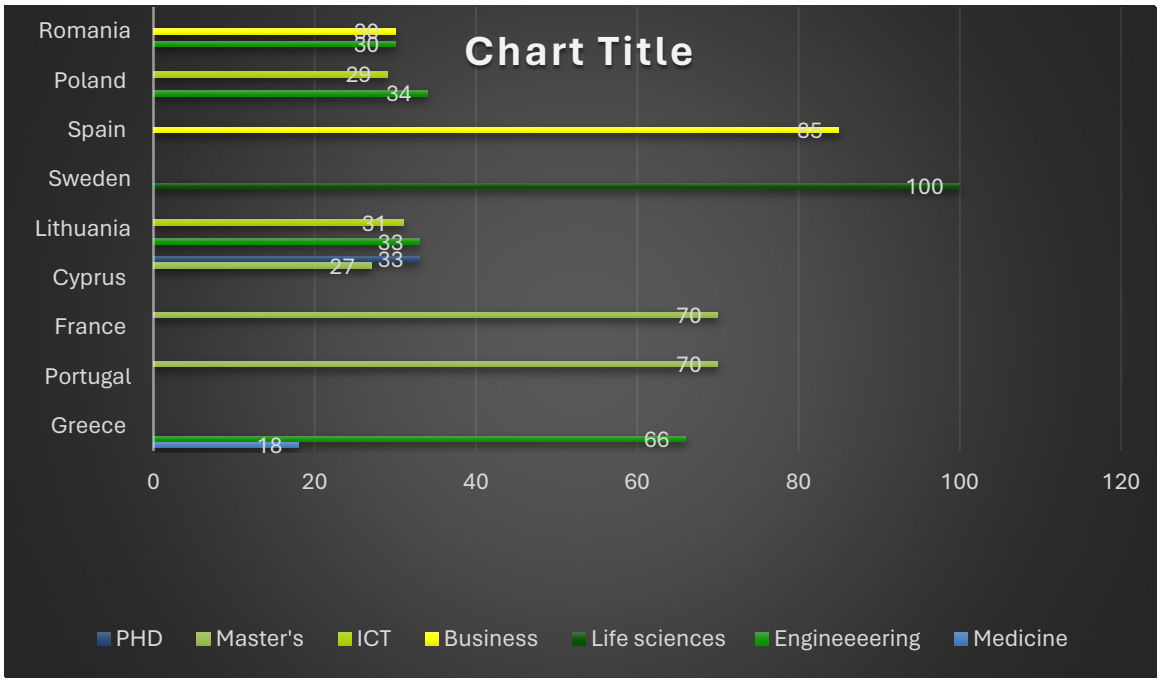

Figure 2 Academic Background Distribution

3.3 Perceived Skills and Entrepreneurial Opportunities

This section delves deeper into the perceived skills and competencies essential for digital transformation in healthcare, as well as the entrepreneurial opportunities identified by respondents across the nine countries participating in the Health2Innovation survey.

According to our data collected, across Europe, there's a significant emphasis on enhancing digital competencies, which are fundamental to advancing healthcare services. In Romania (Figure 3) and Lithuania (Figure 4), survey participants highlighted the importance of cybersecurity and digital health literacy. Romanian respondents considered cybersecurity and telemedicine crucial for navigating future healthcare settings securely, while Lithuanian participants focused on patient-centric approaches and digital health literacy, aligning healthcare practices with individual patient needs and data security.

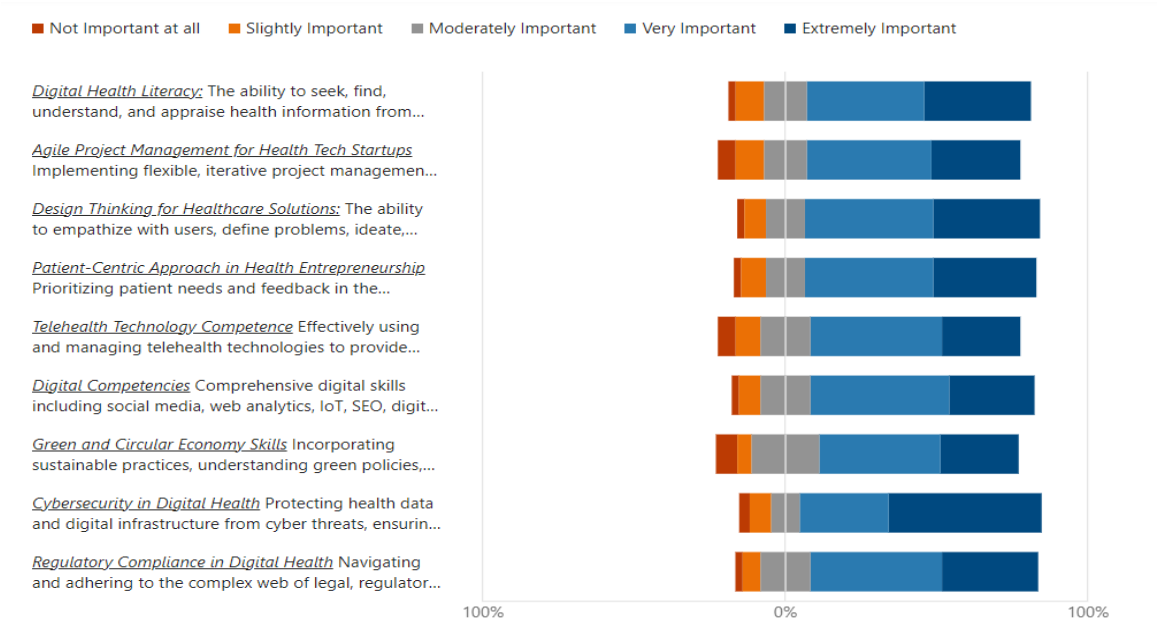

Figure 3 Importance of skills and competencies for success in health-related entrepreneurship_ Romania.

