



# GLOBAL OPPORTUNITY REPORT 2017

Your guide to a world of opportunities

# **GLOBAL OPPORTUNITY REPORT**

**2017**

Global Opportunity Report 2017, First Edition is published by DNV GL AS.

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The survey reported on in this report was conducted in collaboration with the research company YouGov. There are a total of 5,499 completed Computer-assisted web interviews (CAWI) with persons with management responsibility working in companies with a minimum of 100-200 employees. The survey was conducted between 30 September to 23 October 2016.

DNV GL AS,  
Høvik, Oslo

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## PROJECT PARTNERS



### DNV GL AS

Driven by the purpose of safeguarding life, property and the environment, DNV GL enables organizations to advance the safety and sustainability of their business. DNV GL provides classification and technical assurance along with software and independent expert advisory services to the maritime, oil and gas, and energy industries. The company also provides certification services to customers across a wide range of industries, such as Life Sciences. Operating in more than 100 countries, its 15,000 professionals are dedicated to helping its customers make the world safer, smarter and greener.



### UNITED NATIONS GLOBAL COMPACT

The United Nations Global Compact is a call to companies everywhere to align their operations and strategies with ten universally accepted principles in the areas of human rights, labour, environment and anti-corruption, and to take action in support of UN goals and issues embodied in the Sustainable Development Goals. The UN Global Compact is a leadership platform for the development, implementation and disclosure of responsible corporate practices. Launched in 2000, it is the largest corporate sustainability initiative in the world, with more than 9,000 companies and 3,000 non-business signatories based in over 160 countries, and more than 70 Local Networks.



### SUSTAINIA

Sustainia is the biggest Nordic think tank on sustainability founded by the media corporation Monday Morning. Through seven years of comprehensive experience with mapping solutions to global risks, Sustainia has become the leading provider of sustainable business solutions worldwide. We identify readily available sustainability solutions across the world and demonstrate their potential impacts and benefits in our work with cities, companies, and communities. As a world leader in navigating the new market opportunities for the Sustainable Development Goals and with a database of more than 4,500 cutting-edge innovations, Sustainia's mission is to innovate the business models of the future.

# DARE TO THINK BIG

It all happened with remarkable speed. Within a year after the adoption of the new Sustainable Development agenda, businesses and governments around the world integrated the Sustainable Development Goals into their strategies. Frontrunners from all sectors and regions recognized that this new agenda changed everything.

Now these frontrunners are readying to operationalise their new visions of the future. This is where the opportunity mindset comes in: to seize the new opportunities presented by the post-2015 world means grappling with complexity, daring to think big, and moving out of your comfort zone.

## Proof of concept

The first Global Opportunity Report was born in 2015, the same year 193 nations adopted the Sustainable Development Goals (SDGs) in the UN General Assembly. In an increasingly complex world of interconnected financial, political, environmental, and social risks, this report set out to actively engage with the changing global risk landscape to develop a navigation tool for decision-makers. The first report found there are sustainable opportunities to be pursued in every region across the globe. In 2016, these insights were built upon by findings that businesses are ready to take on the responsibility of building a more sustainable future, and they see the SDGs as a guiding tool on this quest.

The fact that so many businesses have integrated the SDGs into their strategies is a testament to the staying power

of the mindset behind the Global Opportunity Report: these businesses have looked at the enormous challenge posed by the new Sustainable Development agenda and recognized they need to grapple with these challenges to succeed now and in the future. Some of the best results of this realisation are demonstrated by Sustainia's mapping of sustainable solutions, which is being elevated in the coming Global Solutions Platform, to be launched in 2017, with UN Global Compact and DNV GL. The exponential growth of sustainable solutions shows just how many opportunities for change are out there.

DNV GL's study, "Future of Spaceship Earth, Business Frontiers," confirms this trend. The study investigates both the likelihood we will reach the Global Goals by 2030 and highlights businesses doing the work to get there. The world's most visionary businesses realise they must change course.

Determined to build their pursuits of profit on the foundation of a bigger purpose, these business leaders are truly demonstrating the benefits of turning risk into opportunity.

## Mind the gap

Identifying your next big opportunity among a myriad of global trends is a daunting task. Addressing this challenge is the driving ambition of the Global Opportunity Report. Like the first and second editions, the 2017 report focuses on five global risks. The risks covered by the third edition are: cities disrupted by climate change; cyber threats; rising

inequality; soil depletion; and unstable regions. Based on these risks, we mapped 15 corresponding opportunities via a thorough review process with experts and a global survey engaging 5,500 leaders.

This year, our survey respondents overwhelmingly agree inequality is the biggest global risk we face. And, yet, the three opportunities to address this challenge were among the lowest ranked compared to the other 12. This apparent gap between the world's biggest challenges and the biggest opportunities tell us the potential benefits of addressing the most serious risks are enormous - but no one feels empowered to take on the challenge.

The lesson of this year's Global Opportunity Report is that closing this gap between risk and opportunity takes new innovative partnerships that can address the challenge from multiple angles. It requires a new leadership paradigm - opportunity leadership.

This report is dedicated to all the opportunity leaders out there.



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# EXECUTIVE SUMMARY

## Shape tomorrow's society

It has become a truism that the movement of data, people, and goods connects us all in unprecedented ways across geographical boundaries. This report is a direct product of this reality, born out of a determined belief that behind every global risk the world faces hides multiple opportunities to innovate and create better, more prosperous, and sustainable societies. Our work is cut out for us, as clearly demonstrated in the Sustainable Development agenda adopted by the UN General Assembly in 2015 – and perhaps just as much by the global political developments of 2016.

### AN INCREASINGLY IMPORTANT MISSION

Now in its third year, the Global Opportunity Report continues its pursuit to map tomorrow's sustainable markets. The myriad market opportunities we have identified over the past three years – of which only the very best made it into the reports – are a testament to the vast possibilities for progress and innovation in the face of seemingly stifling uncertainty.

In the ever-more complex environments businesses are forced to operate in, their ability to analyse, confront, and utilise uncertainties is critical for their success. Further, the vast majority of businesses need to look beyond their own immediate financial interests for this success to last. In other words, they are deeply dependent on the well-being of their surrounding community and, by extension, the world at large. We believe – and our data confirms – businesses are increasingly willing to take on this challenge. As with last year's top risk, unemployment, businesses this year are particularly concerned about inequality, which 46 percent of respondents identify as most worrying.

Those at the forefront of their industry know they must embrace sustainability as a core part of their business rather than an add-on. What they really need is new inspiration to tackle these problems through innovative partnerships, technologies, and solutions – and that is what the Global Opportunity Report seeks to provide.

### HOW TO READ THIS REPORT

As in 2015 and 2016, this report presents five global risks and 15 new sustainable market opportunities that directly address them. Through a consistent innovation process involving digital conversations, opportunity panel, and a global online survey with 5,500 respondents, the Global Opportunity Report has created a new market universe over the past three years.

With risks ranging from extreme weather, water shortage, and unsustainable urbanisation to non-communicable disease, youth unemployment, and the global food crisis, we recommend you consult all three Global Opportunity Reports and seek out the risk areas most relevant for you.

In this year's report, we take stock in a "Trends" chapter to decipher what defines the 45 new markets we have uncovered during the three years of this project, and how businesses can work with them.

### SEIZING THE MOMENT

At the launch of this report, in early 2017, there is no doubt we live in disruptive times. Complex and interconnected crises in the political, environmental, and social spheres are taking hold of our world – and it is time change-makers with a

shared vision for a sustainable future seize the moment. The mindset driving this report does not seek to make things a little better. It is a mindset seeking to turn around our conception of good business towards a more holistic vision of profit and purpose.

We hope you will join us in our pursuit of new market opportunities and help shape tomorrow's sustainable society.

### SUSTAINABLE DEVELOPMENT GOALS



# FROM 15 LEADING GLOBAL RISKS TO 45 OPPORTUNITIES

In every risk lies an opportunity. The three publications of the Global Opportunity Report are a showcase of how leading global risks can inspire to identify global opportunities.

## + What is a global risk?

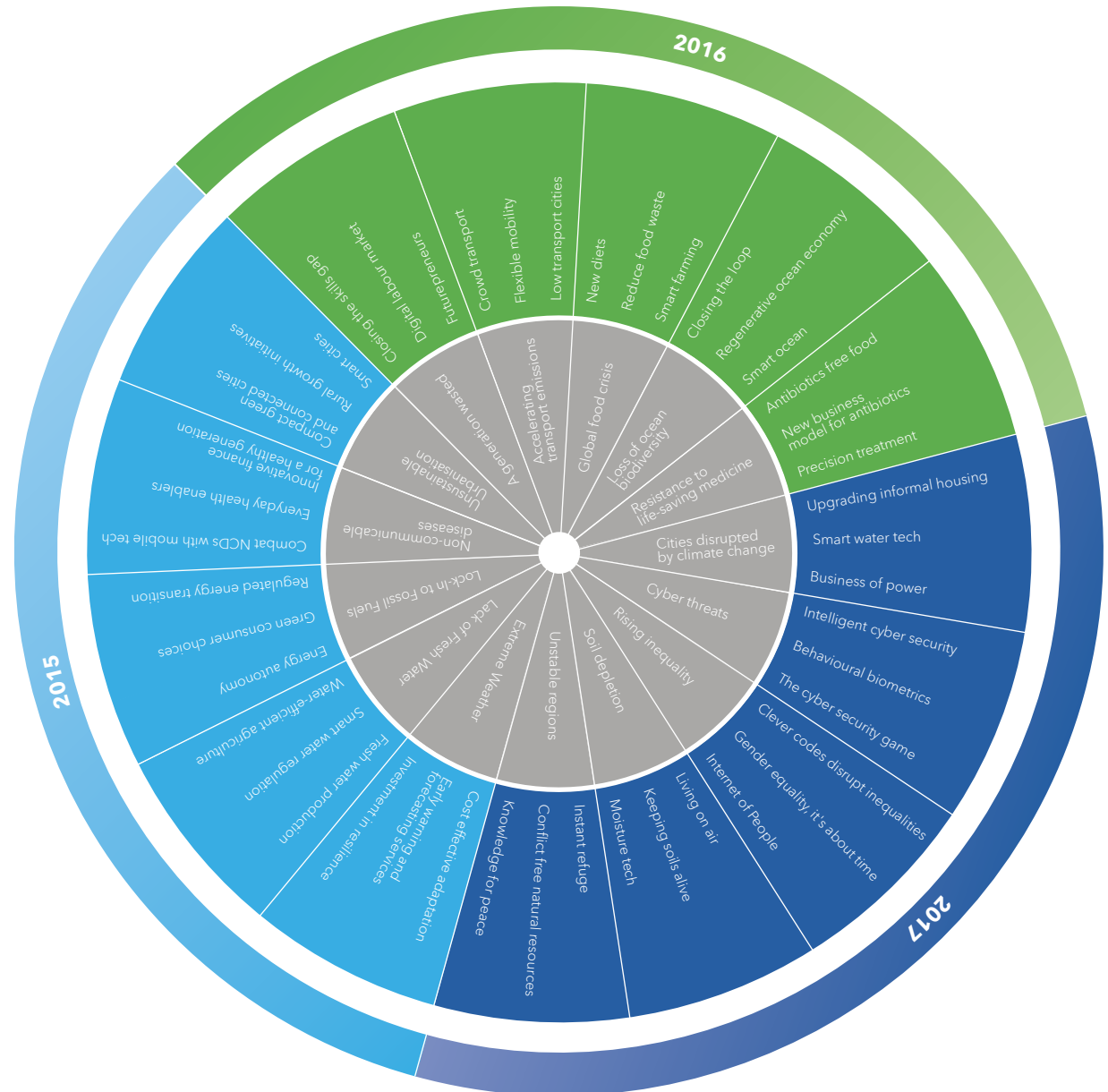
To be included in the report, a risk must be global in nature. It is risks with the ability to break down an entire system as opposed to only impacting individual parts or components of it.

The risks discussed in the report were selected based on a number of criteria. They have to be global in reach, which means they are significant enough to make headlines everywhere. In addition, a risk must be felt by multiple stakeholders as well as being both timely and actionable.

## + What is a global opportunity?

Opportunities are avenues of action for systemic change that stakeholders in business, politics, finance, and civil society can choose to pursue when addressing global risks. They create value for societies and the planet, not just for individuals or businesses. An opportunity is different from a single business solution, because it creates systemic change via multi-stakeholder collaboration.

Opportunities are sustainable. We define sustainability as it was originally phrased in the Brundtland report: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."





# KEY INSIGHTS

## Technological innovations will redefine business

The ranking of opportunities this year makes it clear that every business, regardless of sector or field, must invest in cutting-edge digitisation to stay relevant. Blockchain technology and artificial intelligence are the backbones of two of the four top opportunities this year, illustrating that all industries, including water, education, IT, and energy, will not just be disrupted by technological innovations - they'll be entirely overtaken and reshaped. It's therefore critical that every industry, even those already based on technology, take their digitisation and tech innovations to the next level to capitalise on future market opportunities.

If you only have five minutes, these are the key insights you need to read to understand the markets of the future.

### WATER IS A WINNER

For the third year in a row, an innovative opportunity related to water tops the list of the most impactful and actionable opportunities. Smart water technology enables consumers to use water in a more sustainable manner without increased effort - the smart water pipes and meters will make the sustainable water choices for them. Understanding the potential of this opportunity and fully capitalising on it to deliver crucial services will represent a huge market opportunity; by 2021, the smart water tech market will be worth 20.10 billion USD up from 8.46 billion USD in 2016.

### KNOWLEDGE BRINGS PEACE AND PROFIT

Leaders see the most complex category of markets - delivering education to conflict areas - as the runner-up opportunity. This opportunity showcases the positive impact that can occur when the private sector applies digital

technology to address a public need. This finding signals a change in the perception of leaders: as of now, high-risk markets can be potential hotbeds for innovation. Applying innovation from the ground up, and engaging in dialogue with digitally engaged local consumers to drive peace and profit define this opportunity. The global smart education and learning market is worth 586.04 billion USD by 2021.

### ARTIFICIAL INTELLIGENCE IS REDEFINING OUR INFRASTRUCTURE

Artificial intelligence enables companies and individuals to be two steps ahead of the next cybercriminal. This opportunity employs machine-learning to drive a new market that will secure our most vital infrastructure in the digital economy. It is a sustainable choice made easy for the user of the infrastructure by supplementing firewalls and other cyber security tools with machines able to learn and adapt to the tactics of hackers. There are two important drivers of this market opportunity: 1) intelligent automation in general with systems making decisions for us and 2) the lack of a sufficient number of people with the right skill-set drives a need for less people-intensive approaches. The artificial intelligence market is expected to be worth 16.06 billion USD by 2022, growing at a compound annual growth rate (CAGR) of 62.9 percent from 2016 to 2022.

### THE POWER OF PEER-TO-PEER TRADING

Leaders believe peer-to-peer energy sharing and trading on digital platforms is a market ready for take-off. Blockchain is an open source digital ledger that allows users to record and trace all types of transactions. With regard to energy

## 2017 OPPORTUNITY RANKING

We asked 5,500 business leaders to rank this year's 15 opportunities based on their impact to society and the current capacity to pursue them. What they came up with illustrates a diverse opportunity landscape, but it's clear that technology will be a key driver of the markets of tomorrow.



### In relation to risk

- Unstable Regions
- Soil Depletion
- Rising Inequality
- Cities Disrupted by Climate Change
- Cyber Threats

transactions, users can have a payment and a means to keep track of electricity consumed and delivered. It introduces a new corporate logic, transforming the role of business in the energy transaction from that of the service provider to that of the consumer enabler. This by helping users share and trade electricity, or even donate excess electricity in an expression of new forms of solidarity.

**COMPLEX CHALLENGES CAN DRIVE MARKET TRANSFORMATION**

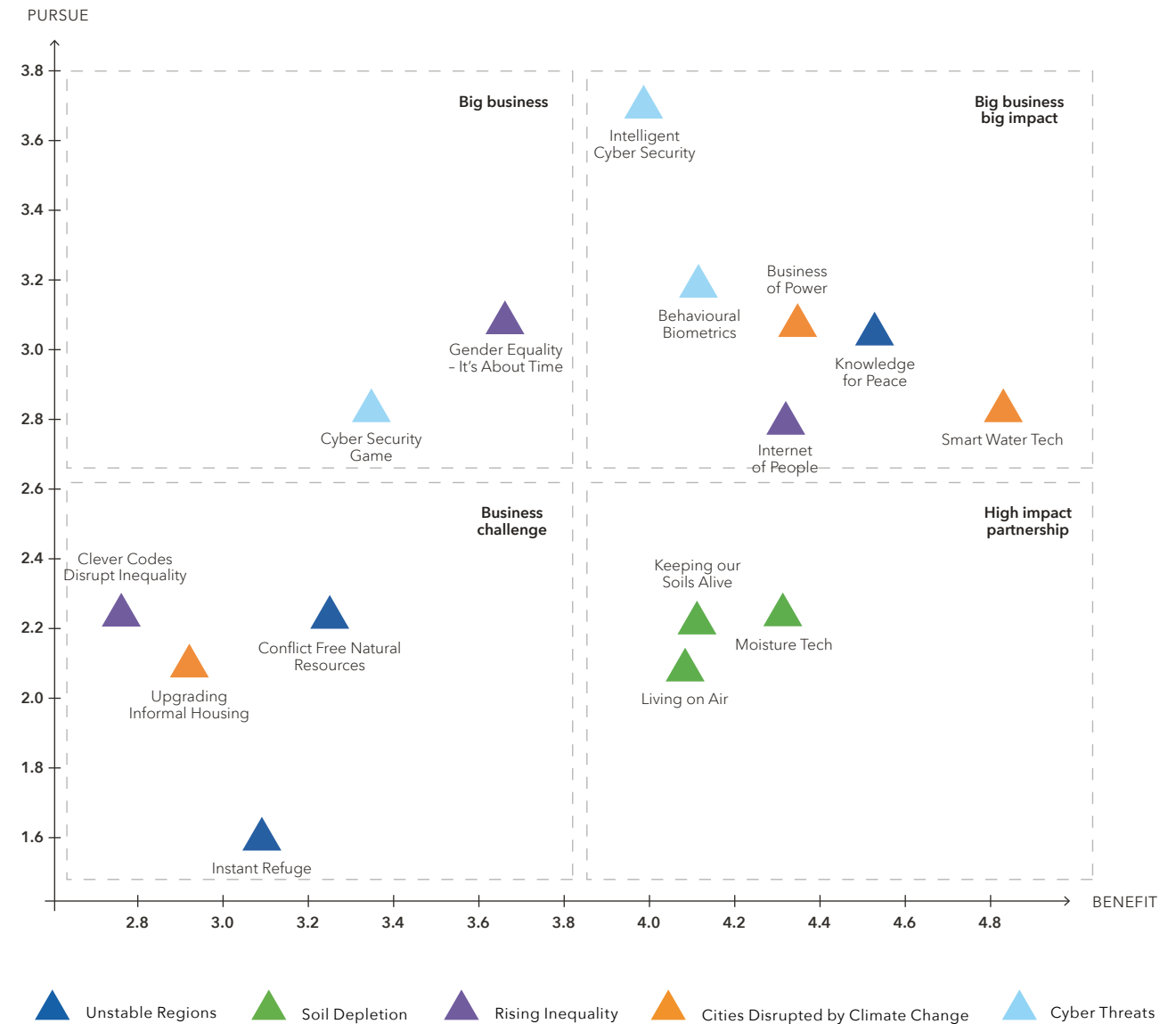
The survey reveals which opportunities represent the best business case in the eyes of the leaders surveyed. Opportunities that capitalise on specific and digitised markets, such as intelligent cyber security and behavioural biometrics, are seen as more favourable business cases. Meanwhile, opportunities that address more complex challenges - such as housing refugees and upgrading communities with informal housing - are viewed by business leaders as weaker business opportunities. Addressing complex challenges has the potential to create stable societies, which is a critical condition for long-term business viability. Carving out specific new market out of complex challenges can help kick-start markets for transformation. One opportunity we can learn from when doing this is Knowledge for Peace, as this opportunity takes a specific and actionable approach to handling a very complex problem.

**SOIL DEPLETION IS READY FOR A MARKET INTERVENTION**

All three opportunities related to soil depletion rate high on their benefit to society, yet are still rated low as business opportunities compared to the other opportunities. Businesses should pay special attention to the opportunities in this quadrant, as they represent the next, most immediate frontier in new market opportunities. It's clear they offer huge benefits to society; if the companies can find a way to capitalise on them, they could uncover and solidify their stake in a crucial future market.

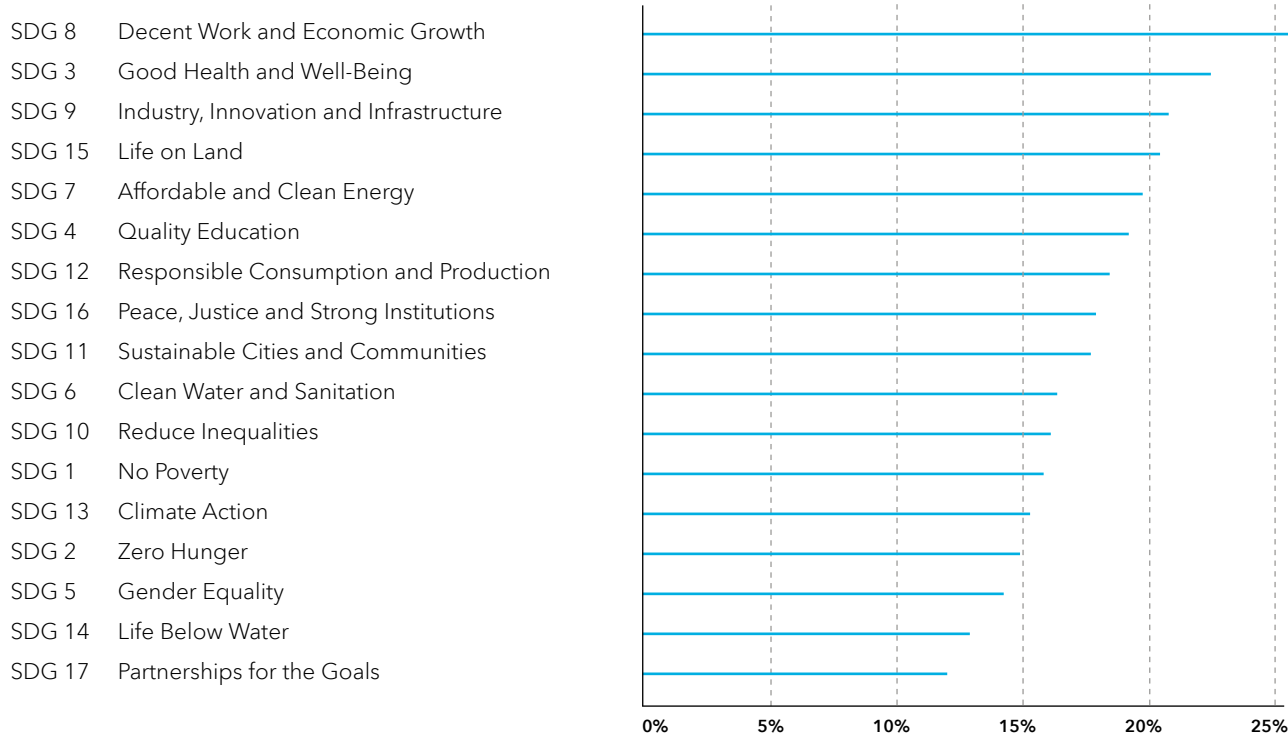
**OPPORTUNITY BUSINESS CASE**

In addition to ranking this years opportunities based on their impact on society and the current capacity to pursue them, we have also plotted them based on the perceived strength of their business case, as indicated by our survey respondents. This tells us how business leaders understand the potential future prospects of each opportunity. The vertical axis represent the likelihood business will pursue the opportunity. The horizontal axis represent how the opportunity will benefit the society. Both are assessed on a scale from -10 to 10. The opportunities are divided in four quadrants according to their ability to provide a good business case and positive impact to society.



## GROWTH AND WELL-BEING

The percentage illustrates how many of the 5,500 survey respondents that have selected the Sustainable Development Goal (SDG) as the one with the most potential for business. Each respondent could select three SDGs.



### SIX GOLDEN GLOBAL GOALS

Across the globe, and over the last two years, notable agreement has emerged about the most promising Sustainable Development Goals for business. The same selection of six Sustainable Development Goals is rated as most promising, even if they've jostled a bit in rank. The cluster is composed of Sustainable Development Goals that address jobs and growth, good health, life on land, affordable energy, education and industry, innovation and infrastructure.

### AFRICA IS READY FOR BLOCKCHAIN

Though they are rated number 4 and 15 on the overall opportunity landscape, opportunities related to blockchain, Clever Codes Disrupt Inequality and Business of Power, are the top-ranking opportunities in Sub Saharan Africa, indicating the region is ready and willing to invest in this critical new way to access services once dominated by formalised and centralised authorities. Blockchain allows for the decentralised exchange of critical services like energy and finance, giving consumers the ability to access loans, insurance, finance, and other vital elements of the economy. African markets can be expected to leapfrog into the next digital era defined by a blockchain-based internet.

### MENA AND SOUTH AMERICA ARE CONFIDENT IN ABILITY TO PURSUE GOALS

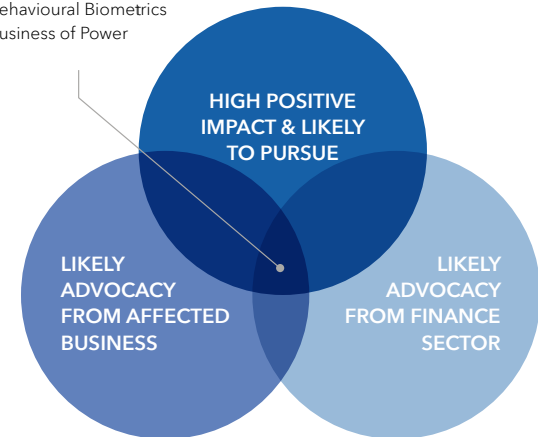
Businesses in the Middle East and North Africa (MENA) and South America reported an increase in their perceived capacities to pursue the 15 opportunities, as well as an increase in their willingness to pursue them, as compared to last year. This ability and willingness to pursue cutting-edge market opportunities indicates these regions will become increasingly important hotbeds for market development in the coming years.

### CASH-IN ON POWER AND TECH

Decentralised power delivery, behavioural biometrics, and artificial intelligence to combat cybercrime are three opportunities that can be expected to mature rapidly through investments and business action. In the global survey, leaders across the globe perceived these three markets to hold a good business case as well as a good investment case. In addition, leaders perceive these markets to positively impact business and both the financial sector and business are ready to actively advocate for growing these markets. Both are important conditions for the opportunities to scale rapidly.

### OPPORTUNITIES OF THE FUTURE

- Top 3 opportunities:
1. Intelligent Cyber Security
  2. Behavioural Biometrics
  3. Business of Power



## IMPACT ON SOCIETY AND CAPACITY TO PURSUE

Overall results for all opportunities when assessed on their benefits to society and on the capacity of respondents home countries to pursue them. All opportunities are rated positively. The average is 3.8 and 3.1 on the two axis on scales going from -10 to 10.





**WELCOME  
TO A WORLD OF  
OPPORTUNITIES**

# 2017

## UNSTABLE REGIONS

More people than ever before are displaced due to conflicts around the world, with millions more impacted in some way. The severity of these crises makes it apparent that all actors, including business, will need to play a role in restabilising areas of conflict.



OPPORTUNITIES:

### KNOWLEDGE FOR PEACE

Educating and re-skilling a labour force can be a catalyst to stabilising post-conflict regions. The ubiquity of the internet offers huge opportunities to reach potential students outside the classic classroom.

### CONFLICT FREE NATURAL RESOURCES

Securing conflict-free natural resources through blockchain and transparent supply chains allows business to meet the demand for open and responsible supply chain practices.

### INSTANT REFUGE

Refugee camps need the functionality of a regular city instantly. Putting the power of innovation in the hands of those who need it most can create instant refuge.

## SOIL DEPLETION

Forty percent of soil used for agriculture around the world is either degraded or seriously degraded. Our soil is losing its ability to perform the services that are essential for humans to survive. Overexploitation has diminished soil's capacity to retain water and nutrients, produce food, and absorb CO<sub>2</sub>.



OPPORTUNITIES:

### LIVING ON AIR

Finding ways to grow food without soil represents an enormous opportunity. Living on air, by employing techniques like vertical farming, can allow agriculture to do more with less.

### KEEPING OUR SOILS ALIVE

By adding supplements of good bacteria and fungi, tired and depleted soils have the potential to regenerate into productive, arable acreage once again.

### MOISTURE TECH

New technologies are enabling soils to act like sponges, retaining water longer than ever before and making crop yields less dependent on predictable rainfall and temperatures.

