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Citizen science: generating ideas and exploring consensus

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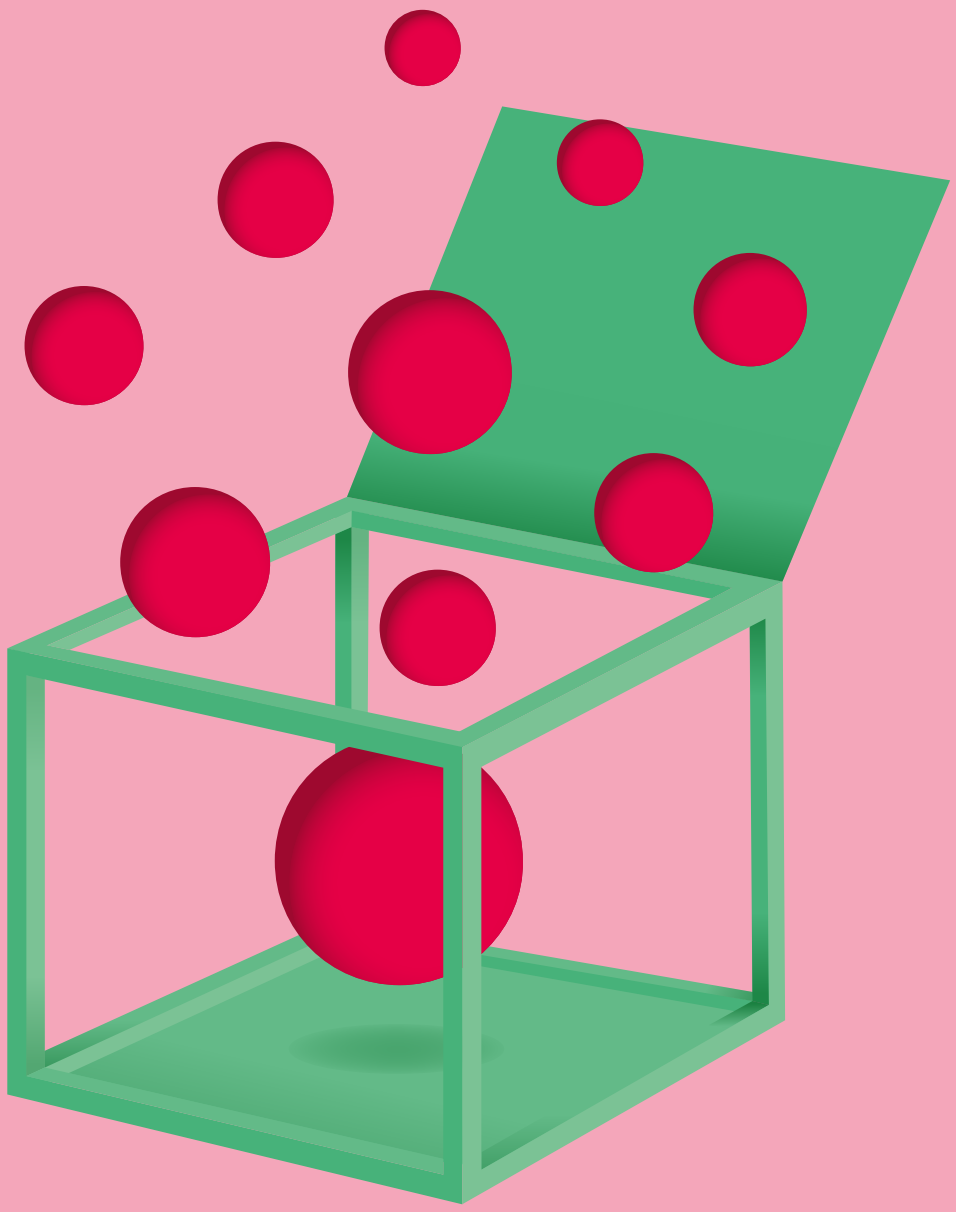

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Summary
Researchers seeking to gather opinions from stakeholders have more options than ever before, thanks to a diverse range of digital citizen science resources. Online idea-generation platforms use crowdsourcing to engage large groups of people to help solve problems and develop innovations, while consensus-exploring tools draw on smaller groups to help researchers understand a range of opinions and achieve consensus on a particular topic. Such approaches could be useful in healthcare improvement studies, helping gather expert ideas from NHS staff and patients and building consensus on important issues.

Figure 1: Online platforms and tools for opinion gathering and consensus exploration: a visual summary

Opinion gathering involves eliciting ideas and opinions from different stakeholders, usually to inform decision making

What are the two main phases of opinion gathering that we have focussed on?

Idea generation and management

Idea generation involves collecting ideas from a group of experts, or the wider community (for example through crowdsourcing), in order to solve specific problems or generate innovation. Idea generation and management can be carried out on a large scale engaging with thousands or tens of thousands of participants.

Consensus exploration

Consensus exploration is a way to examine the degree to which people agree or disagree on a specific question or issue. This could also involve, in the case of consensus building, convergence of opinions.
A variety of methods exist for exploring consensus, many of which are Delphi-based. These methods are usually carried out with fewer than a hundred participants.

What are some of the tools and platforms to implement online opinion gathering?

