



Government
Office for Science



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Life Sciences

*The***AHSN***Network*



England

**Real world testing of ‘combinatorial innovation’
A global invitation to innovators**

1. Introduction

The *NHS Five Year Forward View*, published in October 2014, described our intention to develop a small number of ‘test bed’ sites. These will serve as real world sites for evaluating ‘combinatorial’ innovations that integrate new technologies and other novel approaches that offer the prospect of better care, and better patient experience of care, at the same or lower overall cost.

Together with the Academic Health Science Networks (AHSNs), and HM Government, NHS England would now like to invite innovators from the UK and globally to express interest in deploying and testing their innovations in this flagship initiative. This prospectus explains how innovators should express interest, and the process we expect to follow over the coming months to select our final projects.

2. Why test beds are unique opportunity for global innovators

There is no shortage of innovation in the NHS or the health sector more widely. However, this innovation has not diffused as quickly as, or had the impact that, has been seen in other industries—particularly in reshaping how clinical services are delivered. This is despite the NHS having natural advantages over many other health systems including universal coverage of a diverse population, national standards and relatively rich healthcare data.

Test beds seek to address three important problems that have constrained the impact of innovation in the NHS. First, innovations are often implemented in isolation from each other—and from the infrastructure on which they depend. For example, new technologies have all too often been piloted without complementary changes to existing working practices and information systems, curtailing the value they can release.

Second, there is a comparative paucity of robust evidence about the effects of innovations in real world as opposed to experimental or research settings. This can lead to a divergence between the benefits found in experimental settings from those in clinics or hospitals. It also means we tend to understand too little about the economics of innovations before they are introduced.

Third, innovations are often introduced in an accretive way in the NHS; that is, on top of existing working practices and infrastructure, some of which these new innovations may even be designed to replace. As a result innovations often simply add cost, with little or no gain in value.

For these reasons there remains a large unexploited opportunity to *combine* different technologies, testing these together with innovations in how services are delivered in real world settings. This is particularly the case with digital innovations that empower patients to manage their own health and care, as well as those that exploit health data in new ways. These new generation technologies have the power to transform the care of long term conditions like hypertension, diabetes or mental health.

By evaluating combinatorial innovations carefully, we can identify those which produce significant health improvement at the same or less cost than existing practice. It is these high value innovations that the test bed programme seeks to promote.

Core tenets of the vision for test beds

- To enhance the nation's health and wellbeing, preventing disease and poor health in the first case and restoring people to autonomous and fulfilling lives as quickly as possible when they do fall ill
- To improve health and care services, resulting in better patient outcomes and experience of care, which can be evidenced
- To improve integration between primary, secondary and social care
- To identify ways of reducing health and social care costs at scale
- To increase the NHS' learning capability, accelerating its ability to conduct pragmatic yet robust trials initially in limited sites, and spreading those with the greatest benefits more widely
- To test and incubate innovations that could be spread more widely throughout the NHS, pioneering new models of reimbursement on the basis of proven effectiveness of reducing disease costs.
- To lay the foundations for boosting economic growth, aiming to lead the world in the development and implementation of digital care systems, in innovative care pathways and in precision medicine

3. What is combinatorial innovation?

The concept of combinatorial innovation has emerged to describe different innovations working together rather than, for example, a single blockbuster drug or technology. But the concept also goes beyond multiple different technologies. Instead, it describes combinations of types of innovations; for example technology, workforce, new approaches to patient engagement, digital channels for service delivery and the like, all of which may be needed to achieve real improvements in value.

An example of combinatorial innovation might be a new service delivery model for people with dementia that combines wearable devices linked into mobile or other digital technology; supported and technology-enabled housing; and a lower-cost nurse or allied health professional workforce model. Working together with an NHS site, innovators would be able to test whether their innovations – paired with complementary changes on the NHS side – achieve better outcomes at the same or lower cost in a real world setting.

