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Tech Innovations
Changing the
World

RESPOND
Accelerating Responsible Leadership

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BMW Foundation Herbert Quandt

The BMW Foundation promotes responsible leadership and inspires leaders worldwide to work towards a peaceful, just and sustainable future. Through its activities, the Foundation aims to advance the Sustainable Development Goals of the United Nations 2030 Agenda. It encourages leaders to take their social and political responsibility to the next level.

To that end, the foundation inspires leaders, providing them with a platform for personal and professional development, and connects them, across nations, regions and sectors, through the global Responsible Leaders Network. In the work area of invest, the foundation aims for a systemic transformation towards a sustainable and impact-oriented economic and financial system.

RESPOND

RESPOND is a BMW Foundation accelerator program operated by UnternehmerTUM, to accelerate startups and empower leaders to take their business to the next level. The program supports entrepreneurs who are working towards a peaceful, just and sustainable future in line with the United Nations 2030 Agenda.

As part of the program, founder teams have access to workshops and mentoring at the intersection of business, society and the environment. In addition, our founders have the opportunity to connect with the global BMW Foundation Responsible Leaders Network and the extended network of both organizations. The Responsible Leaders Network currently comprises more than 1,800 leaders worldwide who work towards social and political change in and between societies.

Sifted

Sifted is the Financial Times-backed media platform for Europe's innovators and entrepreneurs. Our Intelligence Unit produces enjoyable, insightful reports on startup and investment trends, emerging tech hubs and the future of work.

Protect *Earth*
Empower *People*
Transform *Society*

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Contents

03	Foreword
04	What's Powering Tech for Good?
08	Europe's Tech for Good Ecosystem: a Heat Map
10	Mariya Gabriel Talks About the European Commission's Support for Innovation
11	Is Good Tech Good Business?
14	Tech for Good: Ever Growing Ambitions
16	Sir Ronald Cohen Discusses the Rise of Impact Investment
18	Protect
20	Plan A: Helping Companies Measure and Improve Their Environmental Impact
22	GOT BAG: Recovering and Repurposing Plastics from the Ocean
24	Hala Systems: Providing Advanced Warning Systems to Civilians in Warzones
26	Hawa Dawa: Highlighting the Real-Time Costs of Air Pollution
28	How Covid-19 Can Fuel a New Model of Aid
30	Empower
32	Amparo: Empowering Amputees with Advanced Prosthetics
34	Meersens: Reducing Everyday Exposure to Pollutants
36	Aurat Raaj: Empowering Young Girls with Menstrual Education
38	goodbag: Rewarding Environmentally Positive Choices with Eco-Friendly Benefits
40	Transform
42	Andrew McAfee Shares His Optimism for a Sustainable Future
44	Made of Air: Producing Materials That Capture Carbon from the Atmosphere
46	Kraftblock: Reclaiming Wasted Thermal Energy to Reduce Energy Demand
48	BOSAQ: Bringing Clean Drinking Water to Remote Areas
50	Brickify: Tackling Plastic Waste and Homelessness
52	Systemic Change for Stopping Ocean Plastics Pollution
54	Thomas Jarzombek Says Startups Need More Government Support
55	Tech for Good: Here to Stay?

Foreword



Rising concern about the environment, social cohesion and unlocked potential has seen an influx of startups driven by a mission to change this world to become a better place. These so-called Tech for Good startups, in other words technologies for a sustainable future, bridge industries and sectors but are united by a common goal of integrating sustainability and impact into the core of their businesses.

The innovation behind the explosion in Tech for Good startups is shaping international political efforts to establish coalitions that will drive positive change through initiatives such as the UN's Sustainable Development Goals (SDGs) and the European Commission's Green Deal. Beyond this, and perhaps in an even more tangible way, it is driving a systemic approach to the implementation of a new era driven by a balance between society, economy and ecology.

But, to achieve these goals and to transform our financial and economic system into a sustainable and inclusive one, a profound transformation is required and we need everyone to contribute — from established companies and startups, as well as investors and opinion leaders.

In this report, we have identified impact-tech entrepreneurship as one very important lever behind this transition of our economic systems. We believe that these Tech for Good startups have the necessary agility, creativity and innovation to tackle the common challenges, drive innovation and achieve systemic change, especially in these challenging times.

While the fallout from the Covid-19 pandemic has exposed the fragility of our economic systems, it has also revealed our interdependency and the importance of uniting in our efforts to transition towards a more sustainable system. What's more, it has highlighted the urgency to act now.

The report aims to showcase pioneering examples of the kind of sustainable business models and technologies, as well as responsible leadership, that can drive this change. Some of the startups we

highlight went through our RESPOND accelerator, operated by UnternehmerTUM, which exists to build a more just and sustainable future by inspiring, activating and empowering responsible tech entrepreneurs who are contributing to the UN's 2030 Sustainable Development Goals.

The programme aims to infuse a mindset of responsible leadership in the startup community and empower founders to build sustainable impact-driven businesses, as Tech for Good is not merely a question of creating cutting edge technology, but also of cultivating the right attitude and mindset. These Responsible Leaders go beyond their professional and personal duties to work towards social and political change — across and within societies, communities, cultures and countries — to showcase real solutions for a better world.

This report also looks to go beyond providing encouraging examples and make a contribution to the overall discussion around the flourishing Tech for Good space by raising questions about the assumptions and motivations driving change and establishing a sustainable and balanced financial system. We hope it makes for an informative and inspiring read.



Dr. Frank Niederländer
Member of the Board

Dr.-Ing. Heba Aguib
Chief Executive RESPOND

BMW Foundation
Herbert Quandt



What's Powering Tech for Good?

Much of the media narrative about the tech sector focuses on its flaws and foibles, from data privacy to economic monopoly. What's often missed is how many tech innovations are now deployed to tackle serious social and environmental challenges, from blockchain-based digital identity schemes for refugees to artificial intelligence designed to slash energy waste.

The 'Tech for Good' movement, stretching from startups to corporations, academic institutes and labs to investors, is a catch-all term covering a range of actors who are using tech, from quantum computing to the humble mobile phone, to make the world a better place. These are, in the main, not NGOs and pilots but businesses that make their profit inseparable from their positive net impact on the world. "We only invest in business models where the driver of revenue is the same as the driver of impact," says Antonio Miguel at MAZE Impact, a Lisbon-based social impact investor. "This means the more revenues the company makes, the more impact it is creating, so that as the company grows, you don't have to have a conversation about trade-offs."

Four forces are pushing Tech for Good as a movement: political will, specifically public investment and innovation-encouraging regulations; tightening links between universities and the private sector, from academic spinouts to partnerships;

a shift in the DNA of 21st century business to emphasise purpose and social impact; and, last but not least, the empowering effect of technology itself, from cloud computing to AI, which allows an ever-growing community of players to wield powers once limited to technology titans.

Government-Primed

The public sector is nurturing Tech for Good in two main ways. First comes its role as a regulatory signaller of the future to come, especially in sustainability. European Union members have set a goal of reaching climate-neutral status by 2050, with some nations, including Austria, Finland, Iceland and Norway, aspiring to earlier targets — between 2030 and 2040. Cities are also committing themselves to time-bound goals, all of which is a business risk to polluting industries and an opportunity for tech companies that can help deliver on those goals.

"There is a heap of demand signalling out there in the real economy that is making this a moment for scaling up investment in climate-tech," says Celine Herweijer, global innovation and sustainability leader at consultancy PwC. "The challenge is that we don't yet have the full suite of technologies to get to net zero economies by 2050. The 2020s will be a key era of investment in climate tech."

“We don’t yet have the full suite of technologies to get to net zero economies by 2050. The 2020s will be a key era of investment in climate tech.”

Celine Herweijer

Global Climate Change Leader at PwC

European governments have not wavered in their commitment to decarbonisation, even using Covid stimulus spending to quicken the transition, for example by adding subsidies for electric vehicles and investing in carbon capture and energy efficiency. The EU’s clean energy package has introduced regulatory requirements to strengthen decentralised energy supply models, according to Urban Windelen, executive director of BVES, the German energy storage association.

“I’ve worked in EU public policy for more than two decades and what you’re seeing right now, in the middle of the Covid crisis, is extraordinary,” says Ann Mettler, senior director of Breakthrough Energy, a cleantech investment network, and Europe director for Gates Ventures. “It has actually strengthened our resolve to embrace climate neutrality rather than derailed it, which is what many might have expected in the beginning.” Around one third of EU recovery funds have been earmarked for climate-related expenditure, according to Mettler.

Government procurement is another big lever to encourage the private sector to design technology with socially beneficial outcomes and public agencies are getting better at engaging with non-traditional vendors, including startups and tech businesses. For example, the UK government’s Spark DPS platform is making it easier for the government to procure new and emerging tech products and services in areas like Internet of Things (IoT).

A wave of public sector employees are also leaving the safe confines of government to build companies that can solve problems in new ways, especially in healthcare. “More and more founders are coming out of government to form startups to solve a

problem they understand well,” says Daniel Korski, former special advisor to UK prime minister David Cameron and the chief executive of PUBLIC, an accelerator for ‘govtech’ startups.

The bigger role of the state in Europe also makes it fertile ground for Tech for Good startups. “In Europe the government is the biggest impact investor,” says Antonio Miguel at MAZE Impact. “Public funds are the biggest ones going into social and environmental challenges, so if you are an entrepreneur or fund, you have better ways to partner with governments as a platform compared to other regions.”

“In Europe the government is the biggest impact investor.”

Antonio Miguel

MAZE Impact

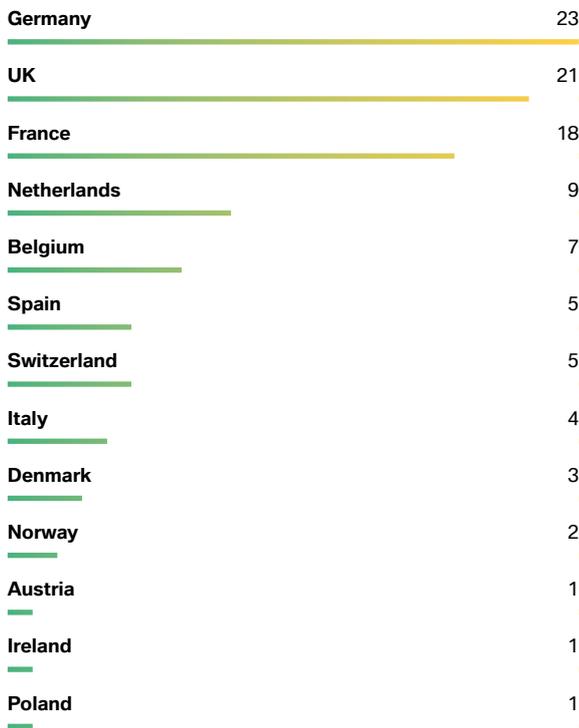
Ivory Tower Innovation

Europe is often decried for lagging the US and China in tech, but it boasts some of the world’s leading universities, whose research is fuelling progress in technical and frontier domains, from materials science to quantum computing and ‘deeptech’. Germany, the UK and France are leading the way for the most universities ranked in the top 100 for innovation, according to a Reuters ranking.



Image: Fraunhofer Institution

Number of Universities in Reuters Top 100 by Country



Source: Clarivate Analytics

The Fraunhofer Institute in Germany is spearheading green energy research, especially in solar energy, with TU Munich as a leader in medical imaging. The UK's Cambridge University is contributing to everything from edtech to smart cities. London's Imperial College has formed innovation labs and a hackathon spirit focusing on rapid production of safe and cheap Covid-19 protective equipment and ventilators to regenerative medicine and energy materials. Belgium's KU Leuven, which topped the Reuters index of European universities, boasts output including a next-generation energy system that can produce hydrogen gas out of thin air. The continent's academic ecosystem is not just a source of intellectual pioneering but also of spin-out companies and founders entering the deeptech sector.

The Social Corporation?

A third change-maker is a new attitude among business executives about the role of companies in the 21st century. As our problems become more complex and interconnected, it is increasingly difficult for companies to isolate themselves from

wider challenges. BlackRock chief executive Larry Fink's investor letters are just as likely to emphasise the importance of purpose and the urgency of climate change as they are about financial markets. Mark Carney, former governor of the Bank of England, loudly warned financial institutions and the business community that the climate emergency is a core business risk, as relevant to decision-making as interest rates.

Large institutional investors, including pension funds and sovereign wealth funds, are divesting from harmful sectors, most obviously fossil fuels but also increasingly other areas like the meat and dairy industries. The number of market indices tracking environmental, social and governance (ESG) metrics grows daily, covering factors from weapons to women's progress, as part of a trend of values-based investment. ESG-focused equity funds have seen inflows of almost \$70 billion in assets over the year to February 2020, at the same time as traditional equity funds saw nearly \$200 billion in outflows.

Some of this is mere virtue signalling, but not all. Climate, especially, is now core to business risk and projections. "Mainstream investors now want to understand the financial impacts of climate risk and they want it embedded in corporate governance at the board and management level and [represented] in the accounts of the business," says Jonathan Labrey, chief strategy officer of the International Integrated Reporting Council (IIRC), a global coalition of investors and regulators developing integrated corporate reporting standards.

"Mainstream investors now want to understand the financial impacts of climate risk."

Jonathan Labrey

Chief Strategy Officer of the International Integrated Reporting Council

But, human rights and liberties are now also becoming board-level conversations, with pressure on companies to have a position on issues including racism, LGBT rights, immigration and even abortion



Image: AI for Earth

and reproductive rights. The #MeToo and #BLM campaigns have come to encompass issues of workplace culture, from diversity of hiring and boardroom representation to pay gaps along gender, ethnic and racial lines. This is all a far-cry from the world of Milton Friedman, who argued the social responsibility of business was to make a profit.

