What works in open data challenges

Method report

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Executive summary

This report reviews current theory and practice behind open data challenges as a mechanism for driving open data improvement, engagement and innovation. Its main purpose is to equip and enable organisations, governments and community organisers to deliver high-quality open data challenges while helping them to recognise nuances within their local contexts.

Open data challenges are a derivation of challenge prizes or inducement prizes, which have a long history reaching back to the Longitude Prize in the 1700s.[1] While the theory and history of challenge prizes is well documented by Nesta's Centre for Challenge Prizes amongst others,[2] open data challenges were not widely recognised until the 2000s.

Open data challenges offer a mechanism that demonstrates the potential of open data, drives its improvement and enables entrepreneurs to innovate with it. They have typically been implemented in contexts where open data publication and use are already advanced, but are now also contributing to innovation and economic development in developing country contexts (as an alternative to hackathons).

The number of countries, governments and organisations releasing data openly has increased significantly in the past few years. However, their motivations remain mixed. While some may see releasing data as an opportunity to increase accountability and transparency, others have realised its potential to support new business growth and innovation. For those with the ambition to support and strengthen a sustainable data infrastructure, open data challenges provide a framework through which to expedite this.

This report draws on an extensive review of literature on the economics and management of innovation contests, which was used to map over 25 open data challenges. Further qualitative insights were drawn from nine interviews that were conducted with organisers of open data challenges, representing seven geographic regions and five scales of operation.

The report explores the case for implementation, explains the key attributes of a challenge prize and provides seven recommendations for prize delivery to help others design, deliver and evaluate open data challenge prizes effectively.

1 See http://longitudeprize.org/history.
2 See http://www.nesta.org.uk/sites/default/files/challenge-prizes-design-practice-guide.pdf.

1. **Set clear objectives that reflect the primary interests of all core stakeholders.** Organisers should only conduct an open data challenge where it is appropriate and will contribute to their overarching goals. While open data challenges often help demonstrate the power of data that has already been released, the timelines they work to are often insufficient to drive the release of new open data. Effective, collaborative, open design and marketing of challenge objectives will ensure that they reflect goals that all key stakeholders subscribe to.

2. **Design a bespoke challenge structure that reflects these primary objectives throughout.** As this report illustrates, subtle and significant changes to challenge design will determine whether or not and to what degree its core objectives are achieved. While keeping resource, infrastructure and organisational constraints in mind, organisers should take time, utilise expertise and employ creative license to design a challenge that best reflects what they are trying to achieve in their unique context. Every challenge should start with a call to action focused on a clear challenge question and culminate in the award of one prize to an overall winner who is committed to sustaining their product or service.

3. **Commit to open design principles and be prepared to iterate or adjust plans as you go.** To deliver a successful challenge, organisers will need to:
   - operate with uncertainty and unknowns as a core element of design
   - invest in relationship building (with partners, participants and volunteers)
   - work as collaboratively and openly as they would expect others to
   - engage stakeholders in design and delivery
   - respect participants' intellectual property and level of investment
   - minimise barriers to participation and have clear incentives

4. **Sustain focus on open data from launch to completion. Support participants to understand, access and use open data.** A challenge cannot succeed unless sufficient, high-quality and relevant data are available. Challenges are much more likely to succeed when data infrastructure, access and resources are carefully prepared and maintained. Organisers should recognise that many of their participants will not be open data experts and will need support in accessing and using it. Understanding what data is available and how it can be used can be a significant barrier in creating ideas. Further, if every opportunity is taken to support data's improvement and that of the surrounding ecosystem, a challenge prize can add significant value for the open data community, including publishers and users. This must be actively built into challenge design.

5. **Take time to plan, deliver and review each stage of the challenge process.** Challenges often look straightforward when observed from an outsider's perspective. However, a challenge is only simple when sufficient thought and expertise is invested in its design and execution. Assembling a team with suitable expertise is no easy task, but experts in business modelling, facilitation, judging and impact assessment will be essential to the success of the challenge.

6. **Do not stop at one challenge.** To optimise their return on investment, challenge prize organisers should consider running multiple challenges over an extended period. This additional upfront commitment will create an opportunity to build momentum with participants and supporters, and ensure lessons are recorded and iterated quickly. The investment needed to launch and deliver a successful challenge is significant, but once initial design, launch and awareness building is complete, much of the hard work is done and the reward will be greater from delivering multiple challenges. A community of innovators, policy experts and entrepreneurs is easier to sustain than to create for a single open data challenge.

7. **Undertake an impact and process evaluation and share it.** As a community committed to working collaboratively and openly, we owe it to one another to share the lessons and experiences that lead to both the successes and failures in our work. Too few process and impact evaluations exist in relation to open data challenges. Together, we have the opportunity to change this.

Introduction:
Challenge prizes and open data in a global context

The history of challenge prizes

Challenge prizes in some form have been recorded throughout history, dating back as far as 1714, and are defined by Wikipedia as "a competition that awards a cash prize for the accomplishment of a feat, usually of engineering. Inducement prize challenges are typically designed to extend the limits of human ability" (Wikipedia, (2016b).

Nesta's Centre for Challenge Prizes further explains that "challenge prizes (also called 'inducement' prizes) offer a reward to whoever can first or most effectively meet a defined challenge. They act as an incentive for meeting a specific challenge, rather than as a reward for past achievements" (Nesta, 2014).

The difference between hackathons and pure challenge prizes

All open innovation techniques, such as hackathons and challenge prizes, all share common objectives. Specifically, they will all raise the profile of a given brand, topic, issue or resource, and engage a community of participants or specialists. However, hackathons and challenges are often conflated, leading to creative interpretations of both and a poor understanding of the design principles for a successful challenge.

