



GCRF Demonstrate Impact

This report highlights case studies in which people in developing countries have benefitted from innovative solutions following support from UK Research and Innovation.



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A world of opportunity

Emerging markets around the world account for well over half¹ of the world's population and, by 2025, consumption of £23 trillion annually².

For the right companies with appropriate, affordable and scalable products or services, the chance to build a business while delivering social impact is both motivating and exciting.

All it takes is creativity, tenacity, and, we think, a helping hand.

This guide will help.

It is for entrepreneurs, start-ups, researchers and anyone else with strong ideas for commercial innovations that can help to solve pressing challenges in developing countries.

By describing the process of successfully implementing commercial ideas in developing countries through case studies, we want to inspire you to apply for funding from the Global Challenges Research Fund³ (GCRF) Demonstrate Impact competition.

¹ <https://www.forbes.com/sites/advisor/2018/08/01/should-long-term-investors-own-more-emerging-market-equities/#ed007dc54ee5> <https://www.forbes.com/sites/advisor/2018/08/01/should-long-term-investors-own-more-emerging-market-equities/#ed007dc54ee5>

² https://www.mckinsey.com/~media/mckinsey/business%20functions/strategy%20and%20corporate%20finance/our%20insights/winning%20the%2030%20trillion%20decathlon%20going%20for%20gold%20in%20emerging%20markets/emc_decathlon.ashx

³ The Global Challenges Research Fund is a £1.5 bn fund to support cutting-edge research addressing problems in developing countries. It is part of the UK's Official Development Assistance (ODA) commitment. The Demonstrate Impact competition will distribute money from the GCRF.

THE GCRF DEMONSTRATE IMPACT COMPETITION

Governed by Official Development Assistance (ODA) rules, this competition awards funds for innovations that have the potential to transform lives in developing countries. They must be aligned to one of the following ten UN Sustainable Development Goals:



By awarding funding, we want to support innovative, affordable products and services that:

-  Benefit poor and disadvantaged people in developing countries
-  Help to create or expand markets
-  Boost regional or national infrastructures and value chains
-  Create jobs
-  Promote gender equality
-  Are socially inclusive
-  Adequately weigh the risk of unintended negative consequence

Addressing these objectives holds unique risks and challenges that are difficult to overcome, which is the justification for making public funds available.

However, this does not mean that your idea cannot lead to commercial success. Indeed, the public investment aims to have a multiplier effect by supporting economically sustainable ideas that can deliver long-term transformational impact.

COMPETITION DETAIL

The GCRF Demonstrate Impact competition is open to UK businesses as the lead applicant. Their technical partners can be from any country. The proposed innovation must already be at a relatively high level of technological readiness.

The competition has two stages.

1. The first is for a feasibility study to assess the innovation's market viability in a developing country. We expect to fund 30 successful applicants, awarding each a grant of up to £60,000.
2. The second stage is for prototyping the innovation in the market, and will be open only to businesses that were successful in the first stage. We anticipate that 15 will go through, this time with much larger awards of up to £500,000 each.

The GCRF Demonstrate Impact competition is designed to de-risk the process and to increase the successful adoption of innovations. We want to encourage businesses to thoroughly understand the cultures, attitudes and local context in the developing country before implementing their ideas. This includes using human-centred design methods to assess user behaviours, confirm market demand, identify appropriate partners, learn and refine the innovation accordingly.

One round of the competition has already happened. It closed in November 2019. The second will launch on 2 March 2020 and close on 6 May 2020.

WHY USE HUMAN-CENTRED DESIGN?

Whereas a technical feasibility study answers whether you can implement your idea, a human-centred design (HCD) study asks whether you should.

An HCD approach provides rich, qualitative insights and ensures that your innovation considers the myriad social and cultural norms, habits and behaviours that might stop your solution from being adopted. The later you discover these, the harder and more expensive it is to rectify the mismatch.

HCD also allows you to fine-tune your ideas through iterative prototyping. For example, during the development of Harambee, a South African youth employment accelerator, one of their key – and completely unexpected – insights into how well applicants would do at interview hinged on whether or not they had eaten beforehand. It turns out that supplying a piece of fruit or peanut butter sandwich in advance of a job interview increased success rates by 30%.

HCD is an established methodology championed by many organisations, including the Design Council. Several organisations have developed helpful HCD tools, including IDEO's Design Kit⁴ for HCD and Stanford Design School's Design Thinking Bootleg⁵ and the SPRING curriculum⁶.

A useful conceptual model is the Design Council's Double Diamond, which envisages two phases, each with two distinct stages.

Applying the Double Diamond model is likely to be highly iterative as you continue learning, sometimes requiring you to revisit your design challenges or even to start the process from scratch. This can be frustrating. However, taking the care and time to really understand the issues, conditions on the ground, the customs, norms, and day-to-day concerns of your users leads to much more robust, workable, and sustainable solutions.