This shapes Tech for Good in two ways. First is that today's most successful corporations realise they need to invest hard capital in tackling social problems. Microsoft's AI for Earth campaign and the new \$2 billion Amazon climate fund bring the skills and capital of two of today's biggest companies to the climate crisis. Secondly, others are setting up their own accelerators and internal units. SAP's Reboot Accelerator programme is working with the United Nations Office of Information and Communications Technology (OICT) to use crowdsourcing to solve global challenges.

Tech as Utility

The third enabler of Tech for Good is the size of the tech toolkit itself. Cloud computing and enterprise software give organisations, from tiny startups to global humanitarian organisations, everything from analytics and business modelling to product development and user-feedback at levels that once required large teams of staff and clunky, expensive enterprise technology.

The app ecosystem, GPS and 'push' notifications have unleashed behavioural trends on which Tech for Good innovators built their stall. "People today assume you can buy food through an app, so the food delivery service sector paved the way for us," says Elsa Bernadotte, founder of Karma, the Stockholm-founded app that allows consumers to buy quality food from nearby sellers who would

otherwise have had to throw it away before it passed its sell-by date. AI and gamification are now central to the success of education tech (edtech) platforms that provide personalised, iterative learning, based on pedagogical theory, neuroscience and user-experience (UX), to offer highly targeted learning.

At the other end of the scale, huge international organisations are using cloud computing to harmonise systems across multiple countries. "Before cloud computing, if you had to set up something new, you would need to install a physical application on a given laptop or desktop," says Norman Muhwezi, an innovation specialist at UNICEF in Côte d'Ivoire. "Imagine an office of 1,000 people implementing a system in government and having to go in there one by one. Then comes the cost of maintaining all the information and servers."

Amanda Feldman, cofounder of Heliotropy, which advises corporates on ways to use their capital to accelerate social progress, believes improvements in the quality and user-friendliness of survey software are also enabling improvements in impact monitoring, a crucial but often poorly executed piece of the social impact equation.

Time will tell the degree to which today's Tech for Good movement, in Europe and internationally, achieves its lofty goals. But the waves that lift the sector, from investor engagement with climate risk to the competitive opportunities heralded by growth segments like edtech and digital health, are structural economic and social shifts that all businesses need to heed.

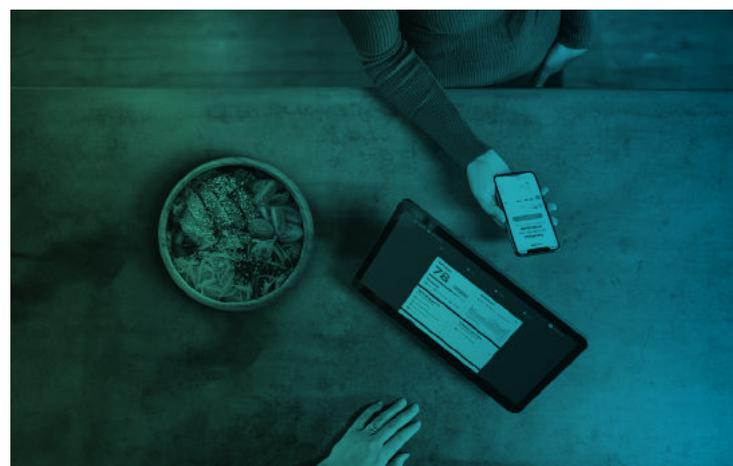
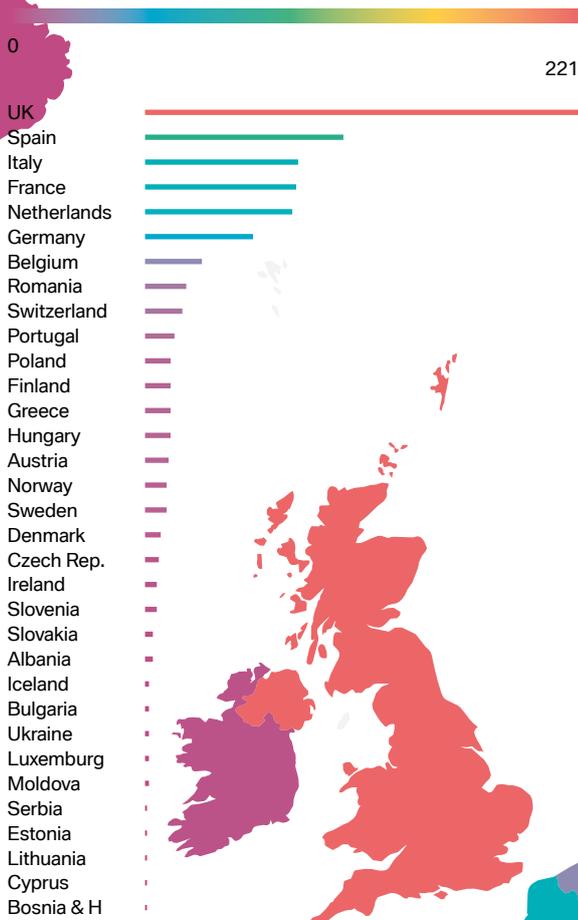
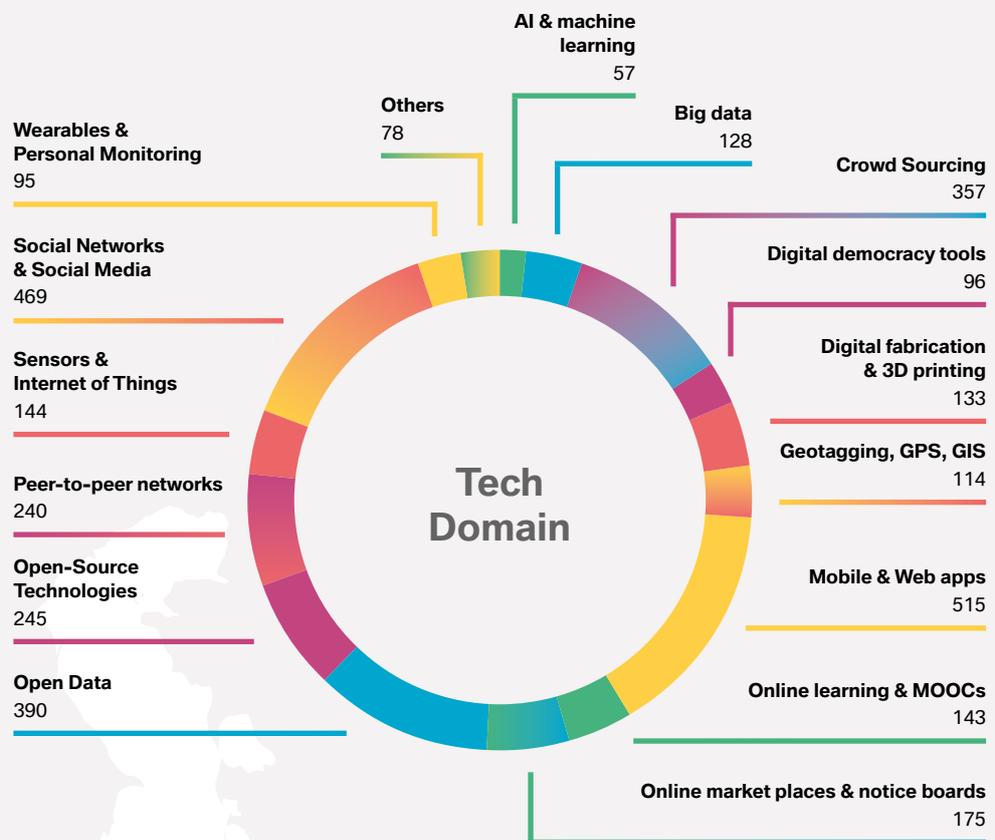


Image: Karma

Europe's Tech for Good Ecosystem: a Heat Map

Tech for Good Projects by Country





Mariya Gabriel Talks About the European Commission's Support for Innovation

What role should governments play in supporting Tech for Good (e.g. by making it easier to work with startups and outside big tech companies on public services)?

Many European founders and employees are shifting towards purpose-driven innovation, which is reflected in an increase in Tech for Good startups. For example, at Slush conference 2019, 36.7% of European startups declared that they were purpose driven, meaning that they contribute to the UN Sustainable Development Goals, with a higher share among younger ventures. The European Commission will continue supporting Tech for Good startups through the reinforced European Innovation Council (budget of ~€9bn), European Institute of Innovation and Technology (budget ~€3bn), as well as the new purpose-driven Horizon Europe Missions in areas to cure cancer, to clean oceans, to recover soils for healthy food, to get climate neutral cities and to mitigate climate change.

What role do Europe's tech-centric universities play in driving innovation?

For the first time ever, the portfolios of innovation, education and research are under the same EU commissioner. I will work on building strong linkages between innovation and universities. Most of the innovations go directly from the universities' students to the tech startups, not passing through research labs. I am working on a European Innovation Area to ensure that there are mechanisms to foster innovation from the universities as well as from research results by connecting this new single market for innovation with the existing European Research Area and the European Education Area. The support from Horizon Europe to the Universities Alliance to foster

innovation in universities is a concrete example of my work bringing together resources from across EU programmes.

How is Covid-19 accelerating digital adoption and will this enable more of the community to benefit from technical innovation?

Covid has made it evident that digital is nowadays as essential to everybody's lives as electricity. The Covid crisis has implied that several sectors that were traditionally closed to tech innovation, such as education or health, are now being disrupted. A good example is the #EUvsVirus Hackathon and Matchathon in Spring 2020 that generated more than 2,000 innovative solutions to fight Covid and almost 80% of them were considered Tech for Good innovations in the areas of health and remote education. The Commission continued to provide support to some of these ideas and new ideas through the €166 million dedicated call for startups to fight Covid.

Is Horizon 2020 more suited to funding big scientific breakthroughs than Venture Capital?

One of the novelties of the new framework programme for research and innovation, Horizon Europe, is the European Innovation Council (EIC). The European Innovation Council aims at filling a vacuum left by traditional VCs: deeptech startups with a purpose. EIC is the European DARPA with a budget of ~€9 billion but improved with a €3.5 billion equity fund and novel actions to connect innovation ecosystems across Europe. The EIC Fund will provide up to €15 million in returns for up to 20% of the company. This equity contribution from the EIC Fund as a patient investor will dilute the risk to crowd-in private investors in deep Tech for Good startups, which are otherwise inviable investments for the VC model.



Mariya Gabriel

European Union
Commissioner for
Innovation, Research,
Culture, Education and Youth



Is Good Tech Good Business?

In the late noughties, investors piled into ‘clean tech’ as the next big thing after the dotcom boom and the first big wave of Internet businesses. Public concern about the scale of the climate crisis was piqued by advocacy campaigns and media, notably Al Gore’s landmark documentary *An Inconvenient Truth*, and investors saw a chance to back the technologies of a post-fossil fuel world. US venture into clean tech grew from hundreds of millions of dollars in 2005 to \$4.1 billion by 2008, with big players like Kleiner Perkins launching dedicated climate tech funds.

Then came the financial crisis, which cut the sector’s investment flows nearly in half to around \$2.5 billion. But the crash was not just collateral damage from the banking collapse. The sector itself had suffered excessive hype. Many business models were unsound. Investors, accustomed to shorter timelines and turnarounds from the digital sector, were not at ease with the knottier engineering problems of clean power.

Fast-forward to 2020 and climate tech is once again on a tear. Early-stage investment jumped from \$418 million in 2013 to \$16.1 billion by 2019, an increase of more than 3,750%, according to joint research from PwC and Dealroom.co. That’s three times the growth rate of the AI sector, arguably the hottest and most hyped tech sub-segment. Is this a new bubble, or a surge driven by fundamentals?

“Today is very different from the early 2000s,” says Ann Mettler at Breakthrough Energy. “Climate has a much higher priority, and there’s a palpable sense that we are on the cusp of a new technology revolution.” In the early 2000s, “investors didn’t understand the difficult engineering and scientific problems that needed to be addressed, and didn’t pay enough attention to the difference between digital tech and cleantech in terms of timelines. I think that’s different this time around”.

There are proven success stories that show how Tech for Good can be big business — and far from limited to public sector contracts or small niches of concerned consumers. “If we look at some of the climate tech unicorns that have emerged, like Tesla, Beyond Meat and Impossible Foods, they are at the confluence of consumer and sustainability,” says PwC’s Herweijer.



Image: Tesla Gigafactory

“Companies in the alternative meat sector will build gigantic conglomerates. They will do good things for society, humanity and the environment, and make a fortune in the process,” predicts Thomas Oehl, founding partner at Vsquared Ventures. The alternative protein sector is one of the stand-out success stories of the current age, even during the pandemic. Ynsect, a French startup manufacturing protein-rich insect food for the farmed fishery sector, raised \$224 million in October, even as the global economy was on its knees.

“If we look at some of the climate tech unicorns that have emerged, like Tesla, Beyond Meat and Impossible Foods, they are at the confluence of consumer and sustainability.”

Celine Herweijer

Global Climate Change Leader at PwC

Sustainability is not the only domain seeing commercial breakthroughs at the same time as societal ones. The edtech sector is drawing investment thanks to a combination of population growth in developing countries, rising demand for technology, improvements in digitisation and market problems, from student debt to stagnation in test scores. Digital health was already on a march before the pandemic from medtech innovations like connected health devices and consumer health apps through to platforms like Doctolib that connect doctors to patients. The pandemic has boosted the need for digital health solutions such as symptom bots, data analytics and 3D-printing equipment.

All of this has dissolved the boundaries between making money and doing good. As recently as 2016, says Karma founder Elsa Bernadotte, there was a prevailing view that companies had to choose between making profits and having a positive societal impact. For large corporations, it may even be a matter of talent attraction as younger generations’ expectations about the role of business shift.



Image: Ynsect

“Young people today want to do something with value, with meaning, to matter, not just to themselves but in a broader way,” says PUBLIC’s Daniel Korski. “The younger generation has been brought up on the idea that you can change anything.” Startups are even prising talent away from big corporates that do not offer them that vision of the future. “We’re attracting people from big tech companies like Uber and Apple who want to apply their skills to make a difference,” says Elsa Bernadotte at Karma.