4. What kind of innovations are we seeking to test?

We are seeking to test innovations that offer the prospect of improving health and healthcare outcomes at the same or lower overall cost; in other words, high value innovations.

We do not wish to over-define the potential range of innovations at this stage, although clearly those that offer the highest potential to address the big challenges in health and care will stand the best chance of inclusion in the national programme. Some of these priorities are listed below:

- Preventing illness and improving health and wellbeing, including health behaviour change approaches as well as approaches to whole population health management
- Supporting people to effectively manage multiple long term conditions such as hypertension, diabetes and mental illness
- Helping people to live better for longer and with greater independence in old age
- Improving diagnostic services
- Optimising the use of medication

This list is not exhaustive and we would welcome proposals that address other, similarly important challenges.

A test bed focused on the Internet of Things

In March 2015, the Chancellor announced that the government would help to fund large-scale demonstrations of 'Internet of Things' (IoT) technology in health and social care. At least one of the test bed sites identified through this programme will focus specifically on implementing these interconnected, digital innovations, with co-funding available for UK-based innovators.

The 'Internet of Things' describes when everyday objects are connected to a network in order to share data and work together. This approach has huge potential in health and social care. For example, IoT technology could enable GPs, hospitals and healthcare providers to gather rich and real-time data about a person's health from a combination of consumer and medical wearable technology, smartphones, and home environmental sensors.

To accelerate the testing of these interconnected innovations, one test bed will be devoted to an IoT approach. Innovators looking to participate in an IoT focused test bed must have a UK base and be working in a consortium with other digital innovators. All proposals should consider how they will satisfy requirements for cyber security, privacy and interoperability through open standards. Any solutions need to be safe, secure and compatible with future innovation.

5. Who can express interest in testing their innovations?

We welcome expressions of interest from innovators from the UK and globally, working either alone or in a consortium. It is our intention to use the test bed programme to entrench England's advantages as a destination of choice for health sector innovators seeking to demonstrate the value of new ways of delivering health and care services.

Innovators may come from any sector. Medical technology, biotechnology and life sciences businesses are important sources of innovations. However, we also welcome interest from voluntary and community sector organisations—which

may be particularly strong at engaging or recruiting people and patients—and from academic and NHS bodies themselves. We would be particularly interested in expressions of interest from NHS employees, again working alone or in partnership, who want to demonstrate their own innovations in real world clinical settings, but which may currently lack the infrastructure or capacity to do so.

The test bed programme is about deploying technologies that are ready to use, in NHS settings—not about inventing new ones. Whilst we encourage proposals that include new technologies, these must have satisfied all regulatory and safety requirements prior to expressing interest in the test bed programme.

6. What are test beds?

Test bed sites are likely to be local groups of commissioners and providers, including NHS providers from all sectors: primary, community, acute and mental health. They will also have strong links to social care and to the local voluntary sector. Our AHSN partners will identify and put forward these sites, making a case for why they offer the right conditions to test innovations. We will also explore larger potential test bed sites that may not be contiguous with AHSNs but may nevertheless offer advantages—for example, town or city conurbations, or rural areas with specific needs.

These test beds will need to satisfy five minimum criteria.

- a. Test beds must have effective leadership underpinned by strong relationships between all participating bodies (NHS primary and secondary health services and social care), with emerging service integration.
- b. Test beds must have the capability to share data across all parties (including any necessary information governance agreements), and use the NHS number as unique identifier.
- c. Test beds should serve a population of sufficient scale, which will normally be 1m or more.
- d. Test bed sites will need to demonstrate commitment to conducting real world demonstrations of combinatorial innovations in live clinical settings, including clinical leadership and buy-in.
- e. Finally, test beds will need to be committed to moving at pace, with governance that promotes swift decision-making and problem solving.

