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HealthTech Innovation in 2024: Romania's Growing Ecosystem

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Abstract

This paper takes a brief look at the HealthTech startup scene in Romania in 2024 considering the global innovations such as Artificial Intelligence-driven diagnostics, biodegradable materials, and 3D printing for medical purpose. On the Romanian side, the paper presented how the local HealthTech ecosystem is quickly growing thanks to support from programs such as EIT Health that provide resources, mentorship, and global opportunities for startups. Challenges such as political instability, limited access to financial capital, and regulatory delays hinder ecosystem growth. To keep up with the ongoing transformation in health care, Romania must adapt by fostering new solutions and building teams that value multidisciplinary collaboration towards daily practice solutions.

Keywords: Ecosystem; HealthTech; Innovation

Global Innovative Trends in HealthTech by Example

In 2024, advancements in medical innovation continue to redefine healthcare, encompassing a diverse range of technologies and approaches aimed at improving patient outcomes and addressing global health challenges. The healthcare sector in 2024 showed some advancement in innovation, driven by advancements in technology and a growing emphasis on personalized medicine. The year 2024 had seen significant developments in various areas, including artificial intelligence (AI), machine learning, and bioprinting technologies, which are expected to reshape patient care and treatment approaches.

The integration of AI into healthcare promises to enhance diagnostic accuracy, optimizes treatment plans, and streamlines operational efficiencies within healthcare systems [1]. For instance, machine learning techniques have the potential to analyze huge amounts of data, enabling healthcare providers to uncover insights that were previously unattainable, thus improving patient outcomes and operational workflows [2]. Artificial intelligence continues to receive researcher's attention, including respiratory care. Researchers have explored how AI-driven innovations such as predictive modeling and machine learning algorithms are transforming respiratory therapy and reducing mortality rates in critical care scenarios [3].

The field of bioprinting also gained attraction, with innovations in bioink technology that allow creation of complex tissue structures. This advancement not only holds promise for regenerative medicine but also addresses critical challenges related to the sourcing of cellular materials for bioprinting applications [4]. The ability to create patient-specific tissues could revolutionize transplant medicine and personalized therapies, making significant strides towards addressing the limitations of traditional organ donation systems.

Healthcare technology also has made progress in rehabilitation. Robotic exoskeletons promise effective tools for stroke recovery, showcasing the integration of AI and advanced materials [5]. Furthermore, the exploration of

neurophotonics is revealing new avenues for understanding and treating neurological disorders, highlighting the potential for photonic technologies to revolutionize neuroscience [6].

Sensor technologies are increasingly utilized in rehabilitation and fitness. Wearable technology, driven by data analytics and real-time monitoring, underscores a growing trend towards personalized health and fitness solutions [7]. This trend is complemented by advancements in precision medicine, particularly concerning children and youth with medical complexities, which emphasizes the need for tailored healthcare interventions [8].

The integration of digital technology into palliative care highlights the evolving role of AI and telemedicine in addressing the limitations of the traditional healthcare models [9]. Medical diagnostics and treatment methods have also substantial advancements with the adoption of point-of-care ultrasonography (POCUS) (e.g., see for example nephrology [10]).

Similarly, 3D (three dimensional) printing technology is revolutionizing medical training with the development of high-fidelity simulators for surgical education. Collaboration between engineers and medical experts enables realistic and cost-effective training tools, fostering skill enhancement for healthcare professionals [11].

In addition to these technological advancements, the healthcare sector is also focusing on addressing systemic challenges that hinder the widespread adoption of innovations. Research indicates that unbalanced budgeting and incentive structures within hospitals can impede the progress of medical innovations, highlighting the need for a more supportive ecosystem that fosters innovation [12]. Furthermore, the ongoing evolution of healthcare innovation ecosystems underscores the importance of collaboration among stakeholders, including healthcare providers, technology developers, and regulatory bodies, to navigate the complexities of implementing new technologies effectively [13]. As an example, a cutting-edge development in materials science was the creation of biodegradable multiblock copolymers. The research conducted at Osaka University holds transformative potential for medical packaging, combining functionality with environmental sustainability and introducing new possibilities for applications in agriculture and medicine [14]. The implementation of stem cell technology in Indonesia has prompted critical ethical discourse, emphasizing the necessity of comprehensive legal and ethical frameworks. The importance of establishing robust policies to guarantee the equitable and safe use of these technologies is highlighted [15].