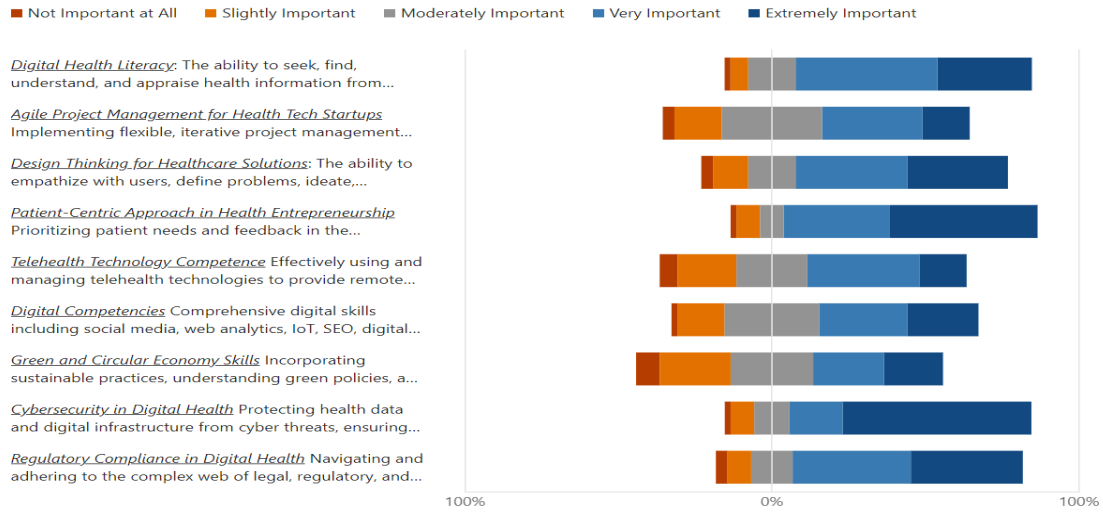

Figure 4 Importance of skills and competencies for success in health-related Entrepreneurship Lithuania

Participants from Greece (figure5) saw robust demand for telehealth skills, reflecting global trends towards remote care. The focus here was on equipping professionals in healthcare entrepreneurship with the digital tools necessary to support remote patient interactions effectively. Polish participants prioritised digital imaging and big data analytics, pointing to a strong inclination towards integrating advanced diagnostic technologies into healthcare practices.

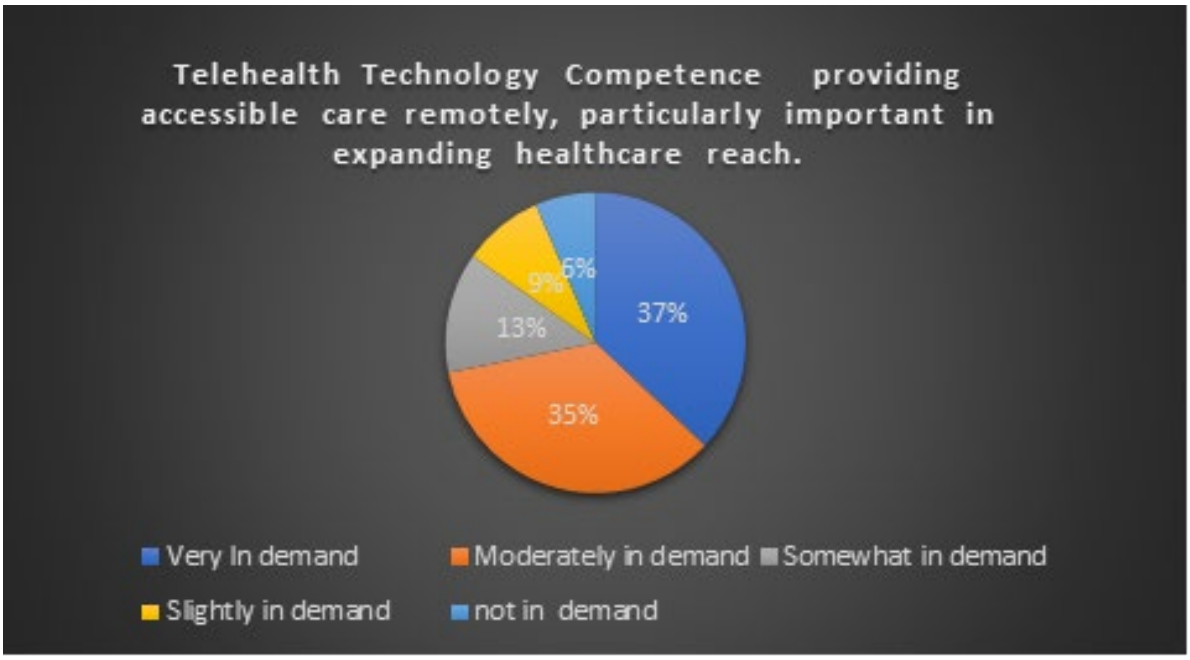

Figure 5 Skills and competencies for success in health-related entrepreneurship _Greece.

French (Figure 6) and Spanish (figure 7) participants identified that acquiring legal and regulatory knowledge was seen as essential alongside fundamental digital skills to navigate the complex regulatory environment of European healthcare. This is a crucial expertise for managing patient data to secure and comply with GDPR (General Data Protection Regulation). In Sweden, participants highlighted that professionals in healthcare entrepreneurship emphasize innovation, with a strong push for integrating cutting-edge technologies like AI and machine learning into areas such as data management and product development. This focus reflects the country's advanced stance in digital health, even though

the dynamic nature of AI poses challenges for its use in medical devices and diagnostics under current MDR regulations.