- **Crowdicity***
- IdeaScale
- HyveCROWD
- SpigitEngage
- Dialogue App

Idea management platforms offer a digital, social space to generate, discuss, refine and evaluate ideas. These platforms can have a social networking look and feel to encourage participation, and host competitions. These platforms have been used by private and public organisations (including NHS trusts) to engage staff and the public, and improve products and processes.

Delphi

- Mesydel
- Delphi2**
- Delphi Blue**
- **ExpertLens***
- Surveylet

Tools for consensus exploration are varied and range from free software to paid-for services. Tools for Delphi enable inviting participants, asking questions, and collecting results repeatedly in rounds.

Real-time Delphi

- Global Futures Intelligent Systems
- Health Consensus
- Risk Assessment and Horizon Scanning**
- eDelphi

Tools for Real-time Delphi allow for group results to be processed and fed back in 'real-time' so that respondents can update their responses immediately. Within healthcare settings, these tools have been used to understand: how services should be run, appropriate indicators of healthcare quality and suitable guidelines.

* Explored as case studies in this document
** Free to use tools

1. Introduction

This report aims to provide a practical overview of online citizen science approaches to opinion gathering – from initial idea generation, collection and refinement (Section 3) through to consensus exploration (Section 4). Idea generation includes collecting ideas from a group of experts or broader groups such as employees, researchers or the public (for example, through crowdsourcing) in order to solve specific problems or bring about innovations.[1] Consensus exploration describes methods for understanding the range of opinions of a group of individuals on a topic. These methods include consensus building, which can enable convergence of opinions on a specific question or issue.

For both idea generation and consensus exploration, we cover a selection of useful platforms and tools, opportunities and challenges, and illustrative examples. While this report does not intend to provide an exhaustive overview, it covers key relevant literature and seeks to offer practical reference to inform the design of research projects that use citizen science.

2. Methods

We gathered evidence for this study by conducting a rapid review of the literature and interviewing relevant experts. We used Google and Google Scholar to search the academic literature, policy reports and non-peer-reviewed studies using search strings with the keywords 'online', 'idea management', 'tool', 'platform', 'method', 'technique', 'consensus building', 'consensus exploration', 'idea gathering', 'idea collecting', 'consensus', 'crowdsourcing', 'Delphi', 'real time Delphi' and 'health'. We included only literature published in English since 2013 that encompassed online approaches to generating ideas and exploring consensus.

As part of the study, we interviewed five experts in the tools or methods of idea generation and consensus exploration:

- Dmitry Khodyakov, Senior Behavioral/Social Scientist, RAND Corporation
- Rob King, Vice President Sales, Crowdicity
- Marie Peach, Senior Account Manager, Crowdicity
- Ted Gordon, Co-Founder and board member of The Millennium Project
- Mylène Rivière, Senior Scientific Advisor, Mesydel

We also highlight several examples of online tools and platforms that have been used to gather opinions. These are listed in Figure 1.

3. Online idea generation and management

Though research questions are typically formulated by groups of experts in the field of study, citizen science has emerged as a more inclusive method[2] with the potential to 'democratise' the idea-generation process.[3] Online management platforms can engage hundreds of thousands of participants with different levels and areas of expertise[2] to crowdsource the collection, selection and evaluation of ideas in an efficient and cost-effective manner. Having a large number of participants increases the diversity of views, which increases the chance of producing valuable ideas.[5] Organisations including Starbucks and Dell, as well as the NHS[1,4,5] have used these platforms to help make decisions, develop new and innovative products, and improve existing products.[5]

Idea-management platforms create a digital social space where participants can collaborate, vote on, and research ideas. Top-ranked ideas can then be adopted by organisations or taken forward in other ways. For example, NHS trusts have used crowdsourcing platforms to gather ideas from staff on ways to improve the services being offered.[7] In this way, online forums also provide an opportunity to engage staff and give them a voice in their organisation. Similarly, the National Cancer Institute in the United States launched the Cancer Research Ideas crowdsourcing website to enable researchers and the public to submit ideas on how best to prevent, diagnose and treat cancer.[6] Submissions were reviewed weekly by a group of scientific experts and patient advocates. Approximately 1,600 ideas were submitted, informing the scientific direction of the Cancer Moonshot (an initiative that aimed for a decade's worth of cancer research progress in five years).

3.1 Platforms and tools for online idea generation and management

We identified a number of idea-generation and management platforms/tools. In Table 1, we briefly describe five paid-for platforms and provide a more detailed discussion of the Crowdicity platform in Case study 1 below.

3.2 Challenges associated with crowdsourcing ideas

Crowdsourcing ideas through online idea-management platforms presents a number of challenges, including the quantity and quality of ideas and how to motivate participants to stay engaged in idea generation over time.

Idea quantity and quality

Generating ideas can be exciting, but sifting through and evaluating submitted ideas can be problematic.[12,13] Depending on the makeup of the crowd and its knowledge, many ideas may not be particularly useful and may need to be evaluated and removed.[11] For example, in Starbucks' 'My Starbucks Idea' initiative, only one of 500 ideas submitted was ultimately implemented.[13] Some researchers have also found that ideas generated from these platforms are less developed than those generated in traditional, off-line focus groups.[11] Systematic and careful evaluation is thus likely to be a requirement of crowdsourcing platforms, while recognising that de-selection of ideas may have its own emotional and social consequences.