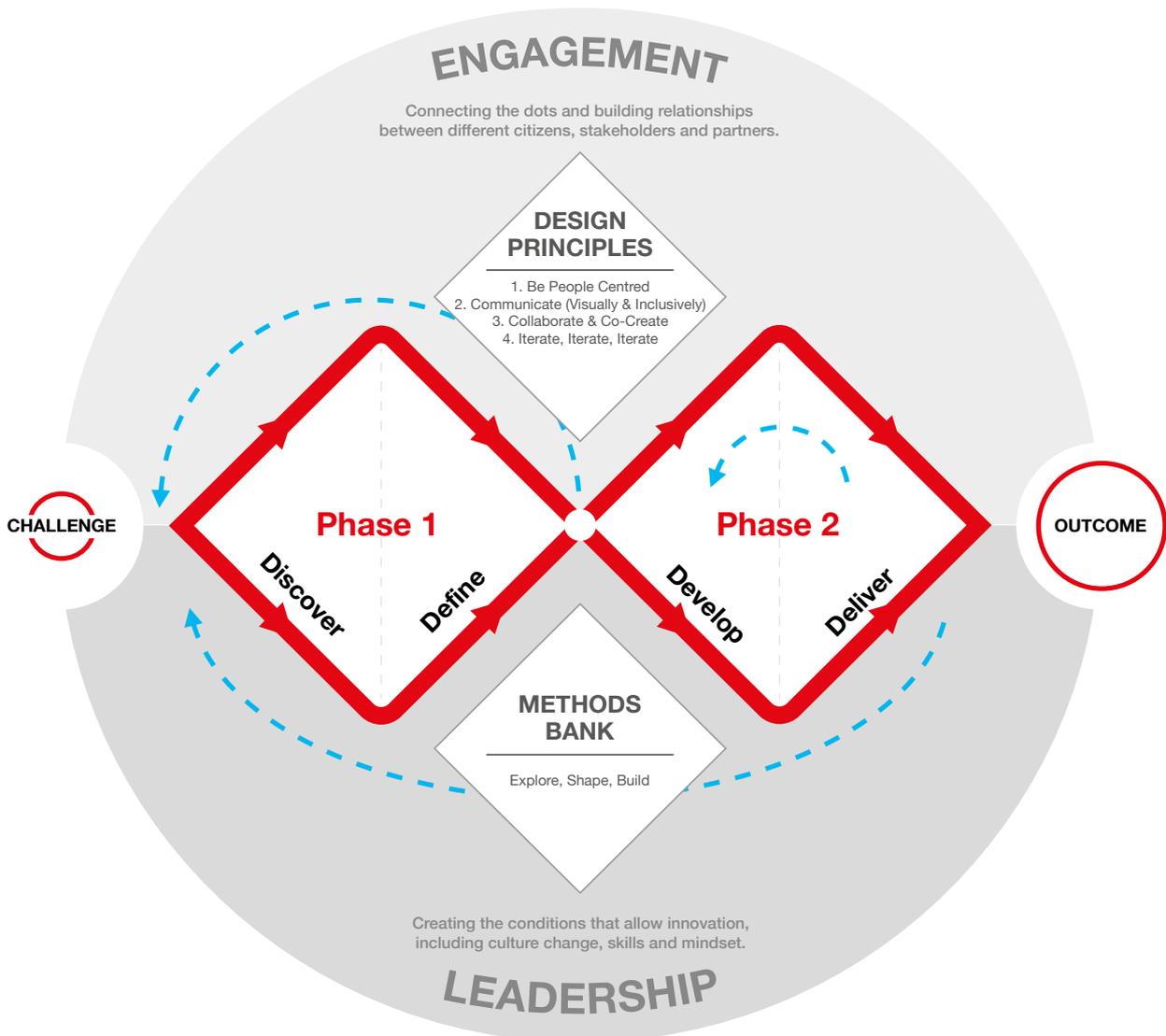


⁴ <https://www.designkit.org>

⁵ <https://dschool.stanford.edu/resources/design-thinking-bootleg>

⁶ <https://www.springcurriculum.com/>

The two phases of the Demonstrate Impact competition align with this model of design thinking and enable innovators to go through this process and refine their solutions to meet real user needs and market demand.



Source: Design Council Double Diamond Model

Phase 1

This starts with a process of **discovery**. This is the time to put your assumptions aside and dive deep into understanding the users, customers and stakeholders that are facing the problem you are trying to solve. The next stage then allows you to use these insights gained to **define** the problem as a design challenge in a relevant way that taps into the experience of users.

Phase 2

This is the time to address your key design challenge and **develop** a minimum viable product to test with users and get real world feedback. After further iteration and refining, the next step is to **deliver** a prototype solution in the market.

The following section expands on the typical phases during a human-centred design process to develop innovative products and services, illustrated with case studies.

With the huge variety of possible solutions out there, it cannot hope to reflect everyone's experience. After all, a new drug treatment has little in common with a new website, for example.

Nonetheless, the different approaches to entrepreneurial success share enough in common to offer most innovators valuable insights to future success.



Discover

Recognising a problem that your innovation might be able to solve, the discovery phase allows you to delve deep into how people experience that problem.

While you might be comfortable with the technical side of your innovation, you might be less familiar with the 'people' side of it. There are several barriers standing in your way.

The first is your assumptions about the need. Even if you have thoroughly assimilated the country data and found a source of trustworthy market intelligence, your assumptions and lack of day-to-day experience on the ground might badly skew your thinking. Assume nothing.

Second, even if you have spent time in your target country previously and think you know the realities of life there, you may not understand all the complex nuances about your users. It is critical to talk to the people affected by the problem and observe how they behave and what their problem-specific experiences are. You must spend time embedded with users and other stakeholders in their homes or places of work to live and breathe the problem. It will yield vital learnings.

The trick lies in how you think of these barriers. Treated as fascinating design puzzles that need fresh ideas or a new perspective, they become merely an extension to the setbacks you might encounter trying to get the technology right. Indeed, combining the social with the technological into a systemic whole is likely to pay off in many unexpected ways. The HCD literature is full of stories of where technological interventions were less than optimal because they failed to take account of user insights.

For example, Tim Brown and Jocelyn Wyatt of IDEO, a global innovation and design firm, tell the story of missed opportunities during the development of a community water treatment centre in Hyderabad in India. The project recognised the dangers to health that consuming water from a borehole well posed to the local population, and they wanted to improve the situation.

However, by failing properly to understand the needs of those who might otherwise have benefitted, the project had less of an impact than it might have done. As it turned out, the plastic containers people had to use to carry away the water were too heavy for many of the users – women. The centre's opening hours meant that it closed too soon for working men to fetch the water. Finally, the minimum quantity of water was more than many of the locals needed, making the facility prohibitively expensive when every rupee counted.

As Brown and Wyatt say, "Social challenges require systemic solutions that are grounded in the client's or customer's needs. This is where many approaches founder, but it is where design thinking excels."



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CASE
STUDY

1



b.e. Design

Dr Bhavin Engineer, Director of **b.e. Design**, was involved in the Nano Membrane Toilet project that secured a large award from the Bill & Melinda Gates Foundation. This project addressed the hazards of poor sanitation, water stress, and associated health risks in regions with few toilets and no network sewerage.

While the technical innovation was in treating human waste on-site without external energy or water, all the end users were concerned about was the bits that they interacted with – the flush mechanism and, especially, the cleaning. Luckily, deep-dive ethnographic research in the target community discovered the issues early, allowing the development team to adjust the design based on user feedback.

When starting out, Bhavin Engineer says that it pays to identify and map out all your stakeholders – manufacturers, investors, resellers, logistics, delivery partners, service and maintenance, system integrators, local authorities, etc. early. He recommends searching the internet and social media, and consulting NGOs, representative bodies, family and friends for contacts to find appropriate partners for successful HCD.

“In this day and age,” he says, “there is no excuse not to engage early with end users and other stakeholders.” He warns, though, that HCD is a marathon, not a sprint, requiring many iterations and the humility to fail fast, fail often, and learn.



“There is no excuse not to engage early with end users and other stakeholders.”

<https://www.bedesign.consulting>





Define

During this stage you start to synthesize all the feedback gathered through on the ground research, user observations, surveys, and focus group conversations into actionable insights.