As we look towards the future, the emphasis on precision medicine, particularly for vulnerable populations such as children and youth with medical complexities, is becoming increasingly prominent. The 2024 Watch List highlights emerging technologies that aim to enhance care for these populations, reflecting a broader trend towards tailored healthcare solutions that meet individual patient needs [8]. Collectively, these innovations show a transformative period in healthcare, where technology and personalized approaches converge to improve patient care and outcomes.

Romanian Ecosystem: Growth Trajectory and Collaborations

Romania's HealthTech ecosystem has shown a promising growth trajectory in recent years [16], underscored by its recognition as a Level 3 (Experimenter) innovation hub for EIT Health (EIT - European Institute of Innovation and Technology; https://eithealth.eu/). The rank places Romania alongside countries such as Italy and Poland, reflect its growing capacity to innovate and adopt digital health solutions.

The Romanian technology readiness level (TRL) is estimated at 4.5, as per "Level 3 Experimenter" classified by EIT Health. The TRL suggests that the technologies are in the middle stages of development, undergoing pilot testing or early real-world applications. This positioning highlights Romania's progress in innovation but also indicates room for growth in terms of deployment and scaling [17].

In comparation, Italy and Poland, both categorized as "Moderate Innovators" in the European Innovation Scoreboard, are estimated to have a TRL of 5.5 (Figure 1). The level of TRL equal with 5.5 reflects technologies transitioning from pilot testing to operational environments, and early market adoption. Thus, Italy and Poland have more mature HealthTech ecosystems than Romania, showcasing the broader deployment and integration of their innovations [18, 19].

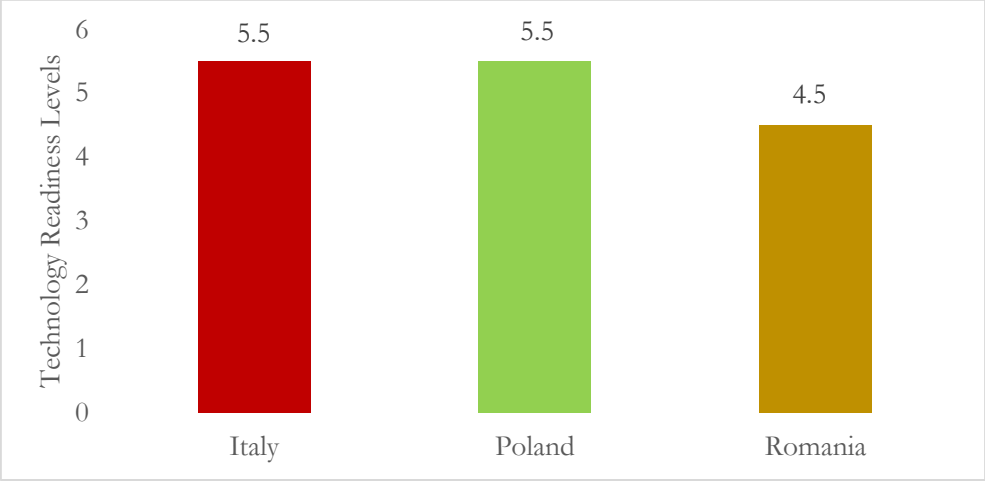

Figure 1. Comparative average technology readiness levels (TRL) of HealthTech ecosystems in Romania, Italy, and Poland

EIT Health, a leading European network of healthcare innovators, plays a pivotal role in supporting the Romanian health tech ecosystem. As one of eight Knowledge and Innovation Communities (KICs) of the European Institute of Innovation and Technology (EIT), EIT Health focuses on fostering collaboration across research, education, and business sectors. Through initiatives such as the Regional Innovation Scheme, EIT Health supports "moderate innovators" such as Romania by providing funding, mentorship, and access to international markets.