The table below shows the differences between the two event types, when they should be used and what outcomes can be expected.

	Hackathon	**Challenge Prize**
Definition	An event in which programmers/ software development specialists (e.g. graphic designers and project managers) collaborate intensively on software projects (Wikipedia, 2016a).	A series of activities leading to a reward for whoever can first or most effectively meet a defined challenge. The incentive is awarded for meeting a specific challenge, not to reward past achievements.

Goals and objectives	**Develop prototypes to test an input or platform.** • Quickly develop new software technologies • Locate new areas for innovation and funding • Test resources such as data integrity/functionality of API • Attendees learn new skills and build professional networks	**Create sustainable products or services that solve a specific issue.** • Raise awareness about and give momentum to the open data movement • Teach participants specific skills • Prioritise the development of products/services • Support participants to expedite product development • Seek to generate socially, economically and environmentally responsible solutions
Participants	Primarily those with technical skills (computer programmers, software developers, graphic designers etc)	Entrepreneurs, startups, big business, academic institutions and SMEs
Outputs	• Working prototypes/minimum viable product • Demonstration of potential • Minimal commitment required by participants	• Innovative and sustainable products and services • Tested business model • Committed, engaged teams
Outcomes	• Refined and tested inputs (data, API etc) • Offers of employment/new jobs • Improved awareness of a specific issue • Personal and professional networks and development	• Increased engagement between data publishers and users • Network of knowledgeable people engaged with the brand/issue and data source • Increased profile for/ awareness of challenge issue • Connect with talented potential future employees
Time investment	Prep: 3 months (often less) Delivery: 1–2 days	Prep: 2-3 months per stage Delivery: 3 months to 5 years
Cost (£-£££)	££	£££
Potential impact	Primary impact on organisation and data users	Broader impact including social and environmental

The underlying research that informs this report assessed 25 selected open data challenges, some of which might be strictly defined as hackathons, particularly those that prioritise "learning" as their primary objective.

Open data and challenge prizes

Open data is data that anyone can access, use and share. Open data lends itself to challenge prizes particularly well because it shares central principles with a well-run challenge prize, since both rely equally on collaboration, openness and building symbiotic relationships.

Putting open data at the centre of a challenge prize has a number of key benefits. It brings a challenge prize concept to a new audience (open data specialists), increasing the pool of potential participants who are passionate and knowledgeable. Including open data in a challenge prize also exposes this core resource to a new audience, increasing awareness and understanding for those sector specialists who are knowledgeable about the challenge topic but not yet aware of relevant data that is publicly available.

Stipulating the use of open data within products and services in this way helps to create demonstrable examples of the power of open data in a business context. When done well, this encourages greater interaction between users and publishers, thereby increasing the quality and availability of data, and helping countries and organisations to create a mature open data ecosystem.

History of open data challenge prizes

In recent history, since the advent of the X Prize[4] in 1996 and the establishment of the Centre for Challenge Prizes at Nesta in 2012, challenge prize methodology has blossomed beyond the realms of engineering to encompass the open data sector. In particular, significant steps forward have been observed since the launch of the Open Data Challenge Series by Nesta and the Open Data Institute in 2013.[5]

4 See https://www.xprize.org.
5 See http://opendatachallenges.org.

The application of challenge prize methodology to the open data sector can be traced back to two main points of origin:

- **The growing expectation that hackathons should deliver more sustainable, quantifiable outputs:** Event commissioners often seek a simpler, more cost-effective mechanism through which to deliver sustainable innovation and settle on a hackathon-challenge hybrid. In 2008, the UK Government invited citizens to find innovative ways to use the masses of data that it has collected in health, criminal justice and education. At the time, the activity was described as a 'data mash-up' competition, offering an example of challenge prize and open innovation theory working in combination (BBC, 2008).

- **The design and delivery of the Open Data Challenge Series (ODCS) by Nesta and the Open Data Institute:** This series of seven challenges was conducted largely in the open and heralded as a success, thanks to an independent assessment by PWC, which projected its return on investment to be 5–10-fold (Nesta and the ODI, 2015. The ODCS released process and impact evaluations along with a handbook (including a summary of its methodology) openly to support others to adopt and adapt the model (Nesta and the ODI, 2015b). ODCS is frequently cited by organisations as the inspiration and/or basis for their own model and approach. One such example is Ukraine's EGAP challenge.[6] EGAP is designed to drive the creation and implementation of new electronic democracy tools to help citizens receive new high-quality services, interact with the government effectively, have a direct impact on it and help it to reach a new level of transparency and efficiency.

Core features of open data challenge methodology

Open data challenges have evolved in a variety of ways. Challenge structure has generally morphed to reflect more the priorities of the organiser than the core features of a challenge method. A project that delivers against the following core questions is technically classified as an open data challenge prize:

- Does the challenge address a **specific and ambitious question** that will require significant innovation?
- Is a **timeline clearly communicated** in which the number of qualifying entries gradually reduces to a small number of winners? Does the process **culminate in a significant cash incentive** (or equivalent)?
- Are participants expected to deliver a **product/service/prototype** that they are

6 See http://egap.in.ua/komponent-3-e-demokratiya/egap-challenge-framework.

committed to in the medium to long term, in order to **deliver sustainability**?

- Are all participants required to use **open data** in their proposition?

Global context for challenge prizes

To date, challenge prizes have been used most in well-resourced contexts. More recently, open data challenge prizes have been increasingly considered and implemented to contribute to innovation and economic development in capacity-constrained contexts (as an alternative to hackathons), such as India and South Africa.