There's no doubt that making sense of the abundance of relevant and sometimes conflicting feedback signals is far from straightforward. Rarely linear and logical, it takes continuous iteration to unearth the telling nuggets to come up with a brief that, in combination with your technical knowledge, could lead to a feasible proposition.

A recognised way through is to define design challenges, often by asking 'how might we' questions that frame a problem as an opportunity. For example, 'How might we create a sense of safety in public toilets in India?' This focuses creativity and innovation around the user experience. It is important to generate as many such questions or design challenges as possible to encourage 'divergent thinking'.

Another factor likely to positively influence the success of this phase is to have a diverse development team. Mono-cultural inputs from people who are all of the same age, gender, religion, sexuality, race and personality types stifle successful innovation for the simple reason that the target stakeholders and end-users will be a richly varied group.

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“A well-constructed brief allows for serendipity, unpredictability, and the capricious whims of fate...”

That said, since your idea is likely to require interdisciplinary inputs, it helps if your team is appropriately collaborative. If possible, you want it to include so-called 'T-shaped' people. These are people with a strong central expertise or area of knowledge but with the empathy and capacity to look beyond their own discipline for correlations, opportunities, and convergent interests. These people have, according to Tim Brown and Jocelyn Wyatt of IDEO, “Openness, curiosity, optimism, a tendency toward learning through doing, and experimentation.”

Of course, at a certain stage you will need to prioritise and decide which design challenge you will focus on. Through a process of judicious distillation and by testing competing ideas against one another, you should come up with a refined design brief.

Tim Brown and Jocelyn Wyatt describe the design brief as “a set of mental constraints that gives the project team a framework from which to begin, benchmarks by which they can measure progress, and a set of objectives to be realized – such as price point, available technology, and market segment.”

The lessons of HCD dictate that briefs should not be prescriptive but focus on meeting the need, which may only be fully understood with further study. As Brown and Wyatt say, “A well-constructed brief allows for serendipity, unpredictability, and the capricious whims of fate – the creative realm from which breakthrough ideas emerge.”

CASE
STUDY

2

aparito

APARITO

Dr Elin Haf Davies is the Founder of **Aparito**, an innovative patient-centric medical technology company that helps drug companies to develop treatments for patients with rare diseases, of which there are over 6,000 affecting 350m people world-wide. The most vulnerable are in remote communities in developing countries with limited healthcare systems and poor connecting infrastructure.

The Aparito solution captures data from ‘diseases in motion’ through wearable sensors and video connected via smart phones to their Atom5 digital platform. This helps with clinical trials, providing a rich real-time dataset to support marketing authorisation and healthcare utility to support market access.

On the back of 20 years of looking after children undergoing clinical assessments and seeing how stressful it was for patients and their families, Davies knew that there must be a better, more efficient way to conduct the process, especially as digital technology was revolutionising every other sector.

Rowing the Atlantic gave her the belief that she could be the agent of change. After gaining her doctorate, she started Aparito and, with money from the Newton Fund, determined to be the first to investigate the genetic profile of epilepsy sufferers in South Africa (where there is a disproportionately high incidence) as a way to develop her ideas for a technical solution.

One of her first moves was to engage with clinical geneticists at the Red Cross Hospital in Capetown, and hit it off straight away, agreeing a common goal that, she says, was ‘worth its weight in gold’. Indeed, all the subsequent learnings from qualitative interviews with carers proved extremely useful, yielding lessons that Aparito still uses today.

Engaging with stakeholders and end-users with open, human-centred design approach unveiled many blind spots. As she says, “While we had an idea of what we wanted to find out, the realities for those children and families meant we encountered challenges and issues that we would not have experienced in another setting.”

For example, although they knew that smartphone ownership was fairly widespread in South Africa, which was partly why it was targeted, she had not appreciated that many of the devices are in fact home-made, meaning that Aparito’s software was not always compatible. Nor had she appreciated the fear surrounding the risk of mugging from wearing Aparito equipment outside of the home. Finally, there was a strong lesson about the useability, acceptability and feasibility of the equipment design: keep it simple.

Since then, Aparito has gone on to secure £1.4 m in investment and won twelve contracts across four continents. “Working in this space is incredibly rewarding,” she says. “I’m lucky to be in this community and to drive forward with positive impacts.”

<https://www.aparito.com>

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‘The most vulnerable are in remote communities in developing countries with limited healthcare systems and poor connecting infrastructure.’



Develop

This next phase is a process of generating, developing and, importantly, validating ideas from a brief by developing a minimum viable product (MVP). This is essentially a low-cost way to test your biggest assumptions by putting a basic model of your product or service into your customer's hands.