## RISING INEQUALITY

Inequality within countries is rising, resulting in devastating economic and social impacts. Combating inequalities related to gender, race, ethnicity, and social class will be of the utmost importance in the coming years.



OPPORTUNITIES:

### CLEVER CODES DISRUPT INEQUALITY

Blockchain technology uses clever codes to disrupt inequality, allowing people all over the world to take control over their digital identities, gain access to bank accounts, insurance, and many other financial services.

### GENDER EQUALITY - IT'S ABOUT TIME

Innovative time- and labour-saving technologies can free up time spent on domestic work, and progressive advertising can help challenge gender norms that land the uneven burden of domestic work on women.

### INTERNET OF PEOPLE

Mobile technologies and the Internet of People are opening up the accessibility of healthcare, particularly for low-income, remote communities, benefitting those in need as well as business interests.

## CITIES DISRUPTED BY CLIMATE CHANGE

Urbanisation and climate change threaten to be a dangerous mixture. More people are moving into urban areas, putting new stresses on already vulnerable infrastructure. At the same time, climate change threatens to disrupt basic components of urban life.



OPPORTUNITIES:

### BUSINESS OF POWER

The business of power is promoting small microgrids that are more resilient against climate disruption than large-scale networks and connect individual energy producers and consumers.

### SMART WATER TECH

Smart water tech, using smart sensors and cloud data management to improve water infrastructure, will be critical in providing access to clean, safe water for urban citizens around the world.

### UPGRADING INFORMAL HOUSING

Upgrading informal housing by creating resilient, robust, and climate-proof homes will help slum communities better manage climate disruptions and improve livelihoods.

## CYBER THREATS

In a more and more connected and digitised world, it is becoming increasingly important to address the threat of cybercrime. While the digitalisation of our fundamental infrastructure is providing huge prospects, such as the internet of things, it also poses a threat to everyday operations.



OPPORTUNITIES:

### INTELLIGENT CYBER SECURITY

Intelligent cyber security offers a promising opportunity, as it employs adaptive algorithms that can detect and respond to threats in real time, stopping breaches before serious damage can be done.

### CYBER SECURITY GAME

Behavioural biometrics uses measurable behavioural traits to verify identity, providing a new layer of security for businesses and individuals and opening a new market for security products.

### BEHAVIOURAL BIOMETRICS

Nudging people with games, and inviting ethical hackers to test system security measures, is designed to make cyber security a bit more appealing and offer better protection against digital intrusions.

RISK

# UNSTABLE REGIONS

More people than ever before are displaced due to conflicts around the world. The severity of these crises makes it apparent that all actors, including business, will need to play a role in restabilising areas of conflict. This sensitive task must be done with great awareness of and respect for local contexts in order to promote peace and not risk further exacerbating instability.







## **RISK**

# UNSTABLE REGIONS

Conflicts can rip apart regions, countries, communities, and families. As millions of people flee their homes due to conflict and persecution, societies are left in social and political turmoil. Such conflicts and instability are putting increasing pressure on the world economy. It has been estimated that in 2015 alone, violent conflicts caused more than a 13 percent loss in the global GDP, an increase of 15 percent compared to 2008.

Progress made in the previous years or even decades might be reversed if the number and duration of conflicts and chronic instability continues to rise. In other words, conflicts pose a serious threat to sustainable development by increasing poverty, destroying infrastructure, and triggering forced displacement.

It is estimated that by 2030, 46 percent of people living in poverty will be in fragile and conflict-affected areas. The

### **VIOLENCE COSTS 13.3% OF WORLD GDP**

# 13.3%



Source: Institute for Economics and Peace. Global Peace Index. 2016.

World Bank estimates that 1.5 billion people live in countries trapped in repeated cycles of violent conflict. The nature of conflict has changed; today more are within than between states. After a seven-year civil war, which is the average length of a civil conflict, incomes are around 15 percent lower compared to expected levels. Furthermore, because of the effects of inflation and lost investment opportunities, the incidence of absolute poverty will have increased by 30 percent compared to before the war began.

Conflicts can also have enormous impacts on the state of infrastructure, as schools, hospitals, and energy systems are destroyed and new infrastructure investments are suspended. As an example, it has been estimated that the ongoing conflict in Syria has destroyed physical infrastructure worth 75 billion USD.

By the end of 2015, wars and persecution had forced more people to flee their homes than at any time since UNHCR records began. 65.3 million people, more than half of them children, were forcibly displaced due persecution, conflict, and violence. The number has quadrupled in the last decade.

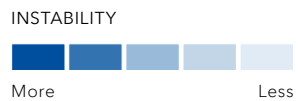
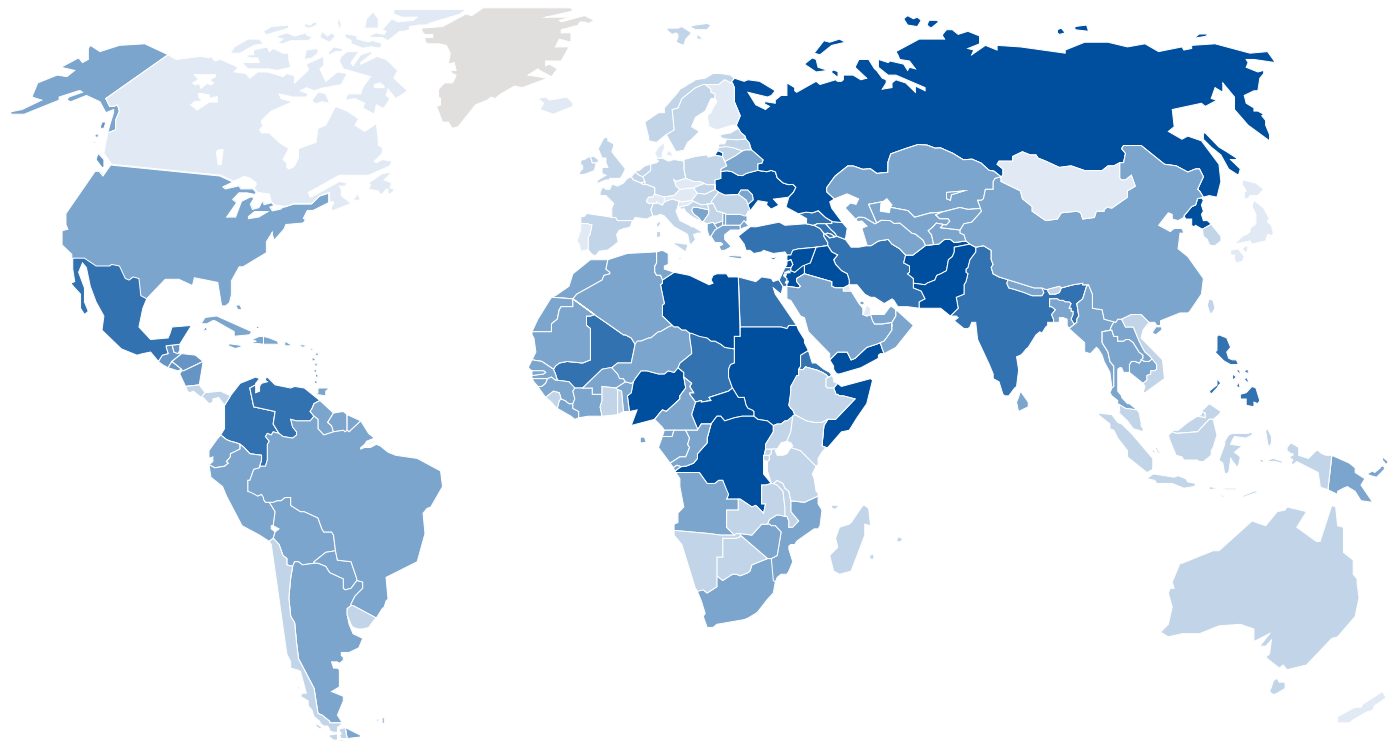
Due to the scale, complexity, duration, and reoccurring nature of today's crises, they can only be solved via systemic approaches. While the primary responsibility for peace and humanitarian assistance rests with governments, companies

can rarely remain neutral, as their actions and policies typically either exacerbate problems or work to mitigate them.

However, businesses can also have a stabilising effect on conflict-affected or fragile areas and play an important role in supporting and empowering conflict-affected people. It is the private sector's ability to bring people from different backgrounds together around a shared goal that can increase social cohesion and thereby mitigate conflicts or help rebuild a sense of togetherness. In addition, business can help stabilise countries by acting responsibly, while also creating job opportunities, economic growth, and social well-being in the community in which they operate, making this sector important in the creation of more peaceful societies.

## CONFLICT - A GLOBAL ISSUE

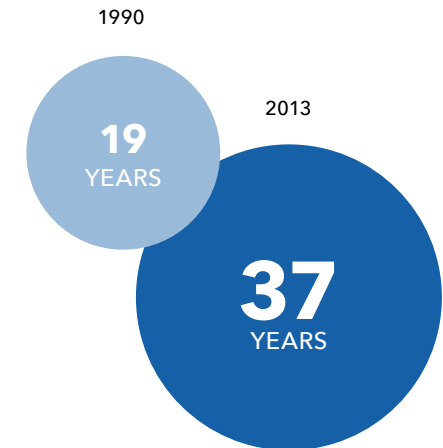
Index measures the global peace based on the level of safety and security, the extent of domestic or international conflict, and the degree of militarisation.



Sources: World Map (above) - Institute for Economics and Peace. Global Peace Index. 2015. Chart (upper right) - Humanitarian Policy Group. Time to Let Go: Remaking Humanitarian Action for the Modern Era. 2016. Chart (lower right) - IDMC. Global Report on Internal Displacement. 2016.

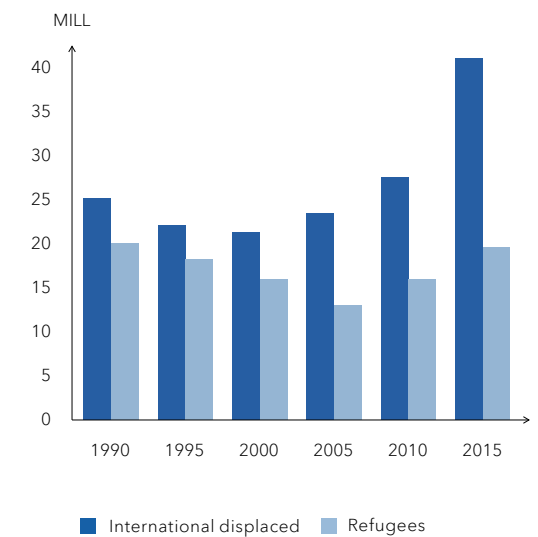
## CONFLICT A STUBBORN CHALLENGE

The changing character of conflict - Average length of conflict (years) increase.



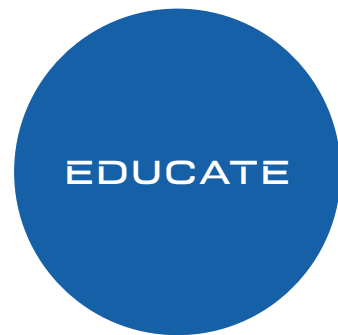
## MORE DISPLACED THAN EVER

8.6 million new displacements by conflict and violence in 28 countries in 2015.

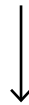


# OPPORTUNITIES TO GET YOU STARTED

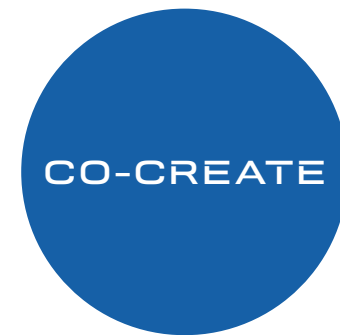
Business can play a critical role in fostering stability during and post conflict through responsible business practices, such as committing to ethical and transparent labour and sourcing practices supporting the reduction of tensions, promoting peace, and meeting basic needs. The opportunities in this chapter are a starting point for how business can contribute to a more peaceful and prosperous world for all.



**KNOWLEDGE  
FOR PEACE**



**CONFLICT FREE  
NATURAL RESOURCES**



**INSTANT  
REFUGE**

## KNOWLEDGE FOR PEACE



Providing education and re-skilling a labour force can be a crucial catalyst to stabilising post-conflict regions. The ubiquity of the internet offers huge opportunities for businesses to reach potential students outside the classic classroom, and instead bring education directly to those who need it through computers, tablets, and phones. Knowledge for peace is about giving people an opportunity to flourish in the aftermath of conflict.

## CONFLICT FREE NATURAL RESOURCES



Consumers are increasingly conscious of where products come from and how they are made. Utilising conflict-free natural resources offers business the dual opportunity to meet this consumer demand for transparency and responsible supply chain practices while also ensuring their products and services do not escalate conflicts but instead work to promote peace and equality.

## INSTANT REFUGE



Refugee camps, and other displacement situations, need the functionality of a regular city, but they need it immediately. To meet this demand for products and services, business can play a role by putting the power of innovation in the hands of those who need it most, creating instant refuge. With quick and efficient responses to housing, sanitation, equipment maintenance, and many other basic services, businesses can benefit the millions of refugees around the world.

## **OPPORTUNITY**

# KNOWLEDGE FOR PEACE

Innovative e-learning products and services present opportunities not only to improve educational offerings in conflict-affected regions, but to support consolidation of peace through the delivery of skills and competencies. The ubiquity of the internet offers businesses the chance to reach out-of-school children.



Conflict and instability rob youth of the opportunity to receive an education, and an uneducated workforce can in turn further fuel instability in a region. More than 57 million children of primary school age are still out of school. 50 percent reside in conflict-affected areas. The use of e-learning technologies can have a remarkable and immediate impact on the education opportunities of formerly armed youth, returnees from refugee camps, migrants, and other post-conflict residents.

The internet is opening up an opportunity space for the private sector to completely change how education is delivered to children in conflict zones via various forms of online educational products. In doing so, the world would come a step closer to fulfilling the basic human right of education for all while granting children a sense of normality, familiar routine, and hope for the future.

### **PRODUCTS AND SERVICES**

Online learning products and services in this opportunity space come in a variety of forms. It is online programs enabling students to access lectures and well-stocked libraries via a smartphone. The best coursework on offer – in mathematics, science, foreign languages, and literature – can be uploaded to a mobile phone, tablet, or laptop and used by a student and teachers.

Educational games with child-centred design can be applied in conflict zones. Studies show educational games can be as effective as traditional learning tools in delivering educational outcomes. Games can provide immediate feedback to children on their results through video or visual elements and it can be a fun way to learn in difficult times.

In places where students and schoolchildren do not have access to smartphones, SMS-based solutions are part of this space. It can be using SMS quizzes in relation to curricula, or it can be the use of SMS to connect students and teachers

in an area. Products in this opportunity space also include joyful and self-empowered learning via connected laptops; children are engaged in their own education, and learn, share, and create together. The One Laptop per Child initiative, an example of an initiative set up to enable this type of transformation of how education is delivered, also applies to children in conflict zones.

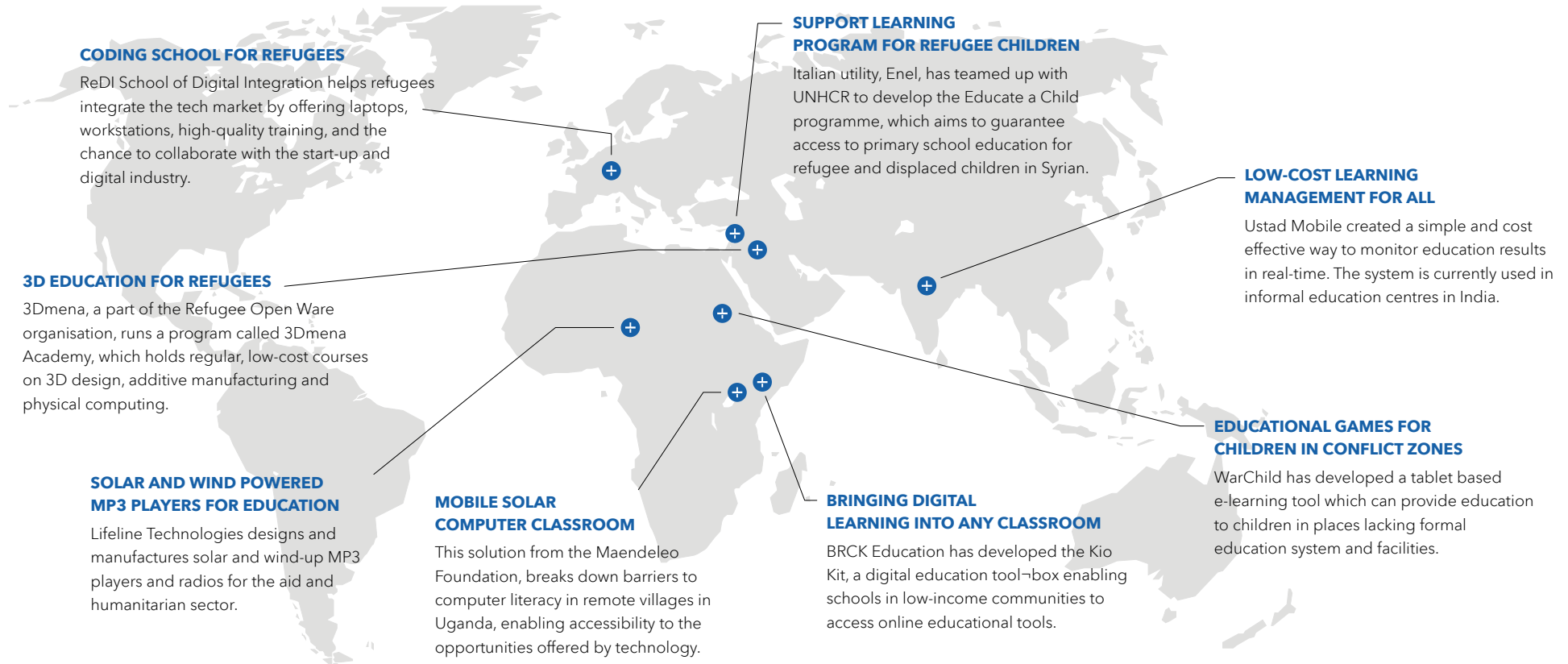
Rapid and continuous technological change leads to the constant evolution of products and services in this opportunity space. One of the trends is increasingly personalised educational programs via the ability of technology to tailor learning activities to a student's individual learning needs and style.

### **MARKET SIZE AND DEMAND DRIVERS**

By 2020, global spending on education is expected to double to 8 trillion USD. Learning through mobile devices may make up as much as 70 billion USD of this market through specialised product offerings.

A demand driver in this opportunity space is the increasing penetration of mobile phones into rural areas and unstable regions and countries. In addition, aid agencies are increasingly calling on the private sector to develop solutions to deliver education to children in situations of conflict via partnerships, which is a source of demand.

## OPPORTUNITIES FOR ALL



544

hours of class time were given by ReDI School of Digital Integration

2,000

pupils, per week, benefit from the Mobile Solar Computer Classroom

200,000

students could get access to primary schooling by 2018 with the Educate a Child Program



SUSTAINABLE DEVELOPMENT GOALS

Sources: 1. ReDI School. "ReDI School: Using technology to break down barriers and connect the leaders of tomorrow". [www.redi-school.org](http://www.redi-school.org) 2. Maendeleo Foundation. "Mobile Solar Computer Classrooms". [www.maendeleofoundation.org](http://www.maendeleofoundation.org) 3. Enel. "Educate a Child: UNHCR and Enel Support Learning Programme". [www.enelcuore.it](http://www.enelcuore.it)

# A GOOD BUSINESS CASE

Unlike other opportunities responding to the risk of unstable regions, the leaders in the survey have expressed a high level of confidence in the impact of using technology to promote remote learning in conflict regions, as well as in the current capacity to develop it, ranking it second on the overall opportunity ranking.

Regionally, respondents in India rate this as the top opportunity, while leaders in China and Europe are more skeptical, ranking this opportunity 10th and 11th, respectively. Looking at the opportunity through a gender lens, men show greater support for this opportunity than women.

### Capacity to Grow the Market

Leaders believe the capacity is substantial enough globally to drive this market opportunity. The economic and political capacities to pursue this market are particularly strong.

### Opportunity Business Case

Leaders across the globe see a good business case in engaging in this market relative to many of the other opportunities.

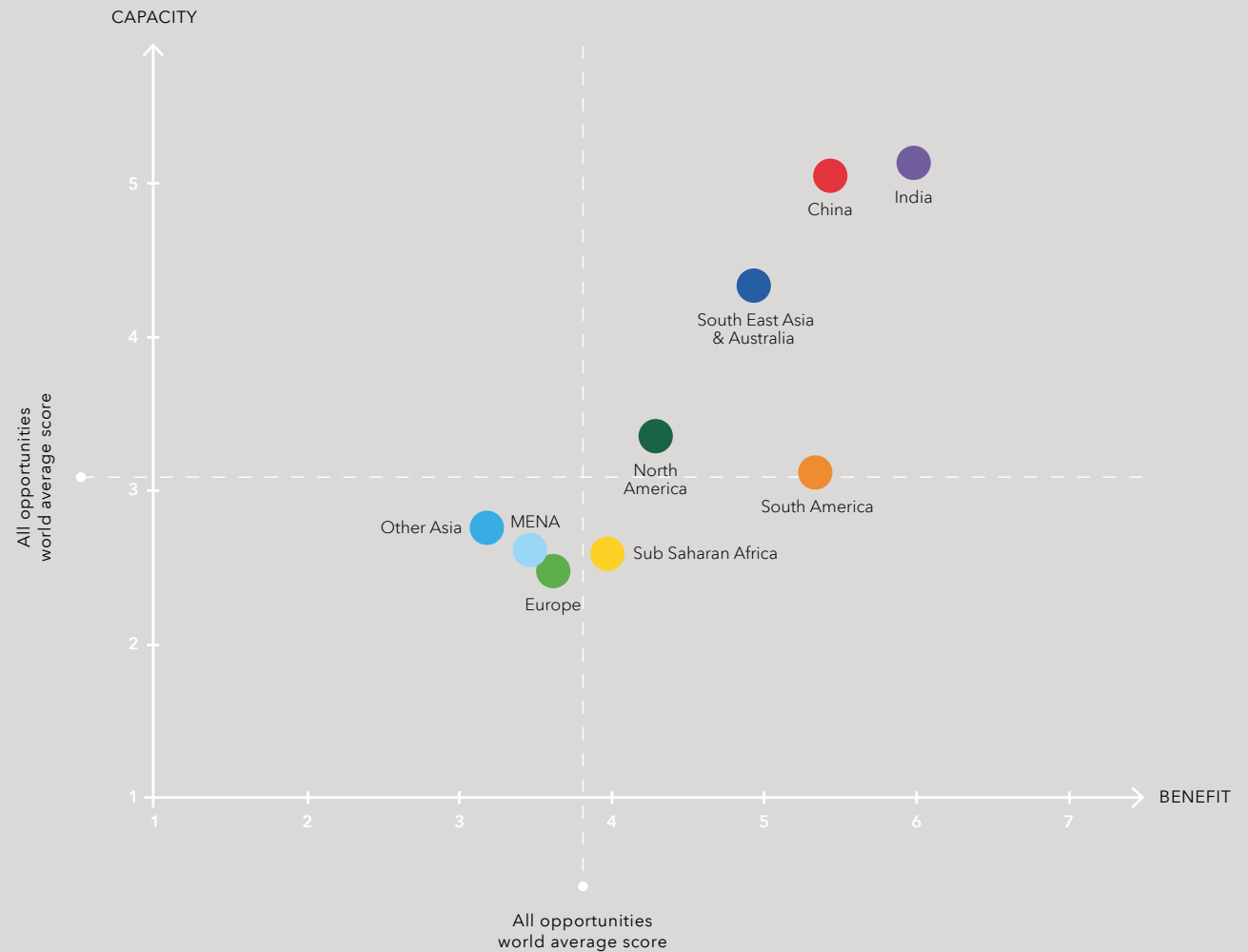
### Sector Impact

Leaders in the manufacturing sector look most positively at the benefits of this market to their sector. Respondents believe civil society and politicians can be expected to advocate strongest for this opportunity.

In India, where the opportunity is most popular, leaders believe the financial and government sectors will advocate strongly for it.

## BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



## NUMBER 2 ON THE OPPORTUNITY RANKING

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
10	GENDER EQUALITY - IT'S ABOUT TIME
11	CYBER SECURITY GAME
12	INSTANT REFUGE
13	UPGRADING INFORMAL HOUSING
14	CONFLICT FREE NATURAL RESOURCES
15	CLEVER CODES DISRUPT INEQUALITY

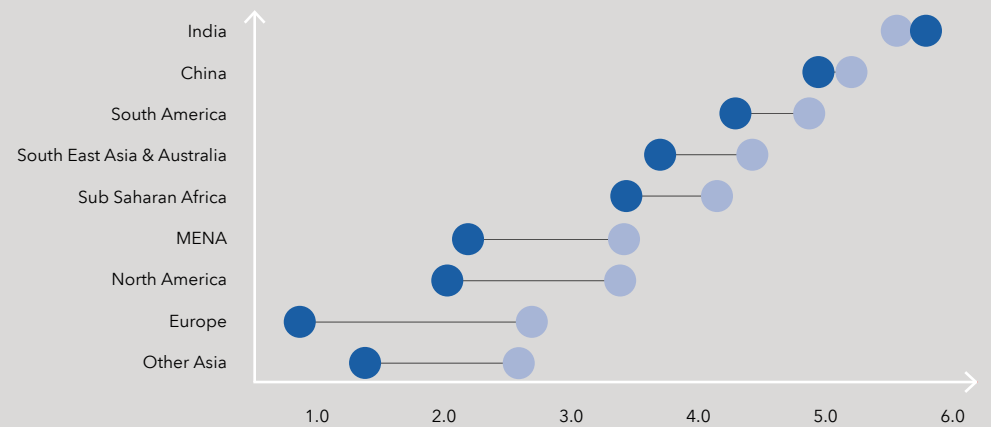
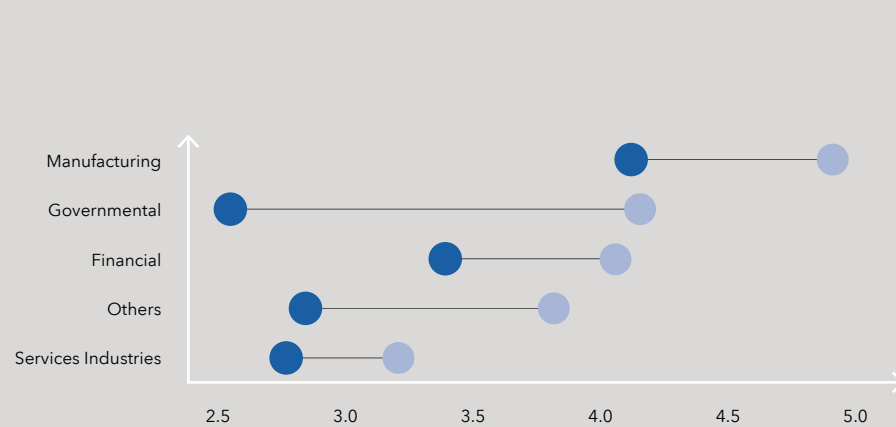
## CHARACTERISTICS OF OPPORTUNITY



A global runner up and favourite for male respondents

## PURSUE AND IMPACT

● Likelihood of pursuing    ● Positive impact on business





## **OPPORTUNITY**

# CONFLICT FREE NATURAL RESOURCES

Technology is driving an opportunity to ensure that every physical product has a digital history, permitting consumers to trace and confirm its origins, attributes, and ownership to ensure conflict free natural resources. Blockchain technology is well-suited for tracking objects and transactions, making it possible for virtually anything of value to be traced. This opportunity is about creating transparency and product traceability in supply chains.



Attempts to control natural resources can cause and exacerbate bloody conflicts. In response, a conflict-free movement is gaining momentum, paving the way for a new market opportunity for conflict-free products. Technology is arriving as an important tool to do the tracking work. Blockchain has the potential to be a game-changer, as it is well-suited for tracking objects and transactions, making it possible for virtually anything of value to be tracked. Emerging products and services are making it possible to ensure that traded resources are not feeding a conflict.

### **PRODUCTS AND SERVICES**

Products and services in this opportunity space include entirely new products, such as Fairphone, whose business models are based on the sourcing of traced and transparent materials, but large established players are also tapping into the conflict-free opportunity space. For example, in 2014 Intel released the world's first commercially accessible conflict-free microprocessor.

Other emerging products and services include certification and insurance services to trace the origin of materials in a product's supply chain. These services allow users and companies to rest assured that their materials are conflict free. Through certification schemes to ensure conflict-free sourcing in the supply chain, companies outsource the reporting work to a third-party expert company that can investigate the supply chain and provide the assurance a company needs for reporting.