Since its introduction in Romania, EIT Health has empowered local startups with resources and expertise, contributing to the ecosystem's recognition as a Level 3 (Experimenter) innovation hub by 2023. EIT Health's efforts extend beyond funding: they foster collaboration between stakeholders, encourage the adoption of digital health solutions, and enhance the visibility of Romanian startups in the European stage. These initiatives positioned Romania for continued growth and integration into the broader European HealthTech landscape.

Programs such as EIT Health's HeadStart funding have supported several Romanian startups, enabling them to scale and compete in global markets. Meanwhile, Romania's growing reputation as an innovation hub attracts foreign startups, particularly from countries like Poland and Estonia, which see Romania as a gateway to the European market [20].

Programs such as Morning Health Talks facilitate dialogue between experts and innovators, while competitions such as InnoStars Awards and i-Days provide startups and students with opportunities to develop their ideas and access valuable resources. Additionally, through mentorship and funding initiatives, EIT Health supports Romanian start-ups in addressing critical health challenges and integrating them into the European innovation network. Thus, EIT Health actively contributes to creating a sustainable innovation platform capable of generating practical and scalable solutions for Romania's healthcare system.

Collaboration is the cornerstone of this process. Within Romania, organizations such as FreshBlood, Activize, Health Innovation Zone, INNO, and FIX Cluj have played vital roles in fostering connections among startups, healthcare professionals, policymakers, and investors. These groups spearhead initiatives, such as Hubvantage and Hackathon4Health, which provide tailored mentoring and resources to help startups grow and succeed [21]. Hubvantage is a personalized support program designed for founders of healthcare startups to enhance their innovation capabilities in the healthcare sector. The program offers a range of activities, including needs assessment, one-on-one mentoring, and networking events, to help startups effectively collaborate with healthcare organizations. In its third edition in 2024, Hubvantage plans to support 15 startups over a nine-month period by combining hybrid formats for its activities, both online and in-person [22]. Hackathon4Health, on the other hand, is Romania's largest health-focused hackathon initiated by Johnson and Johnson Romania. It aims to drive digital innovation in the health care sector by developing creative solutions to pressing health challenges. The 2024 edition, took place in November 8-10 at the Library of the University of Medicine and Pharmacy "Carol Davila" in Bucharest, and focuses on themes such as oncology, hematology, immunology, mental health, and medical

devices. The winners of the Hackathon4Health received pre-seed funding of $10,000 along with six months of mentorship [23]. Hubvantage and Hackathon4Health initiatives share the common goal of fostering innovation in healthcare, but they differ significantly in format and approach. Hubvantage is a long-term program offering continuous mentoring and support to startups with established teams and experience, aiming to align their solutions with the needs of healthcare organizations. By contrast, Hackathon4Health is a short, intensive, three-day event that brings together diverse participants, including IT engineers, software developers, designers, and healthcare professionals, to rapidly develop and showcase digital health solutions.

Romanian HealthTech Ecosystem Landscape

For the last three years in a row, Activize and Freshlood provided the Romanian HealthTech Startups Overview Report, shining light on the ecosystem. The 2024 report provides an overview of over 100 initiatives divided into the following categories: tools for patients and families, tools for healthcare professionals, tools for institutions, and tools for self-care. Compared with the previous edition of 2023, these categories have changed. The former category of tools for concerned individuals have now become tools for self-care with three subcategories: nutrition, mental health, and well-being. Telemedicine tools category does not exist in the 2024 report. The logos from this category were allocated in 2024 to either tools for patients and families (one logo), institutions (two logos), or healthcare providers (five logos). In 2024, there was also a dedicated category for the supporters of healthcare innovators, highlighting their crucial role in the ecosystem. Compared to the previous editions, the total number of logos has increased, with each category gaining new logos and losing a few old ones (Figure 2).