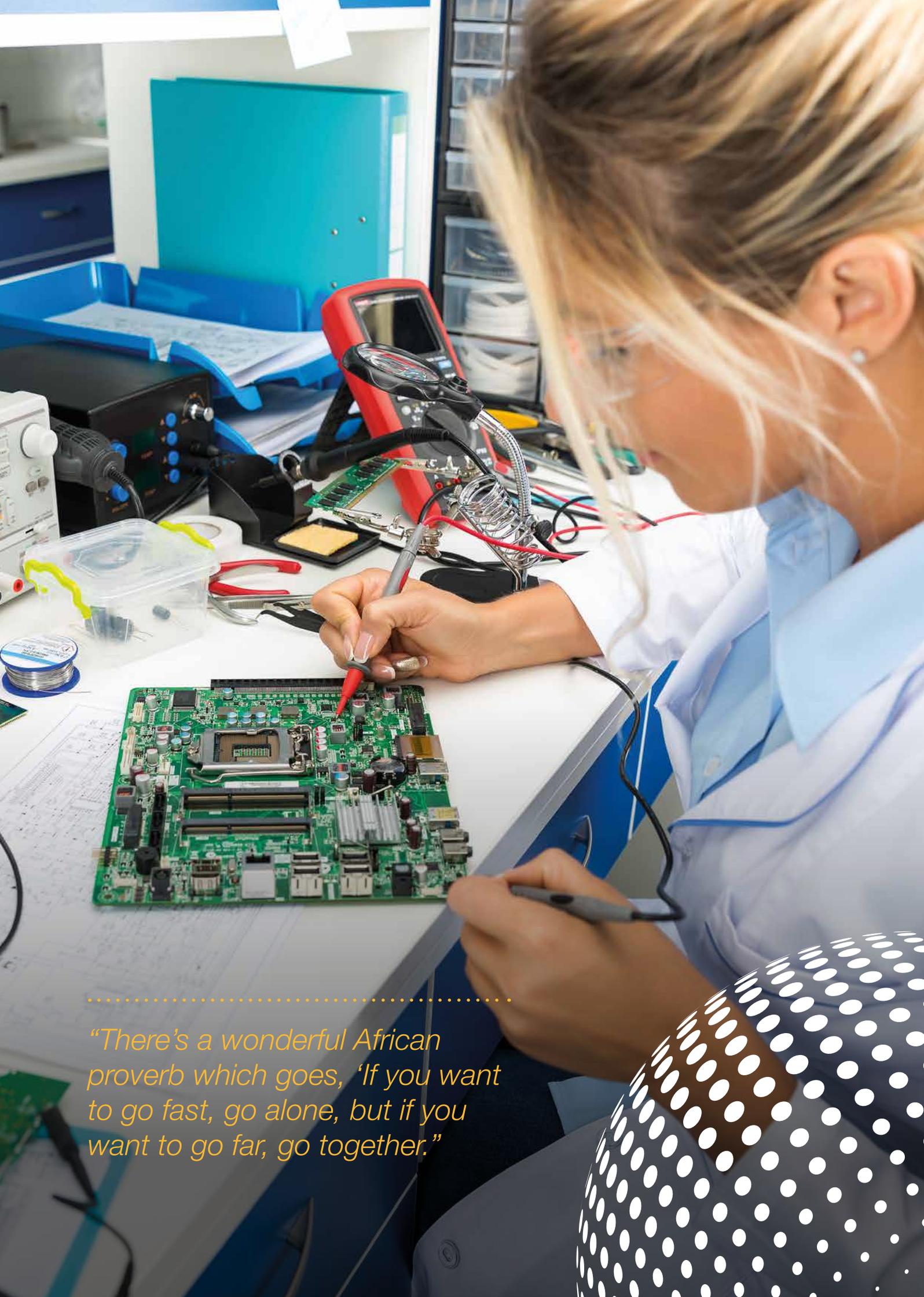
This is the time for an honest, practical reality check when you uncover real responses from users. It typically leads to further iterations, refinements or wholesale pivots.

It is important that you acknowledge the challenges. There are many barriers beyond culture and language. For example, you will need to understand the local legal and regulatory context, the ways to build trust and enthusiasm in communities, and how to avoid unintended consequences.

To develop a new, useful, and workable commercial idea almost by definition requires collaboration. It is the moment when you start to really lean on the extraordinary wealth of information held by the partners and end-user representatives you identified in the previous phase.

Sometimes at the request of your investors, there is a temptation to play your cards close to your chest so as not to reveal your concept to competitors. To do so though is to shut down opportunities for beneficial cross-fertilisation of ideas with people outside of your disciplinary silo. Especially for ideas targeting public-good social, economic and environmental development in low or middle-income countries, a wide and far-reaching network is your value-laden friend.

Elin Haf Davies, Founder of medtech company Aparito (see case study), is clear about the benefits of collaboration. Getting everybody's input and covering your own personal blind spots might be slow and laborious, but it's the only way to get on the right path.



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“There’s a wonderful African proverb which goes, ‘If you want to go fast, go alone, but if you want to go far, go together.’”

CASE
STUDY

3

FIGHT
BACK

Fight Back is a safety training company that delivers self-defence training in Nepal to counter the risk of sexual violence. They provide innovative programmes using physical, vocal and mental techniques to increase safety.

Initially they focused on providing small workshops for 20-30 women at a time, targeting organisations such as banks, hospitals, NGOs etc that had frontline workers. After participating in the SPRING accelerator, which trained the CEO in human-centred design methods, they set a design challenge to expand their market, asking, 'How might we provide safety education to reach adolescent girls in Nepal?'

Through user and stakeholder engagement, they ran focus groups with girls, parents and teachers. This led to an opportunity in one school to test a minimum viable product with a difference: to train 400 girls at once.

This experiment in 'en masse' training produced fascinating results. They learned that it was not only possible but had a much higher impact. The large group sessions created an electric atmosphere, a sense of collective empowerment and peer support amongst the girls who felt safe to speak about taboo subjects for the first time.

From a business model perspective, the MPV demonstrated the potential of a new market and a product that could be delivered at an affordable price point for parents and schools.

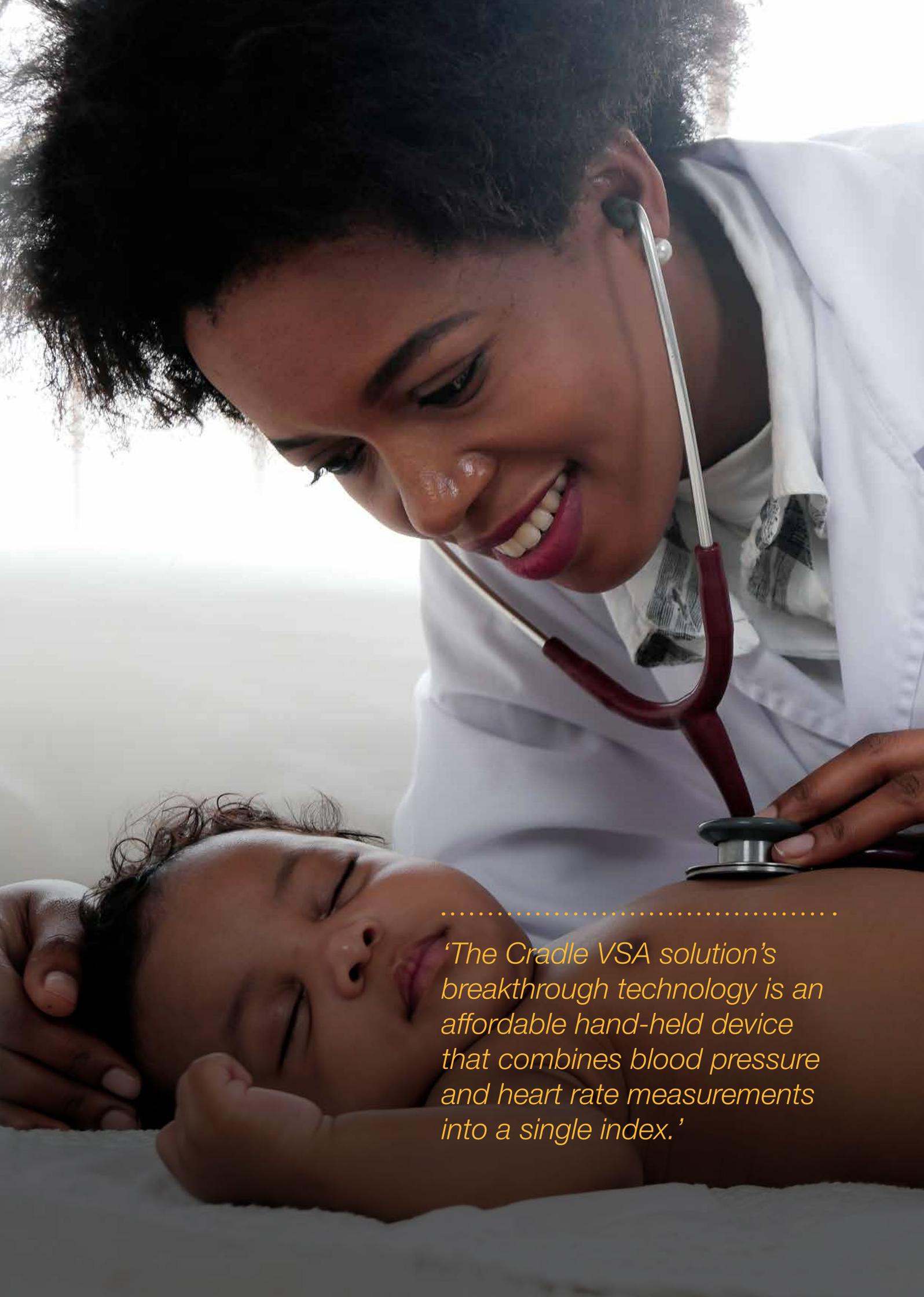
Since then, the team have continued to iterate in response to new design challenges. For example, the schools wanted something for the boys to do while the girls were in the training. Fight Back have developed a course for boys, as well as tailored workshops for parents and teachers, all designed to help reduce the risk of sexual violence.