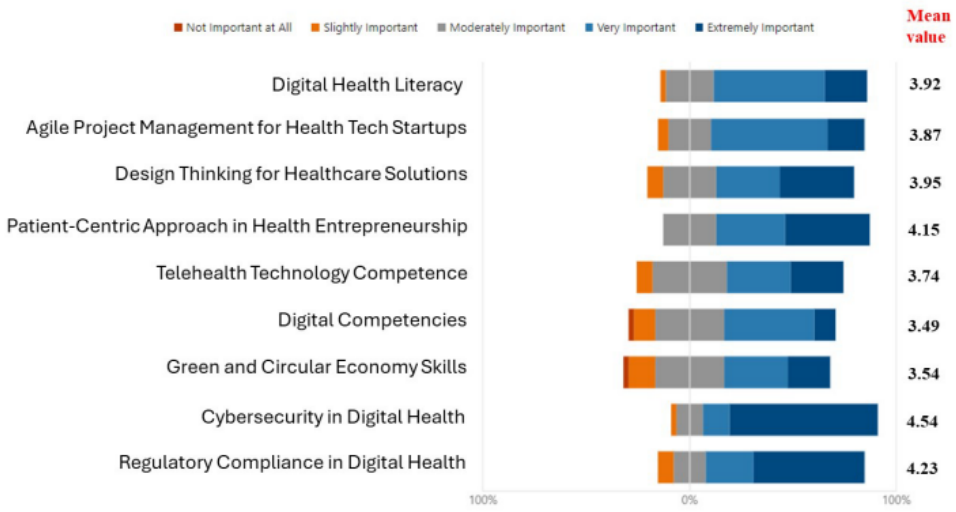

Figure 6 Skills & Competencies for success in health-related entrepreunership_France.

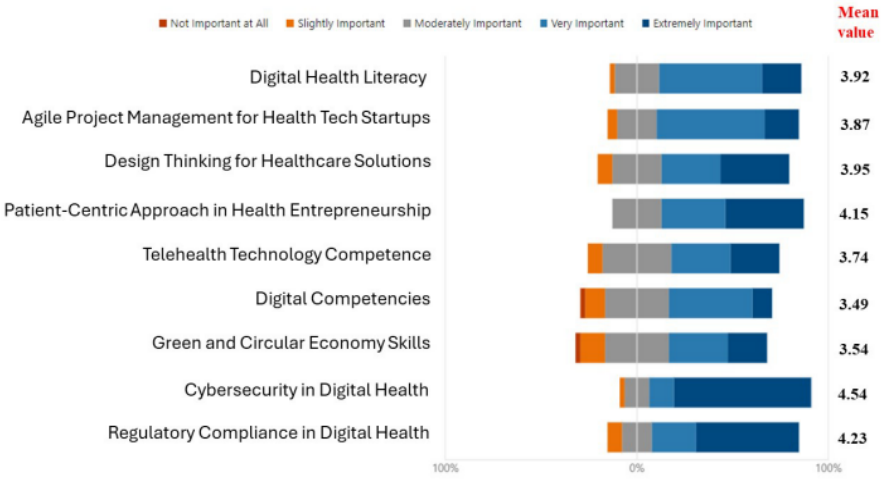

Figure 7 Skills & Competencies for success in health-related entrepreneurship Spain.

Participants from Cyprus (Figure 8 and 9) highlighted the need for enhanced competencies in healthcare information systems, particularly for those that can help support sustainable healthcare practices. The focus was also on developing skills that enable effective management and use of EHRs, which are becoming increasingly crucial in the island's healthcare infrastructure.

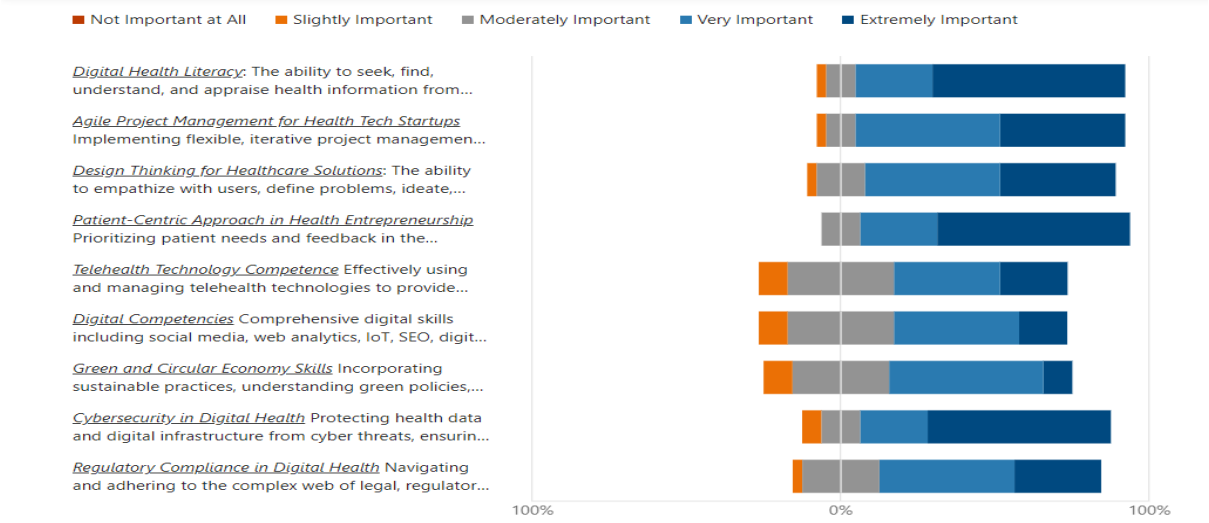

Figure 8 Skills and competencies for success in health-related entrepreneurship Cyprus.