Participant motivation and retention

The quality and quantity of ideas generated through an online platform depends on the degree to which the idea-generation initiative attracts creative participants with relevant knowledge.[11] Sustaining idea generation over time is not straightforward.[13] It is therefore important to understand the motivations of participants and to identify suitable incentives, perhaps in the form of rewards or recognition where appropriate.[11] The South West Yorkshire Partnership NHS Foundation Trust launched an idea-generation platform to gather ideas from staff that engaged more than 2,000 participants. The platform's success was attributed to an active marketing campaign to encourage staff to join, constant engagement from moderators through new challenges, feedback on ideas from top managers, and prizes and recognition for ideas.*

Participant motivation can also be affected by the structure of the search for ideas, as well as competitions and incentives for participants. The search for ideas may be driven by a structured, top-down, problem-solving approach or by an unstructured, bottom-up, idea-generation approach. For example, Starbucks suggested possible categories of ideas when collecting input from customers, while Dell presented specific problems before asking users to submit ideas and arranging short-term 'storm' sessions featuring specific problems that needed to be solved in each 'storm'.[14]

Idea competitions and challenges are one way to encourage users to submit ideas.[11] Unlike unspecified, long-term calls for ideas, idea competitions or challenges generally take place over a defined period of time and winners typically receive prizes.[11,15] Participants can also be offered the opportunity to further develop their ideas as well as project and development support.

3.3 Good practice in online idea generation

While the use of online opinion gathering is relatively recent, there have been some attempts to provide guidelines and 'lessons learned' for the successful implementation of online open innovation communities (for example, by members of IdeaScale, George's Ideas Lab,[16] Crowdicity, and von Briel and Recker.)[17]

* RAND Europe interview (2017).

Table 1: Examples of platforms/tools for idea generation and management

Tool	Link	Example of use
Crowdicity	crowdicity.com/en	'i-matter': The Dorset Healthcare University NHS Foundation Trust launched a Crowdicity-powered online social innovation and ideas platform to gather ideas to improve the safety, quality, efficiency and productivity of the services they provide[7]. Around 2,000 staff participated in the platform, which was available for two years.
Ideascale	ideascale.com	Open Government Brainstorm: The National Academy of Public Administration[8] gathered opinions from the public on how the US government could be more efficient and effective to better meet their needs. During one week, more than 4,000 proposals were submitted and 15,000 individuals engaged with the platform. The most important ideas were taken forward to a discussion and drafting phase.
HyveCROWD	facebook.com/HYVECrowd	Bavaria on the Move: The Bavarian state chancellery invited the public to submit ideas on how to solve Bavaria's challenges. More than 400,000 individuals visited the platform, leading to 740 ideas being discussed in 70,000 posts. Topics discussed ranged from family issues to educational innovation.[9]
SpigitEngage	mindjet.com/lp/sem/no/innovation/spigitengage-demo/	Ignite Innovation: UnitedHealth Group invited employees to submit ideas in response to challenges presented by UnitedHealth Group leaders; 40,000 employees have taken part, generating more than 2,500 ideas.[10]
Dialogue App	dialogue-app.com/info/	George's Ideas Lab: In a local government initiative, Bristol City Council gathered approximately 300 ideas to improve the city.[9]

Table 2: 'Good practices' for implementing online innovation communities

Clearly articulate the goals and specific outcomes from the start to get the crowd involved in the campaign.
Make it easy for people to participate and contribute ideas, rather than struggling with logistics. For example, provide participants with a submission form to allow them to present their ideas clearly and concisely.[11]
Ensure that moderators or a platform management team are actively involved in the discussion. Having adequate support during an idea campaign helps encourage the crowd to submit better quality and implementable ideas. Moderators should solicit conversation among the participants, ask clarifying questions to further develop ideas, and implement plans to engage with as wide an audience as possible (depending on the aims of the project).
Ensure that the support team considers how to sift through ideas once people start suggesting them, how to decide on winning ideas and how to track the implementation of ideas to determine how effective they are.
Find the right incentives to encourage participation. Forms of recognition need to be tailored to each topic and each crowd.
Using idea challenges can lead to better ideas. This can be achieved by focusing on specific problems rather than merely asking participants for ideas. This approach supports targeting of ideas towards areas for which resources can be committed.
Evaluation of crowdsourced or consensus-built ideas is needed in relation to quality, bias, and other characteristics.

Case study 1: Crowdicity

Crowdicity is an online idea-management platform[18] created to help organisations and individuals engage in crowdsourcing. By applying aspects of social media platforms like Facebook and Twitter to crowdsourcing, Crowdicity aims to create networks of people who can contribute, discuss and develop ideas.

Features

Crowdicity is a paid-for platform aimed at idea generation and evaluation. Moderators can set questions or pose challenges. A crowd is then invited to generate ideas, collaborate and evaluate in real-time. The platform has the look and feel of a social network to promote continued participation. Specifically, the platform hosts a group of participants with their own accounts that allow them to 'like', collaborate on and discuss each other's ideas. The platform also has gamification features (e.g. achievement badges, leader boards and points), which aim to make participation more fun and engaging. Crowdicity-based projects can be openly available or closed, with participants joining by invitation only.