In capacity-constrained contexts, our research highlighted the need to build collaboration into the programme design to overcome capability gaps frequently experienced by participants. As these countries release a greater volume of higher quality open data, there is a growing expectation that it should be used. Effective challenge prizes enable organisers and government officials to have greater visibility about who is using their data and how, while fostering open channels of communication to improve the usability of the data.

Why run an open data challenge?

Organisations that design and run open data challenge prizes range from governments to commercial organisations, data publishers to activists. Each will of course have their own motivations. However, the first indication of success for a challenge will come from how effectively they distil these motivations into clear, measurable objectives.

Both the secondary evidence that was considered and the challenges that were assessed to inform this work suggest that challenges are generally organised to achieve a primary objective. These objectives are broadly organised into three main categories – **learning**, **innovation** and **sustainability** (Adamczyk, 2012).

1. **Professional development and learning: Challenges that aim to raise awareness about and give momentum to the open data movement and teach participants specific skills.** Literature widely focuses on the benefits of challenges to develop teamwork, time management, budgeting and communication skills (Adamczyk, 2012). These challenges provide an opportunity for participants to apply scientific concepts to real-life situations, such as using data to address specific problems (Kimmel, 1992).
    - **Used primarily:** by academic institutions or organisations dedicated to education.
    - **Example:** Convergence Innovation Competition (CIC) at Georgia Tech – an annual competition in which students are provided category-specific resources by industry sponsors to employ towards developing a prototype and business case. It includes a rigorous workshop schedule and support system to drive learning agenda (Piller et al, 2004).
    - **Prize:** Contracts of employment and opportunities to commercialise products.

2. **Innovative outputs: Challenges that prioritise the development of products/ services and support participants to expedite product development** (Piller et al, 2004). These challenges offer a cost-effective method to attract numerous dispersed communities of committed innovators, often intended to kick-start a new market (e.g. private space flight) or adoption of a new resource (open data). User-made ideas are often comparable to those of internal experts and provide a compelling platform to integrate internal and external experts toward the innovation cause thereby driving collaboration and open innovation approaches (Poetz et al, 2012).
    - **Used primarily:** within the industry.

- **Example:** NASA Centennial Challenge – designed to engage a diverse community including the public and particularly citizen-inventors in NASA's research and development. The Centennial Challenge drives forward innovation, opportunity and communication by finding innovative solutions through competition and cooperation, enabling challenge competitors to develop and expand their business models and business base, and providing a forum for public outreach.
- **Prize:** Prize purse from US$25,000–5 million.

3. Sustainability and community: Challenges that seek to generate socially, economically and environmentally responsible solutions. In the case of open data, this may apply in two ways. Firstly, a socially motivated challenge question will ensure open data challenges deliver socially beneficial products and services (Belz et al, 2007); secondly, effective open innovation techniques and fostering engagement between participants and data owners will facilitate a sustainable and mature open data infrastructure.
   - **Used primarily:** by governments, charities and not for profit organisations.
   - **Example:** The Open Data Challenge Series run by Nesta and the Open Data Institute. The seven challenges each prioritised a specific theme and social need which was defined in collaboration with sector experts. Challenge participants were assessed according to how well their product or service responded to the social need, their use of open data, the level of innovation and the strength of their business model.
   - **Prize:** Prize purse from £45,000–55,000 per challenge.

As we will see later, the selection and articulation of objectives will have direct implications for the design of the challenge prize and should not be overlooked. The effective, collaborative construction of objectives is a process that should be invested in by all stakeholders, ranging from domain experts to funders and data owners. It provides an opportunity to air and agree primary measures of success and to establish core principles which will guide challenge design and delivery.

What benefits can you expect?

Open data challenges are particularly appealing, both to corporations and governments, because innovative solutions can emerge at a far lower cost than through traditional research and development practices in closed organisational settings (Lampel et al, 2012). Challenges often deliver a number of benefits to the organising group, ranging from increased engagement with specific datasets and a wide spectrum of specialists, to access to a community of advocates

and innovators who are invested in a brand or cause. Rapid shifts in innovation demands and the rising costs of maintaining internal resources make open innovation methods increasingly attractive (Hossain and Kauranen, 2015).

Economic benefits

- **Return on investment for data release or investment is clearer, more significant and measurable.** It is not always easy to demonstrate the benefits of releasing open data. Many organisations are unaware of the degree of their open data's use, which makes estimating the return on their investment difficult. A challenge prize can require that a participant should keep the organiser informed of their progress and success, thereby giving some indication of impact.
- **Foster activity on a broad topic and potentially invest in a new market**. Challenges are particularly useful where groups are unlikely to risk developing ideas themselves because there is not a proven market for them, or the high cost of developing products or services puts them off.

Environmental benefits

- **Limited environmental impact.** Challenge prizes are largely delivered remotely which reduces the requirement for travel or the impact of a physical event. Online platforms such as YouNoodle[7] and Collabfinder[8] provide functionality for team recruitment, submission and judging.
- **Target and overcome specific environmental challenges.** Challenge prize questions can be specifically designed to target environmental needs and improvements. For example, a challenge question could read "How can we use open data to increase the number of people generating their own energy?"

Social benefits

- **Discover new, innovative solutions** to entrenched social (and other more technical) problems which respond to the challenge definition. For example, solutions to food waste, social mobility, public engagement and housing.
- Improve recruitment and community building by identifying talent in communities and building a network of knowledge and expertise.
- **Encourage collaboration between participants.** There is an option to incentivise deeper collaboration and partnerships through the challenge design by requiring academics to submit in partnership with experienced entrepreneurs, for example.
- **Improve awareness of existing innovation, specialists and open data resources,**

7 See https://www.younoodle.com.
8 See http://collabfinder.com.

strengthening open data practice and prompting greater use of open data.