Amit Pradhan, a Silicon Valley investor, reckons high-end technical talent is looking to apply their ideas on a grand canvas. “More and more talented entrepreneurs and experts in cognitive AI, blockchain, the Internet of Things are feeling the call to solve for the bigger challenges, whether it’s digital identity for refugees, creating universal income models or carbon sequestration – instead of the need to build that new Snapchat filter system powered by the latest tech available to them”

Amanda Feldman at Heliotropy says large corporates are losing the battle for talent and forward-thinking organisations are giving their staff space to innovate and finding ways to engage with the Tech for Good ecosystem through corporate venture funds, partnerships with other companies and research institutions and startup accelerators.

Patagonia led the way with Tin Shed Ventures, a corporate venture capital fund investing in environmentally and socially responsible companies. Today, everyone from Shell to SAP, Mastercard to Mars, works on tech-driven impact projects through a range of novel alliances and structures, driven by a business interest to secure their social license, support economic stability and supply chains, and be there early in the development of technologies that could disrupt their business.

European investors could be doing more, according to Vsquared Ventures' Thomas Oehl: "Why is China spotting early stage companies before Europeans do? They put the work in. Why are US funds like Kleiner Perkins, Benchmark and Sequoia finding opportunities? It's because they are good at what they do. I'd love to see more European funded startups but I also want to see equality — we have to do the work to make it an end-to-end European game."

Investors: Impatient Capital?

The Silicon Valley-driven boom in startup funding through to 2020 saw many businesses achieve sky-high valuations without a clear path to profit, reaching its nadir with the abandoned IPO of WeWork. Combined with the pandemic, investors have been in a more sombre mood of late. How interested is this community in backing Tech for Good?

The ecosystem is now made up of the first movers — funds with impact in their DNA — to mainstream investors, from VC funds to institutional investors, who see the opportunity to make money by doing good. The challenge is to be profit-oriented and also patient enough to let businesses come to fruition, a hard balance.

Saskia Bruysten, chief executive of Yunus Social Business (YSB), says her organisation, in essence a non-profit venture investor, avoids companies that rely on equity infusions for sustainability. "That's NGO work, in our view," she says. "In the end, these companies solve a problem for that period of time. The goal we have is to help companies become financially self-sustainable. Then they can continue

to solve problems on their own steam after external investors are in".

Founders are business-minded, rather than just campaigners and activists. "We're seeing high-calibre founders with venture experience, like ex-general managers at big tech companies, now creating their own ventures," says Miguel at MAZE Impact. "We see business model-oriented founders across our portfolio."

An equally important shift in deeptech, science and engineering is getting from university environments to the business sector, and from the lab to the P&L. "We look at teams that are top notch in their respective areas, but it doesn't matter how good your product is, you still have to market it and you still have to sell it," says Vsquared Ventures' Oehl. "This is something where a lot of universities have done a good job through entrepreneurial courses, which are educating scientists and engineers on how the market looks outside academic environments and R&D facilities inside corporates."

"Some investors still live in traditional models of capital built around five to seven-year fund lifecycles that limit them and their ability to invest in the founders and companies looking to solve for the bigger challenges."

Amit Pradhan

Cofounder & President of the Silicon Valley Blockchain Society and Investor

Investors, for their part, also need to make some adjustments of their own, especially if they are expecting fast turnaround and IPOs. "Some investors still live in traditional models of capital built around five to seven-year fund lifecycles that require a certain number of exits, that limit them and their ability to invest in the founders and companies that are looking to solve for the bigger challenges," says Silicon Valley investor Amit Pradhan.

Tech for Good: Ever Growing Ambitions



2008

US clean-tech investment peaks at \$4.1 billion, before falling to \$2.5 billion after the financial crisis



2009

India launches Aadhar, the world's largest biometric ID programme



2010

Tesla IPO

Mobile operator data used to direct humanitarian support after Haiti earthquake



2011

Europe's first 'tech for good' accelerator opens in Bethnal Green, London

Founding of Ynsect, a pathbreaking insect protein startup



2014

The World Bank launches ID4D (Identification for Development) initiative



2015

Paris Agreement adopted by 196 state parties

Agenda 2030 (Sustainable Development Goals) adopted unanimously by the UN General Assembly



2017

Tesla overtakes Ford by market value

Founding of European Innovation Council, Europe's 'DARPA'



2018

Impact Management Project launched to set new reporting standards for impact management





2019

Beyond Meat IPO
UN 'Reboot the Earth' tech challenge
Impact investment market reaches \$502 billion
\$1.7 billion VC investment in US ed-tech
Early stage climate-tech investment hits \$16.1 billion, up from \$418 million in 2013, a 3,750% increase



2020

Amazon sets up \$2 billion climate fund
ESG equity funds take in nearly \$70 billion of assets; traditional equity funds lose \$200 billion
KKR closes \$1.3 billion impact investing fund
Kleimer Perkins launches \$700 million venture fund focusing on security, digital identity and the future of work
#EUvsVirus and #WevsVirus Hackathons

2021

European Union Horizon innovation programme shifts to missions to tackle cancer, climate change, healthy oceans, climate neutral cities and healthy soil



2025

Copenhagen to be the first carbon neutral capital
\$300 billion – forecast market size of 'food security' investment
Amazon aims to use 100% renewable energy

2030

Microsoft carbon neutral; Google 'carbon free'

2050

European Union carbon neutral

Sir Ronald Cohen Discusses the Rise of Impact Investment

You recently published a paper on impact weighted accounting. What's the core advantage of this method?

The Harvard Business School Impact-Weighted Accounts site doesn't just measure environmental impact, it also measures employment impact and product impact. On the site, you will see papers showing exactly how you can measure the impact of a company today on the basis of the public info. Now, we are able to express it in financial terms and show it in the accounts of companies, reducing or increasing their profit according to the net impact that they create. Very soon, we will be publishing examples of companies' employment impact and product impact. Hundreds of companies will be compared in the next few months/year.

We can measure this very dependably, more dependably than we measure risk when we make investment decisions, almost as dependably as when we measure profit. Now, we need governments to mandate that companies provide this information and that it is audited. Here, a historic comparison can be made with the crossroads we find ourselves at today and 1929. In '29 we didn't have transparency of profit, companies could pick their own accounting principles and there were no auditors. Today, we are in the same position with regard to impact. Despite the fact that more than a third of all professionally managed assets are seeking impact as well as profit, we have no transparency. And so, as happened in '33, we want governments to mandate this transparency.

How engaged are mainstream investors in 'Tech for Good' — has it become a business opportunity for them, especially in social sectors like health and education, where the economics may not be as clear as in areas like climate tech (and it may be more of a challenge to balance impact with profit)?

If you look at the Harvard dataset, you will see evidence of how transparent a company becomes in terms of its employment impact, the effect of diversity on gender equality and environmental impact. The same would be true with product impact. So, I don't think we are going to see differing transparency that will drive money looking for impact just towards environmental concerns. Investors are going to be interested in both, particularly because they're not going to want to achieve environmental improvement in one dimension of a company while creating huge social problems in another — for example, they won't invest in solar panel manufacturers and then discover they've been using child labour.

“[Investors are] not going to want to achieve environmental improvement in one dimension of a company while creating huge social problems in another.”

I think the two are merging now and the transparency is going to bring both environmental and social change. Tech is a huge enabler of social improvement; fintech, for example, is going to revolutionise access to finance for people who are currently excluded from the financial system. Similarly, education and health are both going to shift to a more tech-driven approach that can be used remotely. Tech is going to be a major driver of impact improvement and investors understand this, so Tech for Good is a massive new area and I think that you will have unicorns in this area — companies that aren't just worth a million dollars, but are going to improve the lives of a million people.

How has Covid-19 affected philanthropy and social investment, either positively or negatively?

It's been very mixed, but on the whole it's affected it negatively. I think a lot of philanthropists have shrunk back from making commitments because they are worried about financial markets and what

the value of their investments is going to be looking ahead; it makes them reticent. Although, there are some bold leaders like Darren Walker of the Ford Foundation who went out to borrow \$1 billion to fund organisations that are helping vulnerable populations through Covid.



Image: Darren Walker

We will have an increase in homelessness, loneliness, unemployment and all the associated problems, especially with the elderly and single parent families. Then philanthropists are crucial in helping these communities to make it through. Impact investment started by bringing investment to philanthropic organisation and charitable service providers through social and development impact bonds. Philanthropists should be making a huge effort to fund organisations that are helping the most vulnerable. Governments have to provide tax incentives for investors to fund charitable organisations. So, in the UK, we have had incentives — social investment tax relief — which enable you to offset against your income, reducing tax payments. This is a model that should be followed at scale across the world.

What are some of the most innovative investment models you're seeing in the social impact world, e.g. impact debt capital, funds of funds, outcome-based funds?

We are now seeing a lot of innovation in the impact field. We're seeing companies raising green bonds

where the rate of interest will fall if the objectives are achieved. The concept that your interest rate actually falls if you achieve an environmental good is a new incentive in financial markets. We have seen social bonds emerge, which are there to achieve a social good. So, in addition to green bonds, they're education bonds.

“The concept that your interest rate actually falls if you achieve an environmental good is a new incentive in financial markets.”

I think the big innovation yet to achieve scale is pay-for-success, where success is an improved social or environmental outcome. That's where outcomes funds are so important because if you're crafting your social or development investment bond (in a developing country) one by one, and you're going to have to find an outcomes payer and an investor each time, it's very difficult. If, on the other hand, you have a billion dollar professionally managed outcomes fund, you can sign the contract.

On the opposite side, you have social and development impact bonds funds run by professional managers and these funds are providing similar capital to social entrepreneurs but at much lower cost because the only risk they are taking is the delivery risk, as there's no exit or competition risk. There's only the risk of not achieving the outcomes defined in the contract. So, I think this is the biggest innovation today and Covid-19 should take advantage of these mechanisms to attract investor capital where it would otherwise not go.



Sir Ronald Cohen

Cofounder of Big Society Capital and Bridges Fund Management, Chairman of Global Steering Group for Impact Investment



Protect

The following features are selected subsections of wider contributed pieces written by the four Tech for Good startups in our “Protect” category.

Most people do not want to harm, they want to protect. But, as each of these startups lay out, it is hard to make a difference if you don't have the data and transparency around a given issue. Read their stories to understand how they are increasing visibility and accountability to help organisations, governments and individuals make better choices that protect the environment and our most vulnerable populations.



The first category of Tech for Good startups profiled in this report are deploying technology to measure and monitor environmental impacts. After all, what gets measured gets managed. This is more relevant than ever in an age where governments, cities and companies are under pressure to quantify their social and environmental impact and protect our fragile ecosystem. Our Protect startups are creating the tools to enable the protection of our environment and more vulnerable communities.

Software is part of the toolbox. Plan A has built emissions reduction software that lets companies report emissions from direct energy use as well as harder-to-gather data, like business travel and employee commuting. Hawa Dawa is generating fine-tuned pollution data by pulling from multiple diverse sources, including satellite imagery and sensor-gathered IoT, to produce real-life, hyperlocal and even street-level air quality data on key pollutants. This could help policymakers better understand the behaviour of pollutants and forecast the interaction of pollution and weather.

While the climate has dominated our concern today, it is becoming increasingly clear that the ocean is an endangered zone, with growing levels of pollution and environmental damage affecting marine environments. Big name brands like Mercedes and Adidas have started using ocean waste in their production lines. GOT BAG, based in Mainz, Germany, produces backpacks and travel accessories made from ocean plastics, working with fishermen in Java, Indonesia, who collect plastics, ensuring bag production is also providing a livelihood to low-income fishermen.

Protection is not just an environmental issue. Startups are also deploying tech to help some of the most vulnerable — those in war-ravaged regions — with the most precious resource of all: time. In war zones, there is little warning of impending attacks, leaving populations at the mercy of warring factions. Hala Systems built a multicomponent detection and warning system using mobile applications, natural language processing, sensors and remote-controlled warning devices to give civilians advanced warning of impending threats. Initially developed in Syria, the team is now extending their technology to communities around the world.



Plan A

Founded: 2017

Founders: Lubomila Jordanova, Nathan Bonnisseau

Headquarters: Berlin, Germany

Team size: 20-25

Market: Europe

Target market: Global

How they make a difference:

Plan A is the only company in the space that uses a science-first, tech-second approach, which maximises accuracy and alignment to regulatory and scientific frameworks.

Why it's interesting:

In addition to accessing carbon calculator and live emissions data, clients can use tailored 'action cards' with specific reduction and offset recommendations.



Lucy Lyons
lucy.lyons@plana.earth

PLANA

Helping Companies Measure and Improve Their Environmental Impact

Climate change is a risk to society, but it is also a risk to businesses. Weather has the potential to wreak havoc on value chains: a crop supply shortage could be caused by water scarcity, for instance, or a key transit network like a road could be destroyed by a hurricane.

On a more macro scale, as laws around emissions accountability scale up, businesses with stakes in non-sustainable industries are preparing to weather the risks associated with the transition towards a climate-neutral economy. Meanwhile, environmental social and governance (ESG) concerned investors are pulling their money out of risky climate investments like coal. Consumers are also demanding accountability from companies as climate change becomes more of an urgent problem.

“Consumers are demanding accountability from companies as climate change becomes more of an urgent problem.”

The reality is apparent: if businesses do not evolve in the face of the climate crisis, they won't make it out the other side.

The positive news is that companies do not have to be “the bad guys” in the climate change discussion; there are ways they can become leaders and play an active role in fighting the climate crisis.

Plan A's Solution

Evidence suggests that there is high market demand for streamlined, accurate and automated carbon emissions calculation and monitoring solutions that function in line with key regulatory frameworks.

Plan A's calculator is our answer. Our platform is a uniquely accurate, streamlined business-to-business (B2B) software-as-a-service (SaaS) tool that empowers companies to own and act upon their carbon emissions. We do this by streamlining the emissions reporting process for companies in a way that is in line with key regulatory frameworks, allowing them to effectively calculate, monitor, reduce, report on and offset their emissions. Our software automates data collection for all company emissions, maps them out in a dashboard, and automatically creates an action plan that can support the company on its emissions-reduction journey.