The platform is designed to be easy and intuitive to use. Participants can search for ideas using keywords, trends and subjects or search by popularity. The platform can be customised to suit a particular organisation or campaign with custom branding, including backgrounds and banners and a custom URL. It can be used on a smartphone, tablet, desktop or laptop and can be integrated with Facebook, Twitter, Google+, MSN and LinkedIn. The Crowdicity team will also host and set up the platform and provide expertise via training, promotion, and workshops.

Crowdicity reports that employing a 'community manager' who drives engagement and responds to participants is critical to the success of online idea-generation projects. Community managers within organisations using Crowdicity usually spend about an hour a day managing the platform.[†] Other enablers for success include using active marketing to encourage participation, providing feedback on ideas to indicate that participants are being listened to, and giving prizes and recognition for ideas.

Scale

There is no limit to the number of participants who can engage with the Crowdicity platform.

Example projects

Crowdicity has been used to crowdsource ideas for a variety of projects by clients in a diverse range of sectors, including in healthcare and NHS trusts, charity and not-for-profit, education and the public sector, and the utility sector.

Example project one: South West Yorkshire Partnership NHS Foundation Trust

The South West Yorkshire Partnership NHS Foundation Trust launched an idea-generation campaign hosted by Crowdicity to generate ideas on how to improve the organisation. They engaged around 1,600 participants and implemented 153 ideas in the first year of the project. The platform has been open for nearly two years; the trust plans to keep it as an embedded, always-on system. All ideas, regardless of topic, can be posted at all times. The trust also runs pop-up challenges related to its priorities.

Example project two: The Constitution UK project

The Constitution UK project, run by researchers at the London School of Economics and Political Science (LSE), crowdsourced ideas from members of the British public on what should be included in a new UK constitution.[19] During 14 weeks, more than 1,500 members of the general public used the Crowdicity platform to share their thoughts, make comments and vote on ideas. Experts at the LSE Institute of Public Affairs then put together a constitution document from the final selection of ideas. This example illustrates how crowdsourcing can give members of the public a useful means to engage in debates and provide solutions around issues important to them.[20]

Example project three: The Royal College of Nursing

Crowdicity was used to engage staff across the Royal College of Nursing to generate ideas and debate issues around customer service and organisational development.[21] The college's HR team launched the project in conjunction with a staff survey. It resulted in more than 200 unique ideas, 1,786 votes, 450 discussions, eight ideas that were fully adopted, and 24 others that moved into development within a three-month period.

Website

Crowdicity website: crowdicity.com/en/

† RAND Europe interview (2017).

4. Online consensus exploration

Consensus exploration can be used to understand a group of individuals' range of opinions on a particular topic, including whether or not consensus exists, and what any consensus might be. Delphi is one of the first of various methods available to explore consensus. This technique for collecting and synthesising expert opinions was developed at RAND Corporation in the 1950s and 1960s.[22] It is widely used in technology forecasting and futures research. It has also been used extensively within healthcare research to explore or achieve consensus on such topics as determining how services should be run, developing appropriate indicators of healthcare quality, and developing guidelines.[23] While it was not originally developed as an online methodology, it is now commonly carried out using online tools. In the following sections, we describe Delphi and the associated online tools.

4.1 Delphi

Delphi studies adopt the following protocol:

(i) experts on a given topic are asked for answers to a set of questions, including reasoning for their answers (typically the number of experts is relatively small, from 15 to 35)[24]

(ii) the responses are processed by a moderator

(iii) the results, such as the average answer to each question and the range of answers, including justifications for answers, are fed back to the experts

(iv) the experts are then asked another set of questions (which can be the same or different)

(v) this continues for a number of rounds until either the planned rounds are completed, consensus has been achieved, or the results are no longer changing.

Two of the key principles of Delphi, which provide an advantage over other consensus methods, are the anonymity of responses and the provision of feedback to respondents after each round. Maintaining anonymity reduces the chance of particular individuals dominating discussions and allows all participants to have a voice, with each response weighed equally. Delphi offers participants the opportunity to consider others' opinions in a non-adversarial environment.

Delphi studies are often run online using a variety of survey design and distribution tools. These include extremely simple online methods, such as email and Google forms, online survey tools such as SurveyMonkey, LimeSurvey and FluidSurveys, and broader research tools, such as Research Electronic Data Capture (REDCap), a Harvard University-designed system supporting data capture for research studies.[25,26,27,28] For example, researchers in Australia used the Delphi technique to establish a pathway for identifying adult cancer patients with anxiety and depression. They developed an online survey using LimeSurvey and distributed it to oncology and psycho-oncology clinicians through email, using two rounds of questions to reach consensus.[29]

A number of tools specifically designed for Delphi studies also exist, ranging from freeware and open source implementations, such as Delphi Blue, to paid-for software tools, such as Mesydel or Surveylet, which provide both a system for carrying out Delphi studies and support for designing, running and analysing Delphi studies.[30,31,32,33] These more advanced systems include tools for summarising quantitative responses. Surveylet also includes tools that use natural language processing to summarise qualitative responses. These tools can be used to speed up the tasks required between Delphi rounds. We provide a detailed discussion of an online adaptation of Delphi (ExpertLens), which incorporates elements of Nominal Group Technique[‡] and crowdsourcing, in Case study 2 below.