- **Develop ongoing symbiotic relationships** – data providers, publishers and users are encouraged to collaborate more effectively. The quality, availability, use and breadth of data improves as a result.

While open data challenges provide an efficient platform for organisers to seek innovative solutions, participants will also often benefit greatly from their involvement.

Personal professional development

- Build professional networks related to a topic of interest, meet like-minded participants and become part of an expert community.
- Test and learn new skills in a stimulating, supportive environment.
- Access wide-ranging resources including data, user insight reports, research and publications.

Product development

- Get access to expert facilitation, peer support and industry sponsorship.
- Agile and intense process to quickly research and develop in secure environment.
- Bring visibility to themselves, their work and their projects.
- Enter markets that are otherwise difficult to penetrate.

In addition to the broad benefits set out above, the challenge process can be designed to support specific outcomes for the participants in line with the overarching objectives. For example, if learning is a priority, organisers may wish to provide a professional development package alongside the challenge milestones. This package may include training, in person or online, or mentoring on topics such as user research, open data, project management or business models. This will provide an extra bundle of benefits to participants and will have the additional benefit of improving the quality of submissions.

Risks and issues to consider

For colleagues working in capacity-constrained contexts, our research identified four specific challenges that are vital to consider during the programme design and execution of the challenge. First and foremost, **data science capacity and capability** – the success of open data challenge participants depends on their ability to extract, interpret, analyse and apply data. If an existing community of potential participants with the necessary skills and capacity cannot be found and engaged, investment will need to be made in training and expert mentorship for participants who lack these skills.

Second, **adequate data and legal infrastructure** will need to be in place. Not only should relevant, quality data be available for participants at the launch of the challenge, but also investment should be made to ensure the infrastructure supports participants to access and digitise information and locate and manage datasets.

Organisational fragmentation and lack of collaboration were also reported as issues. Organisers must identify clear roles and responsibilities for all stakeholders and make sufficient investment into stakeholder relationships (e.g. work together to set common objectives and design principles).

Finally, though it may not seem an obvious priority, it is essential that organisers **commit in the long term** to their challenge process and **prioritise open data**. This requires that organisers invest in the full assessment of the quality of submissions (including user accessibility and impact of open data use), not just in the number of submissions themselves. Organisers are recommended to monitor participants progress beyond the final winner's award and evaluate the long-term outcomes and impacts of the challenge process.

Four foundations for delivering effective open data challenges

There are **four foundations** for the design and delivery of an open data challenge:

1. The principles of leading a challenge
2. Designing your programme and activities
3. Providing resources and inputs
4. Creating incentives for participants

1. The principles of leading a challenge

The objectives agreed between key organising partners will greatly determine the nature of the challenge outputs. In order to further increase the likelihood of success, organisers are encouraged to consider to what degree they will adopt the following guiding principles. These principles are derived from our research and experience in open data challenge delivery.

Principle 1: Invest in relationships

Whether between partner organisations, individuals within a team or competing teams, relationships are a core foundation for the success and sustainability of an open data challenge. An early investment in building open, collaborative relationships with all stakeholders will pay dividends. In the short term, organisers can expect an increased likelihood of collaboration or pro bono support, deeper understanding of the challenge question and theme, and more collaboration between participants.

When the foundations are set right, this investment can lead to more significant relationships and involvement between parties in the longer term, ranging from permanent employment and freelance support to collaborative product design and delivery.

Capacity-constrained contexts. Investing in building relationships within the open data ecosystem is particularly important where the level of open data maturity is nascent, or where the financial rewards for involvement in this specific event are more limited. This enables future partnerships to develop over the longer term.

Principle 2: Work as openly and collaboratively as you expect others to

An open data challenge is one example of an open innovation technique, as such its success is dependent on the degree to which it is designed, managed, judged and evaluated openly. An open data challenge invites participants to submit their innovations in the open – the quality of these submissions can be improved by clarity of judging criteria and shared insight into the user needs that motivate the challenge question.

Capacity-constrained contexts. Aligning organisations with similar objectives and complimentary skillsets may be more challenging where there is competition for limited resources such as donor funding. Working openly can be perceived as a risk to organisational intellectual property, however, in this case, the benefits far outweigh the risks.

Principle 3: Respect participants' intellectual property and level of investment

It is imperative that participants have clarity regarding their intellectual property throughout the challenge process. All challenges will require participants to make a level of investment in their submissions prior to entry, and teams can incur reputational and other risks as a result. To support their involvement and comfort with the process, clarity should be provided through written terms and conditions with a clear judging timeline and matrix.

The openness of the challenge process requires that participants both compete and collaborate with one another. Creating conditions that support both behaviours, and being clear on the expectations that you hold for participants, will enable them to benefit from the process to the greatest degree possible.

> **Capacity-constrained contexts.** Encouraging collaboration is highly beneficial for the experience and outcomes of the process but this approach may conflict with cultural norms. Finding a suitable balance that both optimises collaboration while encouraging competition should be considered on a case-by-case basis and reflected in the challenge design. For example, meetups will encourage collaboration while the judging process will drive competition.

Principle 4: Minimise barriers to participation

Challenges, particularly those with a lower prize range, are frequently the pursuit of small businesses, entrepreneurs and individuals. These participants are likely to be time-constrained and working on tight margins or in their own time so it is vital that they feel their time is suitably rewarded through professional development, a comfortable environment and a suitable prize.

