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Article:

Bolton, WS, Ng, S, Lam, A et al. (2021) Virtual hackathon to tackle COVID-19 unmet needs. *BMJ Innovations*, 7 (2). pp. 284-287. ISSN: 2055-8074

<https://doi.org/10.1136/bmjinnov-2020-000456>

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BMJ Innovations

A virtual hackathon to tackle COVID-19 unmet needs

Journal:	<i>BMJ Innovations</i>
Manuscript ID	Draft
Article Type:	Letter
Date Submitted by the Author:	n/a
Complete List of Authors:	Bolton, William; University of Leeds School of Medicine, Leeds Institute of Medical Research
Keywords:	Health, Public Health, Community Medicine
Abstract:	

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A virtual hackathon to tackle COVID-19 unmet needs

The MedTech Foundation*

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Article Type: Commentary

Word Count: 1426 (MAX 1500)

Funding: The research was supported by the NIHR Surgical MedTech Cooperative and the Virtual Hackathon was sponsored by the academic medtech research infrastructure group Translate MedTech.

Ethical Approval: Not required

Dissemination declaration: The results will be disseminated on social media platforms and reports back to funders.

Contributions: All authors contributed to the delivery of this collaborative project. WSB wrote the first draft of the manuscript, which was later edited by all authors.

Declarations: All authors have completed the ICMJE uniform disclosure form at http://www.icmje.org/coi_disclosure.pdf and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years. The views expressed in this publication are those of the authors and not necessarily those of the NHS, the National Institute for Health Research, Health Education England, or the Department of Health and Social Care.

Introduction

The COVID-19 pandemic has created an urgent need for healthcare innovation across the globe. In tandem, it has brought travel restrictions and social distancing measures which act as significant barriers to traditional methods of innovation. In this context, we explore the use of virtual hackathons to generate innovation during a global pandemic.

Hackathons are events which bring people from different disciplines together with the aim of solving pre-defined challenges through iterative innovation¹. As the name suggests, this concept emerged from computer sciences, and the model has since been adapted and used in healthcare settings². In healthcare hackathons, clinicians collaborate with computer scientists, engineers, physicists, biochemical scientists, industry representatives and patients to solve unmet clinical needs³. In education, hackathons have been used to facilitate collaborative learning and promote diversity in innovative thinking⁴. Hackathons are typically conducted via a large conference format and small group working over a period of hours or a small number of days.

MedTech Foundation

The MedTech Foundation is a national, interdisciplinary collaborative group that connects members from medicine and engineering to other MedTech-related specialties. The group has Hubs in six universities across the UK. These each deliver an annual educational workshop series called the Innovation Programme, together with a portfolio of research studies, summer internships with industry, and a number of hackathons for a range of unmet healthcare needs⁵⁻⁷. In March 2020, a group of students and early career professionals from the MedTech Foundation recognised an opportunity to contribute to the COVID-19 response⁸. Due to the social distancing measures, running a hackathon via the traditional format was not possible and alternative methods to deliver a virtual hackathon were explored. Their aim was to conduct a virtual hackathon to address unmet needs that emerged from COVID-19 across the UK.

Methods

To identify unmet needs for the hack, a social media strategy was used across several platforms, including Facebook, Twitter and LinkedIn. These were targeted at both frontline healthcare workers and members of the public to describe current areas of unmet need at home or in their place of work/care. An interdisciplinary team of medical students, junior doctors, engineering undergraduates and PhD students designed and facilitated the virtual hackathon. Microsoft Teams (Microsoft Corporation, Washington) was chosen as the platform to deliver the virtual hackathon as it facilitates the formation of multiple small groups, file sharing, inter and intra-group messaging, in-team video conferencing functions, and whole group announcements. The organising team worked in shifts to facilitate the hackathon. Experts from healthcare, engineering and computer science were on standby to call in and advise teams throughout the hack. Participants were recruited one week prior to the hackathon start date.

Results

Defining the unmet needs

A total of 15 questions were formed from the submitted unmet needs, which were grouped thematically and summarised in Figure 1. There were five unmet need themes: 'community', 'education/training', 'mental health', 'public health' and 'hospital'. The diverse set of unmet needs demonstrated the wide impact that COVID-19 has on all areas of the health and social care system, as well as affecting the lives and work of most of the population. A varied set of needs requires a broad range of expertise to address them and a virtual platform for interdisciplinary collaborative working is essential to achieve the desired outcomes.

Conducting a virtual hackathon

One hundred and twenty-three participants signed up to the hackathon: 38 medical students (30.1%), 9 NHS doctors (7.3%) (including seven junior doctors and two consultants), 12

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3 industry representatives (9.8%), and 64 non-clinical students and academics (52%) (42
4 undergraduates; 22 postgraduates) mainly from engineering subjects, product design, and
5 computer science. Approximately one third were based in the Leeds City Region, one third
6 from Cambridge and one third from elsewhere across the UK. Each participant ranked the
7 unmet needs in order of preference, and teams were formed based on these whilst trying to
8 maintain a broad range of disciplines within each team. Initially, 18 teams were formed.
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16 The virtual hackathon ran continuously from 3rd to 5th April 2020. At the end of the event, each
17 team submitted a project proposal and business canvas that captured their main ideas. Some
18 teams were working on similar concepts and so in these circumstances, teams were combined
19 to collaborate on a solution together. There were 12 unique solution concepts submitted at the
20 end of the hackathon. Unlike other hackathons, all teams (rather than a singular team) were
21 offered further support to progress their submitted ideas where practically possible.
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30 *Translating the hack outcomes*