We believe that companies using our tool today will be best prepared for the stricter ESG demands of tomorrow.

“Companies using our tool today will be best prepared for the stricter ESG demands of tomorrow.”

Integrating Scope 3 Greenhouse Gas (GHG) Emissions

When striving for accuracy, carbon accounting professionals and software must account for as many of Scope 1, 2, and 3 GHG emissions as possible. Our calculator accounts fully for Scope 1, which comprises direct fuel and energy emissions, and Scope 2, consisting of indirect energy emissions, i.e. electricity purchased from a grid. Additionally, we currently have the farthest calculation reach on the market in terms of Scope 3 GHG emissions accounting.

Scope 3 integration is particularly challenging because of the breadth of categories and the complexity of what needs to be measured.

For example, transportation, processing and distribution emissions, employee commutes and waste from daily operations. It is extremely important to account for them, however, given that the majority of many companies' emission may fall under Scope 3.

Kraft Foods, for example, reported that over 90% of their aggregate emissions have come from their value chain, a single Scope 3 category. Of Apple's 25.1 million tonne output of CO₂ per year, an average of over 98% fall under Scope 3 generally (product manufacturing, product use, transport, etc.).

There are 15 Scope 3 emissions categories that companies can monitor. Some of these categories are considered upstream activities, including business travel, the transportation of goods and operations-related waste. While others are downstream activities, such as end-of-life treatment of goods (what happens to our phones when we throw them away?), investments and franchise activity.

We calculate emissions in more Scope 3 categories for businesses than any competitor; however, upping our software's capacity to account for all 15, for every type of business, in every circumstance, is an example of one short-term goal that our internal data team is actively focusing on.





GOT BAG

Founded: 2016

Founder: Benjamin Mandos

Headquarters: Mainz, Germany

Team size: 30

Markets: Germany, Austria, Switzerland, France

Target markets: USA, Scandinavia, Netherlands, UK

How they make a difference:

After setting up waste distribution systems in deprived areas of south-east Asia, fishermen are compensated for the trash in their bycatch, which is sorted, cleaned and turned into materials for backpacks and travel accessories.

Why it's interesting:

GOT BAG got its start with a successful Kickstarter campaign in 2018. Today, it has personal relations with every single link of its supply chain. All sourcing and production partners are regularly visited and monitored to ensure compliance with ethical and environmental standards.



Max Schmiel
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Recovering and Repurposing Plastics from the Ocean

Big names have started to include recycled marine debris in their production lines. Mercedes announced their electric car, EQS, with an interior made of ocean plastic last year. Adidas has created a whole collection based on the recycling of oceanic plastic waste — their Primeblue material consists of ocean waste collected by partner startup Parley. Products in the Primeblue line are said to consist of at least 40% recycled material.

But, if you take a closer look, you'll find that Parley collects most of their material on shore, in coastal areas and on islands — not from the ocean itself.

And therein lies a big problem of the industry. There are no legal requirements that a company has to meet in order to say its product is made of ocean plastic. As ocean plastic is very tedious to recover and can require a lot of adjustments during the recycling process, many brands choose to take the shortcut and use so-called "ocean-bound material" for their products.

Despite public outcry against this perceived greenwashing by Adidas and other companies, the environmental benefit created by those products should not be neglected. We can appreciate that plastic is still being removed from the environment and prevented from entering the oceans. Unfortunately, that still doesn't take care of the plastic waste that already is in the ocean that will be decomposing for the next 450 years or more, turning the oceans into a plastic soup.

That's where we come in — bridging the need to do both. GOT BAG is a sustainable startup based in Mainz, Germany, producing backpacks and travel accessories made of genuine from-the-ocean plastic. We are dedicated to the creation and upscaling of a holistic approach to collect bound-for-the-ocean plastic in rural areas of Indonesia.

To tackle the problem of ocean plastics, GOT BAG built a network of fishermen on the north shore of Java who bring all the plastic waste that ends up in their nets as bycatch back to shore. Our approach involves NGOs, local communities, recycling companies and governmental institutions.

Within the first couple of months of our operation, the fishermen at each location managed to retrieve approximately 2 tons of plastic waste per week from the ocean and an additional ton of household waste, which is being treated separately.

“There is big marketing potential in ecologically friendly products.”

Marketing Sustainability

There is big marketing potential in ecologically friendly products. And, it is also core to the GOT BAG organisation to generate income, which is then funnelled back to Indonesia to support the fishermen and clean-up activities. But, the cost of our product plays a big role in our funding, as only 15% of consumers are willing to spend more on sustainable products.

Therefore, the perceived value of the product needs to be increased by guaranteeing the highest

quality of materials alongside the lowest ecological impact and greatest socio-economic benefits for all those involved in the manufacturing process.



To adhere to these moral and ecological standards, all decisions regarding the production follow a strict code of conduct. All parts of the value chain are required to follow certain criteria as set by independent certification providers like bluesign, SEDEX and BSCI.

Also, the proliferation of greenwashing scandals means that the GOT BAG product is met with a lot of scepticism. To prove the origin of the material of our bags, we are piloting a cloud software in collaboration with Berlin-based startup Cleanhub to track the plastic gathered from its source in Indonesia all the way to the finished product.

By providing photographic documentation of our material at each point of the value chain, we will be able to show our customers the entire supply journey. To further our accountability, an algorithm is using pictures provided by all stakeholders to minimise fraudulent behaviour. The collection and learning process at the community points is also supervised by our local partner, Yayasan Rumah Ilham, an Indonesian foundation with expertise in organic waste management and community building.

What's Next for GOT BAG?

As demand for our products is continuously growing, we have already founded a daughter company in the US to handle the sale of the bags in North America and expand our market beyond the European continent. Meanwhile, the clean-up operations are growing and we are hoping to set foot in other south-east Asian countries soon. Finally, we hope to continue on our chosen path, ensuring sustainability for partners, consumers and investors against all odds.



Hala Systems

Founded: 2016

Founders: John Jaeger, David Levin

Headquarters: Delaware, USA, with a subsidiary in Lisbon, Portugal

Team size: 50+

Markets: Middle East North Africa (MENA) and the Sahel (African region between the Sahara and the Sudanian savanna)

Target market: Global

How they make a difference:

Hala's system combines multiple signals about events with the potential to generate violence. AI analysis predicts where and when an attack on civilians may be likely and shares the data with those who need it.

Why it's interesting:

Hala is the only company using AI, the internet of things and remote sensing to develop technology solutions that protect civilians in conflict zones.



John B. Jaeger
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Providing Advanced Warning Systems to Civilians in Warzones

Untapped Innovation in Warzones

Over two billion people live in countries whose development outcomes are profoundly affected by conflict or violence. Conflict has an enormous human toll, but also costs the global economy an estimated \$14 trillion a year, equal to more than 12.6% of global GDP. This cost is led by military and internal security spending, but losses from conflict, crime and interpersonal violence can also add up to trillions of dollars.

The extreme costs are linked to the unprecedented technological changes that have shifted the dynamics of traditional warfare. The distribution and means of destruction have expanded and become more accessible. Yet too few technologies are emerging to ensure that the means of protection are also available.

One reason for the shortage of technologically-driven civilian protection companies like ours is that less than 2% of humanitarian funding is spent on R&D. Additionally, there is insufficient understanding within the funder community about the possibilities and risks of innovative technology in this space. Consequently, donors are more likely to give to known quantities and investors tend to avoid the inherent risks in deploying solutions to difficult places.

The barriers to entering new conflict zones are also exceptionally high. Most donors expect organisations to have significant country experience to qualify and major contracts are often awarded to the same big implementing organisations that have built up capacity over decades.

This sometimes discourages innovators from competing for opportunities in new countries even when technology solutions are well suited to the challenge. Hala has been told “no” from countless government donors, multinational NGOs, development organisations and investors despite the urgency and relevance of our proposed work. Sometimes this is almost comically demoralising, as in the case of the very large NGO that bluntly explained they were in the business of tabulating casualties, not preventing them.

Despite these funding challenges, and due in large part to principled champions within government coupled with our dogged persistence, there are conflict and stabilisation funding programmes within federal agencies that have so far funded our work in Syria, including the governments of Canada, the Netherlands, the UK, Denmark and Germany. They have played a critical role in impacting civilian lives and shifting the paradigm in the use of technology for conflict prevention and humanitarian response.

Crowdsourcing Data for Security and Transparency

Our first public programme born out of Hala Systems is Sentry. It’s a multicomponent detection and warning system that uses mobile applications, natural language processing, sensors and remotely-controlled warning devices to provide besieged civilians with advance warning of impending threats.

Sentry offers the most precious commodity possible in a war zone: time. The more time someone has to prepare for indiscriminate violence, the greater their odds of surviving it. We have provided an average of 7 to 10 minutes of life-saving warning to potential victims of such violence in Syria. Each second gained could make the difference between life and death.

Sentry was first deployed in 2016 to help protect civilians in Syria. Since then, we have been working to further develop our technology and extend our reach to help protect communities, generate credible ground-truth and ensure accountability around the world.



To be effective, Sentry relies on a combination of human observation and advanced technology. At Hala, we break down Sentry’s function into four parts:

First, data is collected about events with the potential to generate violence. This information is gathered from multiple sources, such as trained observers using the mobile app, open sources (Facebook, Twitter), third-party reports, environmental sensors and satellite imagery.

Next, AI driven analysis adds value to the raw data. During this phase, AI driven tools look for correlations between similar data points, separate signal from noise and predict where and when potential violence against civilians is likely.

Then data is shared to those who need it. With Sentry, actionable information is disseminated to at-risk populations within seconds via Internet of Things (IoT) devices, audio-visual warnings, radio and social media.

Finally, incident data is visualised on our Insight web portal in real time. From this we can easily create analytical reports and monitor trends and developments. In fact, this data has allowed us to create the most comprehensive record of the air war over Northwestern Syria that exists outside of a classified environment. The data we have collected is critical for accountability investigations and the work of international human rights organisations.

Our outcome speaks for itself: Sentry’s warning system now reaches an estimated 2.3 million civilians in Syria. Its warnings are correlated with a mean reduction in casualties of between 20% and 30%, which translates to hundreds of lives saved and thousands of injuries averted.



Hawa Dawa

Founded: 2016

Founders: Karim Tarraf, Yvonne Rusche, Matt Fullerton, Dr. Birgit Fullerton

Headquarters: Munich, Germany

Team size: 15+

Markets: Germany, Switzerland

Target markets: UK, Rest of Europe, Asia

How they make a difference:

Its AI platform provides granular pollution data to cities and companies to help them understand the impact on topics as diverse as crop yields, rates of neurodegenerative disease, labour productivity and urban heat islands.

Why it's interesting:

90% of the world breathes dirty air, according to the World Health Organisation (WHO). By measuring and mapping pollution, Hawa Dawa shows it is possible to manage and reverse poor air quality.



Yvonne Rusche
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Highlighting the Real-Time Costs of Air Pollution

Clean air is as much an indicator of good planetary health as the melting ice caps and the plight of the polar bear. Hotspots of nitrogen dioxide (NO₂), ozone (O₃) and particulate matter (PM) — in particular black carbon, a product of incomplete fossil fuel combustion — should be as high on the radar as other global climate issues.

Recent negative press covering vehicle emissions have in some ways helped to bring more transparency to the contribution and the lobbying power of the automotive industry. This press has helped to point out contributory sectors and accountable figures, and, at its most salacious peak, inadvertently helped to demonstrate a significant gap in data transparency on the health effects and extent of urban air pollution.

To be able to bring greater awareness and relevance to the topic of air quality, we need to be able to map it spatially and over time. We urgently need insights into where and why air pollution is most hazardous in order to take mitigating action. For this, what we ultimately need is access to granular, usable data.

“We urgently need insights into where and why air pollution is most hazardous in order to take mitigating action.”

Current monitoring systems fail to provide relevant insights where they are urgently needed and are not fit for either current or future purpose. Data is incomplete or non-digital, resulting in, at best, overreaction, economic disruption or the implementation of ineffective measures, such as complete district closures or vehicle bans close to measurement locations, and, at worst, inaction.

A Solution Fit for Purpose

Consider that the traditional air quality monitoring industry is largely composed of complex sensing systems deployed sparsely across urban areas by governments and research institutions for scientific and reporting purposes. Going forward, this is insufficient to meet demands. Thus, the industry is being disrupted by two different business models:

The first consists of low-cost hardware businesses, foremost being Vaisala, AQMesh and Air Monitors, which have developed granular Internet of Things (IoT) technology that replaces manual tube sampling by delivering digital datasets. This is a more cost-effective way of monitoring across an entire city and complements the expensive European Commission directive 2008/50/EC grade measurement stations.

The second model is the emergence of software and modelling-only businesses. These companies base their analyses on existing air quality data sources and focus on adding value to existing data by digitising it or making it more accessible to industries that haven't traditionally used air quality data. Here, BreezoMeter is claiming market share by targeting its products at a broad range of sectors, including pharma and automotive. Blue Sky Analytics offers particular strengths in the use of satellite data in this space.

We offer a hybrid approach. We combine all available air quality data sets, whether open source, external

IoT, satellite imagery or public data, from official measuring stations with our own collected granular IoT sensor data. We process the output from this entire technology stack into a calibrated, digital dataset that offers real-life, street-level air quality measurements as well as model-based insight.



Our proprietary air quality sensors collect hyperlocal data on the most relevant urban pollutants: NO₂, O₃, particulate matter, as well as other airborne pollutants and influential environmental parameters, such as temperature, relative humidity and pressure. We provide the spatial context for this broad range of ground-to-space air quality data by fusing it with land use statistics, traffic intelligence, health and socioeconomic metrics.

In doing so, we can generate historic, live and forecast pollution heatmaps or models. These help in understanding pollutant behaviour, triggers and how best to target and tackle hotspots. We also undertake analyses that evidence the impact of external factors such as temperature, wind, weather, large events and traffic upon local air quality.