Within 12 months of delivering the first MVP, revenue increased four-fold and the business raised £500,000 investment to scale up.

<https://fightbacknepal.com>







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*'The Cradle VSA solution's
breakthrough technology is an
affordable hand-held device
that combines blood pressure
and heart rate measurements
into a single index.'*

CASE
STUDY

4

CRADLE VITAL
SIGNS ALERT

The **Cradle Vital Signs Alert** contributes to meeting the UN's Sustainable Development Goal 3 to reduce the global maternal mortality ratio to less than 70 per 100,000 live births by 2030. The dangers of childbirth are very severe in the developing world. A recent World Health Organization report states that approximately 800 women die in pregnancy or childbirth every day, 99% of them in low and middle-income countries.

Simple and cost-effective interventions are available but delays in recognising problems and reacting in time are a barrier. Accurate measurement of vital signs is key to early recognition and timely intervention.

Developed by Professor Andrew Shennan of King's College London, the Cradle VSA solution's breakthrough technology is an affordable hand-held device that combines blood pressure and heart rate measurements into a single index. The results display includes a simple traffic light alert system giving the healthcare workers unambiguous information about the level of danger and what to do next. It won the Newton Prize in 2017.

By now a mature and well-known product, it has undergone almost continuous prototyping and iteration in field trials to validate its technical accuracy and to qualitatively evaluate its user-friendliness and appropriateness. Over the years this has involved a huge network of academic researchers, volunteers, trial participants across many countries as well as more formal collaborators bound together by good will.

These include manufacturer Microlife, who have been involved in developing and refining all iterations of the device; JHPIEGO, an international health organisation that helped put together the trial training packages, and Medical Aid films, which makes culturally sensitive and appropriate health education films.

Country-specific help in setting up trials involved close collaboration with a bewildering number of NGOs and research bodies including Maternity Worldwide, Pre-empt Trial, Safe Motherhood Programme at the University of California San Francisco, the Women's and Children's Health Research

Unit, KLE University in India, the Sanyu Africa Research Institute in Uganda, Hope Health Action in Haiti, and the Welbodi Partnership in Sierra Leone.

The first iteration of the device – Cradle 1 – involved field studies in Tanzania, Zambia and Zimbabwe funded by the Bill & Melinda Gates Foundation.

Cradle 2, with \$1m from the Bill & Melinda Gates Grand Challenges Explorations fund, evaluated the refined device in a South African high-risk institutional setting and in community settings in India, Pakistan, Mozambique, and Nigeria.

With the new version, Cradle 3, and a new educational package, the development team set out to determine whether widespread implementation would have a worthwhile impact, leading to pilot trials in Zimbabwe, Ethiopia and India, and main trials in ten countries including Uganda, Sierra Leone, Ethiopia and Haiti. It was funded by the Medical Research Council and the Department of Biotechnology India.

Finally, the Cradle 4 trials focussed on pre-eclampsia in Zambia and India, funded by the Medical Research Council. It started with a feasibility study to evaluate how acceptable planned early birth would be to women, their partners and healthcare workers, a human-centred design approach that sought to understand the local context and incorporate users' views.

All this work has yielded rich feedback that, with intelligent interpretation, has seen the product improve continuously to the point where it is being adopted in healthcare systems across the world. For example, the Cradle 1 field studies discovered that the device's batteries were prone to loss and theft. The team's response was to replace it with a micro-USB charger and sealed lithium battery, feasible because of the concurrent explosion in the use and availability of mobile phones, even in low-resource communities.

<http://cradletrial.com>

CASE
STUDY

5



AQUAFFIRM™

With a background in medical engineering, David Sarphie's journey with his **AquAffirm™** concept began when he matched advances in chemical sensor technology with the dangerous, stubborn, and difficult-to-manage problem of arsenic contamination in drinking water.

The problem affects people in both developing and developed countries around the globe. The World Health Organisation (WHO) estimates that 130 million people drink water containing arsenic (mainly naturally occurring but also as the result of pollution) above safe levels, with short-term exposure causing skin lesions, skin cancer and damage to the cognitive development of children, while long-term exposure leads to fatal internal cancers (e.g. bladder, lung and liver) among 10% of those affected.

With 70 million people at risk due to drinking water from 8.6 million tube wells, Bangladesh is especially vulnerable. Arsenic poisoning kills over 40,000 Bangladeshis every year.

The long-term solution is a clean mains water network. In the meantime, people still rely on well water for their daily lives.

There are several ongoing problems. The first is that there is no easy way to tell if water is contaminated. The second is that concentrations of arsenic in water from the same well vary over time.

AquAffirm answers the first problem with an innovative test strip that is relatively cheap, the manufacture of which is low-risk and scalable.

They are addressing the second problem through the connected test strip reader and back-end machine-learning geo-tagged database – currently under development - that will help governments to map and monitor wells, share the information with citizens, and predict when safety thresholds are breached. The data should eventually be able to guide where and how deeply to dig wells so that they remain safe.