A potential element of this opportunity space is for the due diligence service provider to provide insurance with its report. This insurance gives companies peace of mind the reports are correct - but, if not, they will have insurance coverage. It helps support the move to create a market where consumers can actively avoid purchasing any conflict minerals.

A number of start-ups are frontrunners in this opportunity space working to combine data from insurance companies, police departments, and certification houses. In addition, a number of start-ups are working to use blockchain to trace minerals. It has taken off in tracing of diamonds, but will be applicable across minerals.

### **MARKET SIZE AND DEMAND DRIVERS**

Regulation is an important driver of the conflict-free opportunity space. In the United States, the 2010 Dodd-Frank Wall Street Reform and Consumer Protection Act required manufacturers to audit their supply chains and report use of conflict minerals. The European Union has followed with regulation requiring companies that import minerals into the EU to carry out checks in their supply chains to see if they are funding armed groups.

Corporations are also increasingly setting goals to become conflict free. Another key demand driver is millennials entering the market. To help illustrate the myriad business benefits, Intel recently commissioned an online survey of 500 U.S. millennials, with Penn Schoen Berland, to assess millennials' attitudes about conflict-free natural products. The survey found that millennials, who collectively possess billions of dollars in spending power, highly value social responsibility.

# A TRANSPARENT SUPPLY CHAIN

**BLOCKCHAIN IMPROVES FLOW OF GOODS IN THE BALTIC REGION**  
SmartLog aims to reduce cargo transit times by applying blockchain technology to optimise data transfer in the logistic business.

**BLOCKCHAIN HELP SECURE SUPPLY CHAIN TRANSACTIONS**  
SkuChain developed Brackets, a blockchain based platform that gives a real-time view of the flow of goods and money, and eliminates transaction fees between businesses partners.

**DIGITAL TOOLS POWER TRANSPARENT BUSINESSES AND TRACEABLE PRODUCTS**  
Provenance is a traceability system using blockchains, that can be used to track the provenance of any product through labelling, smart tags, or embeds.

**ANTI-COUNTERFEIT TOOL INCREASES SUPPLY CHAIN TRANSPARENCY**  
Blockverify is a blockchain enabled tool that stops counterfeits by validating and recording products along the supply chain.

**BIG-DATA ENABLED FRAUD DETECTION SYSTEM**  
By using big data from law enforcement and insurance companies, Everledger helps detect fraud and provides a permanent ledger for diamond certification.

**BLOCKCHAIN FOR GLOBAL FREIGHT**  
Blockfreight™ is an open network blockchain allowing stakeholders to have access to an advanced global ledger - a global trade optimisation technology.

**UNIQUE DIGITAL IDENTITY HELPS TRACK AND VERIFY GOODS**  
With Cryptoseal, Chronicle, Inc aims to give products a unique digital identity via an embedded microchip, which will help authenticate goods and track their journey.

**SUPPLY CHAIN MAPPING**  
Sourcemap uses proprietary visualization algorithms to visualize any supply chain. It helps companies spot where violations may occur.

**84%**

of consumers say they seek out responsible products whenever possible

**93%**

of most companies' supply chains is invisible

**\$2.6BN**

market size for traceability software in supply chains by 2019



SUSTAINABLE DEVELOPMENT GOALS

Sources: 1. Cone Communications/Ebiquity. Global CSR Study. 2015 2. Rowe J. "93 Per Cent of Your Supply Chain is Invisible". Network Business Sustainability. Apr 15th, 2013. [www.nbs.net](http://www.nbs.net) 3. Frost and Sullivan. Impact of Industrial Internet of Things on Global Supply Chains, Forecast to 2019. 2016

# HIGH BENEFITS FOR SOCIETY

Conflict-free natural resources did not score high on the overall opportunity ranking compared to other opportunities in the global survey, coming in second to last on the ranking by global business leaders. Leaders in Europe had the most positive outlook on this market opportunity, rating it 8th best out of 15.

### Capacity to Grow the Market

Out of 15 opportunities, the leaders believe this is the opportunity for which there is the least political capacity to pursue. However, there are some regional differences between leaders in China, who are much more positive about the current political capacity to pursue this opportunity, and leaders in the MENA region, who are more positive their economic capacity is strong enough to develop this market.

Leaders in the MENA region rate the economic capacity of this opportunity at 5th place, while the world average puts it 12th. Leaders with mid-level management responsibilities have a higher confidence in the technological capacity to pursue this opportunity than C-level management. This is not the case for most of the other opportunities.

### Opportunity Business Case

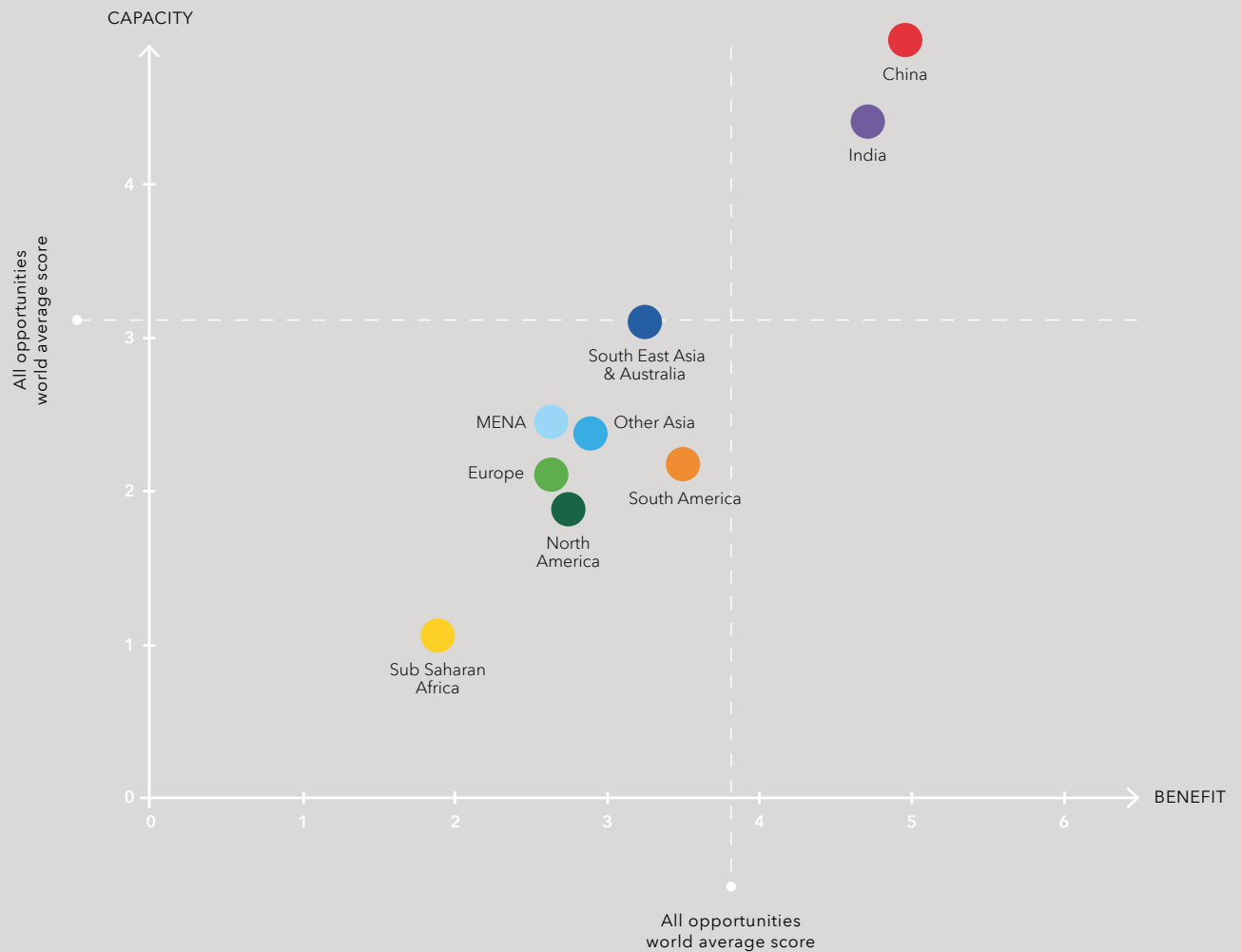
Compared to the other 14 opportunities, respondents do not see a convincing business case in this opportunity, nor do they believe their own organisation will pursue it. However, most leaders in the survey believe it has high positive impacts on society.

### Sector Impact

The manufacturing sector sees the best business case in this opportunity. However, the survey indicates it is not a market many actors will advocate actively for.

## BENEFITS AND CAPACITY

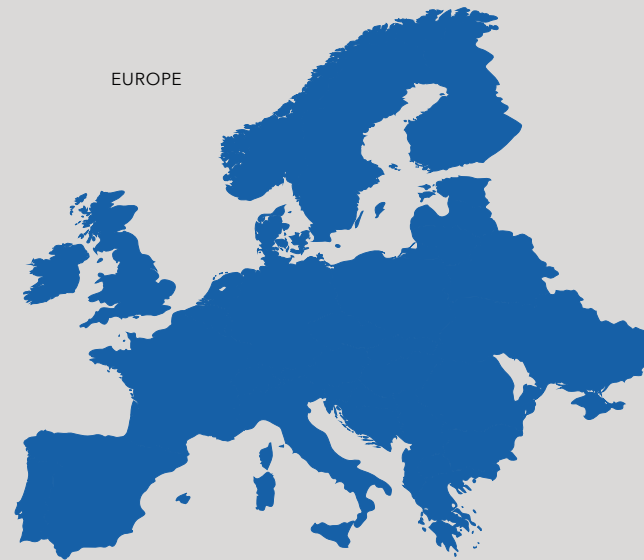
Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



**NUMBER 14 ON THE OPPORTUNITY RANKING**

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
10	GENDER EQUALITY - IT'S ABOUT TIME
11	CYBER SECURITY GAME
12	INSTANT REFUGE
13	UPGRADING INFORMAL HOUSING
14	<b>CONFLICT FREE NATURAL RESOURCES</b>
15	CLEVER CODES DISRUPT INEQUALITY

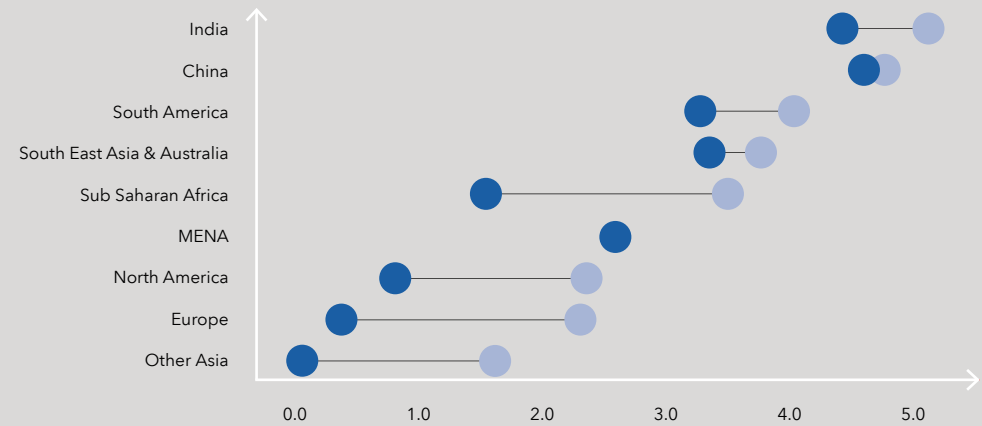
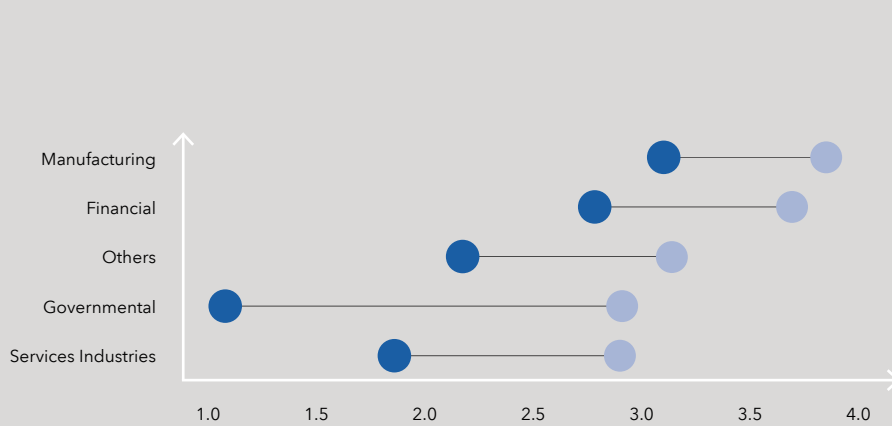
**CHARACTERISTICS OF OPPORTUNITY**



**Respondents in Europe most positive towards this opportunity**

**PURSUE AND IMPACT**

● Likelihood of pursuing    ● Positive impact on business



## OPPORTUNITY

# INSTANT REFUGE

As the number of forcibly displaced people rises, the need for adequate shelter increases. In rural settings, refugee camps are built to provide protection, ensure personal security, and deliver humanitarian assistance. By supporting quick and efficient responses to housing, sanitation, equipment maintenance, and many other basic services, businesses can help fulfil the needs of millions of refugees around the world.



A refugee camp is a form of instant urbanisation, and the world's largest camp is home to as many as 320,000 people. According to United Nations High Commissioner for Refugees (UNHCR), more than 2.6 million refugees currently live in camps around the world and have been displaced for more than five years, some even for over a generation. No matter the size, they have to be able to provide the same basic services as any other city.

Business can play an active role by supporting humanitarian agencies in delivering infrastructure and services to these quickly forming cities. It is an emerging opportunity space that benefits business, the humanitarian community, and refugees.

In this opportunity space, rapid scaling of effort to meet the needs of the displaced is pivotal. In addition, co-creation of products and services can play an important role. Products can be designed by refugees for refugees to meet their particular demands. The power to innovate is put into the hands of refugees themselves. The result can be innovations, which can be scaled and adapted to other parts of the world.

### PRODUCTS AND SERVICES

By their very nature, refugee camps entail huge logistical processes. They often need to be created and functioning within a short time to support thousands of refugees fleeing their homes. The products and services camp residents also require – housing, sanitation, food, water, healthcare, connectivity, and education – have to be deployed immediately.

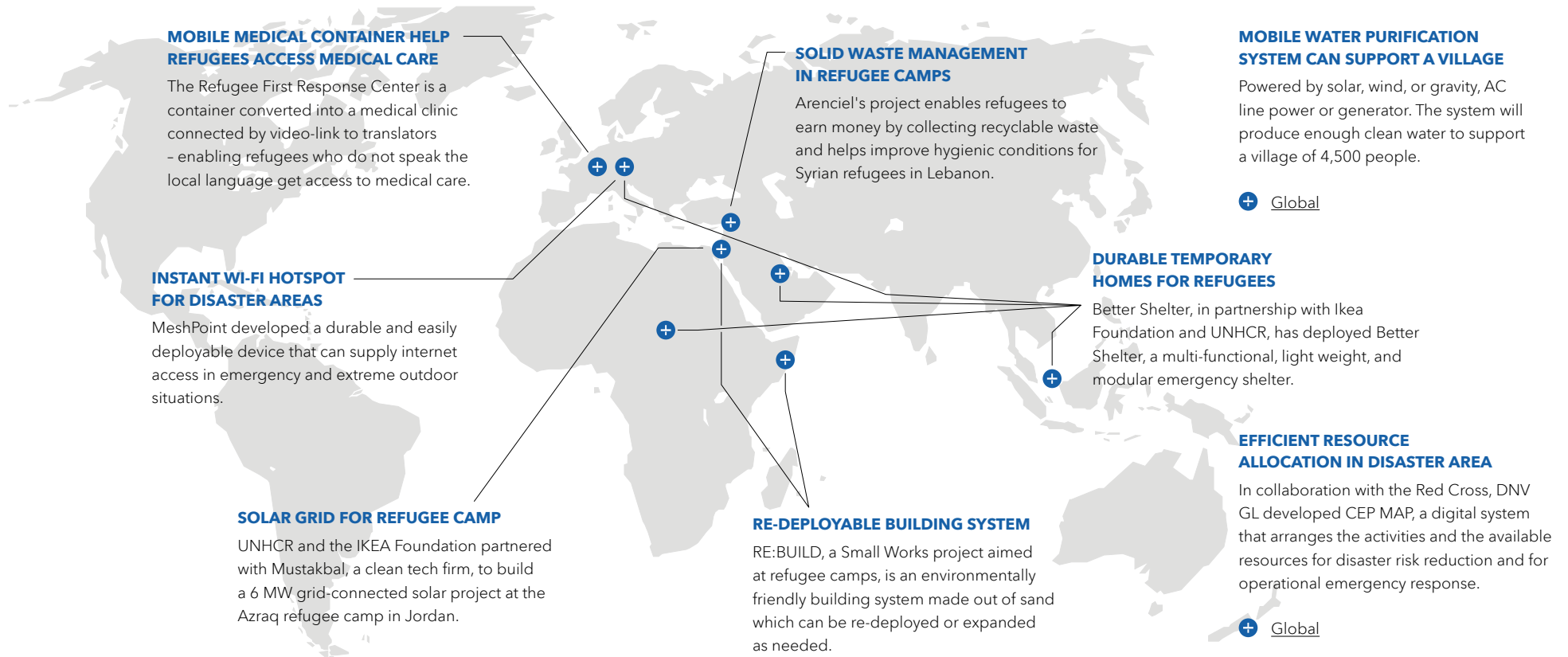
Advanced technologies like 3-D printing, are increasingly being used due to the speed with which solutions can then be replicated and adjusted to the local context. Another example of employing cutting-edge technology to improve

living conditions in refugee camps is the use of drones for fast and reliable data collection and wearable technologies to alert people, encourage behavioural change, or diagnose health needs.

### MARKET SIZE AND DEMAND DRIVERS

On average, 24 individuals worldwide were newly displaced every minute during 2015. As conflicts continue to rage, the number and needs of displaced people show no sign of slowing down. By supporting humanitarian agencies, businesses have the opportunity to help provide improved living conditions through better products and services for these millions of people around the world. By building products which cater directly to people, businesses support the nearly 65 million displaced people worldwide and the 3 million residing in camps.

# INNOVATION FOR REFUGE



**333,000**

people in world's largest refugee camp

**6MW**

grid-connected solar farm for 27,000 people in Azraq refugee camp

**86,000**

liters of clean water can be produced every day by the Mobile Water Purification System



SUSTAINABLE DEVELOPMENT GOALS

Sources: 1. UNHCR. "Refugees in the Horn of Africa: Somali Displacement Crisis - Dadaab". [www.data.unhcr.org/horn-of-africa/region.php?id=3](http://www.data.unhcr.org/horn-of-africa/region.php?id=3)  
2. Hill JS. "Syrian Refugee Camps In Jordan To Receive Solar Power". Clean Technica. 15th Dec, 2015. [www.cleantechnica.com](http://www.cleantechnica.com) 3. International Water Company. "Mobile Water Purification System". [www.internationalwatercompany.com](http://www.internationalwatercompany.com)

# HIGH ON THE AGENDA FOR CIVIL SOCIETY

Instant refuge ranks 12th on the overall global opportunity ranking. It received the highest ranking in the MENA region, where it ranks number four on the list. Leaders in Sub Saharan Africa were less positive about this market, rating it lowest, at number 15.

### Capacity to Grow the Market

The main reason this opportunity receives a low ranking on the overall list is leaders do not think the capacity currently exists to enable this market. Overall, it has been assessed the lowest of any opportunity across all three dimensions of economic, technological, and political capacity. However, respondents in the MENA region seem more confident the economic and political capacity exists to enable the growth of this market, whereas they are more skeptical when it comes to the technological capacity to enable it.

### Opportunity Business Case

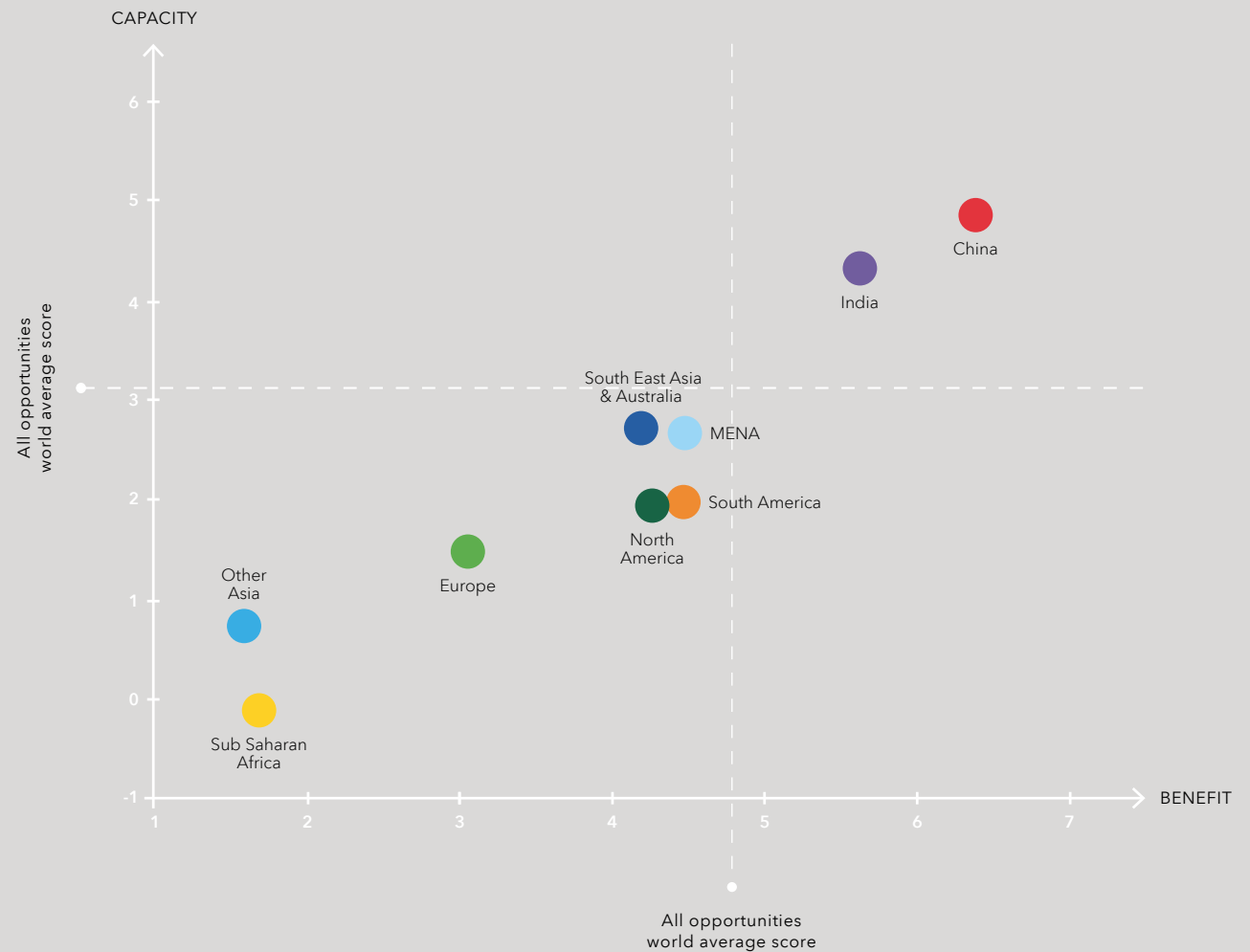
Globally, all sectors generally believe there is a weaker business case compared to the other opportunities in delivering products and services to displaced people.

### Sector Impact

The survey findings put the opportunity high on the agenda of civil society. Political stakeholders in the MENA region can be expected to be lead advocates for this opportunity relative to other regions.

### BENEFITS AND CAPACITY

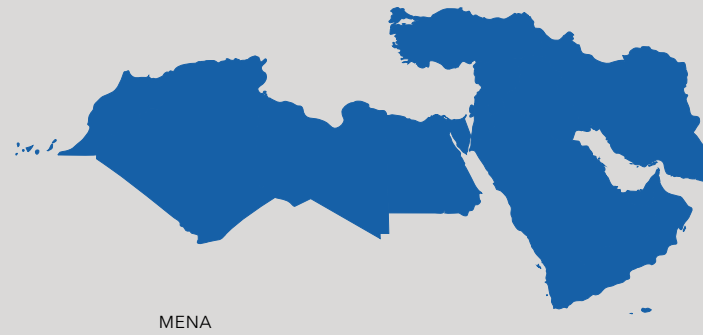
Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



**NUMBER 12 ON THE OPPORTUNITY RANKING**

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
10	GENDER EQUALITY - IT'S ABOUT TIME
11	CYBER SECURITY GAME
12	INSTANT REFUGE
13	UPGRADING INFORMAL HOUSING
14	CONFLICT FREE NATURAL RESOURCES
15	CLEVER CODES DISRUPT INEQUALITY

**CHARACTERISTICS OF OPPORTUNITY**

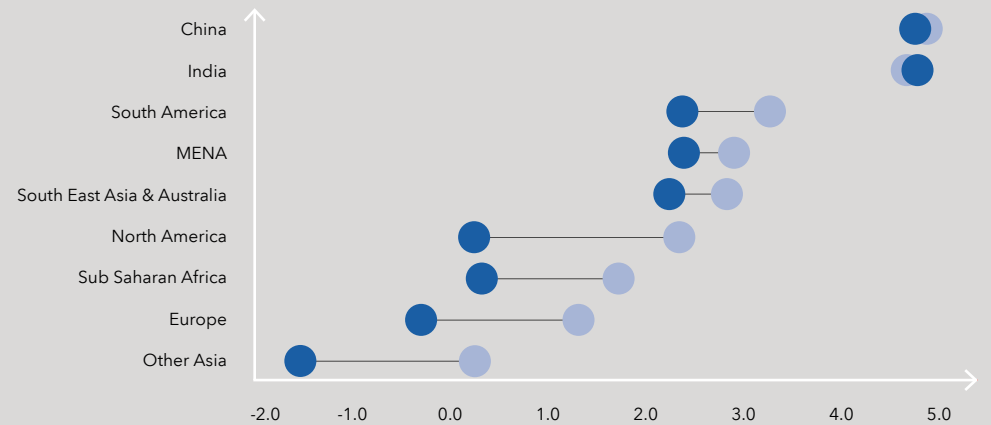
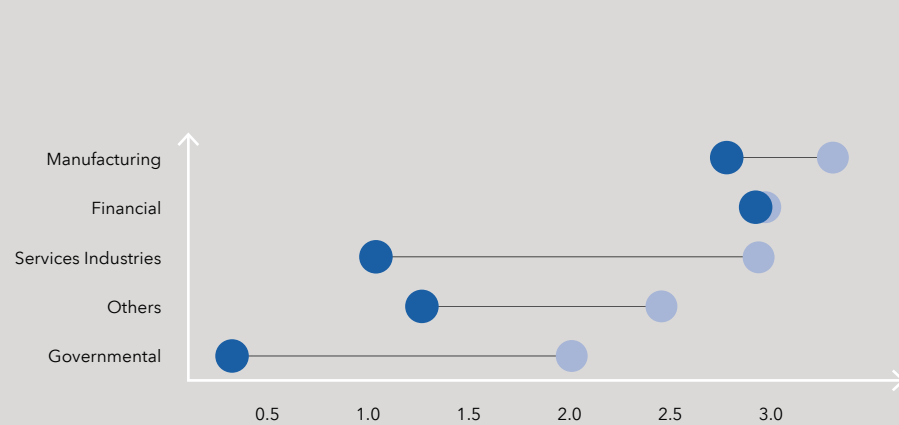


Respondents in the  
MENA region  
have confidence  
in political  
capacity



**PURSUE AND IMPACT**

● Likelihood of pursuing    ● Positive impact on business





RISK

# SOIL DEPLETION

Food production must increase dramatically to feed the world's rapidly growing population. Yet, our soils - the basis of agriculture around the world - are becoming increasingly depleted and degraded. To combat this serious food challenge, new and innovative ways of growing healthy and nutritious food must be explored. This represents an opportunity for business to redefine agriculture, regenerate soils, and ensure a nutritious food supply for future generations.



## RISK

# SOIL DEPLETION

Approximately 40 percent of soil used for agriculture around the world is either degraded or seriously degraded – meaning, among other things, that 70 percent of the topsoil – the layer allowing plants to grow – is gone. Our soil is losing its ability to perform the services that are essential for humans to survive. Overexploitation has diminished soil’s capacity to retain water and nutrients, produce food, and absorb CO<sub>2</sub>, just to mention a few essential services.