A challenge that will have greatest appeal to a wide and well-suited audience is one which has considered and attempted to overcome barriers to participation. Organisers may wish to do this through provision of:

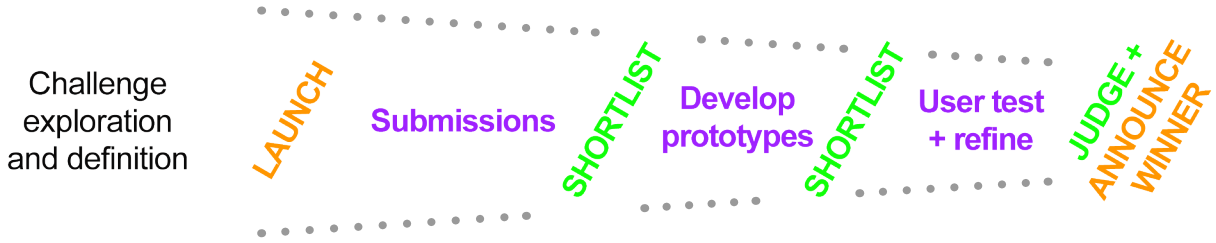
- **Challenge question and definition.** A narrative to explain how and why the challenge question has been selected and what impact is anticipated from submissions.
- **User research and insights** help participants to understand the challenge question more fully and target their submissions to specific audiences.
- **User centred design and universal design principles** or other suitable requirements to guide submissions and put user needs at the centre of innovation process.
- **Data.** A central curated repository for relevant data to include metadata and guidance thereby supporting efficient idea creation and innovation.

Tips for implementation: The more guidance and research that can be centralised, the less burden on participants. Organisers should consider how to work collaboratively with experts in their field to provide these resources.

2. Designing your programme and activities

As Nesta's Centre for Challenge Prizes has established, challenge prizes can be designed to achieve a number of outcomes – whether to solve big problems and achieve major breakthroughs, to make progress towards ambitious goals or to create new markets. [9]Irrespective of the overarching goal, there are some elements of overarching challenge design that are consistent across best-in-class open data challenge prizes. A standard challenge process can be simplified as follows:

9 See http://www.nesta.org.uk/sites/default/files/challenge-prizes-design-practice-guide.pdf.



Key:
Black text: discovery and challenge definition
Orange text: significant communications milestones
Purple text: participant focused activities
Green text: assessment and judging

Defining the challenge: the discovery phase

The discovery phase for any challenge will set up participants, key stakeholders and champions to engage most effectively with the challenge process. Organisers may wish to consider additional activities such as:

- **Roundtable discussions and interviews.** Bring together specialists to better understand underlying issues that could present potential challenge questions/ themes and specific areas of focus.
- **Comprehensive data review.** Review available open data and curate a data guide to help data novices understand what is available, how frequently it is updated, the quality and completeness of the data, and how the data could relate to the challenge question.
- **User research.** Undertake or commission user research activities to expose user needs. Both secondary and primary research can be highly valuable and encourage data specialists who may lack thematic or sector expertise to participate.

Setting communications milestones

The impact and degree of engagement with a challenge can be significantly increased through effective communication. While the main milestones that should be prioritised are the launch of the challenge and the announcement of the winner, there are specific activities that can be employed to increase their hit-rate:

- **Share openly.** Participants and observers will benefit greatly from access to informal, anecdotal information as the challenge progresses. Collaborative note-taking tools such as Hackpad, blog posts and social media activity are all useful ways to share progress, collect input and engage potential participants.
- **Commit in the long term.** The most sellable stories come long after the culmination

of the challenge, once participants have launched, often pivoted, and had some successes. By making a commitment to the winner in the medium to long term, or running multiple challenge prizes consecutively, an organiser will benefit from a multiplier effect.

Setting activities for your participants

While the preparation, communication and assessment of the challenge are all vital logistical elements, the participant activities form the main focus of the process. In its simplest form, a challenge will require participants to submit an idea or concept, develop that concept and then launch it into the market. At each stage, the number of participants will decline and the focus of support will increase. Participant activities can be supported through:

- **Online submission platform.** Organisers may wish to use a submission platform such as YouNoodle or Collabfinder to manage initial participant submissions. The selection of a platform is a difficult process and all options should be considered. For example some platforms will support the judging process as well as submissions but will not support participants to find teammates. An initial online submission provides the opportunity to assess and shortlist suitable participants to engage in the next phase.
- **Meetups.** Physical interaction between participants can be hugely beneficial, particularly in the early stages when idea generation is the focus, and later when teams will benefit from being exposed to specific skills and techniques through training and support.
- **Creation Weekend.** Many open data challenge prizes will require all participants to attend and pitch at a weekend long event. This is a dedicated time period for development and refinement of the product or service before live pitching in front of a panel of judges. The Creation Weekend structure can itself be adjusted to prioritise primary objectives and outcomes.

Assessment and judging

Transparency in assessment will improve both the volume and quality of submissions. Where a participant can easily see what they are being judged on, by whom and how, they can more easily improve their scores and achieve even greater success.

- **Share judging information early.** Communicate the judge's names, judging criteria and matrix as early as possible in the process to help participants understand what is required of them at each stage and how their submissions will be assessed.
- **Communicate scores and feedback openly.** To broaden the benefits and impact of a challenge process, organisers should share feedback with all participants at all stages regardless of the degree of success they achieve. Supporting all participants to achieve success will ensure the greatest possible impact for the challenge process.

3. Providing resources and inputs

The submissions made in response to a challenge question are primarily a reflection of the resources, experiences and knowledge of the participating team. Teams are often drawn from a range of open data expertise levels, a variety of different sectors and across different levels of seniority, depending on the size and draw of the incentive. To improve the quality of submissions, a number of challenges have found great benefit from crowdsourcing and openly sharing resources to expedite the idea and product development.