We plan to select about five test beds. These will be chosen from the most compelling innovations, offering the greatest potential value for patients and taxpayers. An important indicator of a strong proposition will be a firm commitment from NHS delivery partners to implement these innovations seriously and to test them rigorously.

7. How is the test bed programme distinct?

Many programmes support academic research and early-stage innovation, notably the National Institute for Health Research (NIHR) and other research funding bodies, but also clinical trials and other processes conducted in the independent sector. There are also initiatives to help scale innovations, such as

the Innovation Accelerator, and to help small businesses to prototype their ideas including the Small Businesses Research Initiatives scheme. Innovate UK also provides funding through a number of channels.

However, there are comparatively few programmes to support the generation of real world evidence in 'live' clinical settings. The test bed programme will fill this gap, focussing on conducting pragmatic, reasonably rapid (i.e. 2-3 years) yet robust trials of packages of innovations that offer the opportunity to fundamentally improve outcomes and efficiency of clinical services.

Test beds will also have strong digital foundations. The programme will seek to leverage the potential of, for instance, mobile health technologies, wearable devices and the like – as well as the richness of data they generate – to identify approaches to improving care for people with long term conditions, the frail elderly and other user groups that could be implemented at lower overall cost than existing alternatives.

There are several benefits for the NHS from the test bed programme. Most important is the potential for identifying new and better ways of delivering clinical services, and to do so at the same or lower cost. The programme also offers sites the opportunity to show leadership, building strong and mutually beneficial relationships with industry with and through AHSNs.

For innovators the programme offers an unparalleled opportunity to demonstrate the value of their innovations, working together with the NHS, in real world settings. The ability to work closely with providers serving relatively large-scale populations will enable the generation of robust, quantifiable evidence about how well innovations improve care whilst reducing costs. This evidence is critical for persuading commissioners and other potential buyers to commit to mainstream funding.

The on-going involvement of NHS England, the AHSNs our other government partners also offers advantages to innovators. We will assist innovators to navigate the NHS, catalysing partnerships with local test beds. Having designated an initial set of test bed partnerships we will work with them to drive pace and solve problems with a national dimension. There will also be a limited amount of funding available to ensure NHS bodies have the appropriate capacity to participate in the programme (see section 9 for more detail about our role). Perhaps most importantly, together with our AHSN partners we will identify mechanisms to encourage the spread of the highest value innovations more widely throughout the NHS, using test-beds as incubators and sites for developing the evidence-based to advocate for wider diffusion.

8. The process for identifying test beds

Today is the beginning of a four-stage process for selecting test beds that we aim to conclude by December 2015.



a) A global call to innovators: March – May 2015

With the publication of this prospectus, we are initiating a global call to innovators to put forward their proposals for testing innovations in real world NHS settings. At this stage, we are inviting interested organisations or consortia to provide an initial description of what they propose, how they propose to partner with test bed sites once they are selected, and what value they expect to achieve. More details of what we ask from innovators at this stage are provided in the Appendix.

In parallel, our AHSN partners will be working with their local commissioners, providers and partners to identify those who have the right conditions to test innovations at scale through pragmatic yet robustly evaluated projects. In working with their local health economies, AHSNs will also help to better define the key problems or themes that innovations should address.

We will be holding an event for interested innovators in May, before the window for expressing interest closes, to help clarify the aims of the programme and answer questions. This may be attended in person in London. We will also enable participants to attend virtually.

b) Catalyse partnerships: Summer 2015

The AHSNs will review the expressions of interest we receive from international innovators. Depending on the level of interest, we may develop a long-list of the best proposals to develop in the following phases.