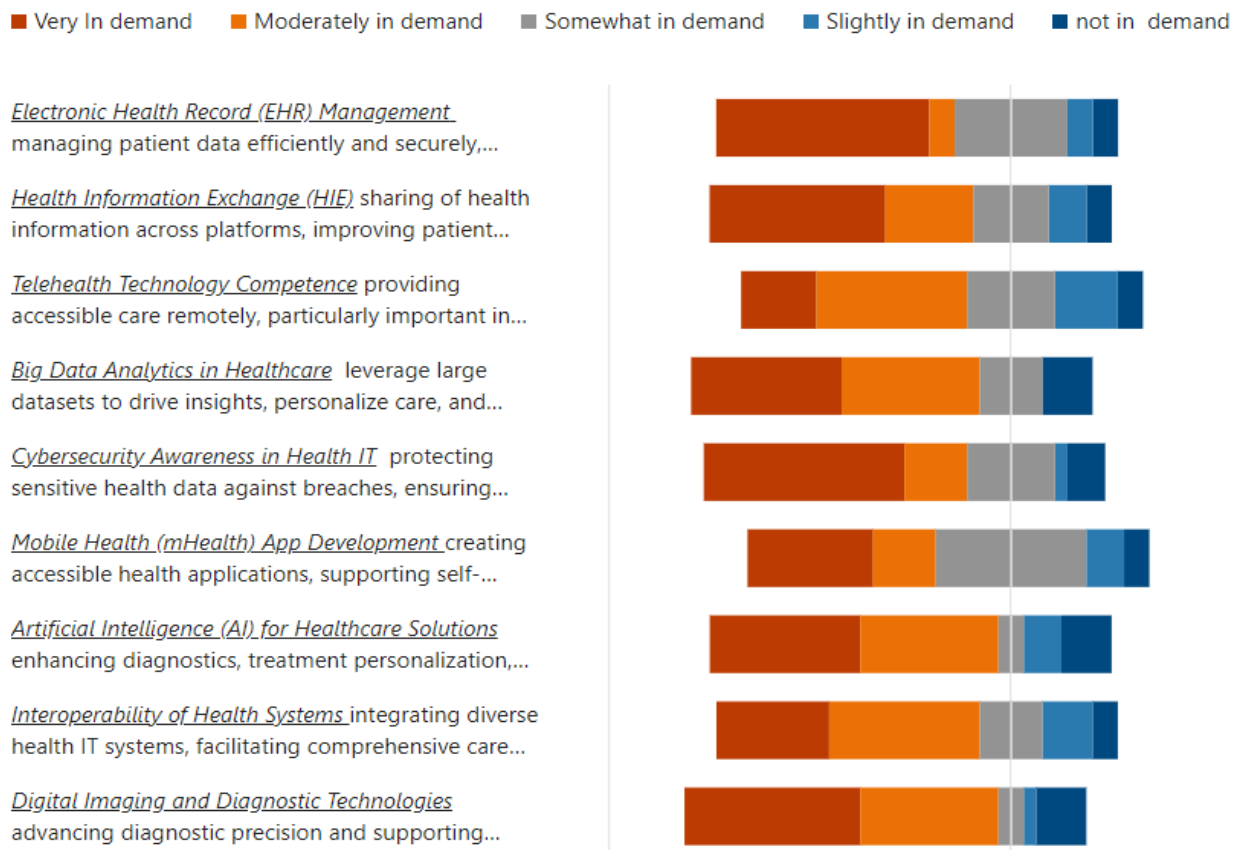

Figure 9 Specific Digital skills in demand within the healthcare industry_ Cyprus.

Spain underscored the need for advanced skills in digital health applications, particularly those that facilitate efficient healthcare management and patient care. Spanish respondents also emphasised the importance of continuous learning and adaptation to new technologies, which are critical for maintaining competitiveness in Europe's evolving healthcare landscape.

The entrepreneurial landscape varies significantly across the surveyed regions. Sweden and France display a robust inclination towards healthcare innovation, supported by vibrant ecosystems that facilitate health-related entrepreneurial activities. These countries have established networks that connect healthcare entrepreneurs with tech innovators, fostering environments conducive to startup success.

Conversely, Cyprus and Portugal showed a more reserved approach to entrepreneurship, with many individuals either unaware of or unengaged in entrepreneurial programs. Efforts are underway in both countries to bolster their entrepreneurial ecosystems, aiming to provide better support structures for startups.

Greece and Lithuania showed to be actively developing their healthcare entrepreneurship environments through initiatives like mentorship programs and startup incubators, designed to stimulate innovation and provide the necessary resources for launching successful enterprises.

Poland and Romania were expressed as advocating for stronger educational frameworks that integrate digital health competencies with entrepreneurial training, aiming to create healthcare professionals who are not only “tech-savvy,” but also capable of leading new ventures.

Spanish respondents also expressed that Spain currently provides a dynamic environment for healthcare entrepreneurs, particularly in areas like telemedicine and personalised medicine. The country's supportive policies and programs encourage the development of digital health solutions, highlighting Spain's commitment to fostering innovation within its healthcare sector.

3.4 Comprehensive Analysis of Healthcare Skills Demand and Entrepreneurial Opportunities Across Europe

The survey analysis across the nine countries that are involved in Health2Innovation provides detailed insights regarding the skills and competencies perceived as crucial for the future of healthcare and the entrepreneurial opportunities within the sector. This analysis integrates findings from all participant countries, highlighting the diversity of skills in demand and the varied entrepreneurial landscapes.

3.4.1 Detailed Analysis of Skills and Competencies in Demand

In Romania, there is a strong emphasis on digital skills, including social media management, web analytics, and IoT, alongside more traditional healthcare technologies such as telemedicine and AI-driven data management and product development. Cybersecurity emerges as a crucial area of focus, given its importance in protecting patient data and healthcare infrastructures.

Lithuania reflects a similar emphasis on digital health literacy, with a particular focus on patient-centric approaches and the integration of digital health records and telemedicine technologies. The need for legal and regulatory knowledge is also highlighted, underscoring the importance of navigating the complex healthcare regulatory environment.

Greece and Poland both underscore the demand for telehealth and big data analytics skills, indicating a shift towards more data-driven healthcare solutions. In Greece, the focus is also on integrating these digital tools into everyday healthcare practices to enhance service delivery and patient care.

Spain's respondents point to a robust demand for agile project management skills, reflecting the country's focus on innovation and the efficient implementation of health tech solutions.

This is complemented by an emphasis on green and circular economy skills within the country, aligning with broader European sustainability goals.

Sweden highlights a strong focus on digital health technologies, particularly in the areas of AI, machine learning, and mobile health applications. These skills are seen as essential for advancing the country's already sophisticated healthcare system and for maintaining its leadership in healthcare innovation.

France emphasises a comprehensive skill set that includes digital literacy, agile project management, and sustainable healthcare practices. French professionals in healthcare entrepreneurship are also being prepared to lead in the implementation of eco-friendly and efficient healthcare solutions, integrating green technologies and principles into daily practices.