The Food and Agriculture Organization of the United Nations (FAO) estimates that food production must increase by 70 percent between now and 2050 if we are to feed the growing world population. However, each year we lose about 100,000 km<sup>2</sup> of cropland (approximately the size of Iceland) due to soil erosion, which is the type of soil degradation referring to absolute soil losses in terms of topsoil and nutrients. If we continue on the same trajectory, we will produce 30 percent less food over the next 20 to 50 years.

### **40% OF SOIL USED FOR AGRICULTURE AROUND THE WORLD IS EITHER DEGRADED OR SERIOUSLY DEGRADED**

# 40%



Source: WEF. "What If The World's Soil Run Out?". TIME. Dec. 14th, 2012. [www.world.time.com](http://www.world.time.com)

Soil degradation is primarily happening due to different human activities such as overgrazing of farm animals (approx. 35 percent), agricultural activities (approx. 28 percent), deforestation (approx. 30 percent), overexploitation of land to produce fuel wood (approx. 7 percent), and industrialisation (approx. less than 1 percent).

The utilisation of a narrow selection of crops is another serious factor threatening the nutrient quality of soil. Modern agriculture focuses on the cultivation of a few major staple crops, such as rice, maize, wheat, and potato. In fact, these four edible plants provide 60 percent of the world's dietary energy intake. Intensive cultivation of these few select crops will make it more difficult to conserve soil and will decrease natural soil fertility.

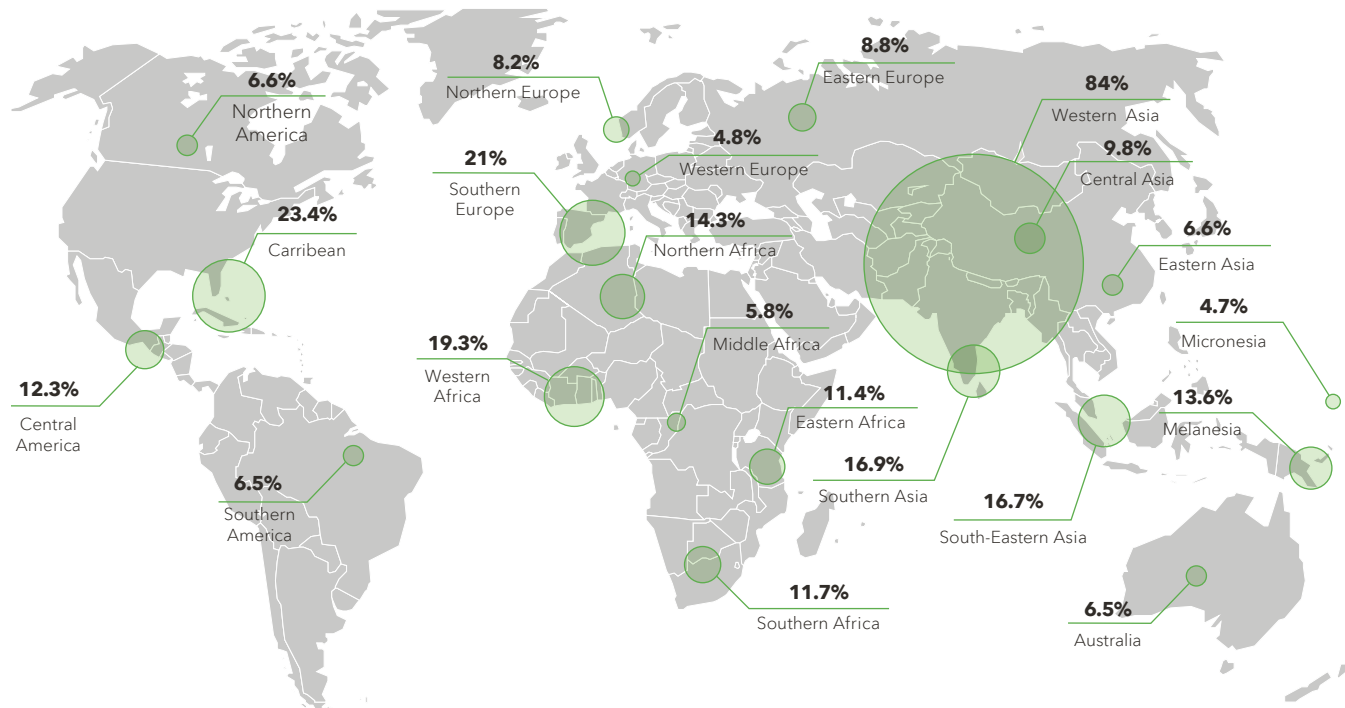
A 2015 report estimates that the global cost of land degradation amounts to as much as 10.6 trillion USD every year – pooling together not only the cost from lost agricultural production and diminished livelihoods, but also from the lost value of ecosystem services such as water filtration, erosion prevention, nutrient cycling, and the provision of clean air. Since humans worldwide obtain more than 99.7 percent of their food (calories) from the land, and less than 0.3 percent from the oceans and aquatic ecosystems, implementing new approaches to combat the risk of soil degradation is of the utmost importance.

Furthermore, soil degradation creates a vicious cycle, in which less carbon is stored, accelerating the effects of global warming, and in turn further degrading land. Perhaps surprisingly, soils are the second-largest active store of carbon after the oceans; more carbon is stored in soil than in the atmosphere (760 billion tonnes) and in vegetation (560 billion tonnes) combined. The ability of soil to act as a retainer for carbon has been weakened in recent decades and projections show the amount of carbon released from poor soil management threatens to undermine reductions made in other sectors.

Further loss of productive soils would severely damage food production and food security, amplifying food-price volatility, and potentially plunging millions of people into hunger and poverty. Although natural soil can be regenerated, the rate at which this happens is very slow. For this reason, soil should be considered a non-renewable resource to be conserved with care for generations to come.

## OUR MOST PRECIOUS ASSET IS DISAPPEARING

We are losing one of our most important assets, the costs of action are lower than the costs of inaction. Percentage change in the value of land from land degradation.

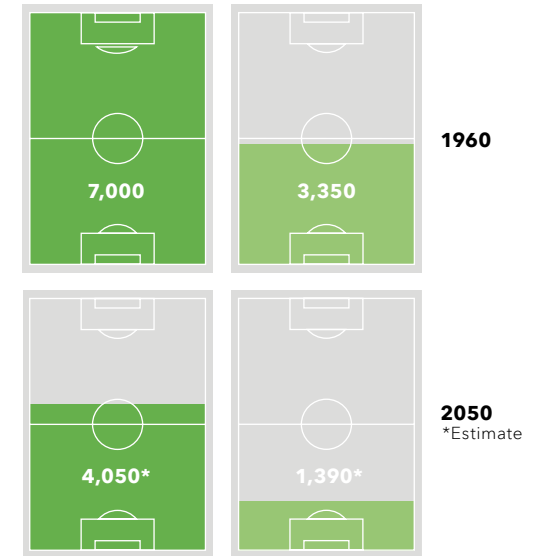


Sources: World Map (above) - ELD Initiative. The value of land: Prosperous lands and positive rewards through sustainable land management. 2015. Chart (upper right) - IASS Postdam. Soil Atlas: Facts and Figures about Earth, Land and Fields. 2015. Chart (lower right) - FAO. "FAO and Post 2020". 2015. [www.fao.org](http://www.fao.org)

## A GLOBAL COMPETITION FOR LAND

With a growing population and only 1.4 billion hectares of arable land at our disposal, each person will have to make do with much less land in the future - and it will not be evenly distributed.

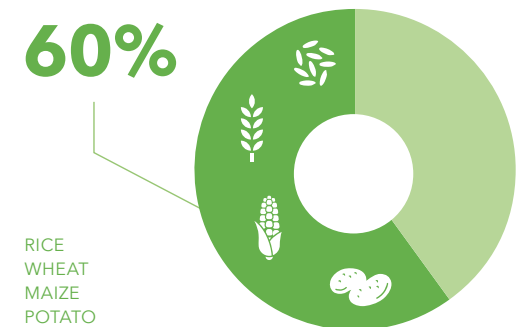
■ Developed countries ■ Developing countries



Agricultural area per person, in square metres. Compared with 1 football field = 7,140 square metres.

## EVERYONE EATS THE SAME

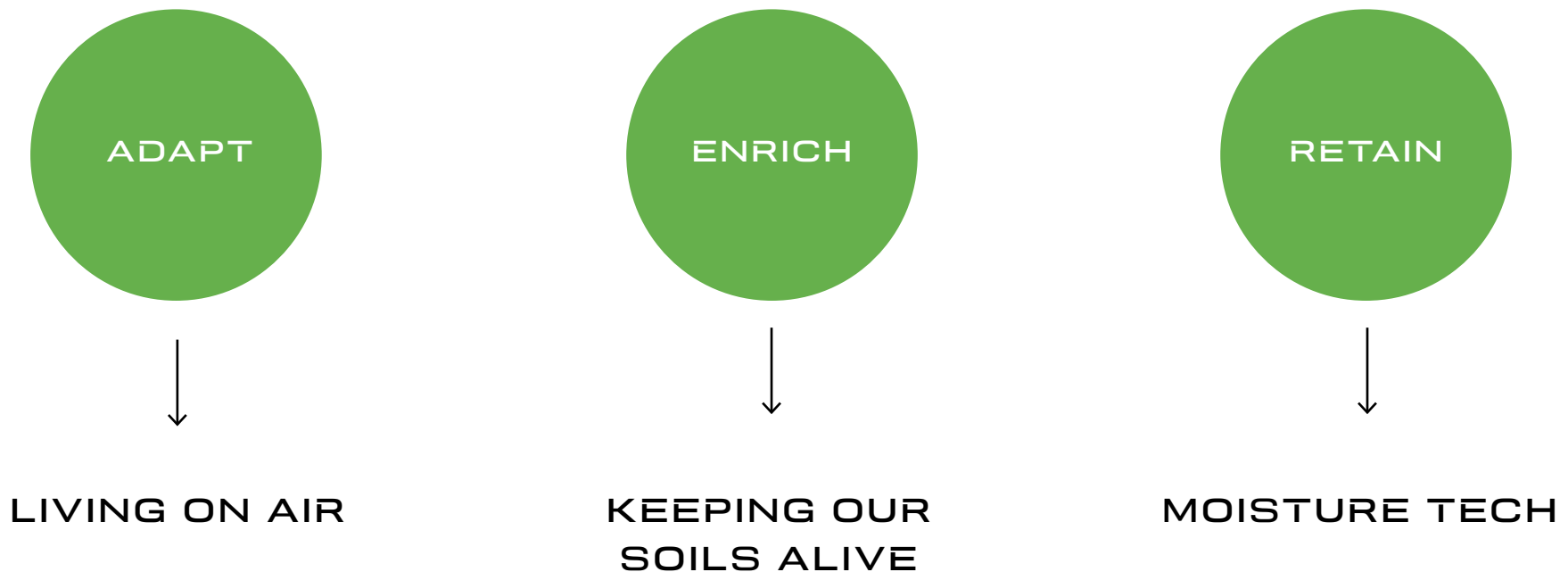
Just 4 of 30,000 edible plants provide a majority of the world's dietary energy intake.



## OPPORTUNITIES

# INCREASE CAPACITY TO FEED THE WORLD

In order to adequately feed our growing global population, we need to rethink the way we grow nutritious and healthy food. Increasing droughts and soil degradation are driving innovations in food production methods, leading to technologies enabling soils to regain their fertility and allow farmers to grow food where we never thought possible. Three opportunities are presented here to help feed the world with healthy food.



## LIVING ON AIR



With viable soil in short supply, finding ways to grow food without it represents an enormous opportunity. Living on air, and producing food without soil and with less water, by employing techniques like vertical farming, will reduce dependence on the shrinking supply of healthy soils to provide the food the world needs.

## KEEPING OUR SOILS ALIVE



Regenerating tired and depleted soils has the potential to turn degraded land into productive, arable acreage once again. To keep our soils alive, we needn't add harmful chemicals. Instead, promising solutions that act like probiotics for soils and plants already exists. By adding supplements of good bacteria and fungi, soils can be revived, allowing them to resume their vital role in food production.

## MOISTURE TECH



Shrinking water supply is a major contributing factor in declining soil productivity. But imagine being able to grow crops where water is scarce. New solutions are emerging within the field of moisture tech allowing soils to act like sponges and retain water longer than ever. This opportunity space offers hope that crop yields may soon need not rely on regular and predictable rainfall.

## **OPPORTUNITY**

# LIVING ON AIR

The use of advanced technologies to produce food without soil, and with reduced reliance on water and fertiliser, will make it possible to grow food in new areas. Soil-free agriculture presents an opportunity to save water and give tired soils a chance to regenerate. The opportunity space includes a range of supporting products like LED lighting and renewable energy technologies.



Soil-free agriculture (also called soilless) presents one of the strongest opportunities for scientific, economic, and technological advancements in the field of agriculture of the last 200 years. Originally invented to produce out-of-season crops, this technology can help to regenerate soils in times of land pressure and degradation. Soil-free agriculture offers higher yields than traditional agriculture, uses water more efficiently, and provides alternatives to toxic soil sterilisation, decreasing risks of soil-borne diseases.

Even more promising, soil-free agriculture can take the form of indoor or vertical farming, and is suitable for dense urban environments. The benefits of soil-free agriculture are manifold. It permits more food to be grown locally, lowering emissions from transport and reducing food moving costs. A more stable food supply will help reduce price fluctuations and food waste, while allowing a variety of foods to be produced any time of year.

### **PRODUCTS AND SERVICES**

Products and services in the soil-free agriculture market include the necessary input into production, including alternative growth media; LED lighting for indoor cultivation; technical and advisory services; and advisory for soil-free agriculture. Products also include towers to grow plants vertically or shelves to maximise the space for production, both of which can be acquired with built-in LED lighting.

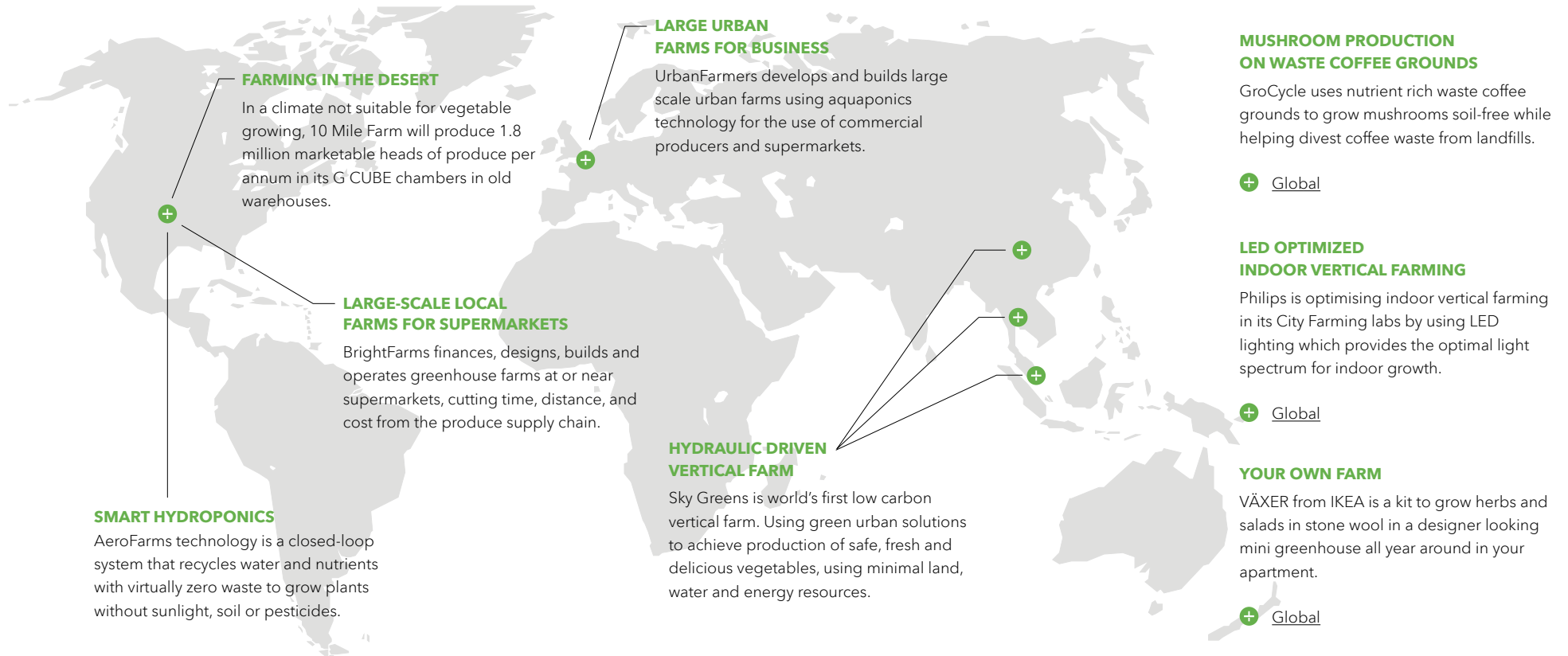
Renewable energy is an important component in this market, as it lowers emissions from lighting used in indoor soil-free farming. Products in soil-free agriculture include solar panels that provide power to submersible pumps. As solar-powered systems continue to drop in price, the costs of operating an indoor soil-free garden will also decrease, making these technologies even more attractive.

### **MARKET SIZE AND DEMAND DRIVERS**

A number of factors are driving soil-free agriculture. First, global urbanisation is driving demand for more locally produced food. Second, the increasing rate of extreme weather events coupled with decreasing soil fertility are creating demand for producing food in more controlled environments. Third, there is a growing movement around self-sufficiency, which brings food production into areas without land available for cultivation, such as cities.

On the whole, alternative soil solutions are becoming a real business opportunity. Aquaponics alone is estimated to be worth 1 billion USD by 2020. The worldwide market value of food produced without soil (this covers both soilless and hydroponically produced food) will show sustained strength with a 6.5 percent compound annual growth rate (CAGR) from 2013-2018, beating the IMF estimated growth forecast of 3.6 percent for 2014. Producer value will increase from 17.7 billion USD to 24.3 billion USD.

# SOLUTIONS TO GROW FOOD WITHOUT SOIL



**80%**

up to 80% decrease in water use for some hydroponic crops compared to traditional farming

**75X**

more productivity per square foot with AeroFarms than a commercial field farm

**1.5M**

tons produced annually in one LED fitted indoor commercial farm



SUSTAINABLE DEVELOPMENT GOALS

Sources: 1. Bateman J. "Necessity Is Driving Agricultural Innovation Indoors". Tech Crunch. Jan 15, 2016. [www.techcrunch.com](http://www.techcrunch.com) 2. AeroFarms. "AeroFarms - Environmental Impact". [www.aerofarms.com](http://www.aerofarms.com) 3. Philips Lighting. "Green Sense Farms". [www.lighting.philips.com](http://www.lighting.philips.com)



# CHINA HAS THE CAPACITY TO PURSUE

The financial sector is ready to play an active role in developing the market for soil-free agriculture, as leaders in this field believe there already exists a substantial capacity to grow this market. Leaders in this sector also believe the market will create positive change. Globally, leaders rank this opportunity 9th out of 15. Europe is the region where the market is most ready to mature, as leaders here place it 3rd on the overall opportunity ranking. The same goes for the countries belonging to the very high Human Development Index category.

### Capacity to Grow the Market

Leaders in China are confident their country has the capacity to develop this market. They rate this opportunity second highest with respect to economic capacity and also high on the political capacity parameter (4th), while they rate the technological capacity lower (9th).

Respondents in most other regions do not believe the capacity is in place to pursue this opportunity. In particular, leaders in India and Other Asia (Japan and Russia) indicate there does not yet exist sufficient capacity in their regions to pursue the market for soil-free agriculture.

### Opportunity Business Case

Globally it is one of the opportunities with the weakest business case in the eyes of all the leaders asked.

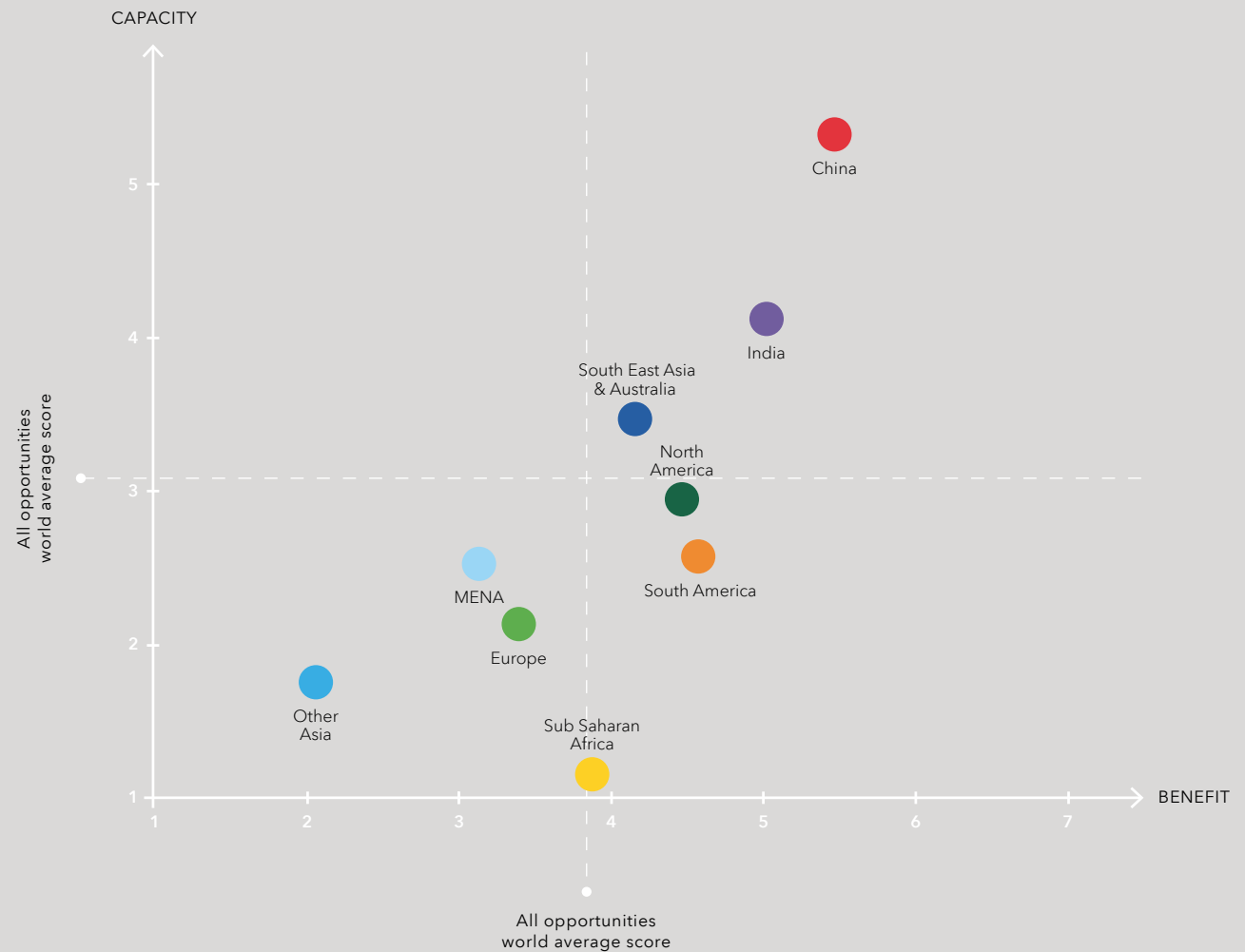
Regionally, leaders in the water-scarce MENA region believe the opportunity will have the most positive impact. However, at a global level, the data points to a need to incentivise business to become actively involved in developing this market. Business in China is the exception to this global trend, where leaders rate the business case higher than in the rest of the world.

### Sector Impact

The soil-free agriculture market does not appear to be high on the agenda of civil society, or politicians. However, the strongest advocates are found in China.

## BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



## NUMBER 9 ON THE OPPORTUNITY RANKING

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
10	GENDER EQUALITY - IT'S ABOUT TIME
11	CYBER SECURITY GAME
12	INSTANT REFUGE
13	UPGRADING INFORMAL HOUSING
14	CONFLICT FREE NATURAL RESOURCES
15	CLEVER CODES DISRUPT INEQUALITY

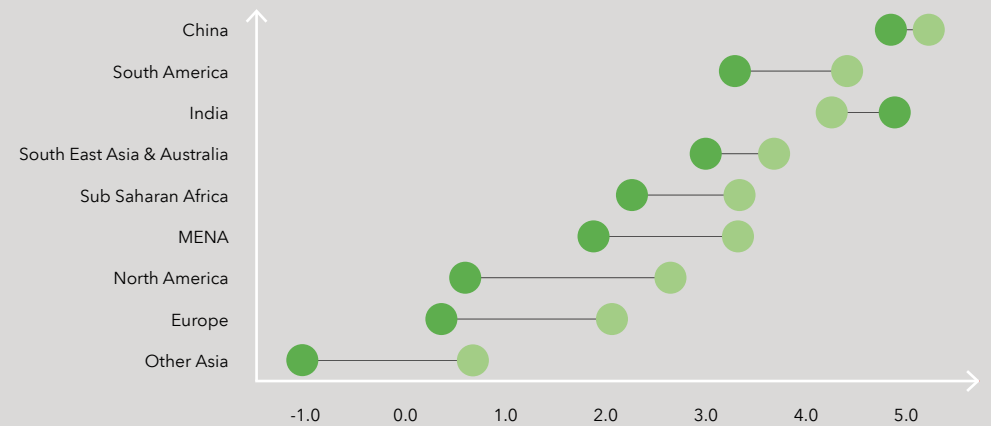
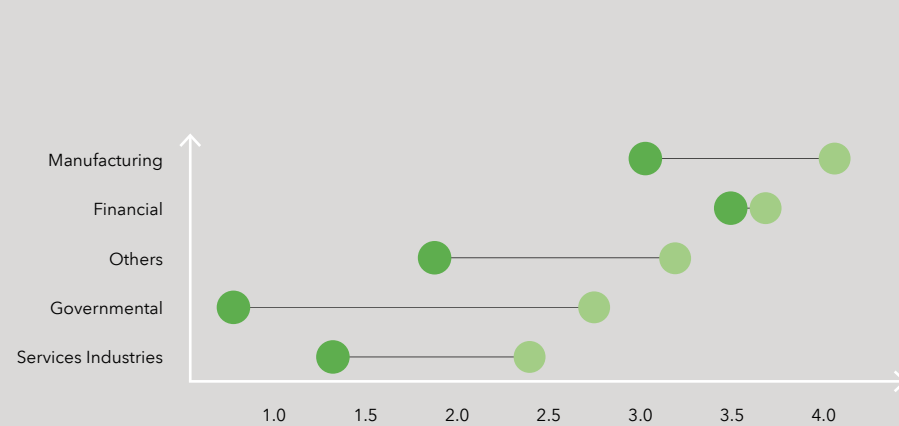
## CHARACTERISTICS OF OPPORTUNITY



Respondents in the Finance sector trust this opportunity to be positive for society

## PURSUE AND IMPACT

● Likelihood of pursuing    ● Positive impact on business



## **OPPORTUNITY**

# KEEPING OUR SOILS ALIVE

The addition of special kinds of bacteria and fungi to soils has the ability to regenerate tired and depleted land, enabling it to become productive and arable again without the use of chemical fertilisers. Keeping soil alive with natural additives represents a big opportunity to reverse the trend of degrading soils and ensure nutrient-rich land.



Bacteria and fungi present an opportunity to reduce the need for chemical fertiliser and rejuvenate tired soils by increasing the content of plant-available nutrients. By introducing “good” bacteria and specific fungi into soil environments, these beneficial mushrooms and microbes act as probiotics of the plant world. Just as good bacteria promote good human health and well-being, beneficial microbes enhance plant vigour and productivity, and are thus a rapidly developing part of agricultural biotechnology.

### **PRODUCTS AND SERVICES**

Microbial additives have been used commercially in global agriculture for more than 120 years, but interest in this market are increasing. Microbial additives – also known as biofertilisers – can be broadly segmented into bacteria, fungi, and others (such as viruses and protozoa) and there are currently nearly 150 registered microbial strains for agricultural products on the market. Microbial products come in different forms, such as powders, liquids or as seed coating. Many of these products can be added to soils along with fertiliser and herbicides.

These products are designed to foster healthy soils that are rich in plant-available nutrients. They consist of microbes grown in the lab which are then subject to field tests. A number of microbial additives have been developed to increase the availability of nitrogen or phosphorus to plants in the soil, maximizing the efficient, sustainable use of nutrients.