Over the summer the AHSNs, with the support of national bodies, will convene a number of events to bring together innovators with potential test beds (e.g. specific commissioners and providers interested in partnering to test innovations). These ‘matchmaking’ events will provide the opportunity for the NHS to provide more detail on the problems or priorities they want help addressing. These events will also offer the opportunity for innovators to consider how their innovations could be combined with innovations on the NHS side to have the greatest impact.

c) Partnerships finalised: Autumn 2015

Following these events, potential test bed areas and innovators will have a period to solidify their joint proposals and finalise their partnerships. Where it is helpful, AHSNs may have a role in brokering these partnerships.

d) Designation of test beds: by December 2015

In the final phase, the sponsoring national bodies expect to designate a small (~5) number of test bed partnerships. These will be selected based on the potential value of the innovations and the commitments made by both innovators and NHS partners to test their package of innovations. Selected partnerships will benefit from national sponsorship and problem solving. We will also consider providing financial support to participating NHS bodies to cover the costs of implementation (see below for further detail on the role of national bodies).

9. The role of national bodies

Test bed partnerships will enjoy on-going support from the AHSNs, NHS England, the Department of Health and the Government Office for Science intended to ensure these partnerships have the best chance for success.

This national support is likely to take three forms. First, the AHSNs, with the support of national bodies, will convene a series of discussions aimed at helping to shape proposals from innovators, but also to help identify test bed sites with the conditions in place described in section 6. As the process described above unfolds, we will also facilitate the forming of partnerships between innovators and test bed sites.

Second, we will provide hands-on support in overcoming barriers that have a national dimension; for example, helping to tackle information governance or data sharing barriers. Each test-bed will also benefit from a direct channel to, and advice from, a senior (individual) national sponsor.

Third, NHS England will consider making available a limited amount of investment for each test bed to cover the start-up costs of NHS bodies supporting the implementation of test bed innovations. However, we expect innovators to invest as well; for example, to cover the costs of the new technologies themselves. It is important that the value proposition of innovations put forward for testing is strong enough to stand on its own merits rather than be continuously supported by government subsidy. Funding will be agreed at a later stage in the process, on a case-by-case basis.

Fourthly, NHS England, together with the AHSNs, will develop a standard national method for evaluating test beds. Crucial to this evaluation will be metrics for assessing of the cost-benefit of the innovations. The costs of this national evaluation will be borne by the national bodies.

Finally, AHSNs and the national bodies will work together to develop an approach for diffusing innovations the highest value innovations more widely in the NHS. We see the test bed programme as an incubator of innovations with the capacity to transform services for patients.

10. How to express interest

Interested innovators should register their interest in participating in the test bed programme [HERE](#) by 12 noon, Friday 29 May, 2015.

Appendix: Expression of interest questions

Q1: What are you proposing and why? (800 words max.)

- What innovation(s) do you propose to test?
- How does this innovation address important problems in health and care service delivery?
- What benefits are expected and why?
- What complementary changes would you look to help NHS sites implement alongside your innovation to release maximum benefits (e.g. workforce, IT, other infrastructure etc.)?
- Why do you expect this innovation to deliver greater value, i.e. better outcomes for the same or lower costs?
- How does your innovation exploit the potential of health data and digital technologies to empower people and improve their care?
- Is your innovation ready to be implemented immediately? Has it satisfied all safety and regulatory requirements?

Q2: How would you work with a test bed site? (500 words max.)

- What arrangements would you put in place to facilitate collaboration but also rapid decision-making?
- What conditions would a test bed site need to satisfy in order for the programme to be successful?
- What do national bodies need to contribute to the partnership to make it a success?

Q3: What is your proposed approach? (500 words max.)

- How would you implement your innovation?
- Over what length of time do you propose to conduct the project?
- How does your approach build in interoperable digital foundations from the start?

Q4: How would success be evaluated? (500 words max.)

- How will your approach ensure you effectively evaluate how your innovation yields rigorously quantifiable improvements in value, i.e. better care and experience at the same or lower costs than alternatives?
- Are you clear what information you need to monitor to complete effective evaluation, including demonstrating outcome and cost benefits?
- What metrics would define success?

Q5: What investment would you contribute? (500 words max.)

- What costs of implementation are you prepared to cover?