

CHAIN REACTIONS

THEMATIC BRIEF HEALTH 3

Potential of Hackathons as innovation driver in health sector



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Definition hackathon

A hackathon is as a design sprint-like event in which a heterogeneous group of participants from different fields such as data analysts, app developers, entrepreneurs, as well as specialists in specific sectors such health, energy, clean-tech, mobility etc. work together in teams to develop new solutions for either a specific topic or a number of pre-defined challenges. In case of an industrial hackathon, these challenges are co-designed by hackathon organizers together with stakeholders from the specific sector in a collaborative process. This enhances buy-in, dissemination and uptake of the developed solutions. The challenges are presented and clarified to the participants ahead of the hackathon, to ensure proper understanding and a level playing field. The visual representation below illustrates the process of a hackathon from the definition of challenges until the actual hackathon event:

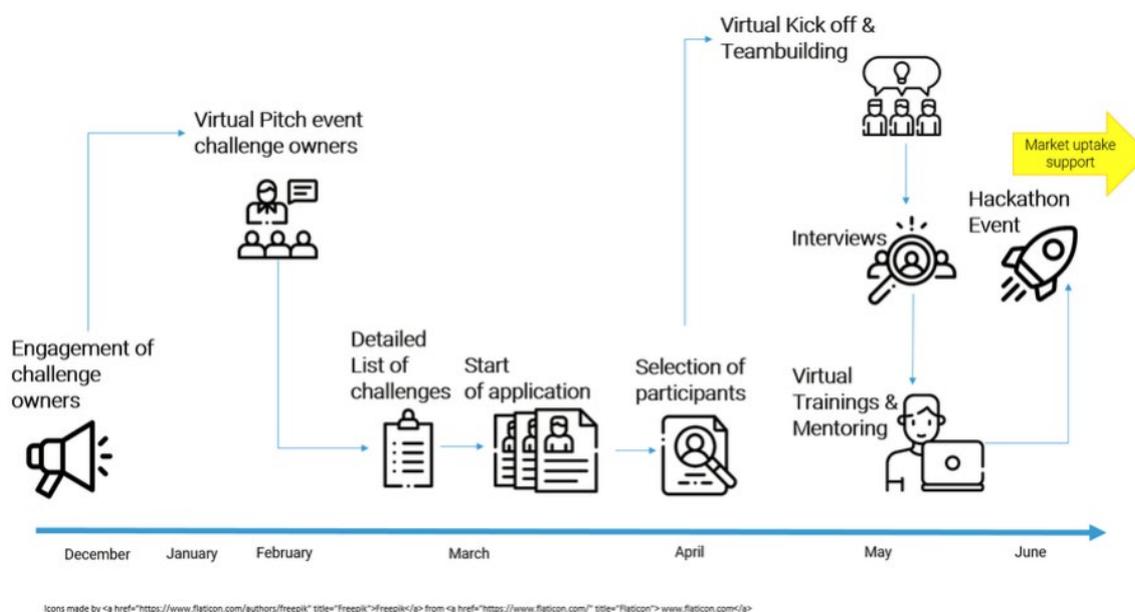


Figure 1: Hackathon process including challenge definition

Source: bwcon

During the hackathon, coaches and mentors support the teams both in technical and business-related questions. Mentors either come from industry or are external experts in business modelling, IPR etc. In the origin, hackathons were mainly focused on IT-related solutions. Over time they have also proved to be useful to provide solutions for a broad scope of various issues, covering also business concepts and innovative solutions to big societal questions.¹ The typical duration of the hackathon event itself is one weekend with participants mostly working both day and night. Below a typical agenda for a 48 hours hackathon is described in a generic manner:

¹ Data4Health Recovery Hackathon, (EU Industrial Hackathon), GRO/SME/19/F/222, EASME/2020/OP/0016



Day 1		Day 2	
9:00	Opening	9:00	Development Time
9:15	Keynote: Inspirational Session on Data 4 Healthy Recovery	10:00	Checkpoint with mentors
9:30	The Hackathon's Challenges		Development time
9:30	Team Building: Get to know your team better	12:30	Lunch
10:15	Start of Development	16:00	Submit your presentation/solution
12:30	Lunch	16:30	Final Pitch
	Development time	18:30	Coffee break and jury evaluation
18:00	Checkpoint with mentors	19:30	Award Ceremony
	Coding around the clock		