Cyprus focuses on developing skills related to the management of electronic health records and advanced diagnostics tools. The emphasis is also on improving healthcare IT infrastructures to support an ageing population, which is particularly relevant given the island's demographic trends.

Portugal sees a growing demand for skills in remote healthcare delivery and digital consultation platforms. These competencies are critical as Portugal looks to expand healthcare access and reduce disparities in rural and underserved areas.

3.4.2 Entrepreneurial Opportunities in Healthcare

Sweden offers a dynamic ecosystem for healthcare entrepreneurs, supported by a strong network of academic institutions and industry partnerships that facilitate the commercialisation of health innovations. This supportive environment is crucial for nurturing the next generation of health tech entrepreneurs.

France and Spain are identified as hotspots for healthcare innovation, with numerous startups exploring digital health solutions.

France provides substantial entrepreneurial opportunities, especially in biotechnology and health data analytics. The French market is ripe for startups that aim to integrate cutting-edge technologies into the healthcare system. These ventures benefit from extensive funding opportunities and a network of incubators and accelerators that provide the necessary resources for early-stage growth.

In Spain, the focus is also on fostering innovation within the healthcare sector. According to the survey, most respondents in Spain were undergraduates in Business, with a significant proportion considering starting their own healthcare-related business or venture. The Spanish respondents highlighted the importance of funding opportunities, mentorship programs, and networking events to encourage exploration of entrepreneurial opportunities in healthcare. Additionally, skills such as cybersecurity, regulatory compliance in digital health, and a patient-centric approach were deemed crucial for success in health-related entrepreneurship. Despite

the interest, there is a need for greater awareness and familiarity with the entrepreneurial opportunities within the sector, as many respondents reported low familiarity and participation in educational and training programs designed to enhance entrepreneurial skills.

In contrast, Cyprus and Portugal are described as having more conservative approaches to entrepreneurship. The findings of the survey suggest a need for enhanced support structures across both countries, such as better access to funding and mentorship programs, to stimulate a more vibrant entrepreneurial environment.

Poland showcases a unique blend of challenges and opportunities, with a clear call for educational reforms to better integrate digital health competencies with entrepreneurial skills. Such integration is seen as essential for empowering healthcare entrepreneurs to lead new ventures and innovate within the sector.

Greece shows significant entrepreneurial activity, particularly in startups that are innovating in telehealth, e-health services, and digital diagnostics. The Greek healthcare sector benefits from a young, tech-savvy population that is keen to engage in new healthcare ventures, supported by a growing number of technology parks and incubators.

Lithuania is developing its entrepreneurial ecosystem with a focus on health tech. There is a concerted effort to leverage Lithuania's strong IT sector to foster startups that can offer innovative healthcare solutions, particularly in areas like patient data management and telehealth services.

Romania is actively working to cultivate a stronger entrepreneurial environment within its healthcare sector. The focus is on digital health startups that can bring innovative solutions to the market, particularly in areas like telemedicine and patient data analytics. Romanian entrepreneurs are encouraged by government incentives and various European funding opportunities aimed at boosting innovation within the healthcare sector. Despite these efforts, there is still a need for more comprehensive support structures, such as dedicated health tech incubators and venture capital funding, to fully realis e the potential of Romanian health entrepreneurship.

As presented in Table 3, this comprehensive survey analysis illustrates the critical competencies required across various European contexts and entrepreneurial landscapes in the healthcare sector. Each participating country presents unique strengths and challenges, suggesting the need for more tailored educational and support programs to harness these opportunities effectively. The insights provided will guide the development of strategies that not only address the current skills gaps but also enhance the entrepreneurial capabilities of professionals in the healthcare sector, thereby fostering innovation and improving healthcare outcomes across the continent.

	Analysis of competencies and skills related to health entrepreneurship			
Countries	Health Entrepreneurship Skills Perceptions	Meaning of Ratings of Different Skills	Confidence Levels and Competence Gaps Identification	Specified Educational Programs
Romania	Focus on cybersecurity, telemedicine, social media management, web analytics, IoT	Cybersecurity is crucial for patient data protection, IoT and telemedicine for advanced healthcare infrastructures	High emphasis on digital skills yet a gap in widespread competence regarding new technologies	Integration of digital health competencies with entrepreneurial training
Poland	Emphasis on digital imaging and big data analytics, need for educational frameworks that combine tech and entrepreneurial skills	Digital imaging and analytics critical for advanced diagnostics	Strong educational structures but need for more practical, entrepreneurial integration	Educational reforms to better integrate digital health and entrepreneurial skills
Spain	Advanced skills in digital health applications, agile project management, and continuous adaptation to new technologies	Skills in digital health and project management for efficient healthcare management; green and circular economy skills	High demand for agile and green skills suggests a readiness for innovation, yet gaps in ongoing training programs	Supportive policies for healthcare entrepreneurs, with emphasis on telemedicine and personalised medicine
Cyprus	Enhanced competencies in healthcare information systems and management of electronic health records (EHRs)	Focus on systems that support sustainable healthcare practices and effective EHR management	Competence in information systems is growing, yet there's a need to develop more advanced skills	Need for improved support structures for entrepreneurs, such as better access to funding and mentorship programs
Greece	Strong demand for telehealth skills, initiatives for healthcare	Telehealth skills are in robust demand, reflecting a shift	Clear identification of skills in remote healthcare but gaps in integrating these	Developing the entrepreneurial ecosystem with tech parks and incubators

	entrepreneurship through mentorship programs and incubators	towards remote care services	into everyday practices	
France	Legal and regulatory knowledge, alongside digital literacy, and sustainable healthcare practices	Comprehensive skill set required, including knowledge of GDPR and other regulations	High competence in regulatory knowledge, potential gaps in integrating sustainable practices	Substantial entrepreneurial opportunities, especially in biotech and health data analytics, supported by incubators and accelerators
Lithuania	Patient-centric approaches, digital health literacy, integration of digital health records and telemedicine technologies	Digital health literacy aligned with patient needs and data security	Strong focus on digital literacy, but need for more comprehensive regulatory knowledge	Developing health tech ecosystem focusing on innovative solutions like patient data management and telehealth services
Portugal	Growing demand for remote healthcare delivery and digital consultation platforms	Critical skills for expanding healthcare access and reducing disparities in rural areas	Awareness of digital consultation skills is moderate, highlighting a gap in widespread training	Efforts to enhance the entrepreneurial ecosystem with better support structures for startups
Sweden	Strong push for AI, machine learning, and mobile health applications, with a focus on data management and product development rather than medical devices or diagnostics	Advanced stance in digital health, emphasizing the use of AI and machine learning for improving data management, developing healthcare products, and enhancing operational efficiencies	High confidence in innovation and technology integration, yet continuous need for training in new tech tools	Dynamic ecosystem for healthcare entrepreneurs with academic and industry partnerships facilitating commercialisation of health innovations

Table 3. Countries Analysis of competencies and skills related to health entrepreneurship.