Some disadvantages of Delphi-based methods should be taken into consideration. Compared with expert meetings, where individuals have to participate in only one meeting, Delphi studies tend to require repeated commitment from participants. Apart from one Delphi-based method (ExpertLens), these methods do not allow for group discussion, and there is no evidence to suggest that repeating the exercise with different experts will yield the same results. While using online tools saves time, the results still have to be processed by a moderator before feedback can be provided and a further round of questions can be developed. In general, Delphi studies are carried out with relatively small groups of experts in the topic being discussed, who are selected to participate by the study organiser. Delphi studies are therefore typically not openly crowdsourced.

4.2 Real-time Delphi

While many of the variants of Delphi focus on adapting the types of questions that can be asked, some also address the way Delphi itself is run. A key example of this is Real-time Delphi, which eliminates rounds of answers. Instead, respondents' answers are processed immediately, the aggregated results can be seen by all respondents at any time (including reasons for responses) and respondents can change their answers at any time. Respondents are also alerted if their response is more than a certain distance away from the average and then asked to give their

‡ Nominal Group Technique is a method for supporting interaction between individuals to facilitate idea identification and problem solving[2].

reasoning so that others can see. Real-time Delphi retains the Delphi principles of anonymity and feedback but reduces the time in which Delphi studies can be carried out.[34]

Real-time Delphi must be carried out online as the answers are processed in real time. As with Delphi studies, Real-time Delphi studies usually end either after a pre-specified time period or when consensus is reached. A number of other Real-time Delphi tools have been developed, including both free versions that are relatively non-customisable and do not come with support, and more professional applications.[35] Ultimately, the tool a researcher chooses should be based on the needs of a particular study and the budget available.

Table 3: Tools and platforms for consensus exploration

Tool	Link	Method(s)	Example of use
Delphi2	armstrong.wharton.upenn.edu/delphi2	Delphi	• Freeware for the Delphi process
Delphi Blue	sourceforge.net/projects/delphiblue	Delphi	• Open source, Java/JSP implementation of the Delphi process
ExpertLens	rand.org/pubs/tools/expertlens.html	Combination of nominal group technique and Delphi	• Paid-for service • Used in a wide variety of areas, including healthcare studies[37,38]
Mesydel	mesydel.com	Delphi	• Paid-for service for the Delphi process • Has been used in a variety of European Commission projects[32]
Surveylet by Calibrum	calibrum.com	Delphi and Real-time Delphi	• Paid-for service for running both Delphi and Real-time Delphi studies • Has been used in a variety of European Commission projects[33]
Risk Assessment and Horizon Scanning	rahs-bundeswehr.de	Real-time Delphi	• Free • Has not been used in any published studies[35]
eDelphi	edelphi.org	Real-time Delphi	• Free • Developed by futurists in Finland • Has been used in a large number of Finnish studies (software is available in English, but many help videos are in Finnish)[35]
Global Futures Intelligence Systems	millennium-project.org/	Real-time Delphi	• Paid-for service • Used for The Millennium Project, a global network of different stakeholders focusing on future possibilities
Health Consensus	onsanity.com/tools-healthconsensus	Real-time Delphi with modifications, including multiple rounds	• Paid-for service • Specifically designed for healthcare studies and has so far been used in 18 different studies, largely in Spain[36]

4.3 Platforms and tools for online consensus exploration

We identified a number of consensus-exploration tools and briefly describe them in Table 3.

4.4 Issues to consider when conducting online consensus exploration

There are no universal guidelines for how to carry out Delphi-based consensus studies. Researchers have to use their own judgement to decide the exact methodology and processes.[23] Below are some issues of particular relevance to conducting Delphi methods at scale or with a crowd.

Choice of experts

The choice of experts is key to ensuring good-quality results in Delphi consensus building.[39] However, there is no definition of an expert, and no clear criteria on selecting experts. The specific definition of 'expert' is therefore dependent on the research question at hand. In a healthcare context, experts might include patients, carers and families as well as healthcare staff and academics.[23,40] To encourage participation throughout the study, experts should ideally have knowledge of the research topic and an interest in the outcome.[23]

Number of experts

There is no clear rule for the number of experts required for a consensus study.[23] While the majority of studies using Delphi-related methods use relatively small groups of experts,[41] there are examples of groups with thousands of people.[36] If the selection of experts is carried out carefully, and depending on the type of question, a small sample can be sufficient to obtain accurate results§. However, if questions require a numerical response, such as rating items on a scale for which statistically significant results are desired, then larger samples will be required¶.

For the majority of online tools described in this report, no limit exists for the number of participants that can be involved in a Delphi study. However, there is no clear evidence that increasing the numbers improves the results of consensus studies. But there are other potential reasons for carrying out consensus building at scale, including stakeholder engagement and increased buy-in.

Attrition

Participant attrition is a significant problem in Delphi-based studies, including online studies. As participants have the opportunity to change their opinions after seeing the opinions and reasoning of others, it is important to promote continued engagement.[42] Attrition can be reduced by ensuring participants are interested in the outcome, providing incentives for participation, and keeping in regular contact with participants.[23]

Evaluation

Once the Delphi study is complete, the consensus-built ideas are likely to benefit from further review and evaluation.