Figure 1: Generic programme of 48 hours design sprint like hackathon event

Source: bwcon

Status quo: innovation in the health ecosystem

The speed of digitization is advancing rapidly in all sectors. Progress in technologies such as big data, artificial intelligence and robotics, the Internet of Things and high-performance computing is impacting the very nature of work and society as a whole. Data is at the center of this transformation. Data-driven innovation is expected to bring enormous benefits for citizens in many sectors, amongst others in the field of improved personalized medicine.² Patient and user-generated health and care data are expected to further proliferate in the coming decade, creating continuously evolving and learning health systems.³ Referring to personalized medicine the European Data strategy states that: *“Personalized medicine will better respond to the patients’ needs by enabling doctors to take data-enabled decisions. This will make it possible to tailor the right therapeutic strategy to the needs of the right person at the right time, and/or to determine the predisposition to disease and/or to deliver timely and targeted prevention.”*⁴ When it comes to data exploitation, we can observe the collection of data in various touchpoints of the health systems, e.g. medical imaging, quantified self-movement, examination support data, disease specific data (such as measuring parameters like blood pressure), lab analysis results. Further it is expected that digitalization will lead to a closer interaction between the strict health sector and some surrounding sectors.

Even if we see already numerous examples of successful digital innovations in the health sector in Europe, Europe is lagging behind in a worldwide comparison. There is still a huge untapped potential on the European digital health market. This is due to the fragmentation of the health and care systems in Europe. Technology providers have to struggle with the

² A European strategy for data, Brussels, 19.2.2020 COM(2020) 66 final, p.1

³ SWD (2018) 126 final: Staff Working Document accompanying the Communication enabling the digital transformation of health and care in the Digital Single Market; empowering citizens and building a healthier society, of 25 April 2018: <https://ec.europa.eu/digital-single-market/en/news/staff-working-document-enabling-digital-transformation-health-and-care-digital-single-market>

⁴ A European strategy for data, Brussels, 19.2.2020 COM(2020) 66 final, p.2



fragmented European market and perceive a lack of budget when it comes to deploying digital health solutions and implementing new care models.⁵

A further challenge lies within the massive amounts of data consumers are collecting whilst using smart health applications. There is risk of discrimination and unfair practices. To tackle this challenge, movements such as the MyData movement give individuals tools at hands to decide at personal level what they want to do with their data (e.g. consent management tools, personal information management apps).⁶

Particularity about health hackathons as part of the participatory medicine concept

The benefit of hackathons can be observed on two levels: idea sourcing as well as qualification of staff in future competencies. In a health hackathon, we even go one step further as we often see the direct involvement of patients and their supports or even relatives of patients who have an intrinsic motivation to develop new solutions that relieve patients from their pain or that make certain services better accessible. Thus, via user engagement an early validation of the ideas is ensured.⁷ As such Hackathons can be considered as an appropriate mean for mobilizing actors representing the whole health ecosystem, particularly:

- Health Industry (ranging from individual developers, manufacturers, SMEs to big pharmaceutical companies)
- Patients as well as healthy persons interested in disease prevention
- Health service providers (such as doctors, caregivers, hospitals)
- Policy makers
- Insurance companies
- Industry with close relation to health industry like wellness, sports, food which has partial relationship with health industry

Currently, interactions within these health systems are changing with a trend towards participatory medicine which Frydman (2010) defines as “... a movement in which networked patients shift from being mere passengers to responsible drivers of their health, and in which providers encourage and value them as full partners.”⁸ This means that patients are no longer simply interacting with healthcare providers, instead many are ‘driving’ the interactions and taking charge of their health by using information sources on the Internet and collecting and using data for self-care purposes.⁹ An example is the Quantified Self movement in which people collect data about themselves (maybe even with tools they create) to improve their self-awareness and decision making.¹⁰ This increased involvement of all stakeholders, and ubiquity of information systems as integral parts of the health care system, raise opportunities

⁵ Data4Health Recovery Hackathon, (EU Industrial Hackathon), GRO/SME/19/F/222, EASME/2020/OP/0016, page 6

⁶ See the Opinion of the German Data Ethics Commission, p. 133

https://www.bmfv.de/SharedDocs/Downloads/DE/Themen/Fokusthemen/Gutachten_DEK_EN_lang.html?nn=11678512

⁷ Karen Day, Gayl Humphrey, Sophie Cockcroft: “How do the design features of health hackathons contribute to participatory medicine?”, in Australasian Journal of Information Systems Day, Humphrey & Cockcroft 2017, Vol 21, Research on Health Information Systems Health hackathon design & participatory medicine, p.1

⁸ Frydman, G. A. (2010). A patient-centric definition of participatory medicine. Retrieved from <http://e-patients.net/archives/2010/04/a-patient-centric-definition-of-participatory-medicine.html>

⁹ Auffray, C., Charron, D., & Hood, L. (2010). Predictive, preventive, personalized and participatory medicine: back to the future. *Genome Medicine*, 2(8), 57.