Challenges in the Romanian HealthTech Ecosystem

Technology Readiness Levels (TRLs) provide a structured method to evaluate the maturity of technologies, moving from initial concepts to fully operational solutions [24] In Romania's HealthTech ecosystem, the progress of innovations through higher TRLs is hampered not only by financial and regulatory challenges, but also by the broader context of political instability characterized in recent months.

From our perspective, uncertainty in Romania's political landscape has compounded the existing obstacles in the HealthTech sector. Frequent government changes and the lack of long-term stable policies have delayed reforms. Without consistent leadership, efforts to establish a cohesive framework for innovation and digital health adoption remain fragmented, forcing startups to navigate uncertain environments with limited government support.

The instability faced by Romania also affects investors' confidence. Political volatility adds another layer of risk in a sector already grappling with low venture capital and stringent regulatory hurdles. Investors often prioritize markets with predictable policies and clear support for innovation, and Romania's political environment could discourage much-needed funding from HealthTech startups. Moreover, the absence of a unified vision from public institutions has left startups struggling to effectively collaborate with the healthcare system, further hindering their ability to scale solutions to higher TRLs [25].

In our opinion, addressing these issues requires concerted effort from all stakeholders— both public and private—to push for political stability and prioritize healthcare innovation as a national strategy. Without this alignment, Romania risks stalling its progress and missing the opportunity to become a competitive player in European healthcare innovations. Political will, combined with the resilience of the local HealthTech community, determines whether the ecosystem can overcome its challenges and reach its full potential.