§ RAND Europe interview (2017).

¶ RAND Europe interview (2017).

Case study 2: ExpertLens

ExpertLens is an online opinion-gathering platform developed at RAND Corporation[2,43] that incorporates ideas from Nominal Group Technique,** Delphi and crowdsourcing.

Features

ExpertLens is a paid-for tool that includes a set system of Delphi rounds[43] (Figure 2). A unique feature of ExpertLens, compared with other Delphi-based tools, is the use of a discussion round where participants interact with one another. ExpertLens uses statistical modelling techniques to analyse participant responses. The analysis combines quantitative ratings and rankings with qualitative explanations provided by participants to evaluate variation in responses and to understand why participants change their answers between rounds.[38] ExpertLens has the potential to gather information from large and diverse groups of geographically dispersed individuals. However, unlike crowdsourcing, which can potentially gather information from hundreds of thousands of non-experts, ExpertLens is typically still used with moderately sized groups of experts. ExpertLens has been used in a variety of healthcare studies, including studies rating features that define care quality improvement[38] and developing health services performance measures.[37] These studies engaged 119 and 50 participants, respectively.

Scale

In a 2011 review of studies that used ExpertLens, the number of participants the studies engaged ranged from four to 415.[2] As group size increased, communication was likely to become more difficult. This poses problems for ExpertLens studies where online discussion is an important part of the methodology. ExpertLens developers recommend that each panel of experts include around 40 experts†† and do not recommend increasing panel size, as it makes the discussion round less manageable and potentially less useful.[38]

Example projects

Below we provide two examples of projects where ExpertLens was used to explore consensus.

Example project one: continuous quality improvement

The Robert Wood Johnson Foundation used ExpertLens with 119 researchers and practitioners to identify definitional features of continuous quality improvement in healthcare. The researchers conducted four parallel online panels of different sizes (with 21, 19, 40 and 39 participants, respectively). The process used in this study consisted of three rounds, and each round was limited to one week. The study engaged a large and diverse group of stakeholders in finding consensus on controversial subjects, such as refining and understanding quality improvement language.[38]

Example project two: performance measures for inflammatory arthritis

The Arthritis Alliance of Canada used ExpertLens to engage 43 Canadian experts to develop system-level performance measures for evaluating models of care for inflammatory arthritis in Canada.[37] The process included three rounds: two rounds of online voting and a discussion round in between. Each round was open for seven to 14 days, and periodic reminders were sent to maximise engagement. The discussion was moderated by a health services researcher and a rheumatologist, who asked questions, clarified responses and moderated the discussion. The study engaged a wide variety of geographically dispersed participants, including rheumatologists, researchers, allied health professionals, government representatives and people with arthritis.

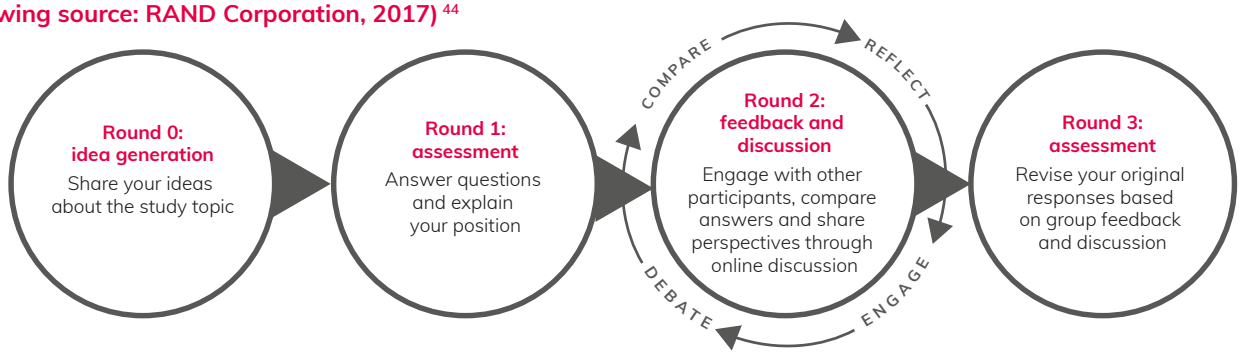
Website

ExpertLens website: rand.org/pubs/tools/expertlens.html

** Nominal Group Technique is a method for supporting interaction between individuals to facilitate idea identification and problem solving.[2]

†† RAND Europe interview (2017).

Figure 2: ExpertLens process (reproduced from the following source: RAND Corporation, 2017) [44]



5. Conclusion

Researchers wanting to generate ideas and explore consensus using citizen science have an increasing number of online tools at their disposal. When it comes to generating ideas, crowdsourcing can help find new solutions to problems and source ideas inclusively, efficiently and cost-effectively. As for consensus building, multiple online tools can help researchers understand the individual opinions of whole groups of people and determine where consensus exists. These tools have been used in many sectors, including healthcare research, and there may be scope to expand their use among healthcare staff and patients to promote engagement and increase buy-in.