¹⁰ Bowen, S., McSeveny, K., Lockley, E., Wolstenholme, D., Cobb, M., & Dearden, A. (2013). How was it for you? Experiences of participatory design in the UK health service. *Codesign-International Journal of Cocreation in Design and the Arts*, 9(4), 230-246. 10.1080/15710882.2013.846384



for participatory medicine with the format of hackathons perfectly fitting into this new ecosystem bringing together participants from all parts of the healthcare system, as well as giving ‘patients’ an opportunity to lead and fully participate in software innovation development.¹¹

Effectiveness of health hackathons

Since the year 2020 and the outbreak of the Covid-19 pandemic, health hackathons have become almost common knowledge. In April 2020, the European Commission hosted the EUvsVirus Hackathon with an impressive amount of participants: 20,9000 people of 141 different nationalities giving rise to over 2,000 pioneering solutions to fight the outbreak. This is a health hackathon with unprecedented numbers.¹²

Besides the enthusiasm about record participation, one can ask for the effectiveness and sustainability of health hackathons. It will be too early today to evaluate in a comprehensive manner the sustainable effects of the EUvsVirus Hackathon. Looking at previous research on Health Hackathons, a study of Olson KR, et al. dating from 2017 provides reliable data. They evaluated the outcomes of 12 hackathons from 2012 to 2015 in India, Uganda and USA by using emailed surveys. To minimize response bias, they coded non-responding teams as having made no progress.¹³ In terms of thematic focus, teams across all 12 hackathons developed mainly predominantly preventive, diagnostic or therapeutic medical devices. In total, 61.2% of projects included hardware in their innovations, with 39.8% having both hardware and software. A significant minority of projects (19.9%) included ‘process’ innovations or non-technical solutions. A similar number of projects, almost 18.9%, included software only.¹⁴

The health issues addressed are illustrated in the graph below

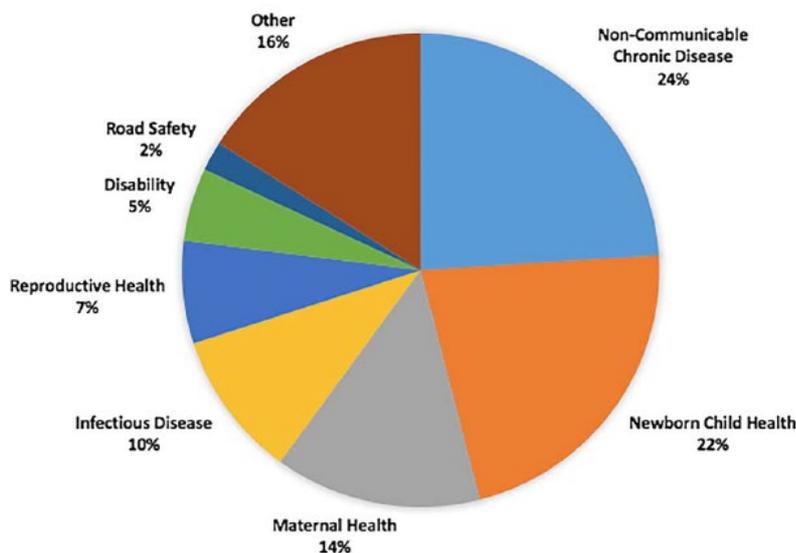


Figure 1: Health issues addressed in 12 health hackathons
Source: Olson KR, et al.

¹¹ Chowdhury, J. (2012). Hacking Health: Bottom-up Innovation for Healthcare. *Technology Innovation Management Review*, 2(7), 31.

¹² https://ec.europa.eu/info/news/european-commission-hosted-euvsvirus-hackathon-gives-rise-over-2000-pioneering-solutions-fight-outbreak-2020-apr-27_en

¹³ Olson KR, et al. *BMJ Innov* 2017;3:37–44. doi:10.1136/bmjinnov-2016-000147, p. 37

¹⁴ Olson KR, et al. *BMJ Innov* 2017;3:37–44. doi:10.1136/bmjinnov-2016-000147, p.40



In terms of sustainability Olson KR, et al. found out that 30% of teams continued work after hackathons. They yielded 1,8 new patents, 1,25 new companies and \$5.34 million of follow-on funding per hackathon with a mean follow-up of 12 months. 25% of all projects initiated at the hackathons had begun preclinical or clinical pilot testing.