### **MARKET SIZE AND DEMAND DRIVERS**

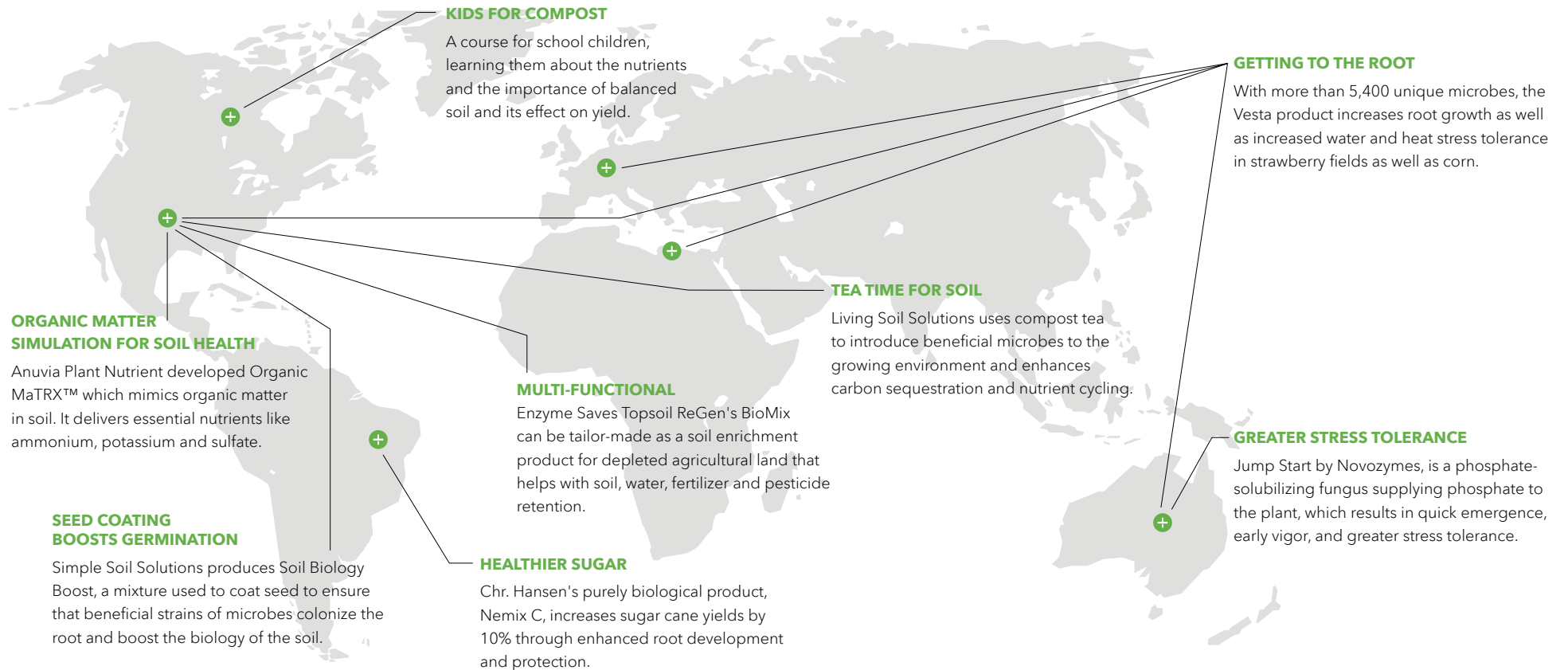
There is a strong business case for taking microbial additives to both small farms and large-scale agribusiness. Replenishing soil is no longer an eco-farming niche occupation, but a way to save billions of dollars. The growth potential in this opportunity space is promising, as the agricultural microbe market was valued at 2.17 billion USD in 2015.

It is projected to grow at a compound annual growth rate (CAGR) of 15.14 percent from 2016 to 2021, to reach 5.07 billion USD by 2021.

Increasing global food demand is a major driver of this market for agriculture, including microbes. According to the Food and Agriculture Organization of the United Nations (FAO), global food production must increase by 70 percent between now and 2050 to feed the world’s growing population. The increased application of agrochemicals on crops to meet food demand will cause soil contamination and other environmental hazards. Therefore, the demand for microbial additives continues to rise.

Other important drivers in the market for agricultural microbes include the growth in the organic food industry, as well as policy initiatives aimed at limiting chemical fertilisers in food production. An example of government action is the EU Common Agricultural Policy, which promotes the use of bio-based products along with organic farming.

# BIOTECHNOLOGY TO ENRICH THE SOIL



149

registered microbial strains for agricultural products

\$5.07BN

by 2021 estimated market size for microbial agriculture

20%

Up to 20% increase in plant growth when biofertilizers are used



SUSTAINABLE DEVELOPMENT GOALS

Sources: 1. Parnell JJ, Berka R, Young HA, et al. "From the Lab to the Farm: An Industrial Perspective of Plant Beneficial Microorganisms". Front Plant Sci, vol 7, pp.1110. 2016 2. Markets and Markets. "Agricultural Microbials Market worth USD 5.07 billion by 2021". 2016. [www.marketsandmarkets.com](http://www.marketsandmarkets.com) 3. Frost and Sullivan. "Biofertilizers - Potential Alternatives to Synthetic Fertilizers". 2014.

# ECONOMIC CAPACITY TO PURSUE IN PLACE

Utilising good bacteria and fungi to boost soil quality is the most favoured market opportunity in the eyes of leaders in China and a runner-up in Europe. Globally, the opportunity is ranked as the 5th best on the opportunity ranking, with leaders in South East Asia & Australia rating it lower, as the 9th best.

From a gender perspective, the opportunity appears to be the most preferred among female respondents, whereas male respondents give it a medium ranking. For the regions with a high Human Development Index score, it is the runner-up on the overall opportunity ranking. The younger the respondent, the more positively he or she views this opportunity.

### Capacity to Grow the Market

Business leaders consulted in our survey believe this market is held back by a lack of capacity. The opportunity receives an overall ranking of 8 out of 15 in terms of the current capacity to mature the market, with the MENA region rating it even lower. The surveyed leaders believe the economic capacity already exists to mature this market. However, their rankings indicate they do not believe the technological and political capacities are sufficient to do so thus far.

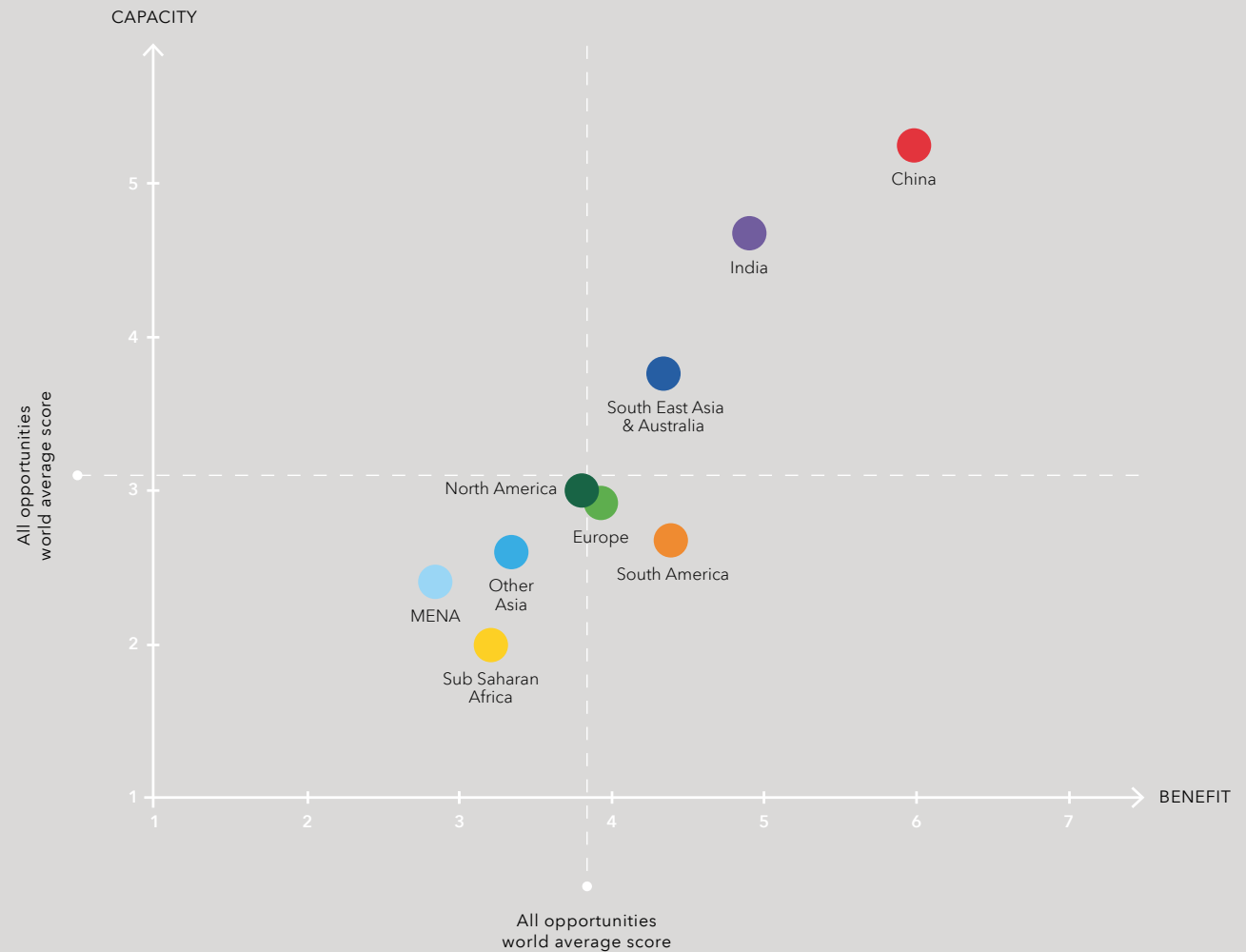
From a geographical perspective, leaders believe Europe will be a frontrunner in maturing this market. The economic and technological capacity is perceived to be ready to drive this market in Europe. Yet leaders in Europe do not believe the political capacity is sufficiently available in Europe to develop this market.

### Sector Impact

Civil society will be a key advocate for this market opportunity, according to the survey. In particular, the issue is high on the agenda of civil society in Europe.

### BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



**NUMBER 5 ON THE OPPORTUNITY RANKING**

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
10	GENDER EQUALITY - IT'S ABOUT TIME
11	CYBER SECURITY GAME
12	INSTANT REFUGE
13	UPGRADING INFORMAL HOUSING
14	CONFLICT FREE NATURAL RESOURCES
15	CLEVER CODES DISRUPT INEQUALITY

**CHARACTERISTICS OF OPPORTUNITY**

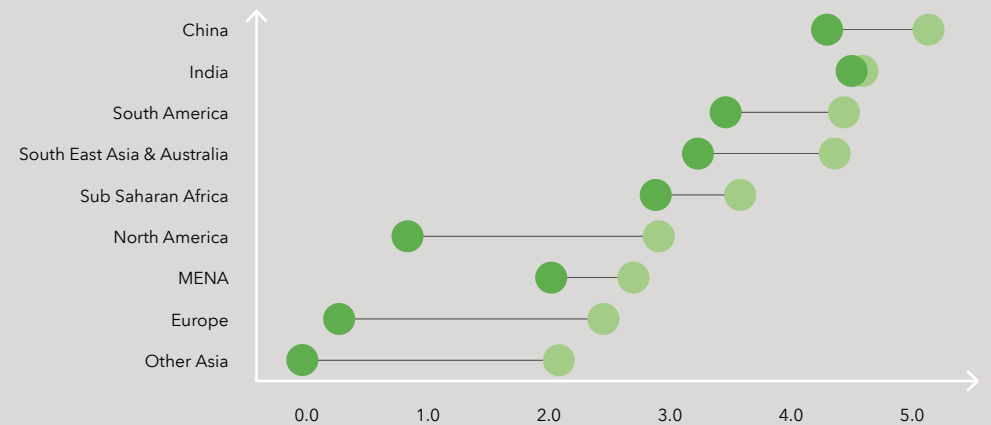
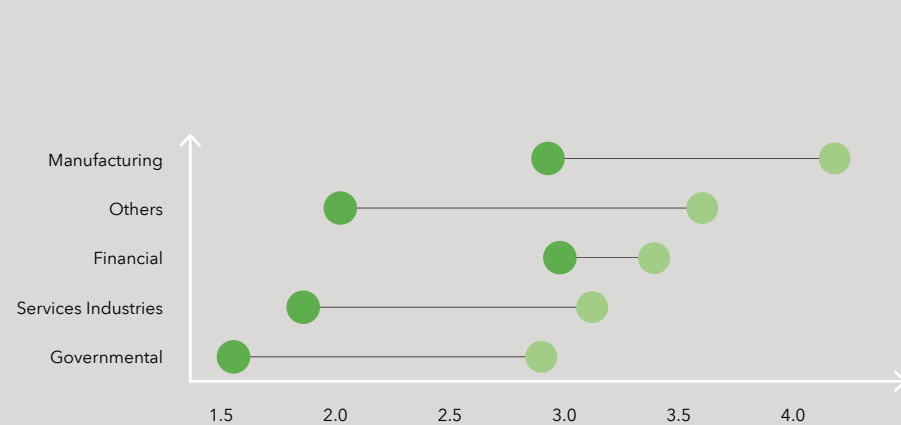


Top opportunity for respondents in China (- runner up in Europe)



**PURSUE AND IMPACT**

● Likelihood of pursuing    ● Positive impact on business



## **OPPORTUNITY**

# MOISTURE TECH

With climate change drying out soils, new water-retaining solutions are emerging – opening up opportunities to make non-productive land arable. Traditionally, agriculture has been reliant on rainfall patterns or irrigation systems, but the products within the field of moisture tech have the potential to cut this dependency and ensure arable soils.



Climate change leads to an increase in the frequency and severity of droughts. It dries out our soils, and, with global food demand growing exponentially, it is critical that we find a way to combat this trend. Fortunately, new technologies are enabling soils to act as sponges and better retain water, making food production less dependent on rainfall and temperature and saving food producers money in the process.

### **PRODUCTS AND SERVICES**

The market for water-retaining soil solutions is an exciting and constantly developing. Part of the products are based on nanotechnology. In the case of water retention, nanoclay can turn dry sandy soils into fertile land. This product, when applied to soils, acts as a sponge that helps the soil retain water.

A new technology is also emerging called Subsurface Water Retention Technology (SWRT) with the ability to improve the water storage capacity of soils. It consists of membranes installed within the soil profile to prevent the loss of water via deep percolation. These water-saving membranes are a new innovation designed to retain water while permitting extended root growth beyond the depths of the membranes.

Another innovative product is the low-tech plant cocoon. This is a small shelter that houses and protects plants in their early stages of development. These shelters guard saplings from drying winds, allow for gradual release of water to the root system, and collect rainwater and dew to replenish reserves. Once the plant has reached maturity, the cocoon dissolves into organic substrate that helps the plant continue to flourish.

Soil moisture sensors are products enabling farmers to manage soil moisture in a smart way via constant access to data on the water content in the soils. Finally, an emerging

element to this opportunity is the use of treated urban and industrial wastes to contribute to increased water retention in poor soils.

### **MARKET SIZE AND DEMAND DRIVERS**

Drought and desertification cause the loss of 12 million hectares of land each year – three times the size of Switzerland – on which 20 million tonnes of grain could have been grown. In China alone, more than 400 million residents are affected by desertification each year, causing a direct annual economic loss exceeding 10 billion USD.

The resulting potential market sizes of remedies against desertification are enormous. The potential to put drylands to productive use is a market driver in the face of increasing food demand. Forty percent of the Earth's land surface is occupied by drylands – home to around 2 billion people.

The global soil moisture sensor market is expected to grow at a compound annual growth rate (CAGR) of 16.2 percent between 2015 and 2020 and reach 206.2 million USD by 2020.

# INNOVATIVE SOLUTIONS TO KEEP SOIL MOIST



**7HRS**  
to transform desert soil into fertile land with Liquid NanoClay

**2X**  
increase in plant root zone's water and nutrient holding capacity with Soil Water Retention Technology

**50%**  
Up to 50% increase in crop yield with Novihum



SUSTAINABLE DEVELOPMENT GOALS

Sources: 1. Desert Control. "The creators of Liquid NanoClay". [www.desertcontrol.com](http://www.desertcontrol.com) 2. Smucker, A. "A new soil water retention technology for irrigated highly permeable soils". The Emerging Technologies for Sustainable Irrigation Symposium. 2015. 3. Novihum Technologies. "Novihum - for healthy soils: natural, fast, permanent and enduring". [www.novihum.com](http://www.novihum.com)



# SECOND-BEST OPPORTUNITY IN CHINA AND NORTH AMERICA

The market for applying technology to improve soils' ability to retain water has been assessed very positively by respondents from China and North America. Leaders in these two regions rank the opportunity as the runner-up with respect to its benefits for society and the capacity of the regions to pursue it.

Globally, the opportunity is ranked number 6 on both of these parameters. According to the survey, it appears the market is most appealing to respondents under the age of 30 as well as to women.

### Capacity to Grow the Market

In general, the surveyed leaders believe the political and economic capacities to further develop the market already exist. However, they perceive a lack of technological capacity to be a limiting factor in developing the market. This indicates further innovation in technology is needed to fully capitalise on this market. In China, moisture tech is considered the opportunity business has the greatest capacity to pursue. In Europe and Other Asia (Japan and Russia) the capacity is also perceived to be very high. Hence, we can expect the market to mature most rapidly in these three regions.

### Opportunity Business Case

New technology to enhance soil fertility via water retention is positively welcomed in Sub Saharan Africa. Business leaders in this region are the ones who see the best business case in this market compared to leaders in the other regions.

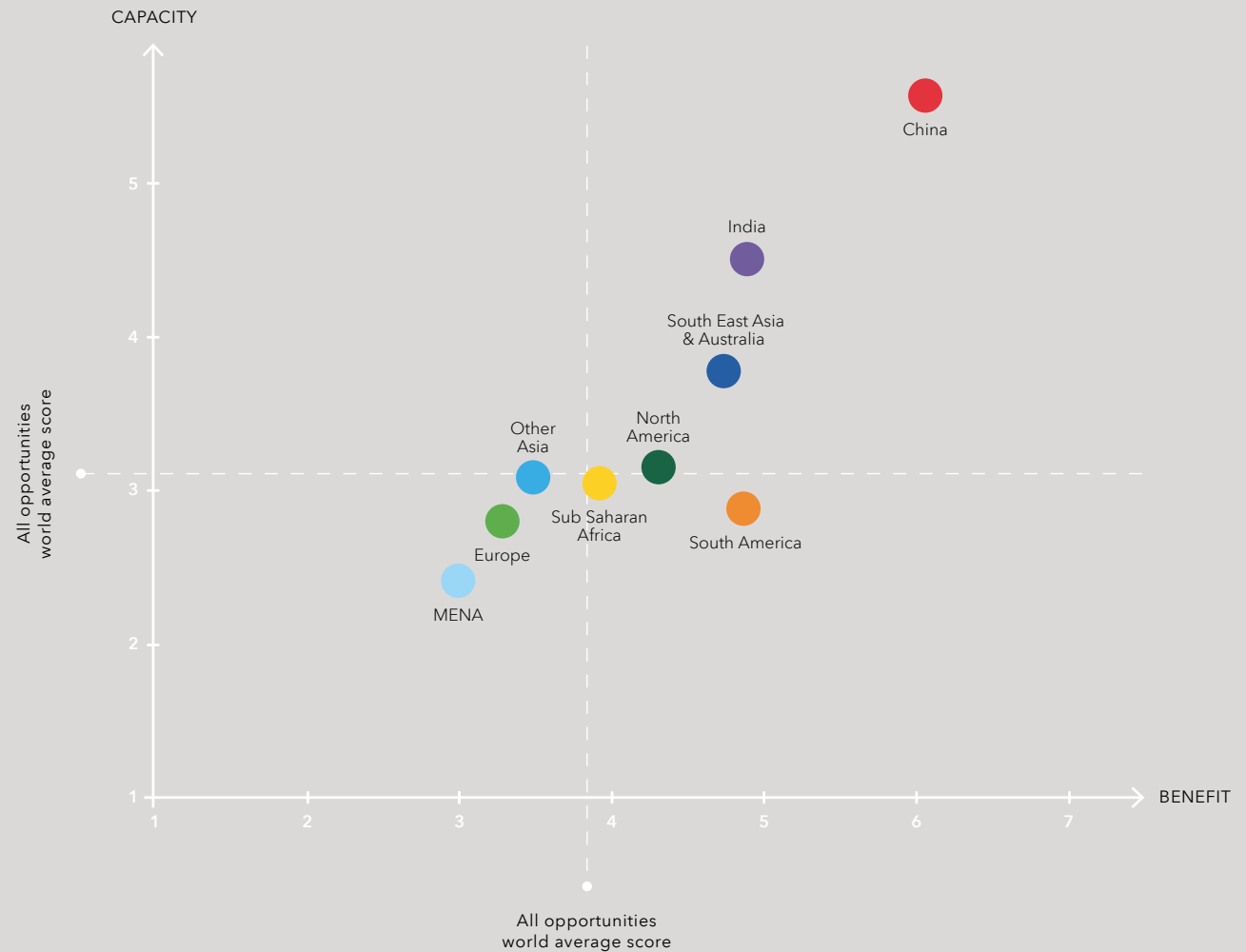
### Sector Impact

The financial sector appears most likely to actively engage in this market. According to the survey, the financial sector is also the most optimistic about the positive impacts of this opportunity on society - making it a potential impact investment market.

Survey results from China and South America reveal a readiness by civil society, politicians, and business to actively work on driving the moisture tech market through advocacy.

## BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



**NUMBER 6 ON THE OPPORTUNITY RANKING**

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
10	GENDER EQUALITY - IT'S ABOUT TIME
11	CYBER SECURITY GAME
12	INSTANT REFUGE
13	UPGRADING INFORMAL HOUSING
14	CONFLICT FREE NATURAL RESOURCES
15	CLEVER CODES DISRUPT INEQUALITY

**CHARACTERISTICS OF OPPORTUNITY**

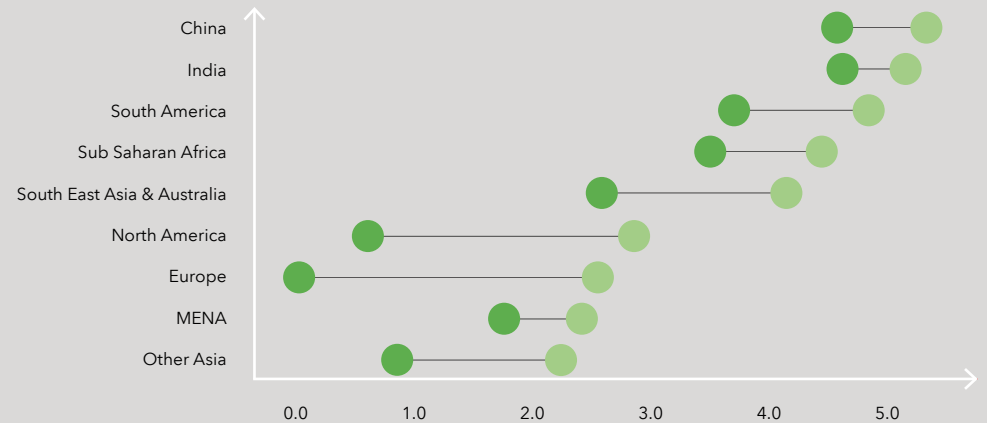
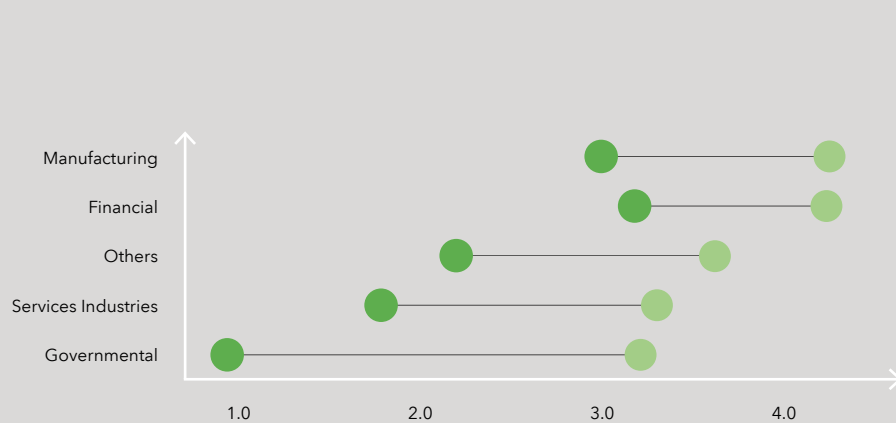
<30



Younger respondents ranked this opportunity the highest

**PURSUE AND IMPACT**

● Likelihood of pursuing    ● Positive impact on business



RISK

# RISING INEQUALITY

We live in an unequal world. Inequality within countries is rising - even if poverty rates have gone down - bringing with it a range of devastating economic and social impacts. Combating inequalities related to gender, race, ethnicity, and social class will be of the utmost importance in the coming years, and business can ensure their products and services contribute to battling inequalities rather than further entrenching them.





## RISK

# RISING INEQUALITY

The gaps between rich and poor are growing all over the world, even as poverty rates have gone down. High economic inequality has a harmful impact on a number of societal outcomes, such as life expectancy, level of educational attainment, and economic growth.

Due in part to the rise of emerging economies, global inequality overall is declining and the number of people living in extreme poverty has declined from 1.9 billion in 1990 to 836 million in 2015. In line with this development, projections show we will witness a massive influx of people into the global middle class, from 1.8 billion people in 2009 to 4.9 billion in 2030. Despite these positive global trends, inequality still exists today, and it's not just the level of income in a community that matters - it's also how income

### 0.7% OF THE WORLD POPULATION OWNS 41% OF GLOBAL WEALTH



Source: WEF. Outlook on the Global Agenda 2015.

is distributed - underlining the importance of addressing inequality for a sustainable future.

While there might be a positive trend globally, inequality is still rising within countries and poses a risk to societies. Global trends show increasing concentration of wealth in an increasingly small number of hands. The gap between the rich and the poor reached a new peak in 2015, where the richest 1 percent had accumulated more wealth than the rest of the world put together. Looking at the OECD countries, income inequality is at the highest level for the past half century. The average income of the richest 10 percent of the population is about nine times that of the poorest 10 percent across the OECD.

OECD found that income inequality has a statistically significant impact on economic growth, costing the U.K. nine percentage points of GDP growth between 1990 and 2010 and the U.S. almost seven points.

The 2015 Change Readiness Index, which measures the ability of governments, businesses, and civil societies in 127 countries to handle economic change and take advantage of investment opportunities, found economic inequality makes it harder for countries to weather crises such as natural disasters and social unrest.

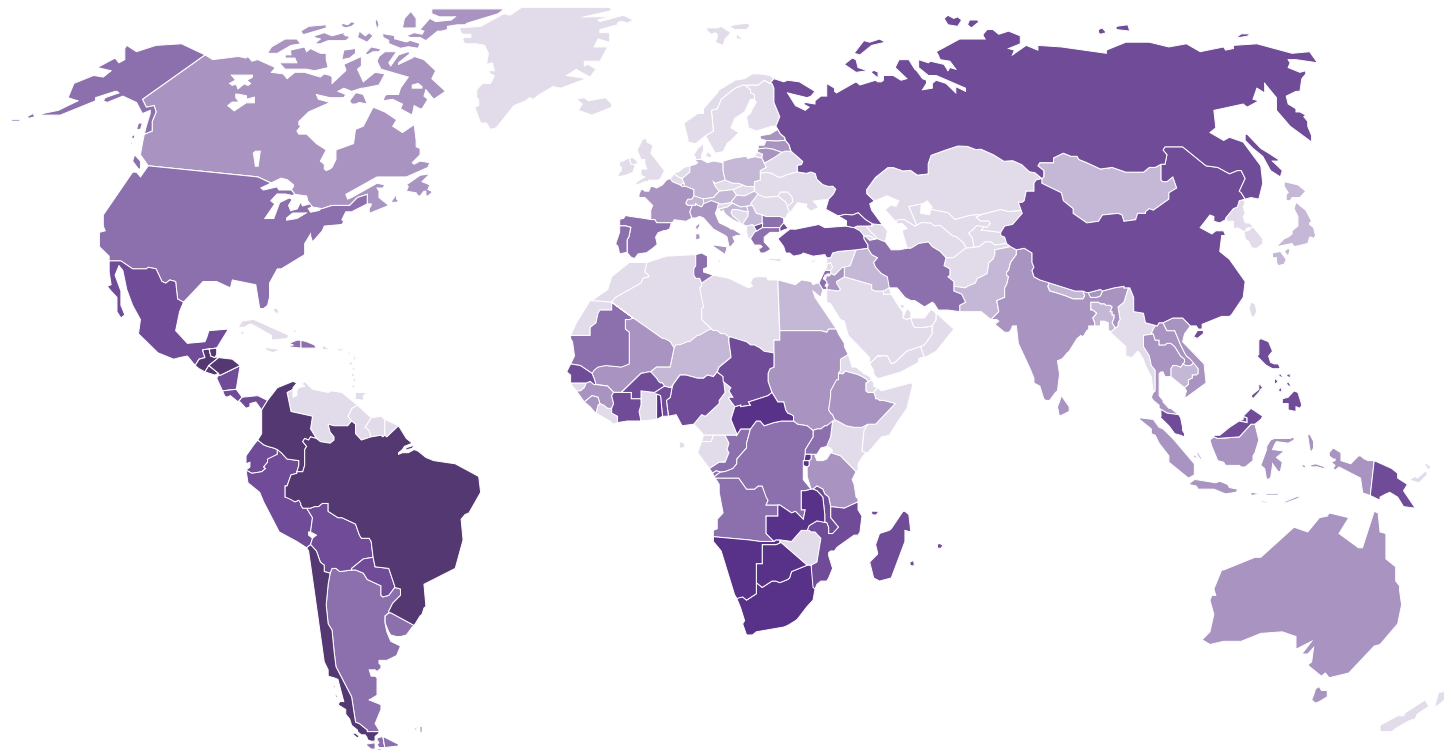
Income inequality is intrinsically linked to social inequality. Within countries and communities across the globe, prejudice and discrimination on the basis of sex, race, ethnicity, and social class fuels income inequality. For instance, women make up the majority of the world's poor and do not have the same economic opportunities as men.