David is clear about the value of prototyping, an important tool for HCD. "Getting our prototypes into the hands of the people who will be using them gives us important insights into how they will be used in practice. It led to improvements in our waterproofing system, for example."

He also acknowledges the value of early engagement with a Professor of Geology at Dhaka University and a research team based at a University in Chennai, India, and of the impetus that securing Newton Fund grants afforded him.

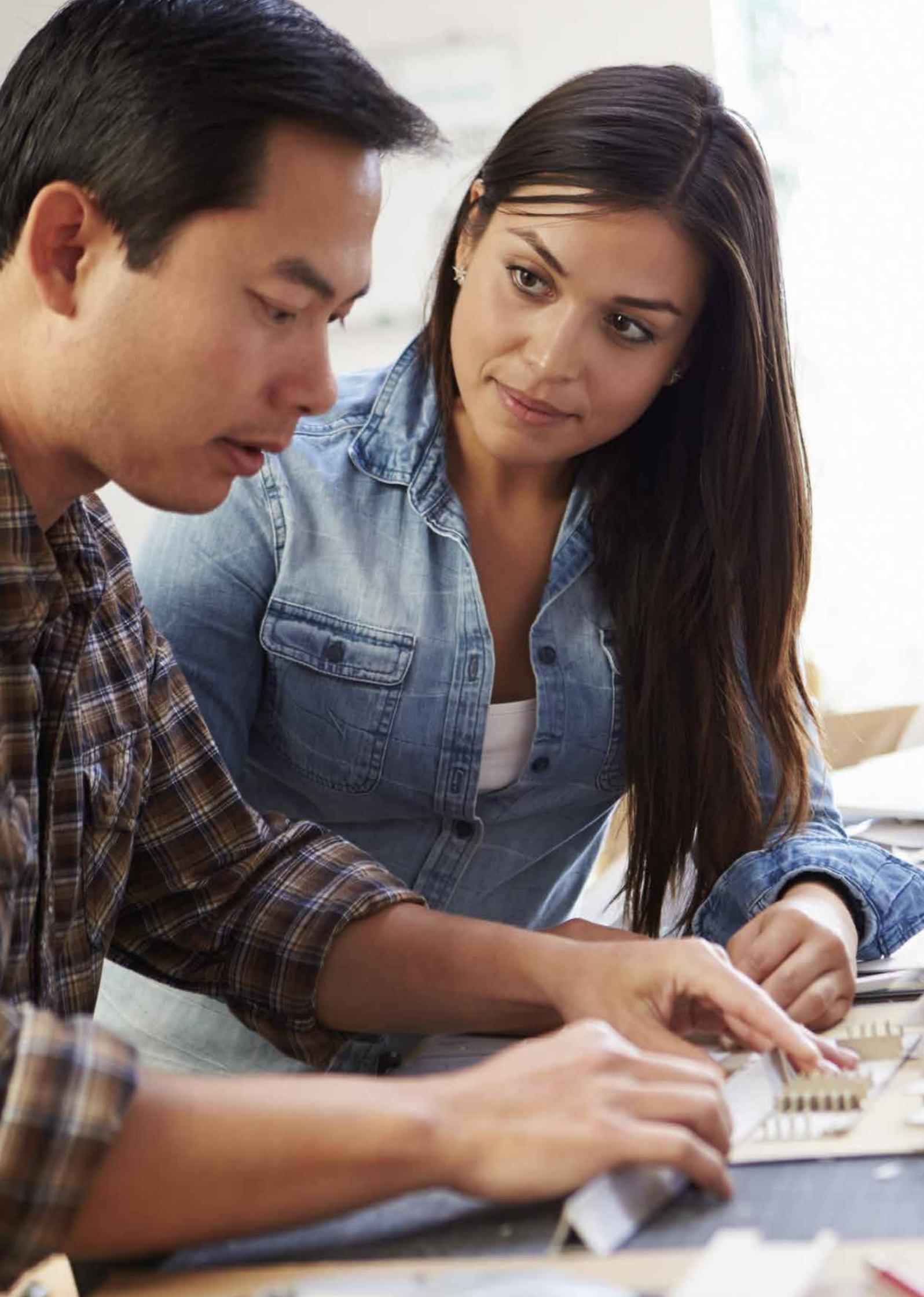
Although the need is urgent, the process of developing robust, trustworthy, sustainable products and systems is slow. David again: "I'm a marathon runner so I'm used to taking the long view on things. Certainly for us it has been a marathon not a sprint. But if we can do it, we should do it, and Innovate UK support has been instrumental in getting us this far."

<https://aquaffirm.com>

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‘With 70 million people at risk due to drinking water from 8.6 million tube wells, Bangladesh is especially vulnerable. Arsenic poisoning kills over 40,000 Bangladeshis every year.’





Deliver

During the delivery stage you switch your focus more closely to designing a prototype business model for exploiting all the learning incorporated into your idea from earlier phases.

Your product or service will not yet have received its final polish, and so you will probably not have entered into any long-term manufacturing, distributor, or reseller contracts. All that comes later, after you have validated your solution in the market and investigated the risks of unintended negative consequences. Only then can you and your investors agree that it is possible to scale up.

A financially viable business model is dependent on hitting the sweet spot between a need and real market demand. This is just as true of solutions that contribute to the UN Sustainable Development Goals as it is of purely commercial enterprises. However, implementing a product or service is, in a sense, an open-ended project. Your first commercial offering will not be your last. Your packaging and marketing information will continuously evolve. Your commercial agreements will change. Against a backdrop of changing human needs and fluctuating economic conditions, no innovation can ever be said to be complete.

The truth is, innovators can never rest on their laurels. What they can do, however, is gather enough positive reality-checked feedback to give them the confidence to take the plunge into commercialisation. Thus, the main output of this phase is when you prove the concept in the market with a prototype that you can sell.

While we are used to the term prototyping applying to the repeated testing of the physical product itself, it should apply equally to the surrounding ecosystem of enabling services - manufacturing, distribution, promotion, engagement, and so on - that the product needs to reach its market.

Tim Brown and Jocelyn Wyatt of IDEO emphasize how important the prototyping phase is for solutions destined for the developing world. After all, this is where the lack of infrastructure, retail chains, communication networks, literacy, and other essential pieces of the system often make the things that we take for granted 'unexpectedly difficult'.



CASE
STUDY

6

DIGIFARM
INNOVATION

About two-thirds of the developing world's three billion rural people live in about 475m small farm households. Many are poor and food insecure, with limited access to markets and services.