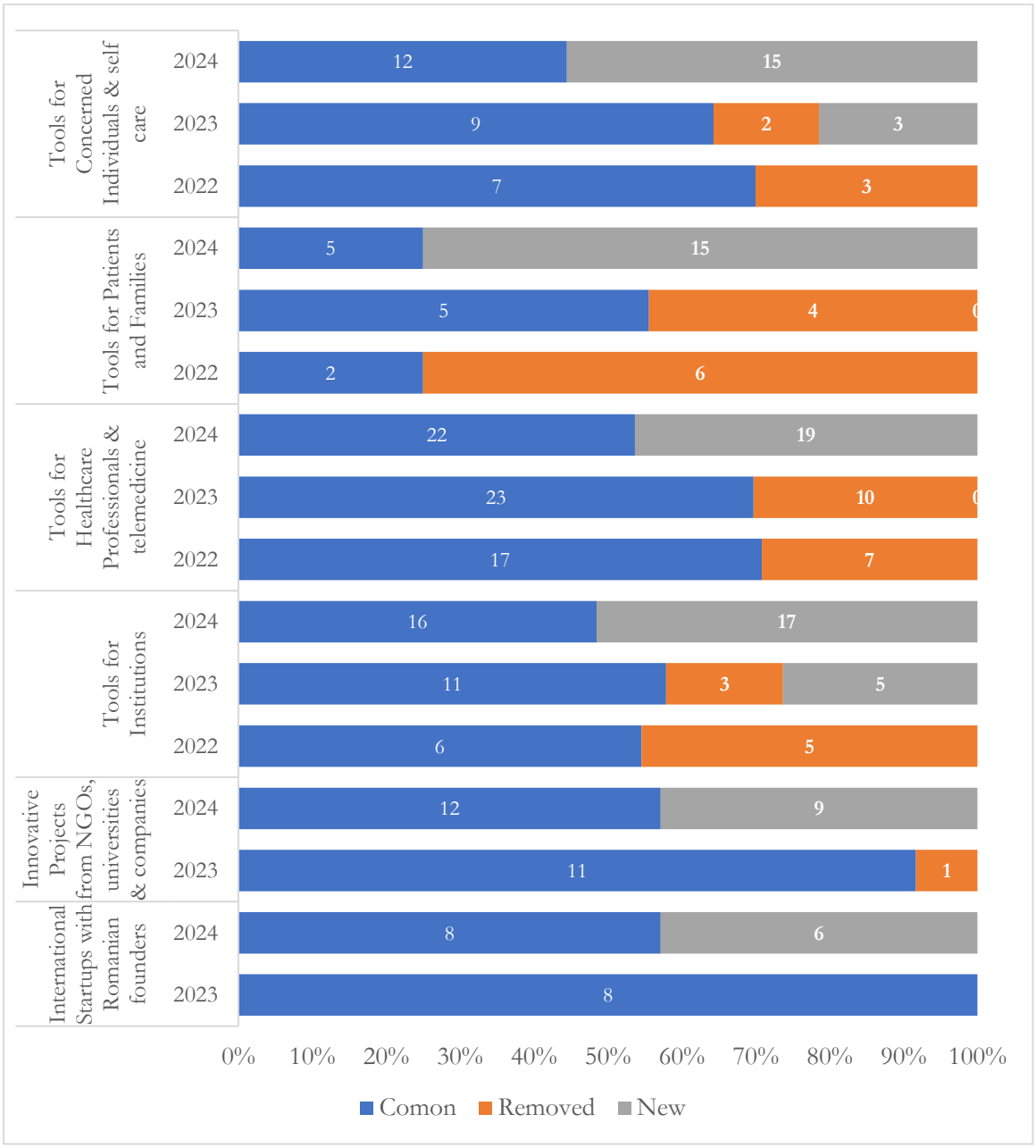

Figure 2. Logos variation between the three editions of the Romanian HealthTech startups map

Romanian Funding Landscape

Between 2020 and 2024, local startups received approximately €16.2 million through public grants from EIT Health and the European Innovation Council Accelerator, alongside €13.3 million were raised across 38 venture capital and angel investment rounds. In stark contrast, foreign startups with Romanian founders attracted €111.2 million in just six funding rounds, highlighting the limited access to capital and cautious investment climate for startups operating within Romania [21].

Romania's HealthTech ecosystem is rapidly evolving, driven by forward-thinking startups tackling pressing healthcare issues through technological advancements. These initiatives aim to make healthcare more inclusive, streamlined, and centered around patient needs [21].

For data management, platforms such as Vault simplify the storage and sharing of medical information, ensuring seamless access to doctors and patients. Similarly, LabTraker uses advanced AI to analyze laboratory test results, helping individuals better understand their health. Telemedicine also showed significant growth. Solutions

such as Dr-Online and HeroDoc make it easier for patients to connect with healthcare professionals, offering video and chat consultations that save time and increase access, particularly in underserved areas [21].

Mental health is another area that has gained considerable attention. Startups such as Calmly offer personalized mental health solutions, such as therapist matching and self-help resources, while Acertivo focuses on habit-changing tools, including smoking cessation programs. Specialized diagnostic tools have also emerged. Alter Medico provides advanced laboratory management systems, and OptiCare delivers affordable eye health monitoring through a simple app that uses a mobile phone and laptop [21].

Education and training have been transformed by technology. Immersive VR and AR platforms are creating realistic simulations for healthcare professionals, while AIDE automates training in highly regulated fields, such as pharma, significantly reducing costs and time. Startups such as Elpida Research INC are pushing boundaries with cutting-edge innovations, such as plant-based nanovaccines for treating diseases such as cancer. Meanwhile, Data Sweep is leverages AI to process and classify healthcare data [21].

Author's View

As a participant and winner in the local phase of the EIT Health i-Days, one of the most impactful aspects for me (AD) was experiencing multidisciplinary collaboration first. Working with people from different fields— healthcare, engineering, marketing, and advertising— revealed that diverse perspectives are essential for creating innovative and practical solutions. This type of collaboration is something I believe we should learn and practice from the very beginning of our education. Hackathons and similar events are great opportunities; however, we need to integrate this mindset and skill set into our academic curriculum to truly evolve as future professionals.

List of Abbreviations: AI - Artificial intelligence; TRL- technology readiness level; KIC - Knowledge and Innovation Communities; POCUS - point-of-care ultrasonography; EIT - European Institute of Innovation and Technology

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