By subscribing to our feature-layered dashboards, interactive reporting and API, cities and governments can monitor entire areas digitally, where previously they could only interpret the data from a handful of single measurement stations. Aside from cities, our customers include traffic management companies, which use our data to help with pollution hotspot tracking, alerts and forecasts, eco-sensitive traffic controls and green navigation.

We can also support healthcare providers and insurers in the development of exposure tracking apps, disease trigger management and new location-based bond products. We even serve companies in the shipping and supply industries to assist with portside emissions and logistics efficiency monitoring.



How Covid-19 Can Fuel a New Model of Aid



Ravi Gurumurthy
Chief Executive, Nesta

Covid-19 is forcing companies, governments and nonprofits to innovate, not in the form of new technologies and inventions but the repurposing of existing ones, and accelerating technological shifts already underway. The growth of remote working and the expansion of digital health consultations could have happened at any point in the last decade, but the pandemic has provided the forcing mechanism to overcome inertia and habit.

“More than half a billion additional people would become impoverished because of Covid-19, leading to spiralling levels of starvation.”

The same is true in low-income countries and those marked by conflict and disaster. While in many of these contexts, Covid-19 caseloads have remained relatively low, the pandemic has disrupted traditional ways of delivering humanitarian and development assistance. It is accelerating innovations in models of aid delivery as schools and health clinics have closed and the distribution of food, blankets, soap and clean water has been interrupted. And, of course, the need is both great and urgent: the United Nations projected that more than half a billion additional people would become impoverished because of Covid-19, leading to spiralling levels of starvation.

There are four key trends in humanitarian aid that are being accelerated by this crisis:

First, rapid delivery of cash direct to the people who need it. Countless studies have demonstrated that cash transfers are one of the most effective, fast and cost-efficient ways to address needs. Cash transfers reduce the cost of orchestrating the delivery of food and other goods, support local economies and give recipients of this aid both choice and agency. As in-kind aid has been interrupted, more is being shifted to cash transfers in places such as Djibouti, Myanmar and South Sudan, further breaking down the traditional model of aid delivery.

Second, data and machine learning is increasingly being used to facilitate the delivery of more virtual, ‘disintermediated’ aid. For example, instead of doing surveys to identify people on low incomes, Joshua Blumenstock, assistant professor at the UC Berkeley School of Information, has shown that satellite imagery and mobile phone data have the potential to be used to target people with a high degree of reliability for cash transfers or loans. Machine learning algorithms can predict household income based on the length and frequency of mobile phone calls, the range of contacts and the variation in locations from which calls are made. In Uganda, the non-profit GiveDirectly is working with a local phone company to deliver government assistance in the form of unconditional cash transfers, and the Bangladesh government is



Image: GiveDirectly

looking to do the same. In countries with weak or non-existent welfare provision, the data held by mobile companies is a better predictor of poverty than those held by the state.

“In countries with weak or non-existent welfare provision, the data held by mobile companies is a better predictor of poverty than those held by the state.”

Third, remote tools that improve learning. School closures have forced education to be delivered via radio, television and the internet. While the quality of such content has historically been relatively poor, we are now seeing well-designed, evidence-based content being deployed. Programmes such as MindSpark In India have shown that adaptive learning software can substantially increase literacy and numeracy outcomes by tailoring the learning to the level of each child. Meanwhile, Sesame Workshop has created a dedicated Sesame Street for Syrian refugees, Ahlan Simsim, and is conducting randomised controlled trials to measure its impact on the children’s social and emotional learning, as well as their literacy and numeracy. In the midst of Covid-19, some organisations have managed to reach substantial scale: for example, Rising On Air, a free distance-learning solution providing structured curriculum content via radio and SMS, has now reached more than 10 million children in 25 countries.

Finally, aid is increasingly being delivered by local responders within each community — frequently supported by ultra-low tech tools. For example, the diagnosis and treatment of malnutrition often requires families to travel many miles on foot, multiple times over the course of a child’s treatment, through insecure territory to reach a health clinic. In South Sudan, prior to Covid-19, the provision of simple tools to help community health workers diagnose malnutrition — specifically, colour-coded measuring tapes and patient registers that use symbols rather than letters — has enabled treatment to be delivered within villages. During the



Image: Sesame Workshop

pandemic, the strengthening of community-based health services through initiatives like this is critical to maintaining health provision.

But, my key point is that none of these shifts in the humanitarian landscape are new. Prior to Covid-19, however, the adoption and diffusion of such ideas and innovations had been slow. The pandemic offers the chance to dramatically accelerate these trends.

“Prior to Covid-19, the adoption and diffusion of such ideas and innovations had been slow. The pandemic offers the chance to dramatically accelerate these trends.”

This process can be further supported by incentivising entrepreneurs, researchers and practitioners to pivot their work towards these pressing problems — as Nesta does through our Challenge Prize centre — and by investing in the rigorous evaluation of each intervention. The ultimate prize is substantial: a more direct, disintermediated system of aid provision that harnesses data and the capacity of local communities, in order to deliver help that is faster, more cost-effective and more empowering.

A black and white photograph of two men standing and smiling. The man on the left has a beard and is wearing a dark sweater. The man on the right has curly hair and glasses, wearing a denim shirt. They are both holding coffee cups, and the man on the left is pouring coffee into the cup of the man on the right. A large teal circle is overlaid on the image, partially covering the men and the text.

Empower

The following features are selected subsections of wider contributed pieces written by the four Tech for Good startups in our “Empower” category. These startups are using technology to empower people.

It doesn't always take a lot of money and strategic change to help people live a better life. Sometimes, a helping hand or a bit of education at the right time and place, or a little encouragement to make sustainable choices, can change the course of a vulnerable population's future. The following startup stories showcase efforts to be that influencing factor. Each is working to empower people with the tools, access and information they need to live healthier and more sustainable lives.



There are many ways to empower populations, business and individuals to achieve a higher quality of living.

Exposure to environmental toxins, for instance, disproportionately affects people of lower income status; they are more likely to be exposed at work, in their living environments and in their food. Lyon-based startup Meersens is not only quantifying that exposure, they are also empowering individuals, cities and businesses with the best known ways to correct for it.

Data can also empower consumer decisions, which in themselves can have a big difference in the environmental sphere. An example of this is goodbag, a reusable shopping bag which gives points to its users for their avoided plastic bag usage, allowing them to unlock discounts and use digital points to plant trees or take waste out of the oceans.

Empowerment tech also impacts social welfare. For example, limited access to medical care and prosthetics is a major constraint in lower income economies. Berlin-based prosthetics startup Amparo is democratising access by developing adjustable prosthetics designs that take less time and money to fit than traditional solutions.

Technology can also help fight social taboos. Pakistan-based Aurat Raaj has built a chatbot offering girls non-judgemental, unbiased information on menstrual health. This is part of an effort to change attitudes and norms in contexts where periods are a source of shame and stigma, as well as poor health and even mortality through inadequate access to or use of sanitary material.



Amparo

Founded: 2016

Founders: Lucas Paes de Melo, Wesley Teerlink, Felix Dietrich

Headquarters: Berlin, Germany

Team size: 10-15

Markets: Western Europe, Northern America, Japan

Target markets: Eastern Europe, South East Asia, India

How they make a difference:

Amparo engineers more affordable and adjustable off-the-shelf prosthetics that can be fitted by professionals in less time and without specialised facilities.

Why it's interesting:

90% of the world does not have access to prosthetic care. Amparo is one of the few solutions tackling this problem with low-tech innovation.



Felix Dietrich
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Empowering Amputees with Advanced Prosthetics

While there is no worldwide registry for amputees that would provide a definite number, estimates suggest up to 40 million people require a prosthetic. Their distribution varies across the developed and developing world, but altogether they make an army of amputees and many of them remain underserved.

Let us imagine the rough conditions one might find in many rural areas of Africa. Usually, in these settings, jobs are very physical. If there is ever an accident, the distance to the nearest hospital is far and the transportation is sometimes not immediately available. If a wound gets infected on the long journey, the doctors are called to cut off the infected limb rather than to save as much as possible. At the hospitals, personnel are also too busy to deal with the risk of recurring operations and so default to amputation. Back in the countryside, the now-amputee usually uses crutches.

Activity and mobility almost always work together. One often carries things while walking; people on crutches don't have this ability and are therefore less able to remain active while in motion. To go back to a physical job they had before amputation becomes nearly impossible. Even helping in the household becomes difficult.

In many cases, this means that a former earner for the family is no longer able to provide or help at home, creating even more work for the people around them. Because of these problematic circumstances, many people that lose a limb end up suffering severe social isolation.

Another World Is Possible

The number of amputees is growing globally and now there is an entire industry, which encompasses

businesses like ours, focused on getting them back up on their legs. Unfortunately, the industry faces widespread systematic issues relating to cost and access that hurt its efficacy.

To change the prosthetics economy on a global scale, we envision a three-fold approach that could lead to an industry-wide shift and make the development of low-tech solutions less of a charitable-like effort:

Boost health care funding. Many national public health systems do not cover the cost of advanced — or even basic — prosthetic devices. When a leg has to be amputated, many countries provide basic prostheses through public workshops; however, the technology used by these public workshops is usually decades behind.

We believe it's not desirable to stop aiming for a better quality of care in the industrialised world. We would much rather see governments give a boost to healthcare funding. Ideally, this would bring the country's individual funding for prosthetics to a reasonable level, with the help of development aid. This would allow us and our industry fellows to offer better technical solutions, while simultaneously reducing costs through scaling. Currently, Amparo's

solution is one of only a few prosthetic devices that will be available for reasonable prices to both private and public healthcare providers.

Increase the number of qualified technicians and facilities. Secondly, the general lack of prosthetic technicians and facilities worldwide is hard to overcome. Huge government initiatives are already underway, but the need is drastic. In 2005, in its most recent report on the topic, the World Health Organisation (WHO) estimated that across all developing countries 180,000 trained people are necessary, of which 40,000 need higher training degrees. Unfortunately, in 2005, no more than 400 prosthetists and orthotists were trained per year by the approximately 24 schools in developing countries.

While our prosthetic solution reduces the need for specialised facilities and increases the amount of prosthetics a professional can provide per day, it cannot cope with the sheer size of the gap in professionals.

Lower importation regulation boundaries. Thirdly, there are many regulations on the trade of medical devices worldwide because governments want to protect their citizens from medical devices of inadequate quality. While understandable, in the age of globalised trade, it seems like disproportionate burdens are laid upon importers in many countries. They seem to target less the good of their own people than the protection of the national economy.

A global-level regulatory agency run by the United Nations, for example for medical devices, that clusters national agencies, such as the FDA, EAC, CE, would be a big step towards improved access to medical devices worldwide. Just recently we lost more than half a year in the bureaucracy to deliver a donation of 30 brand new prostheses to Kenya that conform with European regulations.





Reducing Everyday Exposure to Pollutants

Our chief executive has lived in many countries, including Japan, the US and India. But he was most inspired to address environmental risk factors during the five years he spent in Shanghai, China. There his daughter was born during the 2008 milk powder scandal, where melamine was found in the products of 22 Chinese dairy companies. Melamine is responsible for kidney stones and kidney failure and subsequently caused death and illness in many babies.

Frustrated and determined to help people live healthier lives, he started to look more closely at the science of exposome — the collection of all exposures an individual has encountered in their lifetime, and study of how those exposures have impacted their health. The lived exposures include environment, diet and lifestyle.

Exposome can be thought of as a companion to human genome mapping, which breaks down your DNA and analyses how it pre-determines genetic factors from a physical and functional standpoint. When both exposome data and DNA data is combined, we have a powerful data set to learn how genetic factors and non-genetic factors can work together to impact our health.



Meersens

Founded: 2017

Founders: Morane Rey-Huet, Louis Stockreisser

Headquarters: Lyon, France

Team size: 10+

Market: Europe

Target markets: North America, Asia

How they make a difference:

This research and healthtech company collects a range of data about users' environment, diet and lifestyles. Unique AI and modelling data then finds connections between lived experiences and health, which it uses to set preventive paths to help people avoid identified hazards.

Why it's interesting:

Their AI-driven platform sets a predictive and preventive path to reduce sick leave, loss of efficiency and turnover at work, all while helping people to lead healthier lives.



Emilie Calabre
info@meersens.com



The World of Exposome Research

The study of exposome is quite recent. The concept itself was only defined in 2005, so it is not surprising that only a few companies work on it today.

The existing solutions for the study of the exposome are largely top-down. This means the companies are usually specialised in only one field of exposome — for example, air quality or diets — and use only one device requiring a final biological analysis.

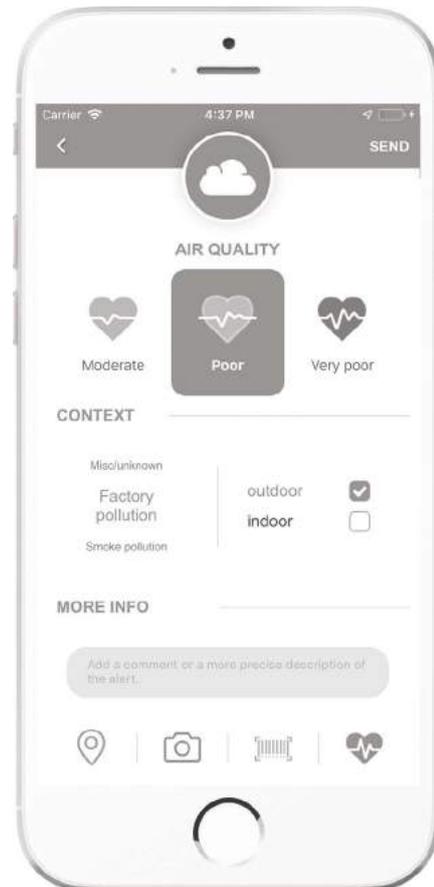
We took a different approach and developed a bottom-up solution that integrates all the tools required for population monitoring. This consists of a software as a service (SaaS) and user-friendly geo-localised application to monitor multiple factors of exposure, such as air pollution, water quality, food quality, noise and UV, but also lifestyle (type of diet, daily habits, physical activity) and medical conditions. Altogether, we are able to process over 700 million points of data on a daily basis to assess exposure and predict any health risks and impacts that could occur in a population's life span.