4. Focus Group Insights

4.1 Formation and Purpose of the Knowledge Committees

The Health2Innovation consortium has established Knowledge Committees, one in each participating country, except for Ireland, Luxembourg, and Germany. These committees play a critical role in the foundational stages of the project, particularly during the research phase focused on identifying crucial skills for healthcare entrepreneurs.

Each Knowledge Committee comprises at least six members, bringing together diverse expertise from academic staff, Vocational Education and Training (VET) providers, representatives of health-related enterprises, career guidance experts, and specialists in tech development and sustainability. The pan-European Committee currently consists of 60 members in total. This multidisciplinary makeup ensures that a broad spectrum of perspectives are considered in the committee's deliberations and outputs. More specifically, the committees include academic professionals who are deeply involved in healthcare education and research, offering essential theoretical insights that are pivotal for curriculum development. They are joined by healthcare professionals such as doctors, nurses, and healthcare administrators, who provide practical insights into the operational and clinical needs of the healthcare sector. Experts in digital health technologies contribute with their knowledge on the latest advancements and practical applications of tech in healthcare. Additionally, members from the vocational training and career guidance sectors offer valuable perspectives on professional development within healthcare. Representatives from health-related enterprises bring a commercial outlook, highlighting market needs and innovation opportunities, while sustainability experts focus on integrating eco-friendly practices within healthcare settings. This diverse group of experts ensures that the training modules developed within Health2Innovation are comprehensive, and cater to the various aspects of healthcare and technology, enriching the project's outputs with practical, academic, and market-driven insights.

The principal aim of the Knowledge Committees is to provide targeted consultation during the research phase of the project. They are tasked with identifying the current and future skills needed in the healthcare market and advising on the structure of the training curriculum. This phase involves conducting detailed focus groups to explore the skills gaps highlighted by the project research and to gather insights on necessary competencies for healthcare entrepreneurs.

While the Knowledge Committees are particularly active during the research phase, their involvement extends to evaluating the learning materials developed based on their findings.

This evaluation will be crucial to ensure that the training materials are effective, relevant, and aligned with the latest developments in healthcare education and practice. The committees will review these materials to confirm that they meet the educational goals set out in this initial phase and can address the identified needs within the healthcare sector.

In summary, the Knowledge Committees provide essential guidance and expertise during the critical phases of Health2Innovation, shaping the educational strategies and ensuring that the training offered is both comprehensive and forward-thinking. Their work ensures that the project outputs are robust, relevant, and well-suited to meet the challenges of modern healthcare environments.

4.2 Skills Gaps and Market Demands in European Healthcare: Focus Groups Analysis.

To align healthcare education and practice with the rapid advancements in technology, recent focus groups conducted across nine European countries (Portugal, Spain, Poland, Lithuania, Cyprus, France, Sweden, Romania, and Greece) have shed light on the critical skills gaps and pressing market demands within the healthcare sector. These discussions were led by participant organizations, with experts from each national Knowledge Committee participating. There were 10 focus group sessions conducted both online and offline, each lasting more than an hour. (In Greece, two organizations conducted focus groups.) They followed identical guidelines aimed at identifying gaps and missing information in academic and field research, seeking consultation on specific skills currently in demand in the health market, and gathering input on the design of the training structure. These comprehensive sessions have revealed specific national challenges and opportunities for systemic improvements, guiding strategic initiatives to enhance healthcare delivery and education which are highlighted in the upcoming sections. The focus group reports, which detail the discussions and findings across the nine European countries, are included in the annexes of this report.

4.2.1 National Insights and Strategic Initiatives

In Cyprus, it was identified that there is a significant deficiency in digital literacy among healthcare entrepreneurs. This gap is compounded by a lack of enthusiasm for entrepreneurship within the healthcare field, attributed to inadequate educational frameworks that fail to promote innovative thinking and business skills. The market demands robust educational programs that not only improve digital literacy, but also foster an ecosystem conducive to healthcare innovation and entrepreneurship.

Lithuania's healthcare sector was expressed as facing similar challenges, with a particular shortage of practical training that integrates digital tools such as AI and data analytics into healthcare practice. The country's focus group have called for comprehensive reforms in healthcare education to include extensive digital health training and the establishment of support structures like incubators and innovation hubs to nurture startups in health tech.

Portugal's discussions highlighted a lack of advanced training in cybersecurity and data protection skills that are becoming increasingly crucial as the healthcare sector becomes more intertwined with digital technologies. Moreover, there is a noticeable resistance among older professionals in healthcare entrepreneurship against adopting new technologies, often due to

a lack of foundational digital training. To address these issues, targeted digital literacy programs and substantial infrastructure improvements are recommended to facilitate the widespread adoption of digital tools.

In Sweden, there is a noted need for strategic education focused on the management of healthcare systems with an emphasis on digital tools for efficient healthcare delivery. There is also an expressed need to improve competencies in health informatics and data management. The proposed solutions include integrating real-time data analytics solutions and developing adaptable training programs that emphasise the practical application of emerging technologies.

The Spanish focus group emphasised that Spain's healthcare entrepreneurs frequently lack familiarity with essential digital tools and applications, and that the gap is exacerbated by educational programs that fail to address the integration of technology in healthcare. This has led to a strong demand for professional development programs in digital health applications and a shift towards patient-centred care facilitated by technology.