Inequality has obvious implications for the groups negatively affected by it; however, it also has a negative spill-over effect on other areas of society such as economic productivity, resilience, and crime rates. Inequality fuels social unrest, and societies marked by inequality experience higher rates of violence than more equal societies do. Life expectancy is also influenced by income inequality. Research has found that people in unequal communities were more likely to die before the age of 75 than people in more equal communities in the U.S. - even if the average incomes were the same.

The causes of these growing income gaps are complex and reflect both economic and social shifts. The OECD points to globalisation - in particular the impact of technology on the workforce - as an important factor.

## AN UNEQUAL WORLD

GINI index - a measurement of the extent to which income deviates from a perfectly equal distribution. On the scale, 0 represents perfect equality and 100 would represent total inequality.



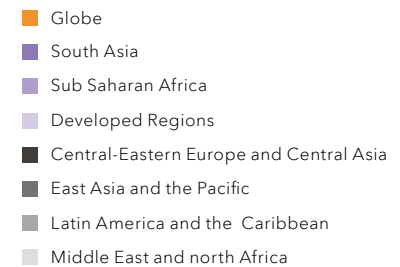
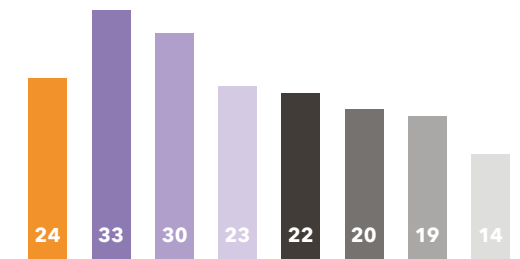
EQUALITY



Sources: World Map (above) - The World Bank. "GINI index". [www.data.worldbank.org](http://www.data.worldbank.org) Chart (upper right) - UN Women. Progress of the World's Women 2015-2016. 2016. Chart (lower right) - De Neve J-E, et al. "Income Inequality Makes Whole Countries Less Happy". Harvard Business Review. Jan 12th, 2016. [www.hbr.org](http://www.hbr.org)

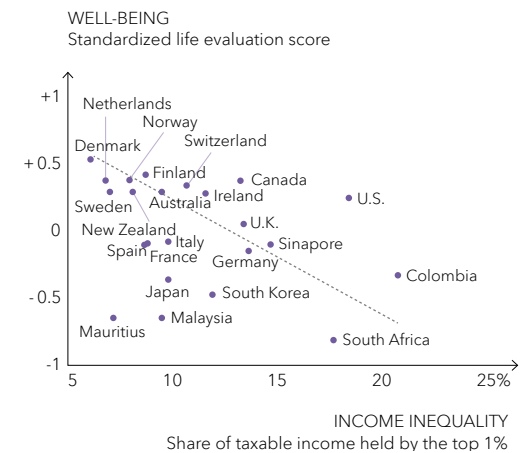
## GENDER PAY GAPS REMAIN STUBBORNLY PERSISTENT EVERYWHERE

Globally, women earn on average 24 percent less than men, with variation across regions



## INEQUALITY MAKES COUNTRIES UNHAPPY

The more income is concentrated in the hands of a few, the more likely individuals are to report lower levels of life satisfaction and more negative daily emotional experiences.



## OPPORTUNITIES

# OPPORTUNITIES FOR A MORE EQUAL WORLD

An equitable society is not only more socially inclusive, but also more economically productive. It therefore makes good business sense for companies to develop solutions that reduce inequalities. Technological innovations have a particularly unique ability to contribute to reducing inequalities of all kinds; the three opportunities presented here offer insight into how business can promote equitable access to crucial financial services, break down entrenched gender disparities, and allow more people to receive necessary life-saving healthcare.



**CLEVER CODES  
DISRUPT INEQUALITY**



**GENDER EQUALITY  
-IT'S ABOUT TIME**



**INTERNET  
OF PEOPLE**

## CLEVER CODES DISRUPT INEQUALITY



Quickly developing blockchain technology using clever codes disrupts inequality, allowing people all over the world to take control of their digital identities. In this market, sophisticated record-keeping databases can help people verify their identity, get access to banking services, to insurance, and many other financial products.

## GENDER EQUALITY - IT'S ABOUT TIME



Innovative labour-saving technologies can free up time spent on housework, and progressive advertising can challenge gender norms that perpetuate the uneven burden of domestic work on women. Gender equality - it's about time is the opportunity to break down the unequal division of domestic workload and lower the total amount of time anyone spends on these tasks.

## INTERNET OF PEOPLE



Providing access to basic health services can mean the difference between life and death. Connected digital platforms and the Internet of People are opening up new opportunities for collecting and sharing personal data, which can greatly improve access to healthcare, particularly for low-income, remote communities.



## **OPPORTUNITY**

# CLEVER CODES DISRUPT INEQUALITY

Blockchain technology uses a sophisticated, tamper-proof, record-keeping database to help people verify their identity, allowing them to access a bank account, insurance, and many other financial services. Blockchain's ability to give people control over their digital identities makes it an increasingly important tool in mitigating inequality around the world.



People living without adequate records are often locked into poverty and exclusion. As many as 2 billion people worldwide are without a bank account. They tend to use only physical currency, making them vulnerable to theft. Furthermore, they cannot borrow money via a formal loan, nor can they access most insurance. Blockchain can correct this systemic failure that excludes too many from the economy by enabling people to get a digital identity. Simply put, blockchain is an open source digital ledger that acts

like an accounting book and tracks all transactions. Everyone owns it but no one individual can make changes, making it tamper-proof. Blockchain allows people to prove their identity, enabling them to record transactions - and, hence, enter the global economy.

Blockchain is an immature opportunity space, with many competing versions of a blockchain future. While blockchain is no longer just a theory, it is still a long way from mainstream adoption. Predictions point to mainstream uptake in 2025, but it may arrive much faster.

### **PRODUCTS AND SERVICES**

Blockchain applications include payments, exchanges, smart contracts, and digital identity. Applications for remittances are also emerging, promising to significantly decrease their cost, which is currently the second-largest source of external financial flows to developing countries. A remittance app allows person-to-person money transfers and the ability to store digital cash directly on a mobile device. The user can send funds instantly to anyone with a smartphone, and the user is not required to have a bank account.

Other blockchain-based potential products in this opportunity space are peer-to-peer lending platforms and peer-to-peer insurance platforms. Here, the role of the insurance company would change; it would calculate the risk profile of a person requesting insurance on the platform and

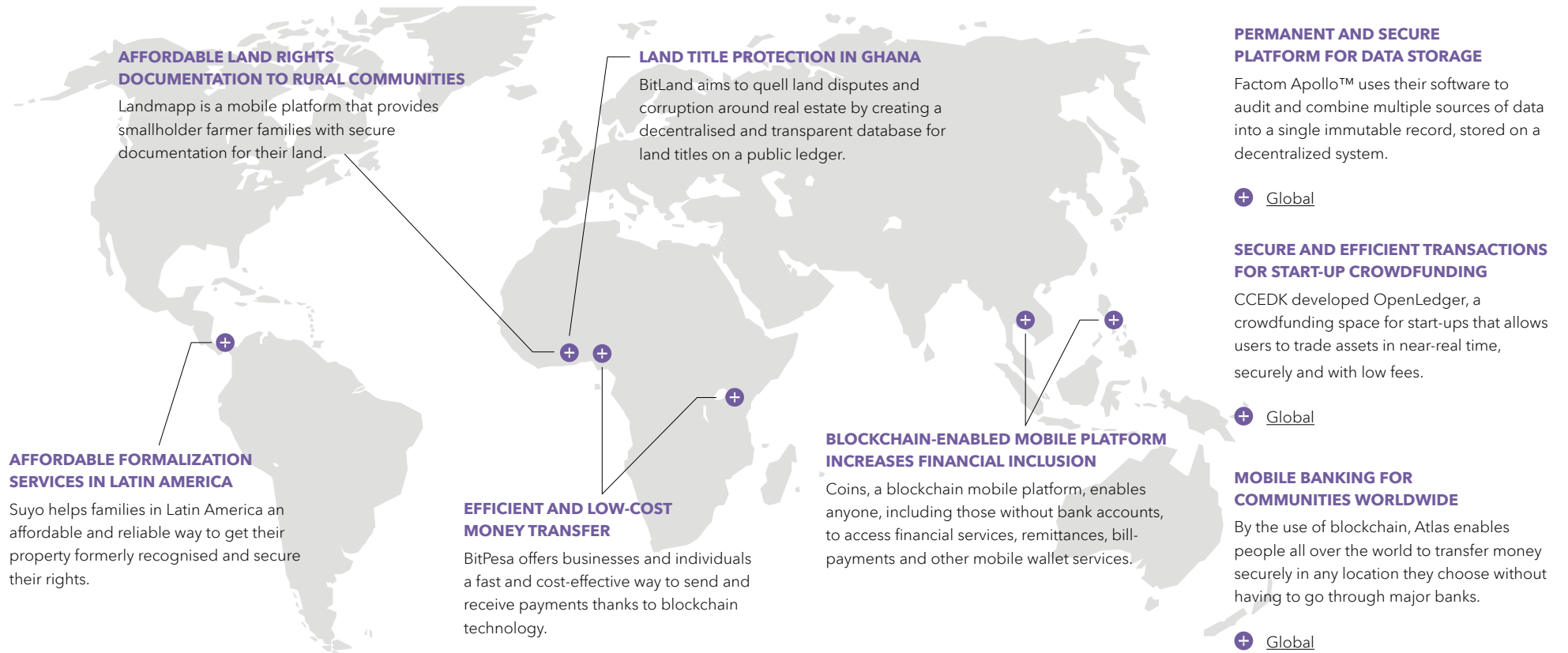
match that user with someone or several people who will supply the insurance at a given rate of return.

### **MARKET SIZE AND DEMAND DRIVERS**

The blockchain technology market is estimated to grow from 210.2 million USD in 2016 to 2,312.5 million USD by 2021 at a compound annual growth rate (CAGR) of 61.5 percent. This market is growing rapidly because of blockchain's high adoption rate across various applications such as payments, smart contracts, exchanges, digital identities, and documentation.

Barclays Africa and its UK parent company, Barclays PLC, completed the world's first trade finance transaction using blockchain technology in September 2016. It saves a lot of time - typically these documents take anywhere from 2 to 10 working days to be delivered from party to party, whereas now it can be done electronically in hours or minutes.

# SMART CODING TO ENSURE EQUALITY



**10X**

potential reduction of remittance transaction cost by using blockchain

**70%**

of land rights remain unregistered worldwide

**2BN**

people are unbanked worldwide



SUSTAINABLE DEVELOPMENT GOALS

Sources: 1. International Monetary Fund. Virtual Currencies and Beyond: Initial Considerations. 2016. 2. UN-Habitat. UN-Habitat and GLTN Youth-Led Action Research on Land Commencement Workshop. 2013. 3. World Bank. The Global Findex Database 2014: Measuring Financial Inclusion around the World. 2014

# SUB SAHARAN AFRICA READY FOR BLOCKCHAIN

On the overall ranking, financial inclusion using blockchain technology is not perceived as an opportunity business, governments, and civil society have a high capacity to pursue. Furthermore, this opportunity is also perceived to have a low impact on society. These findings signal blockchain is not a mainstream technology. Sub Saharan Africa, however, seems to be ready for blockchain to support financial inclusion, as leaders there rate it as their second most preferred of all 15 opportunities.

Regions containing clusters of countries that rank lower on the Human Development Index look more positively at the current capacity to develop this market and see a greater potential for it to make a positive impact on society.

### Capacity to Grow the Market

Respondents in India feel confident the capacity (political, economic, and technical) exists to grow the market for blockchain-based financial products. However, in the rest of the world, the capacity, in all three dimensions (economic, technical, and political) to develop financial products based on blockchain technology is perceived to be in the very low end of all opportunities. The political capacity to grow this market is perceived to be particularly low in Europe and in North America in the eyes of leaders in these two regions.

### Opportunity Business Case

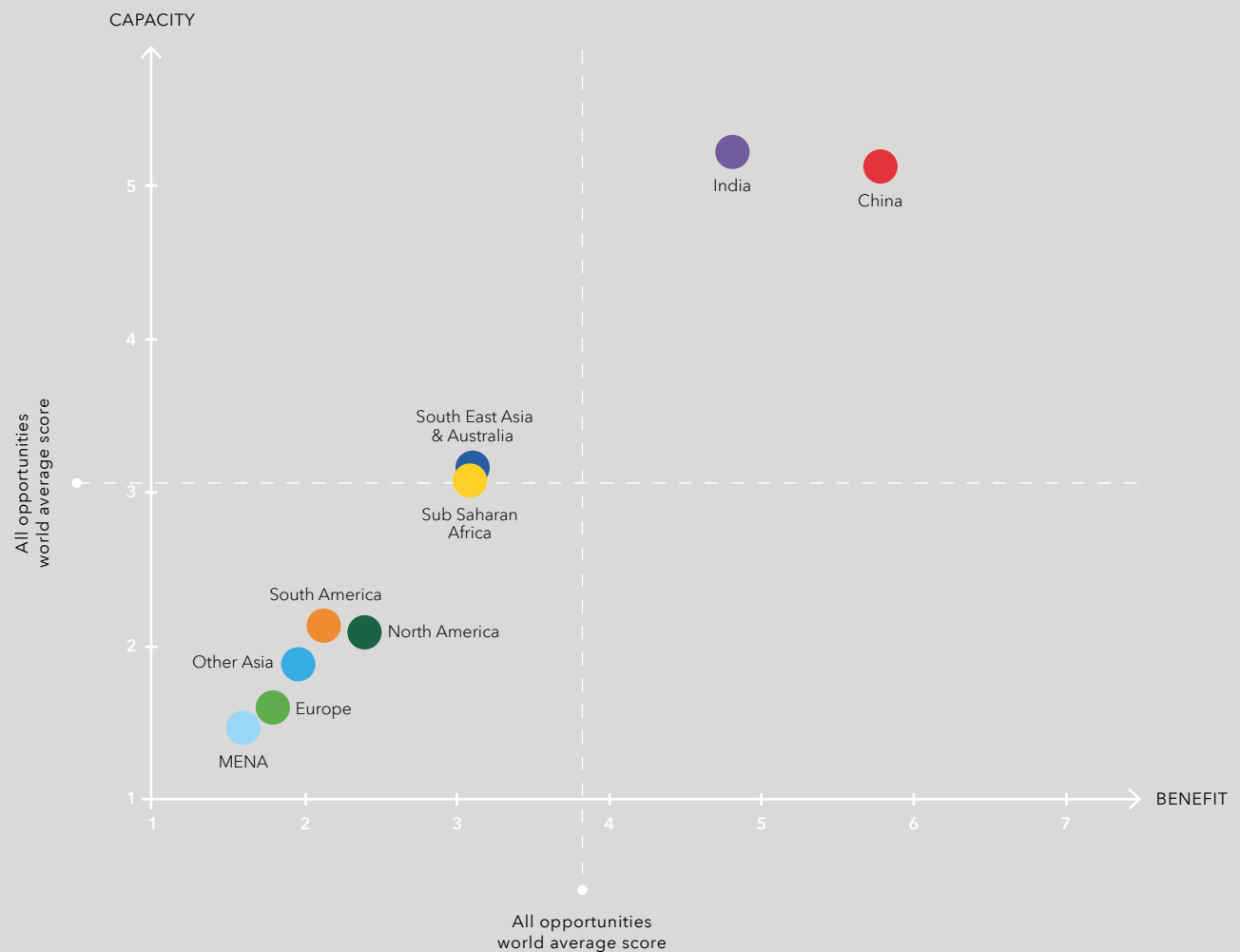
Compared to the other opportunities presented in this report, business leaders have not expressed confidence in the strength of the business case of engaging in this market opportunity and they do not believe their organisations are likely to pursue it to the same extent as other opportunities. The exceptions are China and Sub Saharan Africa, where blockchain-based financial products represent the second most favoured opportunity.

### Sector Impact

Overall, this is the opportunity civil society is least likely to advocate for. The exception is, again, Sub Saharan Africa, where both government and civil society can be expected to actively advocate for this market.

## BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



**NUMBER 15 ON THE OPPORTUNITY RANKING**

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
10	GENDER EQUALITY - IT'S ABOUT TIME
11	CYBER SECURITY GAME
12	INSTANT REFUGE
13	UPGRADING INFORMAL HOUSING
14	CONFLICT FREE NATURAL RESOURCES
15	CLEVER CODES DISRUPT INEQUALITY

**CHARACTERISTICS OF OPPORTUNITY**

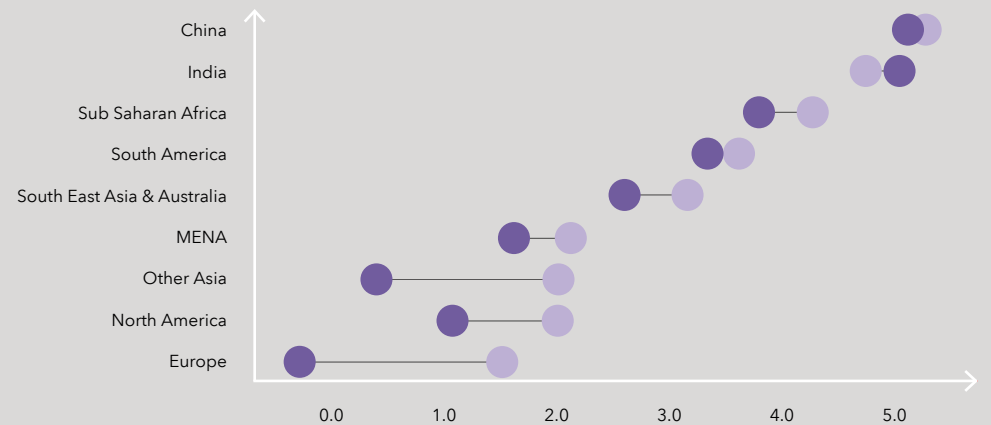
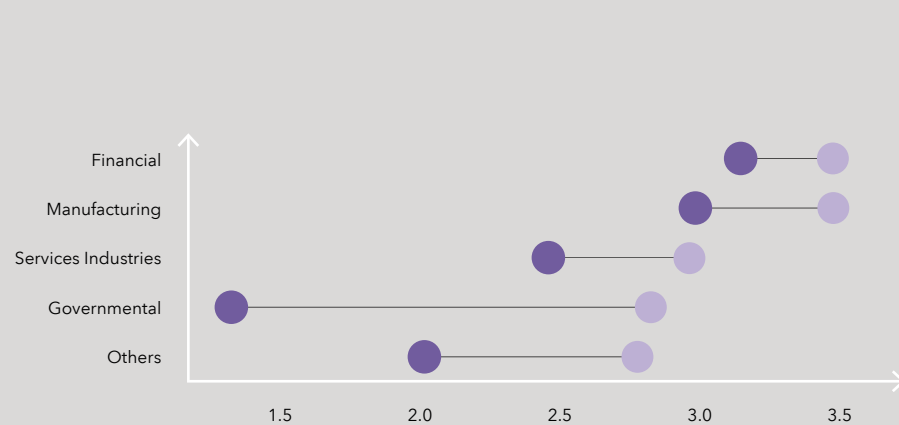


2<sup>nd</sup>

Second most favoured opportunity in Sub Saharan Africa

**PURSUE AND IMPACT**

● Likelihood of pursuing    ● Positive impact on business



## **OPPORTUNITY**

# **GENDER EQUALITY - IT'S ABOUT TIME**

In order to put gender equality into practice, innovative time- and labour-saving technologies can be deployed to reduce the uneven burden of domestic and care work on women. Moreover, progressive businesses must also take the lead in developing cultures, policies, and even advertising that break down gender norms leading to these disparate time burdens.



Women everywhere have a triple work burden in the productive, reproductive, and social spheres. In developing countries alone, women spend 100 million hours a day just carrying water. Women around the world spend 1 to 3 hours more per day on housework than men, and 2 to 10 times more caring for children, the elderly, and the sick. Unequal division of domestic and care work has significant negative impacts on girls and women. Indeed, if women's participation in the formal economy were equal to that of men's, an

estimated 28 trillion USD would be added to global GDP. The way to bring about more equality in the distribution of formal and informal work is to redistribute work and gender roles. There is an opportunity space for business to innovate products and services to reduce time on domestic and care work and to challenge gender roles and stereotypes.

### **PRODUCTS AND SERVICES**

For businesses, the need to reduce time on household chores and care work, specifically for women, carries with it an array of opportunities to innovate. Labour-saving technologies can contribute to freeing up time spent on domestic and care work in developing as well as developed countries.

It is products such as clean energy cookstoves, which do not require the use of firewood, and therefore save users time by avoiding wood collection, in India alone women spend 374 hours each year collecting firewood. Also products such as backpacks for carrying water; and robotic floor cleaners that mop, sweep, or vacuum without supervision can all help alleviate the time burden of housework.

Solutions to reduce the time spend on care work is also part of this opportunity space. It is for instance low-cost childcare, which enables women to enter the labour market. Frontrunners are testing new kindergarten concepts that offer take-away healthy meals, offering breakfast to parents

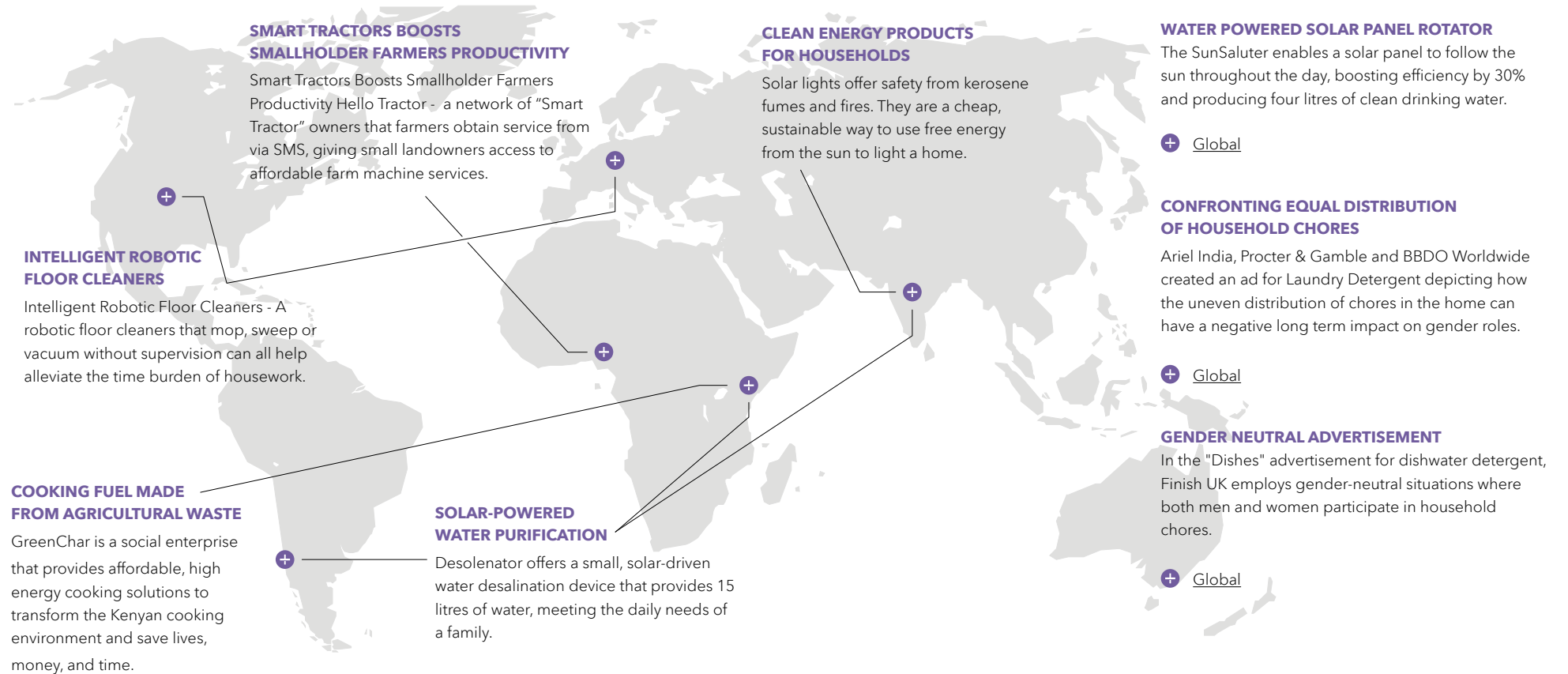
and children in a kindergarten café open 24 hours a day. In marketing these products, business can play a role in challenging gender stereotypes. Just 2 percent of advertisements related to domestic and care work show men cleaning, doing the laundry, or taking care of children.

Several companies have had success branding their products in ways that challenge gender norms in recent years. One is Pantene working to actively challenge the labels and double standards that are holding women back.

### **MARKET SIZE AND DEMAND DRIVERS**

The smart appliances market is estimated to reach 37.2 billion USD by 2020, at a CAGR of 15.4 percent between 2015 and 2020. An important demand driver is the rise in women's labour market participation. Women's presence in the U.S. labour force, for instance, has increased dramatically, from 30.3 million in 1970 to 72.7 million during 2006-2010.

# SOLUTIONS TO FREE-UP TIME SPEND ON HOUSEWORK



**\$28T**  
would be added to the global GDP if women participate in the formal economy

**2%**  
of advertisements related to housework show men cleaning, doing the laundry, or taking care of children

**200M**  
hours are spent by women every day to collect water



Sources: 1. McKinsey Global Institute. The Power of Parity: How Advancing Women's Equality Can Add \$12 Trillion to Global Growth. 2015. 2. Covert B. "Why It Matters That Women Do Most of the Housework". The Nation. Apr 30th, 2014. [www.thenation.com](http://www.thenation.com) 3. UN Water. Water for Women. 2015

# A STRONG BUSINESS CASE

Although this opportunity only comes in as number 10 on the global opportunity ranking, the survey reveals respondents in South East Asia & Australia, and Europe are significantly more positive towards the potential benefits of developing time-saving measures to promote gender equality than other regions, with Europe rating it 3rd and South-East Asia rating it 4th on the overall ranking.

### Capacity to Grow the Market

The political capacity to grow the market is perceived to be substantial in Europe, South East Asia & Australia. This could be an indication gender equality is particularly high on the agenda in these regions. Meanwhile, respondents in South East Asia, India, and China exhibit an above-average confidence in the technological and economic capacity to pursue this opportunity.

### Opportunity Business Case

While the opportunity is not among those perceived to provide the most benefits to society, it represents one of the markets perceived to have a strong business case. It is ranked the 3rd most likely opportunity to be pursued by business, yet its positive impacts on society are not seen as significant. This is the only opportunity exhibiting such a large difference between these two variables. This disparity could signal that respondents believe the market is quite niche, with a more narrow impact on society.

The business case is perceived to be particularly strong by leaders in Europe, South East Asia & Australia followed closely by leaders in the North American market.