Our solution takes “feelings” into account as well as objective environmental data (sensors and modeling). This is important because feelings can often differ from data, and it is still useful for clients such as cities and companies to be aware of them to help improve living environments. Without this information, it's very difficult to set a virtuous circle between a city and its citizens, between a company and their employees or a hospital and their patients, and so forth.

“We are able to process over 700 million points of data on a daily basis to assess exposure and predict any health risks and impacts that could occur in a population's life span.”

Personalised, Prescriptive Actions for Long-Term Health

Making this information available is helpful, but we know it is not enough. Our clients also seek more than this from our solution. That's why we decided to go one step further by calculating personalised risk for each member.



Members enrolled in a programme can fill in a profile composed of 64 questions about their lifestyle and medical situation. Combining this information with environmental exposure data, our algorithms allow us to adapt prevention actions to each one.

For example, a city buys the solution for all the citizens and sees from the questionnaire that some percentage of citizens are asthmatic, and therefore more vulnerable to pollution. Cities can view this information on their platform and inform asthmatic citizens through a mobile app in real-time about any environmental risk and provide advice to reduce their exposure. For example, on a day of high concentration of particulate matter and ozone, the city can activate specific tips on the app such as “avoid physical activity and find a place inside” or “avoid polluted areas and go to a less polluted area indicated in the application's map”.

To improve in this preventative area, we are also working on a patented “Personalised Less Exposed Path”. When connected with a member's profile, our AI methods will allow us to indicate paths that will decrease exposure of one or several pollutants for any given person.



Aurat Raaj

Founded: 2017

Founder: Saba Khalid

Headquarters: Karachi, Pakistan

Team size: 4-5

Market: Pakistan

Target markets: Kenya, Tunisia, Sudan

How they make a difference:

An AI-enabled chatbot aimed at 8 to 15-year-old girls is deployed within schools and community centres. The chatbot provides menstrual education, answers questions and prepares them for an often stigmatised life transition.

Why it's interesting:

Aurat Raaj is one of the first social enterprises to use chatbots for reproductive health education in Pakistan.



Saba Khalid
saba@auratraaj.com



Empowering Young Girls with Menstrual Education

The Stigma of Menstruation

At Aurat Raaj we know that skipping school, wearing unsanitary cloth-napkins and facing shame and disclusion from family, teachers and peers while menstruating are common experiences for adolescent girls across the developing world. For centuries, societal norms, gender-inequality and cultural biases have limited girls from understanding and owning their bodies.

While this situation might be most obvious in Pakistan, a country ranked 151 out of 153 countries on the Global Gender Gap Index Report 2020, it is the same in Nepal, where menstruating women are sent to exile in unlivable huts. Many girls die in these huts from dehydration, the inhalation of smoke and fire, snake bites, extreme weather conditions and infections.

Last year, in Kenya, a teacher shamed a 14-year-old schoolgirl so much for a menstrual spot on her uniform that the girl took her own life. In India, the myths around menstruation are so pervasive that a menstruating woman cannot cook for her family as she is considered “impure” — and, if she does, she better prepare to be born as a dog in her next life.

For us to tackle these deep-rooted perceptions about menstruation embedded generation after generation, we cannot just provide free sanitary pads or menstrual cups to girls or give access to an app that predicts their cycle and fertility. It requires normalising the menstrual process through government and private interventions to make sex education widely available even before girls hit puberty.

In countries where there is a youth bulge and an increasing fascination with mobile phones, which

has been accelerated by Covid-19, technology can do what parents, teachers and governments have failed to do for a very long time: provide non-judgmental and unbiased menstrual education at scale, contextualised to the region.

Impact Data Opens Doors

Convincing school administrations to pilot a reproductive health education curriculum felt like a minefield. Even if the top management agree to the importance of this education, they fear pushback from parents once they know these topics are being discussed at schools.

To combat these misgivings, we turned to data. And schools quickly became interested in data from our pilots that showed how menstrual education improves attendance in the short and long term.

Initially, we did not have it. Our impact measurement metrics originally centred on the number of downloads, active users, time spent on our chatbot, ratings, number of questions asked, types of questions asked and satisfaction from the conversation. But, these metrics don't indicate whether the person applied the learnings or not. This made us transition to a different set of evaluation criteria:

- Has the project contributed to knowledge improvement and busted myths around menstruation?
- Have we contributed to the behavioural change of girls over the long term on the basis of how many girls we help move away from cloth pad use to sanitary napkins and adoption of new products (e.g. tampons and menstrual cups)?
- Have we improved mobility and school attendance of girls while on their periods?
- Does this education improve the reproductive health of girls and support environmental and community improvement?

With each pilot we distributed printed surveys, and later digital surveys, to determine the health



knowledge gaps before the chatbot deployment and what changed after the deployment. Longitudinal studies and focus groups over time gave us insights into the short- and long-term impact.

From a sample study of 500 students in our pilot schools we saw:

- 84.4% of girls started believing that periods aren't shameful
- 85% of the girls were convinced to move away from rags and were convinced to use sanitary pads or other hygienic materials during their periods
- 83.2% of the girls started believing that they shouldn't miss school during periods
- 97.5% of girls left chatbot-based learning feeling confident about how to hygienically manage their periods and take care of themselves

We also saw meaningful change in school attendance. For example, before we began our pilot in a particular Karachi school, girls missed at least two days per month. But, after using our chatbot, data showed that 95% of the girls no longer skipped school every month. The girls knew they didn't need to isolate themselves during their monthly cycle and had access to free products through our product partner.

Measuring our impact and seeing these powerful insights has helped us tremendously in convincing new schools to deploy our chatbot, Raaji, and building trust with our funders and partners. Each time we see these results, the team and I are reminded of our purpose and mission. It makes us optimistic that we are slowly but surely impacting society and creating value.



goodbag

Founded: 2015

Founders: Christoph Hantschk, Todor Lazov

Headquarters: Vienna, Austria

Team size: 10+

Markets: Austria, Germany, France, Netherlands, Portugal, Switzerland, United Kingdom

Target markets: Rest of Europe

How they make a difference:

Every time a user goes shopping with their reusable cloth goodbag in any of the more than 10 million participating stores, they are rewarded with the choice to either plant trees, collect plastic waste out of the ocean or get a discount.

Why it's interesting:

It is based on the nudging principle developed by behavioural economist and Nobel Prize winner Richard Thaler.



Christoph Hantschk

ch@goodbag.io



Rewarding Environmentally Positive Choices with Eco-Friendly Benefits

Our economic system is based on the theoretical assumption that every single human always acts rationally and has all available information present in their mind all the time.

But, in reality, we don't — and can't — do that. We are short sighted and mostly concerned about how we feel now or in the few weeks, months or maybe year ahead.

This issue is particularly pertinent when it comes to climate change and plastic pollution. We can't, for example, calculate the effect that our next long-distance flight will have on our well-being and the well-being of others.

If we could take all that information into account, the decisions we make in our everyday life would be too complex. Consequently, these problems can seem so huge and abstract that as a single human

being we often feel that our actions can't solve them anyway. As a result, we feel helpless, resign and keep doing what we always did without changing our behaviour for the better.

Nudging for Good

The solution is right in front of us. We need simple recommendations to act as a guiding light and support us in making better decisions.

At goodbag, we believe that the best way to inform people about climate change and plastic pollution is through technology. That's why we founded a company that uses real-time feedback to support people to behave more sustainably by making everyone accountable in a positive, engaging way.

All users need is a goodbag, a cloth shopping bag, and our free app. Every goodbag has a small NFC (near-field-communication) chip integrated in the logo that connects with the user's smartphone. The most commonly known use case of NFC technology is contactless payment, but it also allows people to interact seamlessly with digital content. At goodbag, we use it to allow users to unlock their rewards when they scan their bag in-store with their phone.

Not only do users get recognition that a reusable bag has replaced a disposable one, they can also choose from rewards like planting a tree, collecting plastic waste and receiving a discount. To activate the reward all they need to do is verify that they brought their goodbag by holding their phone close to the logo.



They then get instant feedback that either their tree is planted, a plastic bag will be collected or they can access a discount coupon to redeem directly in the store. In the app, users can track their impact, see how often they re-use their bag and which projects they have supported, as well as earn digital achievements and badges as an additional reward.

To date, together with our partners and clients, we have donated over €50,000 to community projects, planted 55,000 trees and collected the equivalent of 35,000 plastic bags out of the ocean.

Making Clients Happy: a Value Proposition That Goes Beyond Impact

With sustainability becoming a mega trend, we see many brands struggling to come up with good solutions to involve their customers. We are not a full impact solution for every brand, but goodbag can help companies on their journey towards sustainability.

Brands that communicate their donations through us are directly embedded in the app with their logo and additional information that users can access every time they interact with their bag.

Companies that partner with us want to know: does this brand interaction lead to a higher brand recognition and improve how their brand is perceived by our users?

To evidence a positive brand effect, we ran a case study together with partner company Denner. In the study we showed people different statements relating to sustainability and asked them if they agree with each statement. We compared the results between customers who had never heard of us and customers that owned and used a goodbag.

The results were better than we could ever have expected: the goodbag users rated Denner better in all three categories. With sustainability associations in general we could increase the score by +17.5%, for reducing emissions we saw an increase of the association by +30.7% and when asked if Denner cares about reducing plastic in packaging the response from users was 39.7% higher.



Transform

The following features are selected subsections of wider contributed pieces written by the four Tech for Good startups in our “Transform” category.

Each of these startups is working to change the status quo in industries that impact our daily lives but often go unnoticed, such as clean air, clean water, housing, and construction. Unfortunately, many of the inputs associated with these “basics” are often unsustainable, expensive and disproportionately affect vulnerable populations. Read the startup stories to learn how they are disrupting and transforming the system and fighting for a better future for all.



Our reshaping of the environment over the last century has not, for all its damage, been able to extend the fruits of modernity — clean water, reliable power and job-creating industries — to all of humanity. With millions still lacking access to basic utilities and the infrastructure of a dignified life, there is growing concern about how to provide energy and infrastructure while at the same time lowering our net negative impact on the environment.

Rich nations cannot pull up the ladder and deny modernisation to other countries. Given our planetary constraints, already overshot, startups and scientists are rethinking our most fundamental assumptions.

For example, tech startups Made of Air and Brickify are reimagining the basic building blocks of our society, by substituting raw, resource intensive building materials with readily available recycled plastic or biomass waste.

And at Kraftblock and BOSAQ, the founders are rethinking the fundamental utility systems that fuel us in the modern world: energy and clean water. They are introducing innovative systems that challenge traditional models and cast-off the environmental harm normally associated with these utilities.

Altogether, these startups are poised to transform the way we build, grow and manage our communities for the better.

Andrew McAfee Shares His Optimism for a Sustainable Future

A Malthusian narrative pervades discussions about humanity's impact on the earth: a relentlessly growing population placing ever greater strain on finite resources. Not everyone is convinced by this story. Andrew McAfee, a principal research scientist at MIT and cofounder of the MIT Initiative on the Digital Economy, believes that, thanks to technical innovation and other societal shifts in governance and public attitudes, our impact on the environment is actually growing lighter.

“Thanks to technical innovation and other societal shifts in governance and public attitudes, our impact on the environment is actually growing lighter.”

“I walked around with this largely unexamined assumption that as our populations and our economies grow, our footprint on the planet has to increase. It just seemed logical and intuitive

until I started to see that, in lots of important ways, especially in the world's richest countries, our footprint is lightning,” he says.

One driver is narrowly economic: businesses are continually trying to find ways to eliminate cost and waste, which drives investment into more efficient ways to produce more from less, the title of his recent book. “If it costs money, the business world is going to work really hard to reduce it, and natural resources cost money, plastic costs money, hydrocarbons cost money, minerals cost money, fertilisers cost money. That cost pressure focuses companies like lasers on reducing that cost.” As a result, the overall weight of the economy — “the total tonnage you have to process to generate your economy” — is going down, he says.

McAfee reckons efforts to put a price on pollution, like cap and trade schemes, have been spectacular successes in driving businesses to protect their bottom line. “Economists love to disagree, but over 3,000 prominent economists, including 27 Nobel Laureates and four former chairs of the US Federal Reserve, have signed an open letter backing carbon taxes,” he says.

McAfee believes AI is still underestimated in terms of its ability to detect subtle patterns in huge data sets, which could deliver a shot in the arm for further emissions-reduction reforms: “A great



Image: Healy coal-fired power plant, NOAA



Image: Data centre, imgix

example is energy management in data centres, which are energy hogs. We can make not marginal improvements but huge ones in terms of energy use of data centres. And a lot of what goes on in those data centres is work to reduce our footprint overall as companies use cloud technology to trim away materials and make savings. Those savings will add up.”

“Efforts to put a price on pollution, like cap and trade schemes, have been spectacular successes in driving businesses to protect their bottom line.”

McAfee is also optimistic that, despite slow progress in shifting the energy mix towards renewables, history shows that countries can, with political will, rapidly shift relative shares. Nuclear energy quickly enlarged its share of the US energy mix until the Three Mile Island and Chernobyl disasters led to a nuclear winter. But, the sunseting of coal is happening a lot quicker than anyone anticipated, he says.

Not everyone will take well to a book about how capitalism and technology will cure a climate crisis that, to many, it has created. But McAfee is not an ideologue and recognises the real ways in which

capitalism has so far failed: “Markets don’t put rails outside themselves. You need other approaches to deal with those serious challenges.” But, he is opposed to any environmental agenda predicated on stopping economic modernisation in the developing countries that are yet to enjoy the fruits of industrialisation.