Like all farmers, their activities are helped if they have access to credit to bridge the gap between planting and harvest. However, this access is rarely granted because of climate risks, poor supply chains, and lack of knowledge about techniques for improving yields.

The **Digifarm innovation platform** aimed to address this issue in Kenya, where 7 million households depend on smallholding outputs to supplement their food. Now successfully deployed in Kenya with partners Safaricom and the Vodafone Group, it shows how prototyping made an initial good idea much stronger.

Safaricom had launched M-PESA, a USSD platform that allows you to send your phone credit to another person, enabling quick, trustworthy commercial transactions to pay bills or save money. It is astonishingly successful, having reached over 20.5 m users and helped to move 2% of rural Kenyan households out of absolute poverty.

Safaricom and Vodafone realized that the system could be transformative for smallholders, and conceived the idea of the Digifarm platform as a way of extending them credit. As a first step, they wanted to understand the specific needs of smallholders to define the product roadmap working with Dalberg Design's human-centred design team.

The results showed a nuanced picture. Smallholders needed credit, but faced other risks, not least the different experience of men and women, the lack of good seeds, herbicides, fertilizers and other inputs, unstable markets, and a lack of information. Without fixing these other risks, adoption of credit services was likely to be low.

The solution was a one-stop shop platform answering all smallholders' questions, bundling services flexibly according to user need.

Developing the bundles has been a process of continuous rapid prototyping in collaboration with Mercy Corps AFA to meet farmers' need for a wide range of services about crops, livestock, and horticulture requiring deep expertise. The platform is therefore collaborative, incorporating a shared revenue model with owner Safaricom providing the platform and partners iProcure as the agricultural goods supplier, FarmDrive the credit scorer, and Arifu providing interactive content. Later prototyping has moved to interactive SMS chat with timely tips and advice.

Digifarm's minimum viable product was launched in three Kenyan counties in 2017, registering 200,000 dairy farmers and with 60,000 active users, far surpassing expectations. By June 2018, after launching an input loan scheme, registrations grew to 700,000, 35% of them active, and attracted 200,000 loan applications. The third major development was to provide users with a digital marketplace, linking them to fair-price buyers, pushing registrations to over 1 million users.

<https://www.safaricom.co.ke/business/digifarm/what-is-digifarm/digifarm>

'The solution was a one-stop shop platform answering all smallholders' questions, bundling services flexibly according to user need.'





Learning from failure

The story of innovation is about learning from failure. In a sense, that is what the testing and iteration all the way along the development pathway is all about: try, fail, adjust, try again, and repeat the cycle until you get a breakthrough. It highlights the importance of having the passion, grit, tenacity, bravery and determination to see things through.

There are two modes here. Proceed to market without testing your blind spots and assumptions, and suffer an expensive, high-impact, and probably terminal failure. Or follow the mantra: fail often, fail fast.

The latter mode is the increasingly accepted, welcomed way forward. Despite our natural reluctance to admit failure, the dangers of not doing so, especially in fields such as medicine or emergency relief where the stakes are especially high, are much more important.

The topic was brilliantly dissected by Matthew Syed in his book 'Black Box Thinking'. The black box of the title refers to the recording devices on board commercial aircraft that are central to the aviation industry's collective commitment to learn from its mistakes.

He tells the story of James Dyson, the inventor of the bagless vacuum cleaner, which took much iteration to refine into a workable solution. Dyson was not the first, second or even the third to come up with the idea. "But he was the only one with the stamina to 'fail' his concept into a workable solution."

Rather than stigmatize failure, Syed concludes, as business leaders we should "praise each other for trying, for experimenting, for demonstrating resilience and resolve, for daring to learn through our own critical investigations, and for having the intellectual courage to see evidence for what it is rather than what we want it to be."

This attitude is at the heart of HCD. It allows you to learn in 'quick, cheap, and dirty' steps, as Tim Brown and Jocelyn Wyatt of IDEO put it, harnessing your limited resources for optimal efficiency.

Dr Bhavin Engineer of b.e. Design has seen the process both as an innovator and as a supplier to start-ups. Failing fast and often avoids expensive fixes later. "Many of us fear failure," he says. "Fair enough, but you need to get your head around the fact that your first effort isn't going to be the thing that works. Get comfortable with that. It's normal."

In fact, the reasons for failure are less to do with the technical solution or the cultural barriers and more often to do with factors that, while critical, are at the periphery of the main need.

For example, in the rush to go to market, developers may not have considered their product's long-term maintenance requirements deeply enough. This might not be to do with its longevity or the cost of replacement parts but the lack of a reliable local infrastructure for spare parts or maintenance personnel to get to where they are needed. For example, while there are about 375,000 hand pumps installed in Africa to supply drinking water, well over a third of them are abandoned due to poor maintenance or construction.

Being aware of the potential risk from day one allows you to tackle the problems early, giving you the time to design viable workarounds and avoid expensive mistakes.



‘... praise each other for trying, for experimenting, for demonstrating resilience and resolve, for daring to learn through our own critical investigations, and for having the intellectual courage to see evidence for what it is rather than what we want it to be.’



CASE
STUDY

7

PLAYPUMPS
INTERNATIONAL

The **PlayPumps International** product, first conceived back in 2005, is an object lesson in how innovation can fail. More importantly, it also shows how the experience should be recycled honestly and transparently to avoid repetition, turning a bad outcome into a positive lasting good.

The product appeared to answer a need – how to get drinking water from a well – with a technical solution – a pump. The innovation was in how it was to be powered: by children playing on specially designed equipment in the form of a merry-go-round.

The idea was that happy energetic children would expend their excess exuberance in hours of play on the merry-go-round, which, in turn, would supply all the local community's water needs for the day, only for the whole process to be repeated again the next day and every day thereafter. On the face of it an extremely attractive idea, it drew excited endorsements from Laura Bush, the Case Foundation, and Save the Children.

Unfortunately, it did not live up to expectations. The system was expensive. The pump was prone to breaking and was difficult to fix. More importantly, it could never have met all the communities' water needs. An article in the Guardian reported that the pump could theoretically provide the bare minimum water requirements for 200 people a day based on two hours' constant play every day, which is considerably less than was claimed.

Even worse, it is not clear that it met the real need, which was to supply clean water in water-stressed regions. PlayPumps could never do this because of its technical limitations.

In the end, dozens of PlayPumps sat idle in Mozambique where they were first implemented, only to have hand pumps reinstalled in their place.

This catalogue of failures points to the importance of thoroughly understanding the issues and need before settling on a design, let alone implementing a solution.