With open data being a relatively new and nuanced discipline, expertise and knowledge in the entrepreneurial sphere is limited. Challenge organisers have benefited from asking an independent data scientist to contribute to the provision of two types of open data-related material. This includes an introduction to open data, including information about the concept, requirements and availability, and also an outline of the main data providers and key datasets that relate to the sector or challenge question. Those who have a basic understanding of open data will also benefit from a second, more thorough, interactive audit and quality assessment. This document will rate the openness of the data and provide clear documentation to help potential participants identify the datasets that will best support their idea at a glance, and help data publishers to see where their data sits amongst their peers.

With participating teams often resource-constrained and limited to specific areas of expertise, user research and user centred design principles can be overlooked. One simple way to set this expectation is to suggest teams refer in some way to user needs and user feedback in their pitch. A solution which will offer benefits far beyond the parameters of the challenge is

the preparation of a **user insight guide** by a researcher. Organisers may wish to commission specialists to create a user insight report to include user profiles of the types of users that teams should develop their products for, an exploration of user needs, analysis of secondary research and interviews with sector specialists.

The Creation Weekend and prototype development phases offer an opportunity to provide **specialist support to the teams**. Experts can work with the teams directly to challenge, coach and advise them regarding specific areas of focus stipulated in the judging criteria, such as use of open data, brand and concept.

4. Creating incentives for participants

The nature, volume and enthusiasm of participants is commonly influenced by their commitment to the cause and equally by the size and type of the incentive. This is a very important aspect of challenge design and the literature is exhaustive on the subject, particularly in relation to the amount or type of reward (Piller et al, 2010), whether to offer single or multiple prizes (Glazer and Hassin, 1988), whether to offer fixed or proportional prizes (Cason et al, 2010), and monetary prizes versus proprietary rights (Che et al, 2015). All 25 open data challenges involved some form of monetary reward. Observably, the size of their cash prizes differed significantly, ranging from $500 to $1,000,000. Open data challenges with simple context structures, single-stage, single-award, often employed one-off, larger-sum prizes, while those with complex structures, multi-stage, multi-module, or both, tended to link each stage or module with a smaller-sum prize.

While a professional development programme of learning and/or recruitment opportunity may be more than enough incentive for a university student, it will not encourage seasoned entrepreneurs to participate in the challenge. It is therefore essential that the organisers explore and test suitable incentives with their intended participant community before committing.

According to one interviewee, the prevalence of monetary award could be attributed to convention and convenience, because *"setting up a monetary prize is the most straightforward and proven thing to do in terms of reward".* While most interviewees were positive about cash prizes, one noted their limitations in a longer-term challenge: *"We call it a prize as if it's a reward, but you must recognise that in order to win that prize, they probably put far more than £50,000 worth of investment into the product or service in terms of their time, the technological developments, the user research sessions they've run, and so on. Effectively, we are not actually even covering their costs for the time they've spent."*

Besides the size and variety of monetary rewards, many challenges focused on the "honour" aspect of winning their open data challenges. For instance, the D4D Senegal Challenge highlighted that winners will win the opportunity to present at an international conference NetMob 2015, held at the Massachusetts Institute of Technology in Boston. Similarly, the Jakarta Provincial Government announced that winners will meet the Vice Governor of Jakarta, who will also take part in the evaluation process. The Data Innovation Challenge organised by the United States Department of Transportation publicised that the awardees will be honored by the Transportation Secretary in a "special session where awardees will present their concept for senior officials from across the US Department of Transportation, Challenge judges and other members of the DoT staff".[10]

Incentive Type	Audience attracted	Implications for challenge design
Cash £1k–250k £250–1m £1m+	Students, small business entrepreneurs Experienced business owners Research institutions, big business	A cash prize is best offered when in combination with seed funding for multiple shortlisted finalists. Smaller seed funding should be offered after the Creation Weekend.
Guaranteed contract	Existing experienced businesses working in the sector	The degree of competition increases and collaboration and openness is often diminished. Intellectual property is a major concern particularly where the contract holder is represented on the judging panel.
Opportunity to pitch for new clients Free exhibition ticket for sector conference Personal introduction to potential clients	Small/medium/new businesses hoping to penetrate new markets. Entrepreneurs.	Focus is less on the product or service developed and more on the team skills and experience. Much less traditional challenge prize approach.

10 For more information on the Data Innovation Challenge, see: https://www.transportation.gov/mission/challenges/datachallenge-rules.

Press coverage Brand association with organisers or sponsors	Small/medium/new businesses hoping to penetrate new markets. Entrepreneurs.	Significant pressure on the success of communications initiatives which cannot be guaranteed. More effective if led by communications specialists.
Engagement with users/user feedback	Small/medium/new businesses hoping to penetrate new markets. Entrepreneurs.	Should be built into the challenge process as it is not a reward for delivery so much as a benefit of the process.
Access to startup incubation programme	Early stage startups with very limited experience	Incubation programme replaces the prototype development phase and so finalists are selected early and the whole challenge process is shorter.

Conclusion and recommendations

The challenge prize or inducement prize concept has achieved great gains across a wide variety of sectors since its inception in the early 1700s – whether in private spaceflight or determining a ship's longitude.[11] So far, in the few years since its application to the open data sector in the late 2000s we have already seen the growth of a new market of product and service-led businesses that use open data to solve specific social, environmental and economic challenges.