A number of factors should be taken into account when designing research projects that encompass online methods to generate ideas and build consensus. These include idea quality and quantity; crowd motivation, retention and attrition; choice of experts in Delphi processes; evaluation; and the time and cost to run these online endeavours. When used well, these tools have the potential to 'democratise' opinion gathering and build consensus that influences how health services are run, how healthcare quality indicators are developed, and how guidelines are created.

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References

1 Hossain, Mokter, & Astrid Heidemann Lassen. 2017. 'How Do Digital Platforms for Ideas, Technologies, and Knowledge Transfer Act as Enablers for Digital Transformation?' Rochester, NY: Social Science Research Network. As of 19 April 2018: https://papers.ssrn.com/abstract=3045012

2 Dalal, Siddhartha, Dmitry Khodyakov, Ramesh Srinivasan, Susan Straus & John Adams. 2011. 'ExpertLens: A System for Eliciting Opinions from a Large Pool of Non-Collocated Experts with Diverse Knowledge.' *Technological Forecasting and Social Change* 78 (8):1426–44. doi:10.1016/j.techfore.2011.03.021

3 Brabham, Daren C., Kurt M. Ribisl, Thomas R. Kirchner & Jay M. Bernhardt. 2014. 'Crowdsourcing Applications for Public Health.' *American Journal of Preventive Medicine* 46 (2):179–87. doi:10.1016/j.amepre.2013.10.016

4 Benbya, Hind, & Dorothy Leidner. 2017. 'Harnessing Employee Innovation in Idea Management Platforms: Lessons from Allianz UK.' Rochester, NY: Social Science Research Network. As of 19 April 2018: https://papers.ssrn.com/abstract=3041319

5 aldivar, J., M. Báez, C. Rodriguez, G. Convertino & G. Kowalik. 2016. 'Idea Management Communities in the Wild: An Exploratory Study of 166 Online Communities.' In *2016 International Conference on Collaboration Technologies and Systems* (CTS), 81–89. Piscataway, NJ: The Institute of Electrical and Electronics Engineers. doi:10.1109/CTS.2016.0033

6 Cancer Research Ideas (homepage). 2018. As of 19 April 2018: https://cancerresearchideas.cancer.gov/

7 Brown, Jodi. 2017. 'i-matter.' Poole: Dorset Healthcare University NHS Foundation Trust. As of 19 April 2018: http://www.nhsemployers.org/~/media/Employers/Documents/SiteCollectionDocuments/Do%20OD/i-matter%20for%20DoOD.pdf

8 Ideascale. 2017. 'OpenGov – Open Government Brainstorm.' As of 19 April 2018: http://opengov.ideascale.com/

9 Raffl, Celina E. 2014. 'Open Societal Innovation (OSI) for Politics, Public Administration and Civil Society.' In *Proceedings of the Oxford Internet, Policy, and Politics Conference (IPP)*, 25–26.

10 Mindjet. 2014. 'UnitedHealth Group: Using Technology to Drive Change in an Evolving Healthcare Landscape.' 2014. San Francisco: Mindjet. As of 19 April 2018: http://www.innovationleader.com/wp-content/uploads/2014/10/MindjetUnitedHealthGroupCaseStudy.pdf

11 Schweitzer, Fiona Maria, Walter Buchinger, Oliver Gassmann & Marianna Obrist. 2012. 'Crowdsourcing: Leveraging Innovation through Online Idea Competitions.' *Research-Technology Management* 55 (3):32–38. doi:10.5437/08956308X5503055

12 Jouret, Guido. 2009. 'Inside Cisco's Search for the Next Big Idea.' *Harvard Business Review* 1 (September). As of 19 April 2018: https://hbr.org/2009/09/inside-ciscos-search-for-the-next-big-idea

13 Hossain, Mokter, & K. M. Zahidul Islam. 2015. 'Generating Ideas on Online Platforms: A Case Study of "My Starbucks Idea".' *Arab Economic and Business Journal* 10 (2):102–11. doi:10.1016/j.aebj.2015.09.001

14 Vrgović, Petar, & Ivana Jošanov-Vrgović. 2017. 'Crowdsourcing User Solutions: Which Questions Should Companies Ask to Elicit the Most Ideas from Its Users?' *Innovation* 19 (4):452–62. doi:10.1080/14479338.2017.1356618

15 Ebner, Winfried, Jan Marco Leimeister & Helmut Krcmar. 2009. 'Community Engineering for Innovations: The Ideas Competition as a Method to Nurture a Virtual Community for Innovations.' *R&D Management* 39 (4):342–56. doi:10.1111/j.1467-9310.2009.00564.x

16 George's Ideas Lab (homepage). 2018. As of 19 April 2018: http://georgesideaslab.dialogue-app.com/ideas

17 Briel, Frederik von, & Jan C. Recker. 2017. 'Lessons from a Failed Implementation of an Online Open Innovation Community in an Innovative Organization.' MIS *Quarterly Executive* 16 (1):35–46.