“Countries follow what economists call an environmental Kuznet’s curve, meaning that pollution increases in the early stages but then levels off as incomes rise.”

In contrast, he argues that countries follow what economists call an environmental Kuznet’s curve, meaning that pollution increases in the early stages but then levels off as incomes rise and populations become more concerned about the environment — and economic dynamism itself provides the innovation to deal with it.

He says: “I am opposed to the view that affluence is the problem here. Our most urgent work is to help the rest of the world get wealthy as soon as possible, because the evidence is clear that when societies and countries get wealthier, their footprint initially gets heavier and then they hit a plateau and it starts to go down. They start to be affluent enough to care about the planet and to take better care of it”.

“Our most urgent work is to help the rest of the world get wealthy as soon as possible.”



Andrew McAfee

Co-Director of the MIT Initiative on the Digital Economy



Made of Air

Founded: 2016

Founders: Allison Dring, Daniel Schwaag

Headquarters: Berlin, Germany

Team size: 10+

Markets: Germany, USA, Scandinavia

Target markets: Rest of Europe

How they make a difference:

Their materials for use in construction, interiors, furniture and more are made up of 90% atmospheric carbon. The materials are suitable replacements for those that use plastics.

Why it's interesting:

For every 1 ton of their material, approximately 2 tons of CO₂ are permanently removed from the atmosphere. Using the materials in manufactured goods means that consumer products can become engineered carbon sinks.



**Neema Shams
& Allison Dring**
neema@madeofair.com



Producing Materials That Capture Carbon from the Atmosphere

Materials represent one of the most significant contributors to the climate crisis. It is a “sleeping giant” of a problem that surrounds us at every turn but remains vague to the everyday person.

Where do materials come from? How are they processed? Which ones are “good” and which are “bad”? These are questions that involve branching industries and no simple answers. One thing that is for certain is that in any projected path of humanity, materials demand will drastically increase in the years to come.



The Truth of Construction Material and Waste

Made of Air was born out of a previous venture, Elegant Embellishments. In 2016, we had invented a facade system called prosolve370e that uses sunlight to break down harmful pollutants and reduce urban air pollution. To create the shapes needed to increase the technology's efficacy, the substrate material had to be plastic. This process revealed to us several problems, but also an opportunity.

The first problem we noted was that there is a critical lack of sustainable materials for durable applications. Our founders had collective experience centred on the built environment, including inventing and manufacturing façade elements for buildings around the world, and had come across this problem in all regions.

We saw that in sourcing building products, single contracts are responsible for enormous material volumes. The decisions are often not affected by public pressure: most building projects are procured and applied within opaque channels. As a result, the conservative building and construction industry has become one of the largest polluters in the global economy. The sector was responsible for approximately 40% of greenhouse gas emissions in 2018.

As it stands, the vast majority of our material resources are not renewable, not sustainable and quickly depleting. These facts stem from not only material discovery and processing methods, but also from economic systems that push for scale and rock bottom prices. The industry has never taken the environment or the true cost of materials into account. Rather, only the short-sighted gains to be had by taking advantage of the globalised economy. To address these critical and underserved problems of supply and demand we saw that we needed to urgently rethink our materials systems.

The Made of Air Solution

In studying plastics, it is immediately obvious how simple some of them are. They consist mostly of hydrocarbon chemistry. Early on, it also seemed obvious to us that this fossil-based chemistry should be replaceable by elements of the earth's atmosphere that were negatively contributing to climate change. So, we thought that if we could connect our material demand with the excess carbon in the atmosphere, we could effectively take our largest challenge and turn it into our largest resource.

From these beginnings, Made of Air has evolved to become a sustainable materials partner. We produce renewable, durable plastics made from

waste biomass. By doing so, we enable manufacturers to permanently store carbon in products and the built environment. While succinct, this statement represents the layers of value that Made of Air brings through its solution.



Our materials are renewable. This means that all elements of Made of Air thermoplastics are bio-based. Unlike most plastics, they do not come from limited resources such as fossil fuels or mined materials. Humans can grow plants again and again but they cannot create more cobalt. Additionally, Made of Air materials are renewable in the circular sense, as they can be recycled and used again for other applications.

Our materials are durable. Made of Air's thermoplastics target durable use cases, which represent around 50% of the overall plastics market. These use cases include industries such as furniture, automotive and the built environment, where plastic elements can have life cycles of between 10 and 30 years.

Our materials are made of waste biomass. Made of Air uses low-value waste products that would normally be burned or landfilled to create our high-value thermoplastics. The process can be used for a variety of waste biomass types. Currently, as Made of Air is a European-based company, the regionally plentiful waste biomass comes from the wood industry.

Our materials permanently store carbon. Made of Air's biggest goal is to take carbon that would normally go into the air and permanently prevent it from doing so. The concept is, as William McDonough, founder of Cradle to Cradle, puts it, putting carbon to work. Currently, we do this by trapping the carbon stored in biomass waste in the permanently stable form of biochar, and then sinking this carbon content into a useful bioplastic material. This process creates a carbon-negative bioplastic which stores around twice its weight in carbon.



Kraftblock

Founded: 2014

Founders: Dr. Susanne König, Dr. Martin Schichtel

Headquarters: Sulzbach/Saar, Germany

Team size: 9

Markets: Germany, Netherlands, Belgium, USA, India

Target markets: Rest of Europe, China

How they make a difference:

To stop excess heat from going directly into the atmosphere, Kraftblock uses a modular system to capture and store energy for later use. It's a solution that's arrived just in time as regulation cracks down on the worst waste-heat industries.

Why it's interesting:

Kraftblock is the only mobile but also modular stationary solution that can take temperatures ranging from 350-1,300 degrees Celsius, making it applicable across a range of industries.



Martin Schichtel

welcome@kraftblock.com



Reclaiming Wasted Thermal Energy to Reduce Energy Demand

Almost everywhere that heat is produced excess energy is released as waste-heat or waste-energy. Just imagine a flare gas stack burning in steel plants or on an oil and gas field. Uncountable gas stacks are burning 100% of their energy to the atmosphere. That is energy that could be utilised with the right infrastructure in place, thereby reducing primary energy consumption, as well as eliminating megatons of carbon dioxide emissions.

That's why we developed Kraftblock, which helps to capture thermal energy and utilise it on demand. Kraftblock storage systems are like a safe for energy; they store excess energy, keep it safe and deliver it when it's needed. This increases the value of formerly lost energy and helps to protect our resources and minimise emissions.

Finding Funding: a Catch-22

Cleantech is a growing niche that investors are increasingly supporting, but it is difficult to find investors who finance hardware developments in the cleantech sector.

“Cleantech is a growing niche that investors are increasingly supporting.”

Software products have the greater advantage. They are being produced quickly and can more easily find users. They can also scale at the push of a button. Only a few make it as the competition is high, but if they do, they usually become very large.

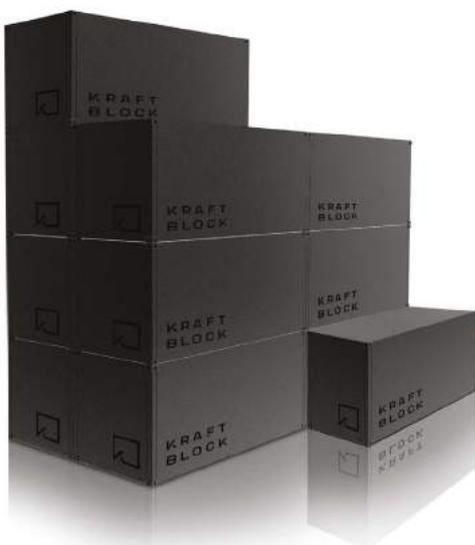
On the other hand, hardware startups like Kraftblock need much more time and money to develop,

especially in the area of large technical systems. Altogether, it takes about 10 years of development and testing before sale of the product can start. During that period, there is little turnover and it is difficult to scale; however, if the product is accepted by the market — and this is a very large market, e.g. the €20 billion flare gas market — and there are almost no competitors, the developed product can be sold for 10 to 20 years without further development, updates or similar. Then scaling is easy.

Only a few investors understand these relationships. Even if they do, there is a difficult catch-22: to be attractive to investors, a hardware startup must have the product, at least one prototype and ideally 1 to 2 contracts with customers, as well as preferably a product that has been integrated into the customer's production line. On the other hand, the customer can only be convinced to contract a new hardware with references from the industry and when, ideally, it has been operating data for 3 to 5 years.

Regulation Gives Hardware a Boost

Despite the many challenges cleantech hardware companies face around funding, investment and initial contracts, Kraftblock has performed incredibly well.



We managed to build partnerships with suppliers like Kanthal, integrators like MAN and contractors like Steag New Energies. Meanwhile, we are in deep talks (concepts and techno-economic feasibility studies) with approximately 30 customers, as well as discussions about commercial offers with nearly 10 additional customers. The budgets for those offers are between €100,000 and several million euros, which means that we reached our commercial milestones earlier than planned and nearly double as fast as our competition.

“It is undeniable that our solutions are increasingly necessary.”

We have been able to overcome the challenges to investors' risk model because it is undeniable that our solutions are increasingly necessary. Per recent regulations, some industries need to decarbonise quickly: ceramic, steel and glass industries are top of the list. Because of this, we have already succeeded in selling pilots to these industries.

We also put our first fully commercial “heat2go” model on the literal street to act as the world's first mobile high-temperature heat system. This means our storage container recovers heat from a small combined heat and power (CHP) plant — these are not big power plants, but small ones that supply villages or rural areas and do not have large piping systems like those typically found in district heating systems. Then the storage is transported by trucks approximately 10km to a “heat sink”, another smaller industrial company that uses the waste-heat for its hot water and heating system. Heat that was usually released into the atmosphere is now recovered and replaces primary energy at the heat-sink. Furthermore, it decreases the emissions at the sink, as the heating system is replaced by the heat2go-system.

With this pilot, we have effectively created a new business model for the CHP operators. If all those storages are fully operational, they will save 10.6GWh of gas each year and avoid the formation of approximately 2,300 tons of carbon-dioxide each year.



BOSAQ

Founded: 2015

Founders: Pieter Derboven, Jacob Bossaer

Headquarters: Ghent, Belgium

Team size: 12-15

Markets: Belgium, Suriname, South Africa

Target markets: Bulgaria, Romania, Moldavia, Ukraine, Ghana, USA, Bhutan, Liberia

How they make a difference:

Bosaq has designed a chemical-free company water purification system that helps decentralised water systems function more efficiently and affordably. IoT systems help local engineers target maintenance needs and quality issues early so that water can always meet high standards for clean water.

Why it's interesting:

Bosaq's prefers a business to government (B2G) model, which means they regularly contract for big deals and get project financing relatively easily.



Jacob Bossaer

jacob.bossaer@bosaq.com



Bringing Clean Drinking Water to Remote Areas

It is estimated that about 785 million people worldwide permanently lack access to a source of clean, safe drinking water. And 2.2 billion people do not have access to a safe source of drinking water at least once a year. In light of the Covid-19 pandemic, access to clean drinking water is even more important as hygiene is essential in the prevention of illness.

The future supply of clean drinking water is only anticipated to worsen. The World Health Organisation (WHO) states that by 2025 half of the world population will be living in water-stressed areas. This is increasingly becoming both a source of conflict and of poor health.

“By 2025 half of the world population will be living in water-stressed areas.”

That's where we come in. At BOSAQ, we're working on a technical and systematic solution to ensure

safe drinking water is accessible, affordable and reliable in even the most remote areas.

Water Is Political

One of the most important things we discovered was that drinking water is a political product. Anywhere in the world drinking water is managed by public companies, or at best public-private-partnerships.

The availability of drinking water is a huge social enabler within communities. It is an underlying factor in creating equality, education, better health and higher living standards. For example, we are engaged in a project to provide drinking water in a village in Suriname where a school is closed in the dry season because of the lack of drinking water for the teachers coming in from the capital (they do not drink from the river). The indirect effect of providing drinking water to these communities is better education. Another example is the time consumption of women, who are largely tasked with fetching water and therefore forced to spend time away from school or other things in their communities.

The task of governments is to enable these communities, hence providing clean drinking water; however, this can only be done if water is available at democratic prices. If prices were determined by the laws of supply and demand, it would become extremely expensive in areas where it is hard to find, resulting in riots and protests. So, politicians have an incentive to supply high quality drinking water to the population at a low price. Politicians therefore

want a robust drinking water supply system — preferably at low cost to them.

A side effect of this pricing model is that innovation in the water sector has been scarce. And risk taking with new technology is always more difficult when public health is involved. This is a challenge but also a huge opportunity for companies like ours. If we can show improved technology at low cost while providing high quality drinking water in a (new) decentralised approach, our experience shows that governments strongly welcome it.

Interestingly, even when political stakeholders are on board this may not be sufficient. We have found that some local communities have a tendency to approach new technology like ours with hostility, unless they can be part of it. So, as part of our political negotiations, we always offer to educate communities about what we do and provide information about why clean drinking water can benefit their health, education and more.

And, ultimately, the joint buy-in from local governments and the community is crucial for a successful long-term deployment of our systems. Local ownership is especially important because it prevents the systems from breaking down due to neglect or disinterest. Financially it is a win-win situation: on one hand, when local communities charge their villagers for water, the villagers feel confident in the quality; on the other hand, with the profits from the water the government can recoup the cost of maintenance and invest in other necessities for the community.

For a company like BOSAQ, political structures, power play within governments, rural importance in election time and water issues on the political agenda (which is almost always the case) are far more important than the technological superiority of our systems. Our business developers and salesmen are more political lobbyists than salesmen. We partly convince our customers with our technological superiority, but rely a lot more on our vision of bringing drinking water to their constituents. In this sense, we strive to significantly reduce the total cost of ownership for decentralised drinking water supply with a specific and main focus on a B2G (business to government) model.