Greece was said to experience a severe shortage of entrepreneurial skills and practical training in digital tools within the healthcare sector, which stifles innovation. The focus group have recommended the creation of supportive ecosystems for professionals in the healthcare sector and greater access to advanced technology training to foster innovation within the sector.

Romania reported a profound lack of advanced digital skills among healthcare entrepreneurs, highlighting a disconnection between current educational offerings and the current healthcare industry's needs. The focus groups advocate for comprehensive digital transformation strategies and stronger support mechanisms for healthcare startups, including mentorship programs and easier access to capital.

Poland has identified significant gaps in digital literacy and security within healthcare facilities. A notable reluctance to embrace entrepreneurship within the healthcare sector was also highlighted, underscoring the need for fostering an entrepreneurial mindset from an early stage.

France identified a crucial need for improved integration of digital tools and cybersecurity skills within healthcare training programs. Participants highlighted the lack of development skills and the pressing need for digital literacy among professionals in healthcare entrepreneurship, which is exacerbated by the rapid digitalisation of healthcare services.

4.2.2 Consolidated Recommendations

Drawing from the unique challenges identified in each country, several strategic recommendations have been proposed:

- For Cyprus and Greece, there is a need to develop platforms that not only enhance digital literacy, but also actively promote entrepreneurship within the healthcare sector.

- Lithuania and Sweden are advised to implement educational reforms that integrate comprehensive digital health training, and that promote continuous professional development to keep pace with technological advances.
- Portugal and Spain would benefit from national initiatives aimed at boosting digital literacy, focusing particularly on cybersecurity and the ethical use of digital tools in healthcare.
- Romania should facilitate the development of a robust digital health ecosystem that includes comprehensive support for healthcare entrepreneurs, such as regulatory guidance and access to funding.
- France needs to develop specialised training programs to improve the integration of digital tools and cybersecurity skills within healthcare training programs. This includes creating support structures for continuous learning, enhancing collaboration with tech sectors, incorporating real-world applications through simulation-based learning, and promoting interdisciplinary education.
- Poland needs specialised training programs to bridge the digital skills gap among healthcare providers, ensuring that all personnel are equipped to handle the latest technological advancements in healthcare delivery. These training programs should cover a broad range of competencies, from basic computer proficiency and effective problem-solving to interpersonal skills and healthcare business administration. The focus on integrating emerging technologies, such as IoT and AI, was particularly emphasised to maximise their potential in improving healthcare delivery and outcomes.

These insights and recommendations aim to bridge the gap between current capabilities and the evolving needs of the healthcare sector, ensuring that healthcare entrepreneurs across Europe are well-equipped to handle the challenges and opportunities presented by digital transformation.

4.3 Healthcare Education: European Focus Group Insights

In an era of rapid technological advancements and evolving market demands, the focus groups organised in the scope of Health2Innovation have provided critical insights into the current training structures in healthcare education. These discussions have not only identified key deficiencies, but also help to propose innovative solutions to align educational offerings more closely with the dynamic needs of the healthcare market as seen below.

1. **Integrating Technology and Innovation**

The necessity to weave technology and innovation into the fabric of healthcare curricula has been a recurrent theme through data collection. In Cyprus and Greece, there is a pressing call for the integration of digital tools and innovative practices within healthcare education. The focus groups have advocated for the creation of modular courses that cover emerging technologies such as AI, blockchain, and telemedicine, reflecting their growing importance in healthcare.

Lithuania has raised concerns about the scarcity of hands-on training with digital tools, which is crucial for bridging the gap between theoretical knowledge and practical application. The proposed solution is the incorporation of simulation-based learning and practical labs, allowing students to experience the real-world applications of their theoretical learnings, thus fostering a deeper understanding of digital healthcare solutions.

2. **Enhancing Entrepreneurial and Business Skills**

There's a significant gap in entrepreneurial education within healthcare training programs, particularly noted in Portugal and Spain. These countries have emphasis ed the need for comprehensive business skills development, ranging from foundational entrepreneurship courses to advanced modules on healthcare venture creation, financial planning, and market analysis. Sweden complements this approach by suggesting the integration of case studies and success stories of healthcare startups into the curriculum, providing students with practical examples of successful healthcare entrepreneurship.

3. **Adapting to Market Needs with Flexible Learning Options**

Romania highlights the need for adaptability in training programs to keep pace with the changing dynamics of the healthcare industry. This includes offering continuous professional development opportunities and micro-credentialing in specialised areas such as digital health law, ethics, and policy management. Greece and Cyprus also support the idea of lifelong learning frameworks that allow professionals in the healthcare sector to continually update their skills in response to new technologies and regulations.

4. **Fostering Soft Skills and Interdisciplinary Learning**

The focus groups in Spain and Portugal have underscored the underemphasis on soft skills development, such as communication, teamwork, and problem-solving, in national healthcare training curricula. Integrating these skills through interactive workshops and group projects can significantly enhance the effectiveness of healthcare entrepreneurs. Meanwhile, Sweden advocates for the creation of interdisciplinary learning environments within their national course curricula where medical students can collaborate with peers in IT, business, and engineering to foster a more holistic understanding of healthcare challenges and solutions.

5. Addressing Regulatory and Compliance Training

Lithuania and Romania have expressed concerns over the lack of training in healthcare regulations and compliance, an increasingly critical area with the advent of stringent data protection laws like GDPR. There is a clear need for comprehensive training modules that cover these aspects, ensuring that future healthcare entrepreneurs are well-versed in the legal implications of their work.

6. Recommendations and Strategic Initiatives

As the healthcare industry evolves with rapid technological advances and complex regulatory environments, there is a pressing need to update educational programs to prepare the next generation of healthcare entrepreneurs. Insights from focus groups across several of the European countries have led to specific recommendations for improving training structures in healthcare education. These suggestions are tailored to address the dynamic market demands and ensure that training programs are both comprehensive and adaptable.