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33 Of the innovations submitted (as of 27th April 2020), seven were primarily digital solutions,
34 three were primarily device and hardware solutions, and two involved a combination (Table
35 1). Three teams subsequently linked with companies working in a similar area and have
36 continued to explore how their ideas may be integrated into existing solutions. Three digital
37 solution teams have created beta versions for preliminary testing, including one artificial
38 intelligence solution that aims to help frontline healthcare workers find answers to COVID-19
39 questions using trusted guidelines/sources. This already has >100 unique users per day⁹. One
40 collaborative funding application has been submitted and more are in preparation. Another
41 has developed a beta and is currently collaborating with a clinical trials unit to improve their
42 epidemiological data collection¹⁰. The remaining teams are either refining their concepts, or
43 may pivot away from their original idea to explore new areas.
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Theme addressed	Solutions (n=) and type Total n = 12	Initial outcomes (as of 27 th April 2020)
Community	Digital solutions n = 2 Hardware or hybrid solutions n = 1	Beta platform created and in use n = 1 Connected to industry partners n = 1 On-going concept refinement n = 1
Education & Training	Digital solutions n = 1 Hardware or hybrid solutions n = 2	Connected to industry partners n = 1 On-going concept refinement n = 2
Hospital	Digital solutions n = 1 Hardware or hybrid solutions n = 2	Beta platform created and in use n = 1 On-going concept refinement n = 2
Public Health	Digital solutions n = 2 Hardware or hybrid solutions n = 0	Beta platform created for testing n = 1 Connected to industry partners n = 1
Mental Health	Digital solutions n = 1 Hardware or hybrid solutions n = 0	On-going concept refinement n = 1

Table 1 – Initial outcomes for projects emerging from the MedTech Foundation Virtual Hackathon to address COVID-19 unmet needs

Discussion

This short communication provides a rare examination of how a wide variety of disciplines can rapidly mobilise to hack and translate innovation in response to a global crisis. In less than four weeks, a virtual hackathon was conducted and tangible outputs realised. The virtual format is ideal for times of social-distancing, but in an ever-globalised world, these working methods are increasingly relevant to connect geographically diverse groups together to innovate effectively.

A criticism of hackathons has been that they often fail to result in tangible outputs¹¹. In healthcare innovation, it is essential that suitable ideas emerging from hackathons are given the environment to translate into either patient, public or healthcare worker benefit. It may not be possible, or indeed necessary, to do this with every concept that emerges. For example, following further market research or preliminary scientific investigation, it may become apparent that the initial proposal is unfeasible. In our commentary, we demonstrate that producing tangible outputs is possible via a rapidly delivered virtual hackathon.

Virtual hackathons have been conducted elsewhere to address COVID-19 challenges¹²⁻¹⁴. In Germany, the Government launched a virtual hackathon to tackle the biggest challenges arising from the COVID-19 outbreak. Over 42,000 people participated resulting in over 800 projects being submitted to a government sponsored panel to decide which will receive funding to be taken forward¹⁵. Delivering at this scale requires the backing of governmental departments or big industry to fund and administer the event. Although the concept of hackathons is not new, virtually delivered hackathons are comparatively rare and there appears to have been a dramatic increase in the number of virtual hackathons since the COVID-19 outbreak. Virtual formats are attractive as they can offer quickly organised and scalable collaboration, although the challenge of achieving translation and impact remains. Additional issues that arise from virtual formats come from practically navigating who, and where, the ideas belong to, and how decisions around their translation should be conducted

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3 after the fact. In many COVID-19 related innovation activities, concepts are being developed
4 open source as a contribution to citizen science¹⁶⁻¹⁸. Post-outbreak, the authors recommend
5 the wider adoption of virtual hackathons as a strategy to generate innovation efficiently and
6 effectively whilst breaking down discipline and geographic silos. Mechanisms to achieve open
7 collaboration whilst maintaining and protecting intellectual property rights can greatly enhance
8 the overall efficiency of the innovation pathway¹⁹. Face-to-face hackathons are often intensely
9 enjoyable and concentrated experiences owing to the close contact of multiple different
10 disciplines working together. Some properties may be difficult to replicate over a virtual 'hack
11 from home' format. However, attitudes may change as people become increasingly familiar
12 with virtual events. Virtual formats also offer an extra element of inclusivity, where potential
13 barriers to traditional formats such as physical impairments and child care commitments can
14 be mitigated.

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29 The COVID-19 outbreak has forced the rise in the use of these virtual delivery formats and
30 many lessons will be learned and hopefully shared with the wider innovation community. We
31 demonstrate that innovation via virtual hackathons is possible and effective at generating
32 solutions to unmet needs in healthcare. In the future, virtual formats will likely become
33 increasingly popular and used to augment the delivery of innovation, and as such, innovate
34 how we innovate.

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Figure 1 – Themes of the COVID-19 unmet needs tackled in the MedTech Foundation Virtual Hackathon

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