Consequently, Olson KR, et al conclude that these are key steps towards accelerating technical innovation and that this model of innovation would offer favorable returns particularly in settings with limited resources or where financial expenditures are under increasing scrutiny. They further documented several indicators of a strengthened health-focused innovation ecosystem emerging from the hackathons. Participants reported significantly increased confidence in their ability to address medical technology challenges. Furthermore, many of the hackathon participants would not have met each other without the hackathon structure. Over 30% of teams mentioned having at least one team member who subsequently worked on other projects with people they had met at a hackathon. This ecosystem effect is particularly important for the health sector as medical technology development requires a specific focus on users who may be distinct from innovators. Therefore, an ecosystem that includes skill sets necessary to commercialize high-value health products will be important to support impactful innovations.¹⁵

The authors conclude: *“Data presented indicate that, within three different global locations, a healthcare hackathon model including preceding priming activities and targeted post event support is a reliable source of solutions to healthcare challenges. To a great extent, these events help develop a healthcare solution ecosystem primed to solve as yet unaddressed challenges.”*¹⁶

Outlook: (Health) Hackathons as a policy tool in the post covid 19 era

It may be too early to assess the implications of Covid-19 in details. Still, it is clear that the Covid-19 outbreak has an impact on human health as well as on European economy and industry including changes in the supply chains. During the year 2020 enormous unprecedented measures – economically and socially – have been taken.

The relaunch of European economy and the strengthening of the European health system – both in terms of managing the ongoing crisis as well as pandemic prevention for the future – will be at the core of the European Union. Even if the focus is now on dealing with the immediate effects of Covid-19, the European Union, industry, policy makers and society must learn from the crisis and reflect how to build more resilient health systems resistant to future pandemics.¹⁷ In the New Industrial Strategy for Europe, the Commission underlined its willingness to co-design and co-create solutions with industry itself as well as with social partners and citizens.¹⁸ In this context, hackathons as described above are a powerful tool to achieve this transformation and economic recovery in an inclusive way putting people at their core. One of the mentors of the above mentioned EUvsVirus Hackathon, Fiona Chambers, head of the School of Education at University College Cork puts it in her words “I believe [it’s] a game changer – crowd-designing of this nature will yield viable and feasible ideas, igniting the EU’s collective brainpower in tandem with its compassion”.¹⁹

¹⁵ Olson KR, et al. BMJ Innov 2017;3:37–44. doi:10.1136/bmjinnov-2016-000147, p.41ff

¹⁶ Olson KR, et al. BMJ Innov 2017;3:37–44. doi:10.1136/bmjinnov-2016-000147, p.44

¹⁷ Data4Health Recovery Hackathon, (EU Industrial Hackathon), GRO/SME/19/F/222, EASME/2020/OP/0016

¹⁸ COM(2020) 102 final.

¹⁹ <https://sciencebusiness.net/covid-19/news/eu-vs-virus-hackathon-proves-be-popular-experiment-chaotic-times>



Literature

Communication from the Commission to the European Parliament, the Council, the European economic and social committee and the committee of the regions, A European strategy for data, Brussels, 19.2.2020 COM(2020) 66 final

Data4Health Recovery Hackathon, (EU Industrial Hackathon), GRO/SME/19/F/222, EASME/2020/OP/0016

Karen Day, Gayl Humphrey, Sophie Cockcroft: How do the design features of health hackathons contribute to participatory medicine?”, in Australasian Journal of Information Systems Day, Humphrey & Cockcroft 2017, Vol 21, Research on Health Information Systems *Health hackathon design & participatory medicine*

SWD(2018) 126 final: Staff Working Document accompanying the Communication enabling the digital transformation of health and care in the Digital Single Market; empowering citizens and building a healthier society, of 25 April 2018: <https://ec.europa.eu/digital-single-market/en/news/staff-workingdocument-enabling-digital-transformation-health-and-care-digital-single-market>

Frydman, G. A. (2010). A patient-centric definition of participatory medicine. Retrieved from <http://e-patients.net/archives/2010/04/a-patient-centric-definition-of-participatory-medicine.html>

Auffray, C., Charron, D., & Hood, L. (2010). Predictive, preventive, personalized and participatory medicine: back to the future. *Genome Medicine*, 2(8), 57.

Bowen, S., McSeveny, K., Lockley, E., Wolstenholme, D., Cobb, M., & Dearden, A. (2013). How was it for you? Experiences of participatory design in the UK health service. *Codesign-International Journal of Cocreation in Design and the Arts*, 9(4), 230-246. 10.1080/15710882.2013.846384

Chowdhury, J. (2012). Hacking Health: Bottom-up Innovation for Healthcare. *Technology Innovation Management Review*, 2(7), 31.

Opinion of the German Data Ethics Commission, p. 133

https://www.bmjv.de/SharedDocs/Downloads/DE/Themen/Fokusthemen/Gutachten_DEK_EN_lang.html?nn=11678512

https://ec.europa.eu/info/news/european-commission-hosted-euvsvirus-hackathon-gives-rise-over-2000-pioneering-solutions-fight-outbreak-2020-apr-27_en

Health hackathons: theatre or substance? A survey assessment of outcomes from healthcare-focused hackathons in three countries, Olson KR, Walsh M, Garg P, et al. *BMJ Innov*, 2017;3:37–44.

<https://sciencebusiness.net/covid-19/news/eu-vs-virus-hackathon-proves-be-popular-experiment-chaotic-times>