Tackling Plastic Waste and Homelessness

The plastic industry in Nigeria is growing rapidly. Over 3,000 plastic companies exist in the country today, a massive leap compared to the 50 companies that launched the industry in the 1960s. A survey by the National Bureau of Statistics revealed that the industry has witnessed a significant increase in the past decade alone, with an annual growth of 13.9%, from 120 kilotonnes in 2007 to 442 kilotonnes in 2017 and now 513 kilotonnes in 2020.

But, plastic production isn't the only problem. It's also how we handle it and what we do with it. Unfortunately, as the human population increases, waste generation increases. In Lagos State, Nigeria's major capital hub, already 15,000 metric tonnes of waste are generated daily, of which 15% are plastic waste. Of all categories of plastics, single use plastics (disposable plastics) are the most harmful to our ecosystem. There is rarely a well-defined infrastructure to manage these wastes.

At Brickify, a Nigeria-based company, we are aiming to turn one problem into a solution. We take discarded plastic and turn it into affordable, high-demand building materials that help low-income populations live in dignified homes. We also use these bricks to construct roads and meet a variety of other development needs.

One of our floor bricks is built with at least 50 PET bottles, while a house brick uses at least 200 to 300 PET bottles. To build the bricks, we collect plastic wastes from water bodies, as well as places where plastic wastes are generated on a daily basis, such as households, religious centres, corporate offices and schools. Our collection efforts ensure we reduce and, in some cases, eliminate plastic pollution. This strategy to collect plastic waste not only helps guarantee us a constant supply of material, but also increases the involvement of citizens.

Brickify

Founded: 2019

Founder: Oluwamayowa Salu

Headquarters: Lagos, Nigeria

Team size: 10+

Market: Nigeria

Target markets: Kenya, Zimbabwe, Algeria, Egypt

How they make a difference:

Brickify organises local plastic waste collection in Nigeria. Plastic is then cleaned and transformed into plastic bricks. The bricks fit together like legos and can be quickly used to construct much needed, affordable and high-quality houses and roads.

Why it's interesting:

Tons of plastic are needed for each building. To ensure a steady supply, Brickify establishes waste management systems in areas where there previously wasn't one. In this way, it is tackling many systemic problems at once.



Oluwamayowa Salu
salumayowa@yahoo.com



The house bricks are fashioned in the form of a “lego” set: they interlock and do not need additional materials such as cement, iron bars, water or any other substance or elements. Just purchase the bricks and interlock them. Our bricks can be used to build houses, hospitals, schools, kiosks, business offices, low cost houses and resettlements for the displaced.

“Our bricks can be used to build houses, hospitals, schools, kiosks, business offices, low cost houses and resettlements for the displaced.”

Changing the System

Homelessness is a bitter experience and millions struggle with it on a daily basis. I have been homeless before and I know the pains. As a young graduate, I was not only unemployed but couldn't afford a house. I lived in my pastor's office for 11 months before I could get an affordable shelter, even though the eventual house I got was dehumanising.

In Nigeria, my story is not unusual. Countless people sleep under bridges, in makeshift shelters, in refugee settlements, as well as shelters not fit for humans. The rising rate of unemployment has worsened the situation. In most parts of Africa, countries are struggling with their economy, there is rising poverty, terrorism and internal conflict, which have all fuelled and increased the number of Internally Displaced People, as well as made people homeless. Homelessness demeans and is a cause of poverty, increased risk of disease, exposure to crime and robs people of ambition.

This is why I founded Brickify. I passionately pursued a solution that will not only help to address environmental and societal issues, but also one that increases the ease of building and affording a house.

We believe that we have the solution to tackle homelessness in Africa, hence we need to scale our project. We have prototypes and are currently building our first 200 houses in partnership with an anonymous client. Our plan next year, hopefully in the absence of another pandemic, is to build at least 3,000 housing units and recycle over 10,000 tonnes of plastic waste in the process.



Systemic Change for Stopping Ocean Plastics Pollution



Dr. Manuel Braun

SYSTEMIQ

Even as the COVID-19 pandemic dominates headlines, there is no shortage of news on ocean plastic pollution, which continues unabated. In fact, it is set to worsen and represents a fundamental ecosystem threat. On the current trajectory, the world will see the amount of plastic waste entering the ocean triple — from 11 million metric tons (Mt) today to 29 million Mt by 2040. But a new study from The Pew Charitable Trusts and SYSTEMIQ, published in the journal *Science*, shows the world has all the technologies it needs today to radically reduce ocean plastic flows by 80% in twenty years. But, to achieve this, we need a total overhaul of the world's plastics system, including the production, collection, consumption and disposal/recycling of plastic and plastic waste — it requires integrated system change.

“A new study shows the world has all the technologies it needs today to radically reduce ocean plastic flows by 80% in twenty years.”

Innovation is a critical driver. Fully eliminating the flow of ocean plastic pollution will require a dramatic increase in investment and a far greater focus on research and development to deliver disruptive interventions and new business models that will

move the world closer to eliminating 100% of the plastic entering the ocean.

Disruptive and ambitious interventions are needed to underpin a plastics economy that is smarter, more sustainable and circular: reducing the growth in plastics production and consumption, establishing effective substitutes, designing products for recycling, doubling recycling capacity, limiting waste exports, reducing microplastics sources and radically expanding waste collection rates in middle- and low-income countries. First, a comprehensive understanding of the system and all the factors contributing to ocean leakage is needed — this will enable the stakeholders along the value chain, waste flows, capital streams and more to set substantial ambitions in line with the key system transitions needed. A common emerging vision of a more sustainable system is essential to create the right enabling conditions and to mobilise actors so that interventions materialise — for example, by creating coalitions of stakeholders that reinforce each other's actions.

Entrepreneurs can play a key role as system-level innovators and accelerators to drive system change. Programs like RESPOND have the potential to catalyse their impact. GOT BAG and Brickify are two great examples of innovators addressing the challenge of ocean plastic in a systemic way. GOT BAG is an example of how a startup can build sustainable products that reduce ocean plastic and implement an operating model that follows circular economy principles, while mobilising consumers towards more sustainable product choices. Similarly, the entrepreneurs at Brickify prove that we can realise innovative reuse applications for plastic waste that not only reduce plastic waste entering the ocean, but also create social, environmental and economic benefits.



Image: Project STOP

Thomas Jarzombek Says Startups Need More Government Support

How effectively are governments working with tech companies on delivering public services? Could you discuss this within the context of Germany?

We have been working together with tech companies for many years, especially in the field of Government. Digital technologies have become an integral part of urban planning. Going forward, we want to step up our efforts to digitalise public administration. There are great opportunities, especially in the fields of education, energy, health and transport.

During the crisis, the hackathon launched by the Federal Government under the hashtag #WirVsVirus has clearly demonstrated what digitalisation and creativity can achieve. Within 48 hours, almost 1,500 solutions from 'society for society' were collectively developed throughout Germany. We want to continue to harness this momentum for innovation to revitalise our economy after the crisis.

In my view, the government should do far more to support startups. In this respect, I believe we should follow the lead of the United States, where NASA has placed orders worth \$10bn with Elon Musk's startup SpaceX. This is the approach we need if Europe is to be the birthplace of the next Google or Facebook.

Do you think today's startups are focusing enough on the big societal challenges, rather than concentrating on consumer tech?

I can confirm that Germany is home to a large number of startups that want to make a difference in society. For example ReDI School of Digital Integration is a non-profit enterprise that offers programming courses for refugees with an interest in IT, making it easier for them to kick-start their career in the tech and startup scene.

If we want to meet the challenges of society, social entrepreneurship is key. This is mirrored by the results of the German Social Entrepreneurship Monitor for 2019. For the vast majority of the companies surveyed (83.5%), making an impact in society is more important than financial profit.

What measures are the German government taking to protect startups from the Covid crisis?

The federal government has implemented a €2bn programme to support startups, new technology companies and small businesses during the Covid-19 crises. Within the first of the two pillars of the programme additional public funding for startups is provided through venture capital investors via the public fund-of-funds managed by KfW Capital and the European Investment Fund. This additional funding — the so-called Corona Matching Facility — can be used for funding rounds for startups as part of co-investments made jointly with private investors (pari-passu according to the European State Aid-Framework).

The second pillar of VC financing and equity replacement financing is made available for small businesses and startups (up to a maximum of €75 million in revenue annually). This is done via regional promotional institutes and taking into account the rules under the Temporary Framework for State Aid adopted by the European Commission to support the economy in the current Covid-19 outbreak.

Additionally, 100 startup teams that are at the end of their funding period within the EXIST programme have been receiving unbureaucratic assistance from the German states (Bundesländer) since March 2020. This includes the extension of the funding period by up to three months in justified cases and a corresponding increase of funding.



Thomas Jarzombek
German Commissioner
for the Digital Industry
and Startups



Tech for Good: Here to Stay?

The Tech for Good agenda has gathered steam over the last decade, with breakout startups and large corporations demonstrating that positive impact and profit can be more than balanced and actually fuse together. But, companies can only make a difference by remaining in business. What are the key challenges and headwinds for the sector?

The Covid-19 pandemic is both a threat and a stimulant, depending on the segment in question. Some investors have pulled back from otherwise sound businesses that are too exposed to the disruptions of the current era; Yunus Social Business, for instance, was nearing an investment in a startup providing reusable cups at events but did not proceed. The fund reckons the virus will remain a daily reality for a three to five-year time horizon, factoring in the long road from vaccine development to universal access, especially in resource-constrained economies, according to chief executive Saskia Bruysten. This meant the company could not achieve its impact.

Karma, the Swedish food waste app, suffered from the closure of food outlets and widespread nervousness about travelling. While they started a new delivery service, and saw an uptick in users in some locations, cofounder Elsa Bernadotte stresses the importance of keeping the conversation about climate and sustainability in the public mind while Covid-19 dominates the agenda. Amanda Feldman

at Heliotropy makes a similar claim, informed by her research with the Predistribution Initiative; that issues of wider systemic risk, like financial sector inequality or climate change, cannot be put on hold.

At the same time, the pandemic is also a spur to innovate. Digital health reforms have moved faster in six months than in the decade previously, from telemedicine and remote consultation to contact tracing, wellbeing and mental health apps and health analytics. The crisis has also revealed the connectivity between social, economic and environmental problems. Amanda Feldman describes Covid-19 as an environmental crisis that morphed into a health crisis, which itself overlaid onto structural inequalities in our societies: “I think we will refocus in the near future and, when we do, it will not just be on climate issues or social issues, but the intersections between them.”

“Covid is accelerating the reality that capitalism is broken, but the spirit of entrepreneurs is not broken,” says Marcello Palazzi, cofounder and board member of non-profit B Lab Europe. “How do we shift it towards solutions that increase wellbeing and prosperity?”

A second shift is the risks that come with success. As Tech for Good and the broader ‘impact investment’ agenda go mainstream, companies can jump on the bandwagon and reduce the field

to empty marketing. ‘Greenwashing’ has become all too familiar in the environmental domain, as companies make vague claims or brandish their ecological commitments through isolated corporate social responsibility initiatives rather than integrating environmental impact into their core business. ‘Social washing’ and ‘impact washing’ could be the next chapter in this nefarious practice, manifested in companies picking their own metrics, creating fluffy codes of conduct or refusing to share the data needed to assess true progress. In a sense, such washing is, like plagiarism, a sort of respect. “I have given up on worrying about this,” says Antonio Miguel at MAZE Impact. “If there’s greenwashing or social washing, at least it’s because the market is becoming bigger. This didn’t exist when it was niche.”

But, more rigorous reporting norms and practices will help protect the authenticity of Tech for Good and the wider movement of positive impact business. “Eight years ago, we were talking about impact investing, but no one could really tell you what it was and if they did, they were making it up,” says Amanda Feldman, who co-facilitated the Impact Management Project (IMP), an initiative bringing together over 2,000 practitioners to agree on impact performance reporting. Today, more and more companies are integrating financial and non-financial reporting, bringing ever-more clarity into what constitutes a beneficial impact and how to report on it.

“Right now, there’s a consensus emerging around this and a push to align standards on the impact of your portfolio. We know what data we need,” says Feldman. “The more that impact reporting initiatives progress and pioneering companies break new ground in the detail and rigour of their impact data, the more mature the overall conversation will become,” she adds. “If you know how to read a financial statement, you’re going to ask the right questions about what’s missing. We are getting to that stage now with impact reporting.”

“Technology is making it easier and less expensive to get data. It’s like riding a bicycle or going on a rocket — now you have a rocket,” says B Lab Europe’s Palazzi. “You can measure anything on a dashboard.” But, he adds that tech alone is not enough: “The important shift is in the culture of

business and leadership. Just like we had the Six Sigma management philosophy of process improvement, we need new ways of doing things, as much as needing more technology.”

Last but not least is securing Europe’s place in the global competitive landscape in Tech for Good. Thanks to the resources and policy direction of the European Commission and many leading governments, the continent should be a front-runner in developing the Tech for Good portfolio. But, it has fallen behind in areas like AI and consumer technology, with China and the US staking out leadership positions. Will the same fate befall the social and environmental tech sectors?

“Europe continues to be very strong on research and science, but less so on development, deployment and scaling up of technologies, but there is now a realisation about this problem,” says Ann Mettler at Breakthrough Energy. She argues that the EU Horizon programme and the European Commission Innovation Fund, are starting to invest more in technology transfer and demonstration projects, helping to put science and lab work on a path towards commercialisation. Another challenge for the region is to link its high-level objectives with all of the tech enablers needed to get there. Energy storage systems, for instance, are critical to meet Europe’s climate targets, but more support is needed to drive systemic adoption of energy storage.

“The great businesses of the future will be those that profit from solving a social or environmental issue.”

Antonio Miguel
MAZE Impact

Ultimately, says Antonio Miguel at MAZE Impact, the need to align business and impact will come not from corporate volunteerism and ad hoc initiatives, but market pressure in a changing world: “The great businesses of the future will be those that profit from solving a social or environmental issue, rather than creating them. For the latter, consumers won’t want to buy from them, talent will not work for them, and capital holders will not invest in them.”

Protect Empower Transform

Tech Innovations
Changing the
World

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