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MIT 'Medical Hackathon' Model

Medical technology offers enormous potential for scalable medicine — to improve the quality and access in healthcare while simultaneously reducing cost. However, current medical device innovation within companies often only offers incremental advances on existing products, or originates from engineers with limited knowledge of clinical complexities. While this type of technology may generate heavy venture capital investment, it often results in increased treatment costs and designs limited in their population impact.

This paper describes how the Hacking Medicine Initiative, based at the Massachusetts Institute of Technology (MIT) has developed an innovative “healthcare hackathon” approach, bringing diverse teams together to rapidly validate clinical needs and develop solutions. Through a collaboration with the Massachusetts General Hospital (MGH) Consortium for Affordable Medical Technology (CAMTech) across multiple hackathons in Uganda and India, the Hacking Medicine group has demonstrated that its techniques and processes also succeed in creating high-impact interventions in low and middle income countries (LMIC).

The Hacking Medicine Model

Broadening the principle of “innovation through hacking” to healthcare, Hacking Medicine was formed under the Trust Center for MIT Entrepreneurship in 2011, to translate hacking techniques from computer science to healthcare. These "hacking marathons" were popularised in the early 2000s by the technology community as a forum for quickly developing solutions during short periods of focused innovation. Communities of computer programmer enthusiasts and system designers would gather for 24-hour “hackathons” where clever solutions were created or improved. In 2012, more than 200 hackathons were held in the United States, hosted by companies varying from 7-Eleven to Foursquare.

MIT Hacking Medicine has extended the hackathon model to address the more complex healthcare environment. Events include the many diverse stakeholders across healthcare regulation, delivery, payment, and product development. The bulk of the hackathon is comprised of brainstorming sessions and pitches to various health system stakeholders to validate or invalidate problems, as well as propose solutions and related business plans.

Hackathons are competitive events, ending in a final pitch contest with judges who may include healthcare leaders, technologists, entrepreneurs and venture investors. Winning teams receive prizes typically either modest monetary rewards or follow-up consultations with experts and investors, although the prizes vary at each hack.

The Hacking Medicine group has organised over 22 events across the globe, including events in Cambridge,

Massachusetts (USA) and Madrid, Spain. It has collaborated with CAMTech to jointly organise five hackathons including two in India and one in Uganda. These five international joint efforts have resulted in the development of over 100 innovations, five talent recruitments, five technology development startups, and two CAMTech Innovation Awards of $100,000 each.

Principles and Outcomes

Hackathons are based on three core principles; emphasis on a problem-based approach, cross-pollination of disciplines, and “pivoting” on or rapidly iterating on ideas.

The Augmented Infant Resuscitator (AIR), a value-based product conceived at the first Hacking Medicine/CAMTech collaborative hackathon at MGH in 2012, is only one of several examples of successful projects that have spawned from hacking medicine events. The weekend events have inspired multiple startup companies addressing a wide range of problems in healthcare including:

- Pillpack provides a solution to improve the experience of people with complex medication regimens. This company fills, sorts, and delivers medications in easy-to-use packaging and has progressed within one year to receive venture capital funding and expand to over 40 US states.
- Podimetrics is developing an insole that collects and transmits data in an effort to prevent complications from diabetic peripheral neuropathy.
- Smart Scheduling uses machine learning to help physicians and clinics optimise clinic schedules and predict no-shows.

Internationally, hackathons have tremendous potential to catalyse the development of impactful and affordable technology in LMICs. Applying high-income country (HIC) technologies to medical problems within new cultural settings can be fraught with financial, political, and cultural concerns. Starting the process by focusing on local needs, hackathons help to avoid the trap of providing unrealistic care.

Also, focusing on the end-user from the onset of technology development allows for cultural contextualisation. Technologies developed and designed in one cultural context may be translated into a different tool in another geographic setting. Ultrasound, for example, can be viewed as a vital diagnostic tool in one country, while it is a tool for gendercide in another.

Conclusion

Although not all areas of healthcare are “hackable,” there is a great potential to apply development techniques used by high tech companies to healthcare. Hacking within medicine emphasises needs-based solutions, cross-pollination of multidisciplinary stakeholders, and “pivoting” or iterative design.

The Hacking Medicine approach to innovation also borrows philosophies from Silicon Valley and MIT such as design thinking techniques and open innovation. CAMTech, through its work to accelerate medical technology development in LMICs, has recognised Hacking Medicine’s approach as a catalytic component of the solution pathway. Although relatively new, the success of this approach is clear, as evidenced by the development of successful startup companies, pioneering product design, and the incorporation of creative people from outside traditional life science backgrounds who are working with clinicians and other scientists to create transformative innovation in healthcare.

Reference:
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