7. Modular and Flexible Curricula

The adoption of modular and flexible curricula, as emphasis ed by Cyprus, Greece, and supported by Sweden, offers a strategic approach to education that accommodates ongoing changes in healthcare technology and policy. This method allows educational institutions to update or introduce new modules that reflect the latest developments in the field, such as digital health applications or changes in healthcare regulations, without overhauling the entire curriculum. This flexibility ensures that students always have access to the most current knowledge and tools.

8. Hands-On Learning Experiences

Meanwhile, Lithuania and Spain advocate for the incorporation of hands-on learning experiences within the healthcare curriculum. This approach aims to bridge the gap between theoretical knowledge and practical application, crucial in a field where practical skills can significantly impact patient care. By implementing simulation labs, clinical practicums, and virtual reality scenarios, students can experience and navigate real-world healthcare challenges in a controlled, educational environment, enhancing their readiness for actual clinical settings.

9. Entrepreneurial Education

Recognising the importance of innovation in healthcare, Portugal, Spain, and Greece have highlighted the need for enhanced entrepreneurial education. This training is not limited to creating new businesses, but extends to innovating within healthcare settings to improve services and patient care. Entrepreneurial education programs might include courses on

healthcare venture creation, innovation management, and sustainable business practices, equipping students with the skills to initiate and lead change within the healthcare sector.

10. Interdisciplinary Learning Opportunities

Sweden and Romania propose fostering interdisciplinary learning opportunities, where students from healthcare, technology, business, and engineering collaborate. This integrative approach encourages a broader understanding of patient care, from technological innovations to business operations, culminating in a holistic healthcare education that prepares students to think critically and collaborate effectively across disciplines.

11. Regular Updates to Regulatory Training

Finally, Lithuania and Romania stress the importance of consistently updating regulatory training to keep pace with legislative changes, especially in a heavily regulated field like healthcare. Keeping professionals well-informed about the latest regulations and compliance requirements ensures that they are not only competent, but also practice safely and ethically within their legal boundaries.

These recommendations are directly linked to the insights provided by each country during the various focus group discussions. This clear connection between the identified needs and the proposed changes ensures that the suggested updates to healthcare education effectively address the specific needs and challenges identified in each country. This alignment enhances the relevance and impact of the proposed educational improvements across the participating countries.

5. Conclusions and Recommendations

Health2Innovation has implemented a dual approach by integrating rigorous academic research with practical field studies to comprehensively assess the healthcare landscape across Europe. This approach has been instrumental in revealing not only the theoretical gaps within current healthcare educational systems, but also the real-world, practical challenges faced by professionals in healthcare entrepreneurship in adapting to digital transformation and sustainable practices.

Academic research within the project has highlighted a series of gaps in healthcare education, particularly in the integration of cutting-edge digital tools and sustainable healthcare practices. It was found that, while healthcare curricula generally provides robust medical knowledge, it often lacks comprehensive training in digital technologies such as data analytics, AI, and the principles of green healthcare, which are crucial for modern healthcare environments.

Complementing these academic insights and field research provided a practical perspective on the implementation challenges. The outputs of this research illuminated widespread discrepancies in the adoption of digital technologies, and revealed a critical shortage of digital literacy among professionals in healthcare entrepreneurship. Furthermore, the need for sustainable practices within healthcare settings was identified as an underdeveloped area that required immediate attention.

Contributions from the focus groups organized within the national Knowledge Committees were pivotal in tailoring the project's focus to meet specific regional needs. Through these discussions (focus groups), it became evident that there was a universal demand for educational reforms to better prepare healthcare entrepreneurs for the future. The focus groups, representing a wide array of European regions, collectively emphasized the necessity for healthcare education programs to be more responsive and adaptable to rapid technological advances and regulatory changes.

To address these identified gaps and to enhance the overall efficacy and sustainability of healthcare services, Health2Innovation proposes several strategic recommendations:

- **Develop Integrated and Responsive Curricula**

There is a compelling need for educational institutions to overhaul existing curricula to integrate seamless instruction in digital health technologies along with sustainability practices. Such curricula should be dynamic, allowing for quick updates as new technologies and environmental policies emerge.

- **Expand Practical Training Opportunities**

Enhancing practical training opportunities through increased access to simulation labs and real-world internships is critical. This will ensure that Current and upcoming students and professionals in healthcare and related fields can effectively apply their theoretical knowledge in practical settings, thereby bridging the current gap between education and practice.

- **Enhance Continuous Professional Development**

Establishing continuous professional development programs that provide ongoing training in the latest digital tools, cybersecurity measures, and sustainability practices is essential. This should become standard practice across healthcare institutions to ensure that all professionals are equipped to meet the demands of modern healthcare delivery.

- **Foster Interdisciplinary Collaboration**

Encouraging interdisciplinary programs that merge healthcare with sectors such as IT, business, and environmental science is recommended to foster holistic problem-solving skills. This approach will enable healthcare entrepreneurs to tackle complex healthcare challenges more effectively.

By implementing these recommendations, the Health2Innovation project aims to equip professionals in healthcare entrepreneurship across Europe with a comprehensive skill set necessary to navigate and lead in a digitally evolving and environmentally conscious healthcare environment. This strategic overhaul is expected to catalyse a transformation that not only aligns with contemporary global healthcare trends but also anticipates future developments. Supporting data, detailed field research reports, and additional analyses that informed these conclusions and recommendations are available in the annexes of this report.

6. Appendices

1. National reports
2. Field research questionnaire
3. Field research reports
4. FG reports
5. KC Members

7.Executive Summary Language Versions

French

https://drive.google.com/file/d/1qJO1Xn64lWyAyypzFxl81s0aWf4nJTz5/view?usp=sharing

German

https://drive.google.com/file/d/1Z04pGFJLyIQ841gjKAdUjYp6Y86GsTX/view?usp=sharing

Greek

https://drive.google.com/file/d/1gZTSC6jTfARvZn-nYhSwCZIc5ULSw5V_/view?usp=sharing

Lithuanian

https://drive.google.com/file/d/1cZI9Vz1dRJlLWjJ60HXhBu_HwLa0nxTD/view?usp=sharing

Polish

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Portuguese

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Romanian

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Spanish

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Swedish

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