While its definition is still subject to misconceptions, the open data challenge prize approach is gaining traction across regions, demographics and communities internationally. Designed to incentivise, engage and support the growth of a burgeoning market of products and services that use open data, open data challenge prizes are increasingly considered the best mechanism with which to:

- **demonstrate potential applications** for open data,often for social good
- **increase the use** of open data
- **improve the quality and availability** of open data

However, in order for an open data challenge prize to deliver positive impact on the open data ecosystem, startup market and open data infrastructure, we must invest fully and deliver them to the best of our ability. A challenge prize should only be embarked upon if all core stakeholders share the ambition to achieve long-term sustainable products and services which use open data, and to do so by incentivising participants to solve a specific, ambitious challenge question.

For the best chance at success, the following recommendations are set out for open data challenge prize organisers.

1. **Set clear objectives that reflect the primary interests of all core stakeholders.** Organisers should only conduct an open data challenge where it is appropriate and will contribute to their overarching goals. While open data challenges often help demonstrate the power of data that has already been released, the timelines they work to are often insufficient to drive the release of new open data. Effective, collaborative, open design and marketing of challenge objectives will ensure that they reflect goals that all key stakeholders subscribe to.

11 See https://en.wikipedia.org/wiki/Inducement_prize_contest.

2. **Design a bespoke challenge structure that reflects these primary objectives throughout.** As this report illustrates, subtle and significant changes to challenge design will determine whether or not and to what degree its core objectives are achieved. While keeping resource, infrastructure and organisational constraints in mind, organisers should take time, utilise expertise and employ creative license to design a challenge that best reflects what they are trying to achieve in their unique context. Every challenge should start with a call to action focused on a clear challenge question and culminate in the award of one prize to an overall winner who is committed to sustaining their product or service.

3. **Commit to open design principles and be prepared to iterate or adjust plans as you go.** To deliver a successful challenge, organisers will need to:
   - operate with uncertainty and unknowns as a core element of design
   - invest in relationship building (with partners, participants and volunteers)
   - work as collaboratively and openly as they would expect others to
   - engage stakeholders in design and delivery
   - respect participants' intellectual property and level of investment
   - minimise barriers to participation and have clear incentives

4. **Sustain focus on open data from launch to completion. Support participants to understand, access and use open data.** A challenge cannot succeed unless sufficient, high-quality and relevant data are available. Challenges are much more likely to succeed when data infrastructure, access and resources are carefully prepared and maintained. Organisers should recognise that many of their participants will not be open data experts and will need support in accessing and using it. Understanding what data is available and how it can be used can be a significant barrier in creating ideas. Further, if every opportunity is taken to support data's improvement and that of the surrounding ecosystem, a challenge prize can add significant value for the open data community, including publishers and users. This must be actively built into challenge design.

5. **Take time to plan, deliver and review each stage of the challenge process.** Challenges often look straightforward when observed from an outsider's perspective. However, a challenge is only simple when sufficient thought and expertise is invested in its design and execution. Assembling a team with suitable expertise is no easy task, but experts in business modelling, facilitation, judging and impact assessment will be essential to the success of the challenge.

6. **Do not stop at one challenge.** To optimise their return on investment, challenge prize organisers should consider running multiple challenges over an extended period. This additional upfront commitment will create an opportunity to build momentum with participants and supporters, and ensure lessons are recorded and iterated quickly. The investment needed to launch and deliver a successful challenge is significant, but once initial design, launch and awareness building is complete, much of the hard work is done and the reward will be greater from delivering multiple challenges. A community of innovators, policy experts and entrepreneurs is easier to sustain than to create for a single open data challenge.

7. **Undertake an impact and process evaluation and share it.** As a community committed to working collaboratively and openly, we owe it to one another to share the lessons and experiences that lead to both the successes and failures in our work. Too few process and impact evaluations exist in relation to open data challenges. Together, we have the opportunity to change this.

What do you think?

If you have insights into open data or challenge prizes that you would like to share, we want to hear from you. Get in touch with amanda.smith@theodi.org or tweet us at @ODIHQ.

About this report

The Open Data Institute (ODI) connects, equips and inspires people around the world to innovate with data. It is independent, nonprofit and nonpartisan, founded in 2012 by Sir Tim Berners-Lee and Sir Nigel Shadbolt. From its headquarters in London and via its global network of startups, members and nodes, the ODI offers training, research and strategic advice for organisations looking to explore the possibilities of open data.

This report was supported by the Open Data for Development (OD4D) programme. OD4D is a global network of leading organisations that are creating locally-driven and sustainable open data ecosystems in in Latin America, the Caribbean, Africa, and Asia and East Europe. The OD4D network builds knowledge and provides support to governments and policy-makers in key issues such as policies, standards, innovation and skills development.

OD4D is managed by Canada's International Development Research Centre (IDRC), and it is a donor partnership with the World Bank, United Kingdom's Department for International Development (DFID) and Global Affairs Canada (GAC). OD4D focuses on building up the supply of quality open data, and also on improving the use of that data by leaders in government, civil society, the media, and business so that it furthers public interest and improves people's lives.

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Appendix

Glossary

Challenge prize / Inducement prize

Challenge prizes, also called inducement prizes, offer a reward to whoever can first, or most effectively, meet a defined challenge. They act as an incentive for meeting a specific challenge, rather than an award for past achievements (prizes that do this are referred to as recognition prizes).