18 Crowdicity (homepage). 2018a. As of 19 April 2018: http://crowdicity.com/en/

19 Durant, Ben. 2018. 'Constitution UK.' London: London School of Economics and Political Science. As of 19 April 2018: http://blogs.lse.ac.uk/constitutionuk/

20 Bryant, Peter, Christopher Fryer & Darren Moon. 2015. 'Harnessing the Power of the "Massive": An Innovative Approach to Participation, Digital Citizenship and Open Learning on-Line.' In *Learning with MOOCS II, 2–3 October 2015, New York, USA*. As of 19 April 2018: http://eprints.lse.ac.uk/64225/

21 Crowdicity. 2017b. 'RCN Crowdicity Example.' 2017. As of 22 November 2017: http://crowdicity.com/en/customers/health-and-nhs-trusts/royal-college-of-nursing/

22 Dalkey, N. C., & O. Helmer. 1963. 'An Experimental Application of the Delphi Method to the Use of Experts.' *Management Science* 9 (3):458–67.

23 Hasson, Felicity, Sinead Keeney & Hugh McKenna. 2000. 'Research Guidelines for the Delphi Survey Technique.' *Journal of Advanced Nursing* 32 (4):1008–15.

24 Gordon, Theodore J. 2009. 'The Real-Time Delphi Method.' *Futures Research Methodology* Version 3:19.

25 SurveyMonkey (homepage). 2018. As of 19 April 2018: https://www.surveymonkey.com/

26 Limesurvey (homepage). 2018. As of 19 April 2018: https://www.limesurvey.org/

27 Fluidsurveys (homepage). 2018. As of 19 April 2018: http://fluidsurveys.com/

28 RedCap (homepage). 2018. As of 19 April 2018: https://catalyst.harvard.edu/services/redcap/

29 Shaw, Joanne M., Melanie A. Price, Josephine M. Clayton, Peter Grimison, Tim Shaw, Nicole Rankin & Phyllis N. Butow. 2016. 'Developing a Clinical Pathway for the Identification and Management of Anxiety and Depression in Adult Cancer Patients: An Online Delphi Consensus Process.' *Supportive Care in Cancer* 24 (1):33–41. doi:10.1007/s00520-015-2742-5

30 Delphi2 (homepage). 2018. As of 19 April 2018: http://armstrong.wharton.upenn.edu/delphi2/
31 Delphiblue (homepage). 2018. As of 19 April 2018: https://sourceforge.net/projects/delphiblue/
32 Mesydel (homepage). 2018. As of 19 April 2018: https://mesydel.com/
33 Calibrum (homepage). 2018. As of 19 April 2018: https://www.calibrum.com
34 Gordon, Theodore, & Adam Pease. 2006. 'RT Delphi: An Efficient, "Round-Less" Almost Real Time Delphi Method.' *Technological Forecasting and Social Change* 73 (4):321–33. doi:10.1016/j.techfore.2005.09.005
35 Aengenheyster, Stefan, Kerstin Cuhls, Lars Gerhold, Maria Heiskanen-Schüttler, Jana Huck & Monika Muszynska. 2017. 'Real-Time Delphi in Practice – A Comparative Analysis of Existing Software-Based Tools.' *Technological Forecasting and Social Change* 118 (May):15–27. doi:10.1016/j.techfore.2017.01.023
36 Monguet, J.M., A. Trejo, T. Martí & J. Escarrabill. 2017. 'Health Consensus: A Digital Adapted Delphi for Healthcare.' *International Journal of User-Driven Healthcare* 7 (1):27–43. doi:10.4018/IJUDH.2017010103
37 Barber, Claire E. H., Deborah A. Marshall, Dianne P. Mosher, Pooneh Akhavan, Lori Tucker, Kristin Houghton, Michelle Batthish, et al. 2016. 'Development of System-Level Performance Measures for Evaluation of Models of Care for Inflammatory Arthritis in Canada.' *The Journal of Rheumatology*, January. doi:10.3899/jrheum.150839
38 Khodyakov, Dmitry, Susanne Hempel, Lisa Rubenstein, Paul Shekelle, Robbie Foy, Susanne Salem-Schatz, Sean O'Neill, Margie Danz & Siddhartha Dalal. 2011. 'Conducting Online Expert Panels: A Feasibility and Experimental Replicability Study.' *BMC Medical Research Methodology* 11 (1):174.
39 Taylor, R. E., & L. L. Judd. 1989. 'Delphi Method Applied to Tourism.' *Delphi Method Applied to Tourism*., 95–98.
40 Slomian, J., P. Emonts, M. Erpicum, L. Vigneron, J. Y. Reginster, & O. Bruyère. 2017. 'What Should a Website Dedicated to the Postnatal Period Contain? A Delphi Survey among Parents and Professionals' *Midwifery* 53 (Supplement C):9–14. doi.org/10.1016/j.midw.2017.07.004
41 Flostrand, Andrew. 2017. 'Finding the Future: Crowdsourcing versus the Delphi Technique.' *Business Horizons* 60 (2):229–36. doi:10.1016/j.bushor.2016.11.007.
42 Hsu, Chia-Chien, & Brian A. Sandford. 2007. 'Minimizing Non-Response in the Delphi Process: How to Respond to Non-Response.' *Practical Assessment, Research & Evaluation* 12 (17):62–78.
43 RAND Corporation. 2017a. 'ExpertLens.' As of 19 April 2018: https://www.rand.org/pubs/tools/expertlens.html
44 RAND Corporation. 2017b. 'How ExpertLens Works.' 2017. As of 19 April 2018: https://www.rand.org/pubs/tools/expertlens/about/how-it-works.html

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