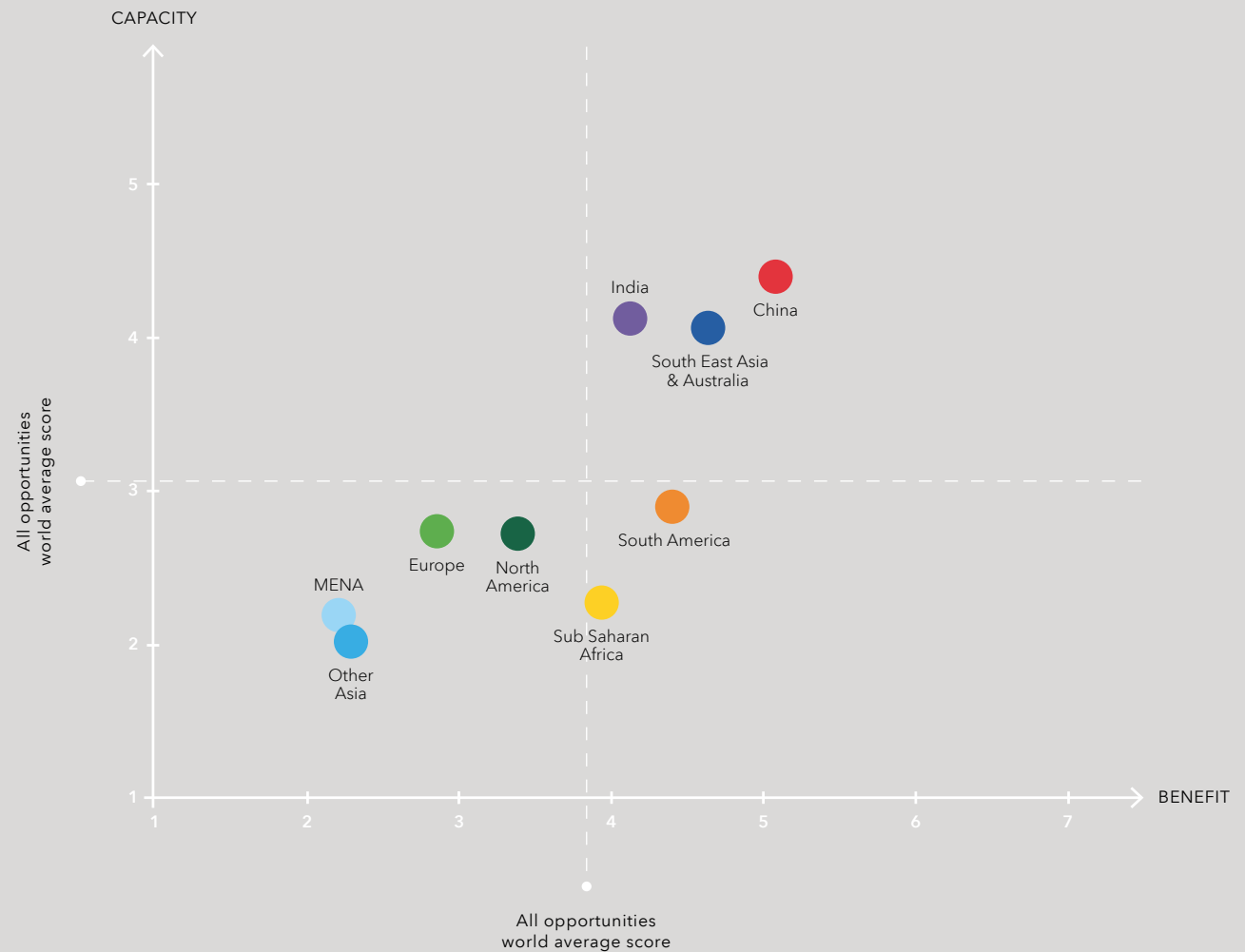
### Sector Impact

Looking at the sector perspective, it is clear the governmental sector and the service industry see the greatest benefits in pursuing this opportunity.

In Sub Saharan Africa, civil society is expected to advocate most strongly for this opportunity and in Europe the public sector will likely advocate for it most strongly.

## BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



## NUMBER 10 ON THE OPPORTUNITY RANKING

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
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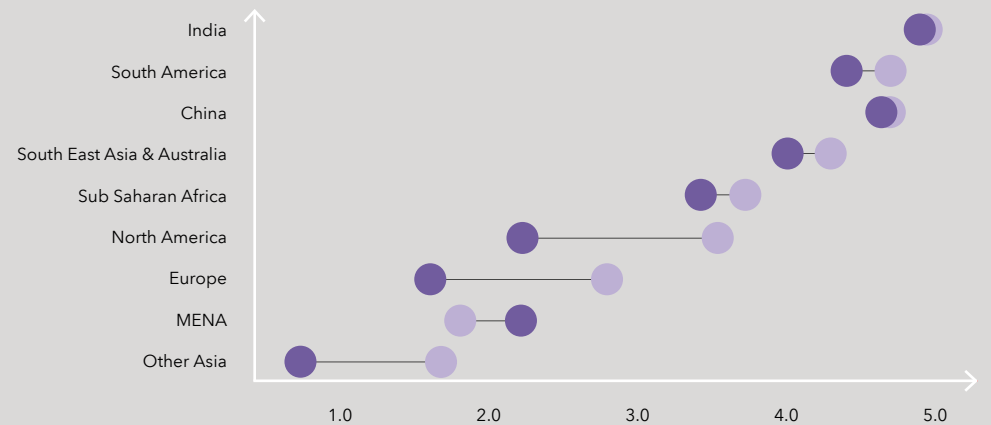
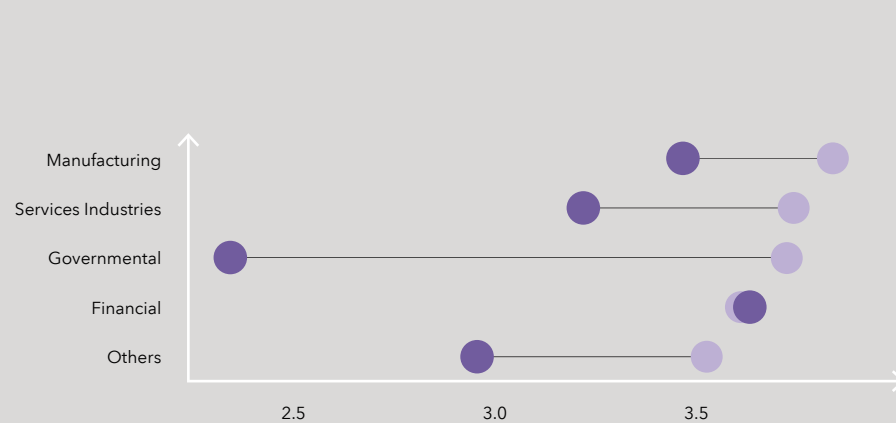
## CHARACTERISTICS OF OPPORTUNITY



Good business case, less convincing impact

## PURSUE AND IMPACT

● Likelihood of pursuing    ● Positive impact on business





## OPPORTUNITY

# INTERNET OF PEOPLE

Mobile technologies and connected digital platforms are opening up new opportunities to deliver healthcare to low-income, remote communities. A key element of this connectedness is the Internet of People, which refers to the digitalisation of relationships between people and the collection of personal data, and enables more personalized, predictive, participatory, and preventive healthcare.



You only understand the preciousness of healthcare once you need it - and the 400 million people around the world who lack access to healthcare know exactly how valuable it is. For people living at the Base of the Pyramid, the threshold for health problems that can hold you back is lower than for everyone else. If you live in a rural area with no access to transportation, or you lack insurance or a bank account, a simple infection can destroy your livelihood. The internet of people, enabling the collection, processing, and application

of personal data, is opening an opportunity space for business to provide the Base of the Pyramid, connecting service users with healthcare, benefiting the poor as well as business.

### **PRODUCTS AND SERVICES**

Products and services that are opening up the Internet of People opportunity space include wearables, mobile healthcare apps, digital platforms, and patient communities enabling service users to easily access real-time health information and healthcare advice, and permit health organisations to leapfrog having to put in place the traditional infrastructure built by the developed world.

Furthermore, integration of devices and services offers people answers to health-related questions without them having to travel to the doctor or clinic but instead participate in live group chat forums or engage in confidential one-on-one text conversation with a doctor in their local language. More diagnostics, decisions, and advice can be provided by intelligent systems based on personal health data and analytics. These products act almost like a clinic in the pocket of the service user, helping people diagnose and monitor symptoms and diseases.

The number of products and services operating in this new opportunity space is on the rise. From combating malaria to detecting counterfeit drugs, the emergence of digital health

solutions is saving a significant number of lives. As Eric Topol says: "Wherever there is a mobile signal, there is the capability for delivering better healthcare."

### **MARKET SIZE AND DEMAND DRIVERS**

The global Base of the Pyramid markets represent a major opportunity for companies ready to serve it, with a total purchasing power of 5 trillion USD. The mobile health market alone is currently valued at 10 billion USD and is expected to grow by a CAGR of 15 percent to reach 31 billion USD by 2020. Others have reported a much higher expected growth rate, with figures as high as a CAGR of 49.7 percent from 2014 to 2020.

Growth of the Internet of People opportunity space is mainly attributed to the increasing penetration of smartphones, tablets, and other digital platforms. Increased access to mobile technologies and internet accessibility to remote areas, as well as the rapid spread of mobile banking and payment options is opening up access to the Base of the Pyramid consumer.

# REBOOTING HEALTHCARE WITH INTERNET OF PEOPLE

## REMOTE PERSONAL DOCTOR

Babylon allows users to book a video consultation with a doctor or a therapist, get answers to quick questions, track their health, and store basic health information.

## MOBILE ENABLED MICRO-FINANCING FOR HEALTHCARE

Changamka MicroHealth is an electronic platform, accessible by mobile phones, to facilitate the financing of healthcare services for the working poor in Kenya.

## GLOBAL PATIENT TO DOCTOR COMMUNITY

HealthTap Inc. operates an online platform that connects people looking for health information to a network of doctors who answer their health questions.

+ [Global](#)

## TEXT MESSAGES ENABLE MATERNAL HEALTH ENGAGEMENT

GiftedMom works with NGOs to provide free mobile services to expectant mothers and women with new-born children.

## GENERAL HEALTH DIGITAL PLATFORM

Kyan Mar Yae, Myanmar's first general health app from Koe Koe Tech delivers health information on categories ranging from infectious diseases to family planning.

## E-HEALTH RECORD SYSTEM

TRACnet from The Centre for Health Market Innovation, is an electronic health record system that allows health workers in Rwanda to enter, access and share health information.

## REMOTE EYE CARE DIAGNOSIS

The Vula Mobile app improves eye care diagnosis, treatment, and referrals by putting health workers in rural areas directly in touch with eye specialists.

## MOBILE WALLET FOR HEALTH EMERGENCIES

Sema Doc, developed by Commercial Bank Africa and Safaricom, provides a mobile money users with loans for medical emergencies.

**4.30BN**

mobile phone users worldwide in 2016, representing 58.7% of the global population

**400M**

people are without access to healthcare

**\$10BN**

is the size of the mobile health market



SUSTAINABLE DEVELOPMENT GOALS

Sources: 1. eMarketer. Mobile Phone, Smartphone Usage Varies Globally. 2016 2. WHO, World Bank. Tracking universal health coverage: First global monitoring report. 2016. 3. Research 2 Guidance. mHealth Economics 2016. 2016.

# A TECHNOLOGICAL MATURE OPPORTUNITY

Improving health through the Internet of People ranks in the middle of the list, coming in at number 8 on the global ranking. At its core, this opportunity addresses the need to deliver health solutions to low-income communities by making use of growing ubiquity of mobile phones and the digitalisation of relationships and data across the world. The opportunity received its highest ranking in Other Asia region (covering Japan and Russia), where it ranks as the fourth most preferred opportunity. Europe and India also view it favourably, ranking it as number 5, while in the MENA region it comes in towards the bottom of the list, at number 12.

### Capacity to Grow the Market

A closer look at the capacity assessments indicates that, globally, the technological capacity needed to grow this market is perceived to exist already, whereas the political and economic capacities are seen as lagging behind. This is especially true for the Sub Saharan Africa region, where both the economic and political capacity is rated very low.

### Opportunity Business Case

The business case for acting on this market is estimated to be stronger than the other Base of the Pyramid market opportunities, but it is lower than many of the other opportunities, such as those related to cyber security.

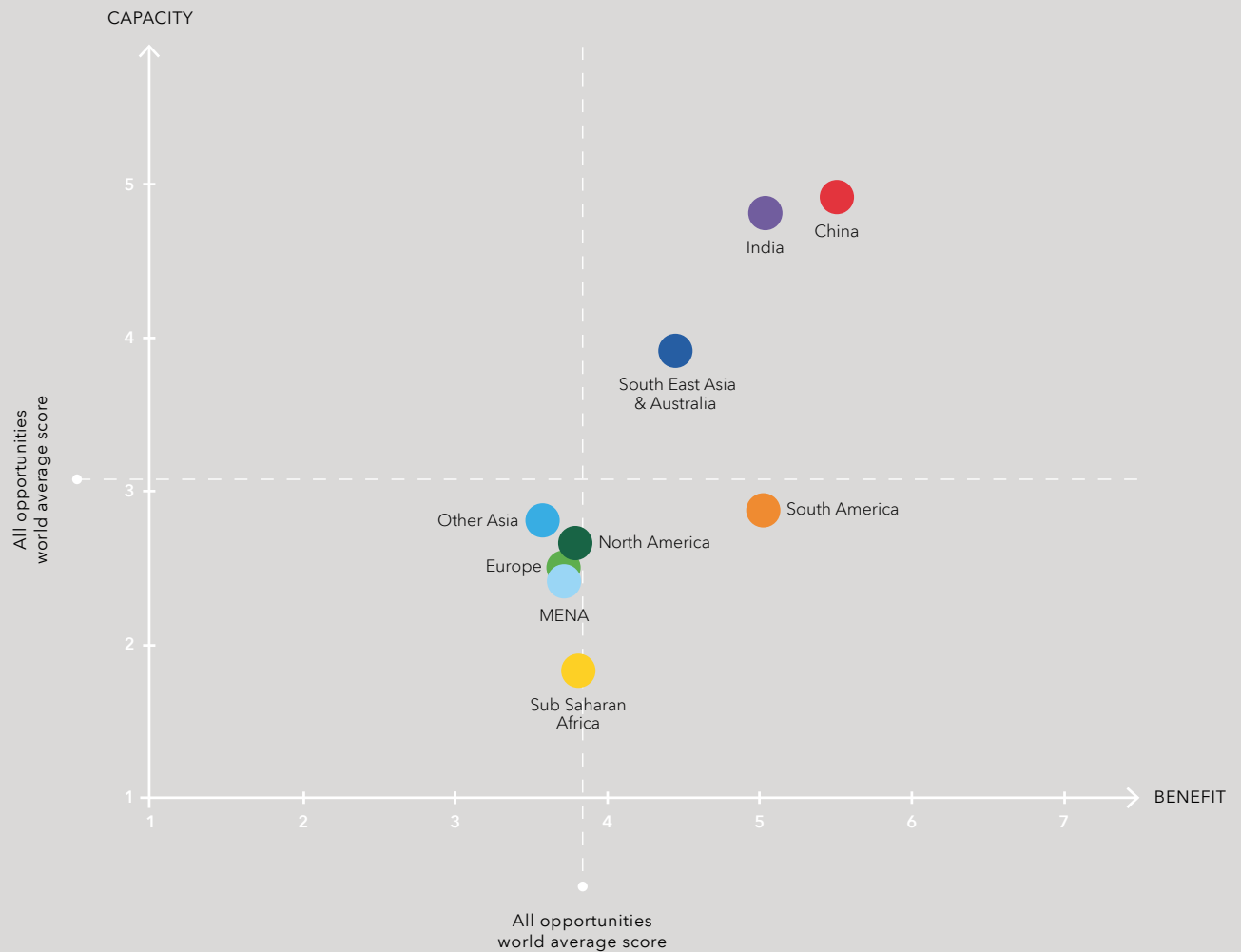
### Sector Impact

Of all 15 opportunities, this is the opportunity, that the finance sector is least likely to pursue. Meanwhile, the sectors most likely to pursue the opportunity are manufacturing and service sectors, with manufacturing sector significant more likely to pursue the opportunity than the other sectors.

Civil society is expected to advocate actively for this opportunity, as respondents' average scores placed it as the third most advocated for opportunity for this group.

### BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



## NUMBER 8 ON THE OPPORTUNITY RANKING

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
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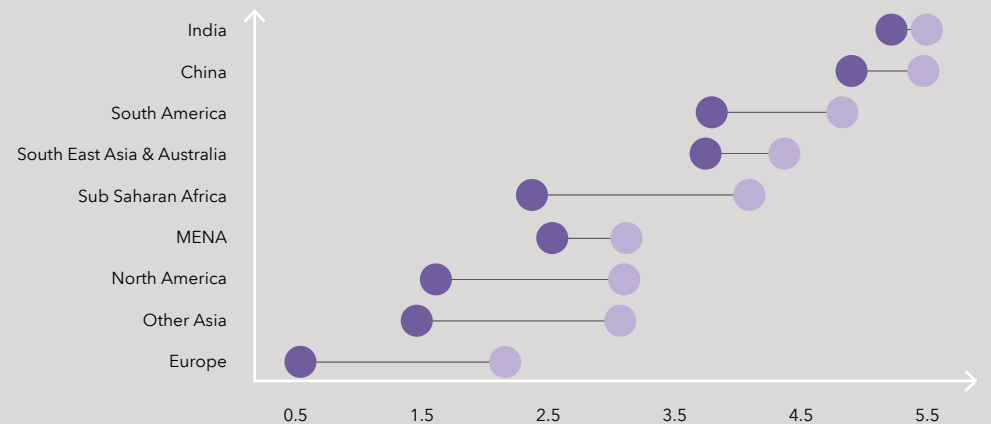
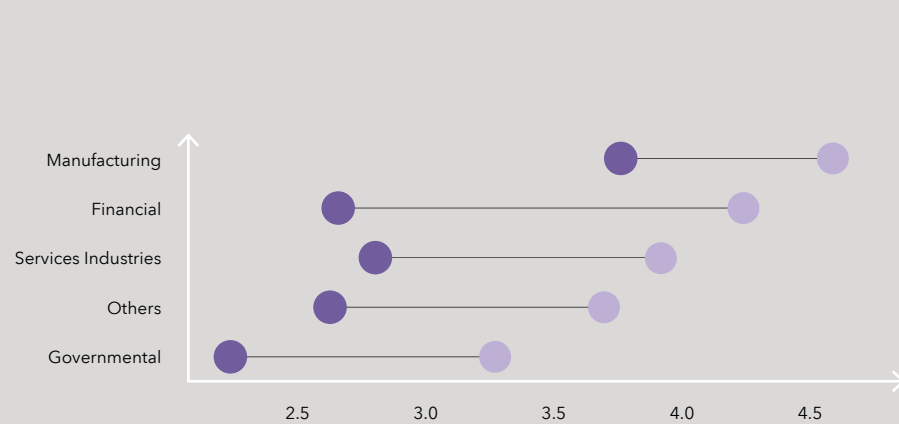
## CHARACTERISTICS OF OPPORTUNITY



One of the top opportunities for governmental and manufacturing sectors to pursue

## PURSUE AND IMPACT

● Likelihood of pursuing    ● Positive impact on business



RISK

# CITIES DISRUPTED BY CLIMATE CHANGE

Urbanisation and climate change threaten to be a dangerous mixture. More people are moving into urban areas, putting new stresses on already vulnerable infrastructure. At the same time, climate change threatens to disrupt basic components of urban life. Creating more resilient infrastructure is an absolute must if cities are to thrive in future decades.





## RISK

# CITIES DISRUPTED BY CLIMATE CHANGE

Climate disruption is exacerbating urban challenges such as heat islands, air pollution, and extreme weather events. The effects of a changing climate will impact all aspects of urban society, including infrastructure systems, public services, the built environment, and ecosystem services. While these challenges disproportionately affect economically disadvantaged and minority communities, they also bring serious political, social, and economic repercussions.

Cities are growing at an unprecedented rate today, particularly in the developing world, where 1.4 million people are added to urban areas each week. By 2030, around 60 percent of the global population will live in cities, and a vast majority of them in coastal regions.

It is vital that cities operate and function resiliently, even as climate change subjects them to an increasing number of

### URBAN FLOODING DISRUPTING CITIES IS ESTIMATED TO COST 1 TRILLION USD A YEAR



## 1 TRILLION \$ A YEAR

Source: Rosenzweig C et al. "ARC3.2 Summary for City Leaders". 2nd ed. NY: Urban Climate Change Research Network, Columbia University. 2015.

extreme and disruptive weather events. Resilient cities are important for everyday life as well as for the global economy, as more than 80 percent of the global GDP is produced in urban areas.

Climate change will impose a range of potential risks to cities. One risk is the increasing prevalence of urban heat islands – a phenomenon in which urban centres and cities are several degrees warmer than surrounding areas due to the presence of heat-absorbing material, reduced evaporative cooling caused by lack of vegetation, and production of waste heat. The warming climate combined with urban heat islands increases the need for cooling and air conditioning systems, which in turn increase energy consumption in cities. Other climate-related risks to cities include heavy downpours and flooding with cascading impacts on critical systems such as energy supply, food distribution, and logistics.

Cities do not just experience the effects of climate change, they also contribute to their creation, as, today, cities generate up to 75 percent of energy-related greenhouse gas emissions. Spurred by the need to act, and invigorated by the COP21 climate agreement, a number of cities have developed climate action and adaptation plans. However, for many local governments, this task can be seen as overwhelming when faced with such complex and

interdisciplinary challenges involving disparate stakeholders and planning agencies.

Finally, climate disruption does not hit people equally. Economically disadvantaged and minority communities tend to live in more hazard-prone, vulnerable, and crowded parts of cities. These circumstances increase their susceptibility to the impacts of climate disruption and reduce their capacity to adapt to and withstand extreme events. As of now, 1 billion urban dwellers live in informal settlements that lack provision for risk-reducing infrastructure and basic services. Their homes and livelihoods are also often those most at risk from the impacts of climate disruption.

Climate disruption is already costly for cities globally. Climate change-induced urban flooding alone is estimated to cost approximately 1 trillion USD a year, globally, and the annual cost of adaptation measures is estimated to range between 80-100 billion USD, of which about 80 percent will be borne in urbanised areas. These figures will only rise as cities are increasingly disrupted by climate change and must work faster to mitigate and adapt to its effects.

## WHEN THE COLDEST YEAR WILL BE AS WARM AS THE HOTTEST YEAR

A city hits "climate departure" when the average temperature of its coolest year from then on is projected to be warmer than the average temperature of its hottest year between 1960 and 2005.



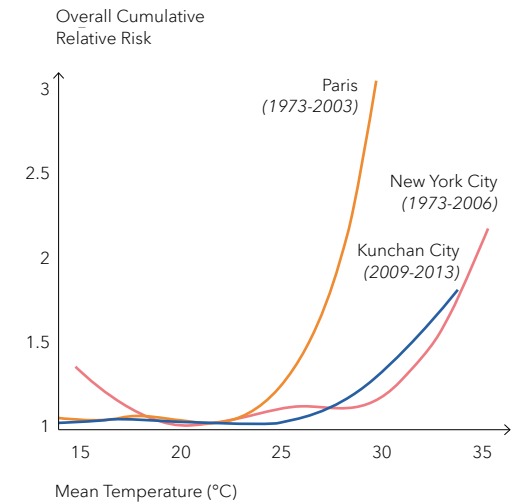
### ESTIMATED YEAR OF CLIMATE DEPARTURE

● 2023 - 2033   
 ● 2033 - 2043   
 ● 2043 - 2053   
 ● 2053 - 2063   
 ● After 2063

Sources: World Map (above) - Mora C, et al. "The projected timing of climate departure from recent variability". Nature, vol 7470, pp 183-187. 2013. Chart (upper right) - Rosenzweig C et al. "ARC3.2 Summary for City Leaders". 2nd ed. New York. Urban Climate Change Research Network, Columbia University. 2015. Chart (lower right) - E3G. Underfunded, Underprepared, Underwater? Cities at Risk. 2015.

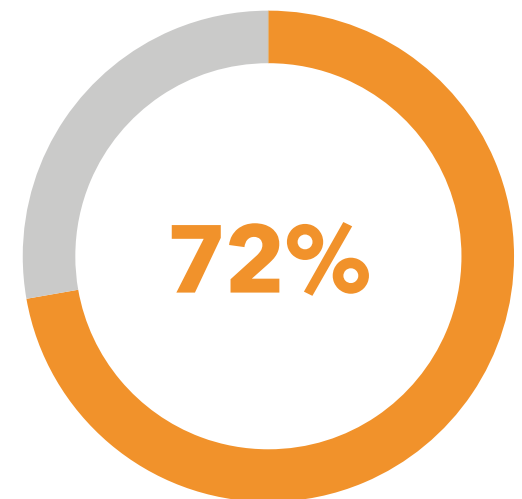
## MORTALITY INCREASES AS TEMPERATURES RISE

Overall cumulative heat-mortality relationship in Paris (France), New York City (USA), and Kunshan City (China).



## NO STRATEGY IN PLACE

A study on the climate change response of 200 urban areas across 11 EU countries has found that 72% of these cities had no adaptation strategy whatsoever.





## OPPORTUNITIES

# MAKING CITIES SMARTER AND MORE RESILIENT

Home to more than half the world's population and responsible for 80 percent of global GDP, cities are, in many ways, the cornerstone of global society. Meanwhile, increasingly intense and unpredictable storms, temperatures, and precipitation threaten many basic urban systems, sparking a need for innovations that boost resilience while maintaining growth. The three opportunities presented here can not only future-proof cities but also generate profit for business.



**BUSINESS  
OF POWER**



**SMART  
WATER TECH**



**UPGRADING  
INFORMAL HOUSING**

## BUSINESS OF POWER



Energy is the newest player in the sharing economy, as new technologies are emerging that connect individual energy producers and consumers without a centralised utility. The business of power is putting surplus locally produced energy on the energy market and promoting small microgrids that are more resilient against climate disruption than large-scale networks.

## SMART WATER TECH



Using smart water tech to improve water management will be critical in providing access to clean, safe water for citizens around the world. Smart sensors and cloud data management can help cities plug leaks and prevent water losses, while enabling them to make informed decisions about water flows in real time. These innovations are helping cities and their water supplies become adaptive and responsive to disruptions.

## UPGRADING INFORMAL HOUSING



Slums and informal settlements are particularly vulnerable to climate change, due to poor infrastructure and lack of resources, and they also tend to be the hardest hit by storms and floods. Therefore, upgrading informal housing by creating resilient, robust, and climate-proof homes will help these communities better manage climate disruptions and improve livelihoods, which also benefits the entire local economy.

## **OPPORTUNITY**

# BUSINESS OF POWER

Energy will be the next big thing in the sharing economy, as digital and technological advancements make it possible to share once-centralised services directly from peer to peer. Decentralised micro-grids can ensure better resiliency against climate disruption while enabling citizens to trade surplus of renewable electricity production with their neighbours.



Increasing frequency and strength of floods, storms, and other extreme weather events are disrupting energy systems and causing mass power outages for urban residents. In response, decentralised energy systems that can disconnect from the traditional grid and operate autonomously are emerging to provide more resiliency in the energy supply.

Decentralised energy sharing is an opportunity space in which micro-grids play a key role, as they provide flexibility

and improve the ability to respond to rapid fluctuations in the supply-demand balance. The rise of blockchain technology, which facilitates secure local trading of electricity on a decentralized grid, can further shape the opportunity to transform the power grid into a decentralised network, allowing households to trade electricity without a middleman.

### **PRODUCTS AND SERVICES**

Products in this new decentralised energy market encompass solar panels, smart meters, and other smart devices and software to manage energy flows and ensure flexibility. Services in the opportunity space include solar storage community platforms, cloud platforms that enable energy sharing, and software to manage transactions.

Another potential service in this opportunity space is connecting several micro-grids in a larger grid so the network will function as a virtual power plant, connecting sprawling networks of independent batteries, solar panels, and energy-efficient buildings and remotely controlling them with software and data systems.

Blockchain and decentralized energy sharing have the potential to break down the distinction between producers and consumers. Historically, utilities have had a one-way relationship with bill payers, but the growing adoption of home-solar systems re-shapes this relationship. Consumers

become 'prosumers' who generate their own electricity and either sell it back to the utility, or sell their excess electricity directly to their neighbours, effectively cutting out the utility.

### **MARKET SIZE AND DEMAND DRIVERS**

The worldwide market for community resiliency micro-grids is expected to expand from 162.9 million USD in 2015 to 1.4 billion USD by 2024. For the broader micro-grid market, revenue may reach 40 billion USD by 2020.

An important demand driver is the rise of the energy literate consumer, the growing consumer segment that has a perspective beyond price. They are aware of and concerned about where their energy comes from. Combined with rising energy costs and declining costs of micro generation technology such as solar panels, small-scale wind turbines, and energy storage, these conscious consumers are driving governments and citizens to increase investment in a variety of distributed energy sources.

One enabler of this opportunity space is the battery storage market. The battery market is marked by high-demand, and the manufacturing cost for batteries is on the decline, making it more accessible to consumers.