Challenge prizes landscape review (2012). Available at:
https://www.nesta.org.uk/sites/default/files/challenge_prizes_landscape_review.pdf

Open data

Open data is data that anyone can access, use and share.
http://theodi.org/what-is-open-data

User centred design

User-centered design (UCD) or user-driven development (UDD) is a framework of processes (not restricted to interfaces or technologies) in which the needs, wants and limitations of end users of a product, service or process are given extensive attention at each stage of the design process.
https://en.wikipedia.org/wiki/User-centered_design

Universal design principles

The 7 Principles of Universal Design were developed in 1997 by a working group of architects, product designers, engineers and environmental design researchers, led by the late Ronald Mace in the North Carolina State University. The purpose of the Principles is to guide the design of environments, products and communications. According to the Center for Universal Design in NCSU, the Principles "may be applied to evaluate existing designs, guide the design process and educate both designers and consumers about the characteristics of more usable products and environments".

- Principle 1: Equitable Use
- Principle 2: Flexibility in Use
- Principle 3: Simple and Intuitive Use
- Principle 4: Perceptible Information
- Principle 5: Tolerance for Error
- Principle 6: Low Physical Effort
- Principle 7: Size and Space for Approach and Use

http://universaldesign.ie/What-is-Universal-Design/The-7-Principles

Examples of open data challenges

Open Data Challenge Series[12], Nesta and ODI, UK (2013–2015)

Funded by: Department for Business, Innovation and Skills.

Format: Two phase open data challenge. Challenge definition, data sharing, submission, selection of semi finalists, creation weekend, selection of finalists, incubation, selection of winner

Topic: Range of seven social issues ranging from education to heritage and culture.

Incentive: £5,000 for semi finalists + mentoring, £40-50,000 for final winner

Goal: To develop sustainable, innovative products and services using open data for social good. To engage entrepreneurs and innovators in open data.

Learning: It is very valuable of investing in evaluation of impact and process, and to commit to multiple challenges in a series to allow for the process to be iterated immediately, and for marketing reach to accumulate over time.

Longitude Prize[13], Nesta, Global (2014–2019)

Funded by: InnovateUK.

Format: Three phase challenge. Challenge question researched and selected from six options by public vote. Registration, application, judging (Prize Advisory Committee), testing, judging (Longitude Committee), winner declared. If necessary, this cycle will be completed multiple times until a winner is identified and verified.

Discovery awards available to provide seed funding to develop an idea.

Topic: How can we prevent the rise of resistance to antibiotics? (On average antibiotics add 20 years to each person's life. The development of antibiotics has been vital to our survival, yet the rise of antimicrobial resistance is threatening to make them ineffective in the future.)

Incentive: £10 Million.

Goal: To engage a diverse community and solve one of the greatest challenges of our time.

12 See http://opendatachallenges.org.
13 See https://longitudeprize.org.

GODAN Open Data Challenge, Global (2016–2017)

Funded by: Global Open Data for Agriculture and Nutrition (GODAN).

Supporting Partners: Thought for Food (TFF), Presidents United for Hunger (PUSH)

Format: A virtual challenge process in which participants were required to submit a pitch presentation for their product/service online (YouNoodle platform). Nearly 40 entries were made across the two challenge themes and three finalists per track were selected by volunteer judges.

Topic: Two tracks were identified for this challenge: the policy track and the maker's track. The challenges both centred around availability and use of data and focused on GODAN's ambition to achieve world food security.

Incentive: Three seed-funding prizes per theme for finalists: $3,000, $2,000, $1,000 plus access, transport and accommodation for the GODAN Summit in New York, and access to a three month mentoring program. The final winner will receive $5,000 and an opportunity to pitch their product at the TFF and PUSH Summits in 2017.

Goal: To engage a younger generation in the work of GODAN and to identify and support innovation in the sector.

Learning: Focus participants on one track and prioritise innovative products and services rather than changes to policy as these are more accessible and can be addressed practically.

EGAP Challenge[14], Ukraine (2015–2019)

Funded by: IBM, Cisco Systems, De Novo, and Intel.

Supporting Partners: iHub Vinnytsia, Space Hub Dnipropetrovsk, Impact Hub Odesa and Lutsk Local Development Foundation.

Format: A five stage process (research, stimulation, creative weekends, incubation, selection of winners) which will run multiple times over the duration of the challenge. Each cycle will focus on a specific theme or topic.

Topic: The challenge targeted submissions that were helping to improve interaction between the government and citizens ranging from "resolving social problems" to "making the activity of government agencies more transparent and open".

Incentive: UAH 4.5 million split between up to 20 projects.

Goal: Ultimately, the challenge aims to implement new electronic democracy tools to help citizens receive new high quality services, interact with the government effectively and have a direct impact on it, as well as help the government reach a new level of transparency and efficiency.

Learning: A challenge is limited by the availability of open data. For their next challenge the team will focus on topics where there is sufficient, quality open data available.

14 See http://egap.in.ua/en/egap-challenge-framework.

South Africa Open Data Challenge[15], South Africa (2016–2017)

Funded by: International Development Research Centre

Supporting Partners: Open Government Partnership South Africa (main organiser), The ODI, OpenData for development network, OpeniX, Geekulcha, {code}bridge, Code for South Africa and Open data durban.

Format: Open, online call for participants to submit their concept. Shortlisted participants will be invited to a local Creation Weekend.

Topic: Responsive Cities: help residents work better with local government.

Incentive: First place: R10,000, Second place: R4,000, Third place: R1,000.

City winners and finalists will also be awarded top-up awards by local partners depending on solution potential and available budgets. For example Gauteng-based participants could receive up to R300,000 in seed funding (provided by The Innovation Hub to support piloting of projects selected for implementation by a city partner).

Goal: To solve the respective challenges in the cities, while driving forward demand and use of open data in order to encourage new data publication.

Learning: Maintaining consistency over multiple locations while also maximising value from the local expertise, data and resources.

15 See http://challenge.responsivecities.org.za.

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