That is not to say that PlayPumps have not done good. While they might not meet all the water needs or address the real issue of water scarcity, they do serve a purpose, especially in school playgrounds, for example. Equally, the product has brought opportunities for play to children who might not otherwise have had them, and has sparked other play-related innovations.

On the other hand, the implementation fell far short of having the impact expected. The Case Foundation decided to openly admit the project's shortcomings, regroup, and take the effort forward in more effective ways by supporting the Water for People initiative.

Jean Case of the Case Foundation is philosophical about the project. She hopes that by being transparent about their failure, the whole philanthropic sector will end up a little wiser and closer to solutions that make a difference. As she says, "We've learned that progress comes through trial and error, and much of what we enjoy today is because somebody somewhere was willing to blaze new ground."

<http://www.playpumps.co.za>

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"We've learned that progress comes through trial and error, and much of what we enjoy today is because somebody somewhere was willing to blaze new ground."



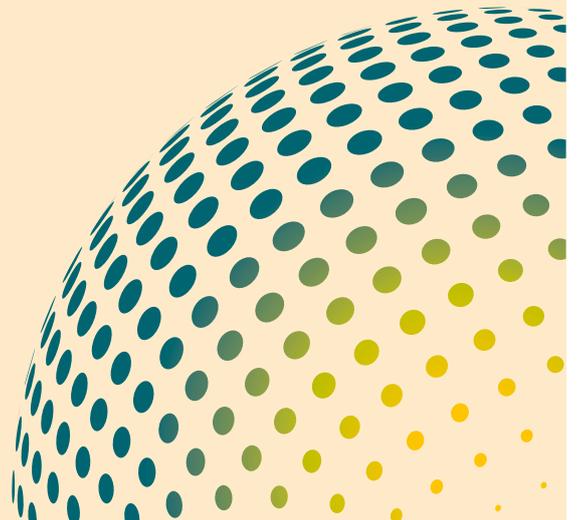


SUSTAINABLE DEVELOPMENT GOALS

The GCRF Demonstrate Impact Competition is part of the global effort to reach the UN's Sustainable Development Goals by 2030, deploying funds to tackle the challenges of social, economic and environmental inequality.

It is vital that this funding has the maximum impact. Pursuing a human-centred design approach to innovation increases the likelihood of adoption, resulting in feasible, viable, sustainable solutions.

If you have innovative ideas that could help address one of the sustainable development goals we encourage you to get in touch. Talk to the KTN team. Attend our events. Network. And above all, apply for funding.



Useful sources of quantitative data

It is of course important to have good factual intelligence about a region or country to guide your business development plans.

There are countless consultancies, interest groups, NGOs, trade bodies, and others trying to track actual conditions and market data and predict future trends. They are very useful.

There is also a group of public interest organisations that provide authoritative data for free. The ones that you will find useful in assessing the viability of your ideas are set out below.

The United Nations (UN)

<https://data.un.org/>

A website containing numerous databases or tables collectively known as 'datamarts' covering a wide range of statistical themes including:

- Agriculture
- Crime
- Communication
- Development assistance
- Education
- Energy
- Environment
- Finance
- Gender
- Health
- Labour market
- Manufacturing
- National accounts
- Population and migration
- Science and technology
- Tourism
- Transport
- Trade

It oversees some specialised databases, too:

- <https://unstats.un.org/unsd/mbs/app/DataSearchTable.aspx> Monthly Bulletin of Statistics Online
- <https://unstats.un.org/sdgs/indicators/database> SDG Indicators - i.e. statistics about the UN's Sustainable Development Goals
- <https://comtrade.un.org> UN Comtrade – data and statistics of official international trade statistics

The World Health Organisation

<https://www.who.int/data/gho/data/indicators>

The World Health Organisation maintains the Global Health Observatory, a database that includes rich variety of indicators including everything from alcoholism to zoonotic events.

International Labour Organisation (ILO)

<https://ilostat.ilo.org>

Chief source of data about issues to do with labour, covering many topics from child labour and unpaid work to the working poor and health and safety at work.

The World Bank

<https://data.worldbank.org>

World Bank data has huge amounts of free, up-to-date, global data about:

- Agriculture and rural development
- Aid effectiveness
- Climate change
- Economy and growth
- Education
- Energy and mining
- Environment
- External debt
- Financial sector
- Gender
- Health
- Infrastructure
- Poverty
- Private sector
- Public sector
- Science and Technology
- Social development
- Social protection and labour
- Trade
- Urban development

You can search it by country or groupings of countries.

OECD

<https://data.oecd.org>

OECD has comprehensive, up-to-date, global data about:

- Agriculture
- Development
- Economy
- Education
- Energy
- Environment
- Finance
- Government
- Health
- Innovation and technology
- Jobs
- Society

Again, you can search it by country, although the list is not comprehensive.

Our World in Data

<https://ourworldindata.org>

They publish public good data dispelling or confirming myths about the world.

Topics include:

- Health
- Demographic change
- Food and agriculture
- Education and knowledge
- Energy and environment
- Innovation and technological change
- Poverty and economic development
- Living conditions, community and wellbeing
- Human rights and democracy
- Violence and war

SDG Tracker

<https://sdg-tracker.org>

A website that contains statistics tracking progress against the UN's Sustainable Development Goals.

International Monetary Fund (IMF)

The IMF has some potentially useful forecasting reports called World Economic Outlook Reports (<https://www.imf.org/en/Publications/WEO>) and Regional Economic Reports (<https://www.imf.org/en/Publications/WEO>).





The Global Challenges Research Fund (GCRF) is a £1.5 billion fund announced by the UK Government in late 2015 to support cutting-edge research that addresses the challenges faced by developing countries.

<https://www.ukri.org/research/global-challenges-research-fund>



UK Research and Innovation works in partnership with universities, research organisations, businesses, charities, and government to create the best possible environment for research and innovation to flourish. We aim to maximise the contribution of each of our component parts, working individually and collectively. We work with our many partners to benefit everyone through knowledge, talent and ideas.

<https://www.ukri.org>



Innovate UK is part of UK Research and Innovation, a non-departmental public body funded by a grant-in-aid from the UK government. We drive productivity and economic growth by supporting businesses to develop and realise the potential of new ideas, including those from the UK's world-class research base.

<https://www.gov.uk/government/organisations/innovate-uk>

Knowledge Transfer Network

Knowledge Transfer Network is Innovate UK's network partner and also provides innovation networking for other funders in line with its mission to drive UK growth.

<https://ktn-uk.co.uk>