# SOLUTIONS TO ENABLE LOCAL ENERGY TRADING

## PRODUCE AND TRADE ENERGY LOCALLY

The Brooklyn Microgrid is a community microgrid where individuals can buy and sell renewable energy from residential rooftop solar installations.

## SOLAR LOAN FOR RESILIENCY

Solar and battery financing through Mosaic enables people to have access to affordable solar loans.

## TRANSACTING LOCAL ENERGY WITH NEIGHBOURS

TransActive Grid enables members to buy and sell energy from each other, using smart contracts and the blockchain.

## BRING LOCAL RENEWABLE ELECTRICITY TO LIFE

Piclo, from Good Energy and Open Utility, is a peer-to-peer energy matching platform for renewables.

## ENERGY COMMUNITY

The sonnenCommunity is a community of sonnenBatterie owners, as a member you can share your self-produced energy with other members.

## THE AIRBNB FOR ENERGY

The Airbnb for energy Through Vandebro, consumers can buy electricity directly from independent producers, such as farmers with wind turbines in their fields.

## ALL POWER TO THE PRODUCERS AND CONSUMERS

Power Ledger allows renewable energy asset owners to sell their surplus energy - using Blockchain.

## PEER TO PEER POWER

Auckland-based P2 Power developed the technology, named SolarShare, to enable those who don't have solar panels to buy solar power.

**10%**  
per year solar panels have dropped in price since 1980

**12%**  
Up to 12% of Belgian households are already prosumers

**\$1.4BN**  
is the expected market for community micro-grids in 2024



Sources: 1. Farmer JD, Lafond F. "How predictable is technological progress?" Res Policy. vol 45(3), pp647-665. 2016. 2. Prisco G. "An Energy Blockchain for European Prosumers". Bitcoin Magazine. May 2nd, 2016. [www.bitcoinmagazine.com](http://www.bitcoinmagazine.com). 3. Microgrid Knowledge. Community Microgrids. 2015

SUSTAINABLE DEVELOPMENT GOALS

# A FAVOURITE IN SUB SAHARAN AFRICA AND MENA REGIONS

The business of power is the most preferred opportunity in Sub Saharan Africa as well as in the MENA region, while it is also rated highly by leaders in India and South America. The opportunity represents the market for delivering renewable energy via decentralised grids, by, for example, using blockchain technology.

### Capacity to Grow the Market

It is clear from the survey the market for decentralised energy can be expected to mature most rapidly in India. Indian leaders perceive all the ingredients for market growth, including technological and economical capacity, to be readily available in the Indian market. Another market to keep an eye on is Sub Saharan Africa, which may leapfrog into a green transition through decentralised power delivery, according to the survey. The survey also indicates leaders in Sub Saharan Africa are confident the technological capacity to grow a decentralised energy market is readily available in their region.

### Opportunity Business Case

Respondents from China and the MENA region are among the leaders most confident the opportunity will have a great impact on business. Additionally, the opportunity embodies the strongest business case of all opportunities, according to Indian leaders. This indicates the Indian market for decentralised energy provision will mature rapidly.

### Sector Impact

According to the survey, the service industry and the public sector expect this opportunity to provide the most positive impact on society, while the manufacturing and "other" sectors are most likely to pursue it.

In addition, the survey indicates we can expect partnerships to form between civil society and business to accelerate the market for decentralised energy further, especially in India and in Sub Saharan Africa. In both regions, respondents expect business and civil society to be strong and active advocates for the decentralised energy market space.

## BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



**NUMBER 4 ON THE OPPORTUNITY RANKING**

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
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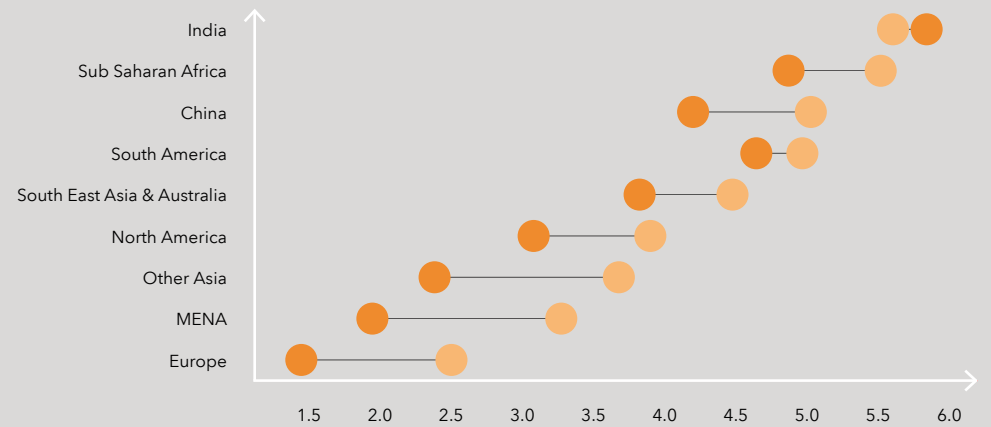
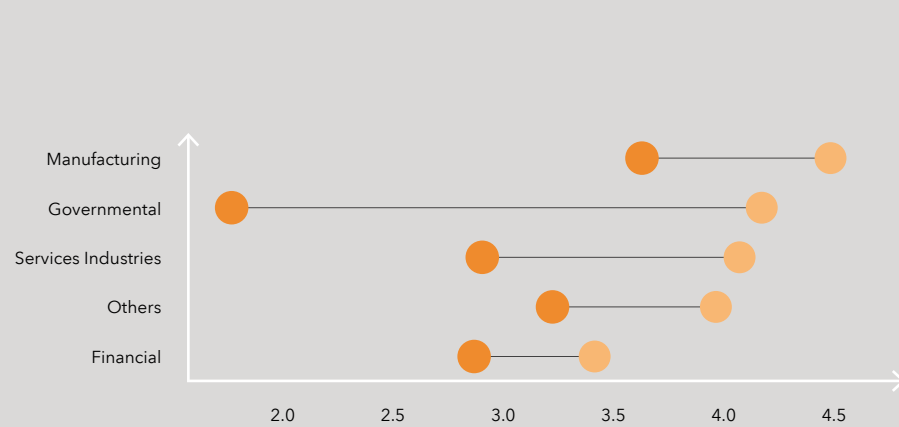
**CHARACTERISTICS OF OPPORTUNITY**



**Top Opportunity  
for Africa!  
(MENA and Sub  
Saharan Africa)**

**PURSUE AND IMPACT**

● Likelihood of pursuing    ● Positive impact on business



## OPPORTUNITY

# SMART WATER TECH

The use of smart water infrastructure enables cities to better manage their water distribution networks in the face of climate disruption. Turning the existing static network of water pipes and pumps into adaptive and connected networks provides huge benefits in reduced water and energy consumption. The opportunity will benefit both operators and consumers, as the reliability of delivery will increase while water supply costs decrease.



Access to clean water is a growing challenge for urban communities in the face of climate change. Making matters worse, much water is lost before it reaches consumers' taps due to inefficient water management systems and aging infrastructure prone to leaks. Technological innovations offer hope for this sector, as smart water systems are designed to gather meaningful and actionable data about the flow, pressure, and distribution of a city's water, which can be used to better serve customers and prevent losses. Developing

newer and smarter products and services around smart water management is our best bet in reducing massive water losses in pipes and shrinking overall water consumption.

### PRODUCTS AND SERVICES

Smart sensors form the backbone of the products and services within the smart water opportunity space. Smart sensors on pipes and other critical water management infrastructure have the ability to detect leaks, measure water-related data, including rainfall, pH, temperature, turbidity, flow, pressure, and even contamination levels. As internet of things devices, smart sensors are Wi-Fi enabled, allowing data to be sent in real time to cloud storage. Therefore, to be truly effective, smart sensors are integrated with advanced software systems capable of handling and managing these large datasets in real time. In doing so, municipalities can utilise this data to improve service, stop leaks, and boost efficiency.

The strength in this opportunity space is its ability to offer water utilities specific paths towards operating cost and carbon footprint reductions, while improving service and supply management.

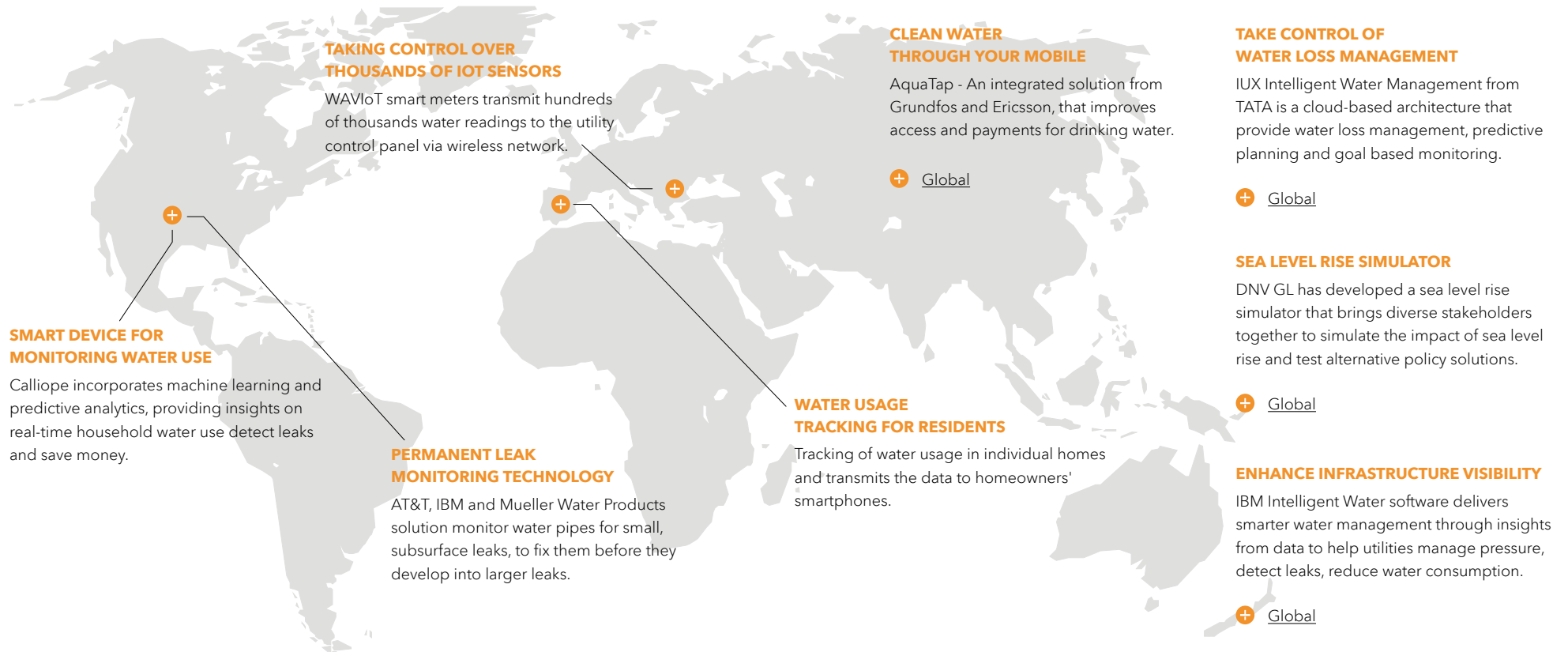
### MARKET SIZE AND DEMAND DRIVERS

Utilising cutting-edge technologies is a prime opportunity for this field, as the global market for smart water management is estimated to grow from 8.46 billion USD in 2016 to 20.10

billion USD by 2021, at a compound annual growth rate (CAGR) of 18.9 percent during this period. Zooming in on the opportunity, the market for smart water metering is expected to grow from an estimated 3.88 Billion USD in 2016 to 5.51 Billion USD by 2021, at a CAGR of 7.23 percent from 2016 to 2021. North America dominates the smart water metering market, but Europe is expected to show significant growth rates in the coming years.

The need to replace aging water infrastructure is expected to be the biggest market demand driver for smart water management in the coming years. In addition, climate change and urbanisation will continue to put enormous pressure on natural resources and urban systems, and smart water systems are an opportunity to tackling these climate disruptions. Hence, continued frequency of droughts and water shortages will drive the demand for smart water technology in the long term.

# MAKING WATER MANAGEMENT SMART WITH INNOVATIVE SOLUTIONS



**\$1T**  
market for water sector in 2025

**1.5BN**  
people live in areas affected by water scarcity

**\$7-12BN**  
savings yearly by using smart water tech



Sources: 1. OECD. "OECD Environmental Outlook to 2050". OECD Publishing, 2012. 2. OECD. "OECD Environmental Outlook to 2050". OECD Publishing, 2012. 3. RobecoSAM. Water: The Market of the Future. 2015



# BEST OPPORTUNITY OF THEM ALL

The adoption of smart water technology in cities is perceived as the top opportunity across all regions surveyed. The opportunity tends to be rated higher in the regions with a high Human Development Index score. Respondents in Europe and South East Asia & Australia rate it as number one, whereas it is the runner-up for respondents in India, MENA, and Sub Saharan Africa.

### Capacity to Grow the Market

Politicians are not perceived by the leaders we surveyed to have a strong capacity to make this market grow. However, leaders are confident their regions already hold the sufficient technological and economical capacities to pursue smart water technology.

### Impact on Business

Taking a regional look at how leaders view this opportunity, a number of notable differences emerge. Leaders in the MENA region perceive this opportunity to have the strongest business case of all 15 opportunities. In China, the opportunity is perceived to hold the strongest business case and have the highest impact on business. Hence, demand for smart water technology in China can be expected to grow.

### Sector Impact

Leaders in the survey expect both civil society and business to advocate strongly for the smart water tech market. Hence, we can expect civil society-private sector partnerships to shape this market. The manufacturing sector sees a particularly good business case in smart water tech.

In China, leaders believe the financial sector is most likely to be active on the smart water market. However, although the finance sector regards smart water technology as a good opportunity, respondents from that sector are sceptical about the probability of their own organisation pursuing this opportunity, as demonstrated by the number 12 ranking on this criterion.

### BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



## NUMBER 1 ON THE OPPORTUNITY RANKING

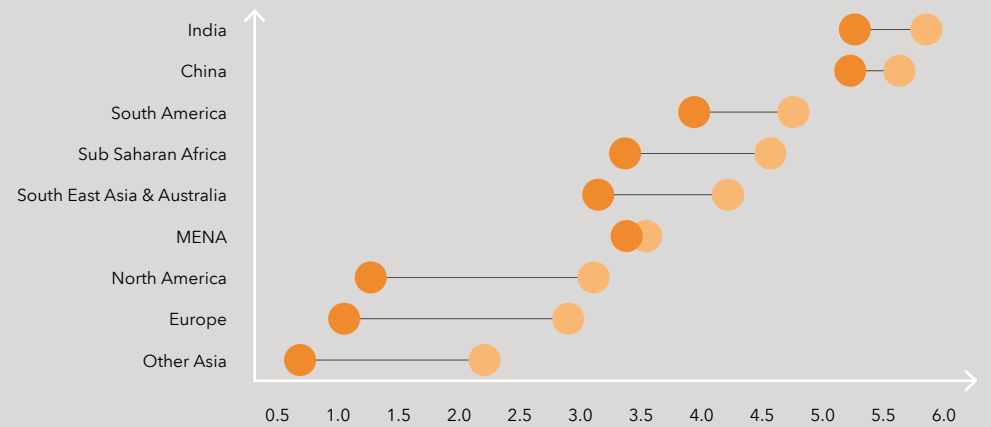
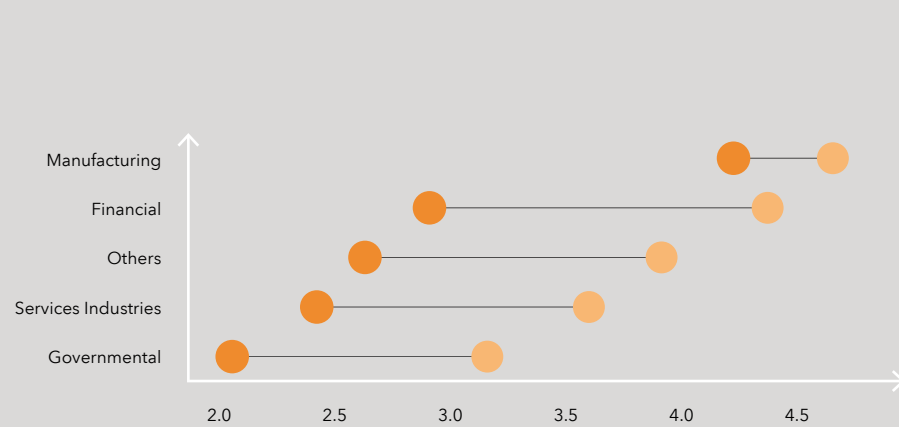
1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
10	GENDER EQUALITY - IT'S ABOUT TIME
11	CYBER SECURITY GAME
12	INSTANT REFUGE
13	UPGRADING INFORMAL HOUSING
14	CONFLICT FREE NATURAL RESOURCES
15	CLEVER CODES DISRUPT INEQUALITY

## CHARACTERISTICS OF OPPORTUNITY



## PURSUE AND IMPACT

● Likelihood of pursuing    ● Positive impact on business



## OPPORTUNITY

# UPGRADING INFORMAL HOUSING

Improving living conditions in slums by focusing on upgrading housing has the potential to transform these communities into healthy and safe neighbourhoods while spurring innovation in the architecture, design, and engineering markets. This is an untapped market for business to enter, which demands solutions that combine resilience and affordability.



Upgrading living conditions in slums will become critically important as climate change intensifies. These communities – typically found in megacities – are home to 12 percent of the world's population, and their houses are more liable to collapse in extreme weather events. Upgrading homes in slums and informal settlements is a space for innovative, affordable, and resilient housing.

According to award-winning architect Alejandro Aravena, architects will need to build the equivalent of 1-million-person city every week for the next 15 years – with a budget of just 10,000 USD per family.

Slum residents are innovative and entrepreneurial by necessity, having created homes and infrastructure from seemingly impermanent materials and scarce resources. Hence, when developing and deploying solutions for housing in slums, there is an opportunity for mutual learning and innovation rather than a one-way exchange of products. This process of mutual listening and learning has the potential to foster innovative solutions relevant to the global market, combining resilience and affordability – a winning formula in any market.

### **PRODUCTS AND SERVICES**

Investing in housing in slum communities has an array of positive and multiplying side effects, such as providing residents with the ability to divert their energy towards pursuits other than simply keeping a roof over their heads. Slums contain both an opportunity space for new products and services, as well as new investment opportunities. Products and services in this opportunity space include whole-building retrofitting; climate-proofing adaptation add-ons, such as affordable compressed gravel flooring to combat health problems from dirt floors; energy-positive

and pre-fabricated houses; reusable air filters and building material; sustainably sourced low-cost bricks and mortar; and coatings that have a cooling effect and absorb pollution.

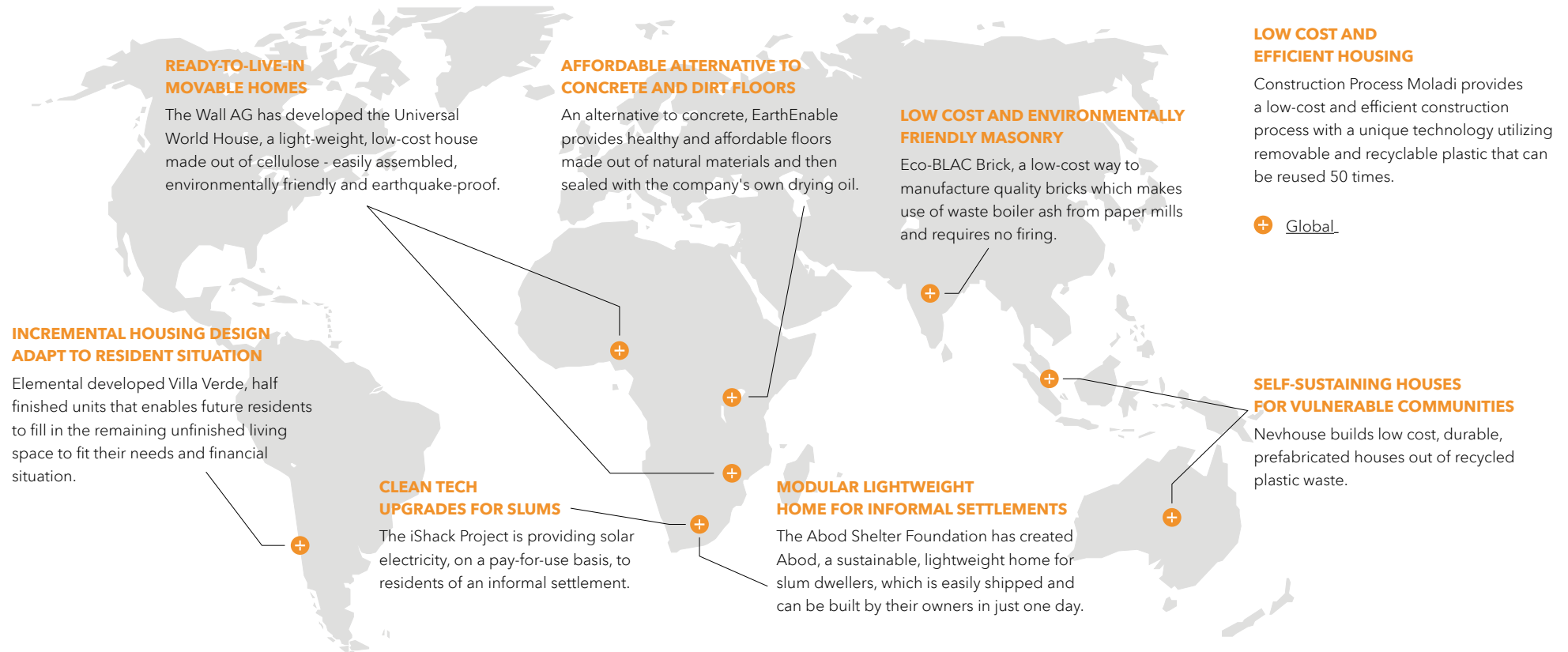
Building half houses is a piloted approach in the favelas of Chile, where slum dwellers use their savings and government subsidies to get help from an architect to build half a house, with the shell for the other half to be completed over time. The owner of the house completes the other half as they gain resources for the materials. Hence, once the entire house is completed it is truly co-created by architects and residents.

### **MARKET SIZE AND DEMAND DRIVERS**

Market reports on the slum housing market are virtually non-existent. However, with 828 million people around the world residing in slums, the number of potential consumers is important and growing. The number of people moving to urban areas is increasing every day, and housing supply in slums is nowhere near meeting the growing demand, which is projected to double by 2030.

Considering the enormous demand and substantial size of the low-income housing market, which is worth more than 300 billion USD globally, surprisingly few market-based approaches exist to provide housing solutions for poor people residing in slums.

# MAKING INFORMAL HOUSING SAFE AND SUSTAINABLE



**12%**  
of the global population lives in slums.

**96,100**  
housing units needs to be built every day to meet demand.

**\$300BN**  
is the size of the global market.



Sources: 1. Ellis P, Roberts M. "Leveraging Urbanization in South Asia". Washington: The World Bank. 2016. 2. UN-Habitat. Housing & slum upgrading. [www.unhabitat.org](http://www.unhabitat.org) 3. McKinsey Global Institute. A blueprint for addressing the global affordable housing challenge. 2014

SUSTAINABLE DEVELOPMENT GOALS

# A FAVOURITE IN CHINA

Upgrading informal housing in slum communities is ranked lower than most opportunities, ranking 13th in the list of 15 opportunities. The opportunity is ranked the highest by leaders in China and the MENA region, where it is the 5th most preferred opportunity of all.

### Capacity to Grow the Market

A very low perceived capacity to develop this market across all surveyed regions indicates a lack of belief in the potential of this opportunity. In fact, respondents have evaluated the political, economic, and technological capacity to be lower than all other opportunities in the survey. Nevertheless, respondents in China - where it is a preferred opportunity - evaluate the overall capacity to mature this market higher than all other regions. Hence, the market for delivering housing to slum residents can be expected to mature faster in China relative to other regions.

### Impact on Business

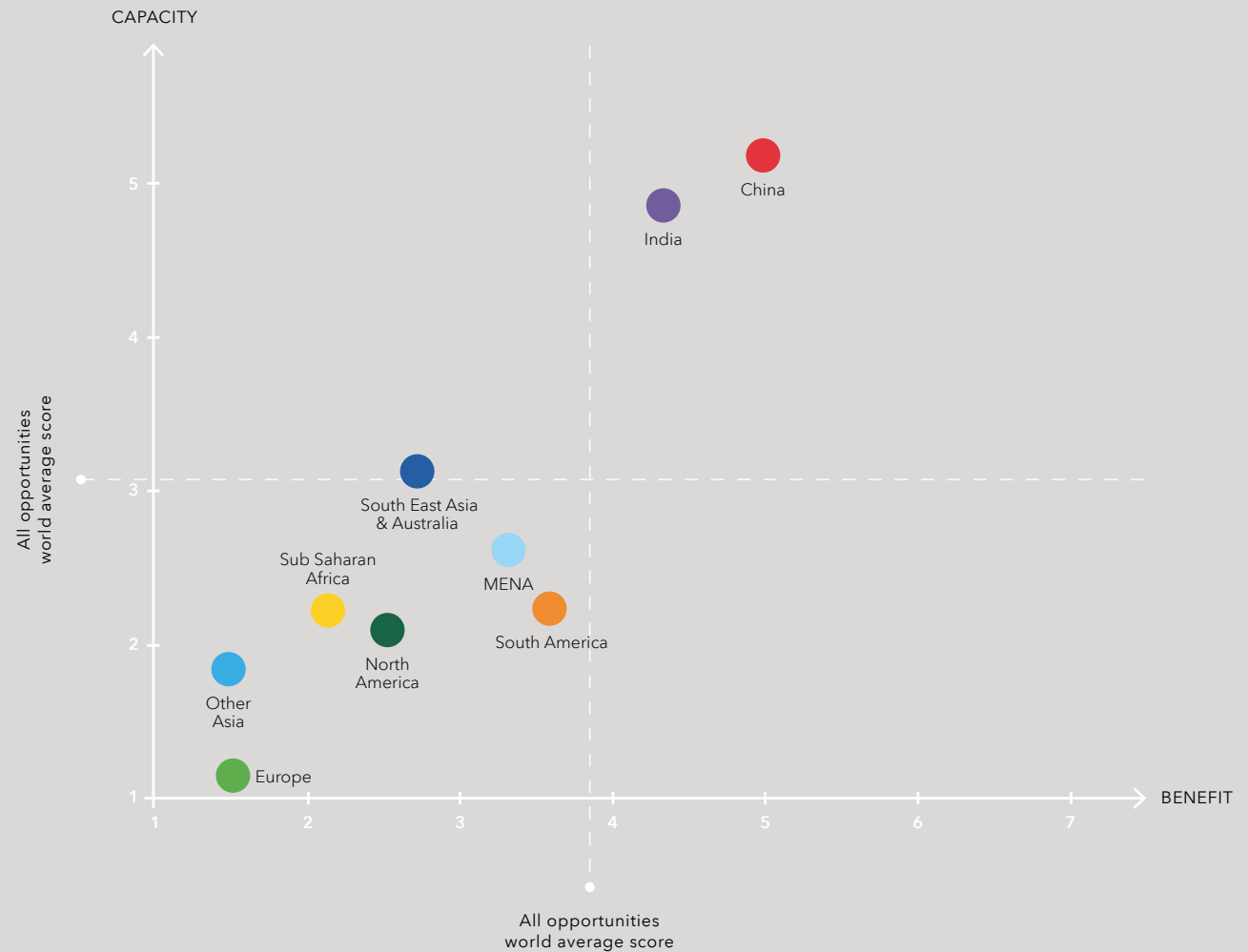
Globally, respondents do not believe their organisations are likely to be positively impacted by the opportunity, nor do they expect their organisations will engage in this market opportunity. The leaders surveyed perceive the business case to be less attractive relative to most of the other opportunities, as it is ranked second to last in terms of the strength of its business case.

### Sector Impact

The financial sector ranks this opportunity highest (8th) with regard to its likelihood of pursuing it; however, no business sector is truly eager to pursue this opportunity compared to the other opportunities. The majority of business sectors believe this opportunity has one of the least positive impacts on society. The survey reveals it is the opportunity business is most likely to actively advocate for in China, which supports the notion that the market for slum housing can be expected to mature fast in China.

### BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



**NUMBER 13 ON THE OPPORTUNITY RANKING**

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
10	GENDER EQUALITY - IT'S ABOUT TIME
11	CYBER SECURITY GAME
12	INSTANT REFUGE
13	<b>UPGRADING INFORMAL HOUSING</b>
14	CONFLICT FREE NATURAL RESOURCES
15	CLEVER CODES DISRUPT INEQUALITY

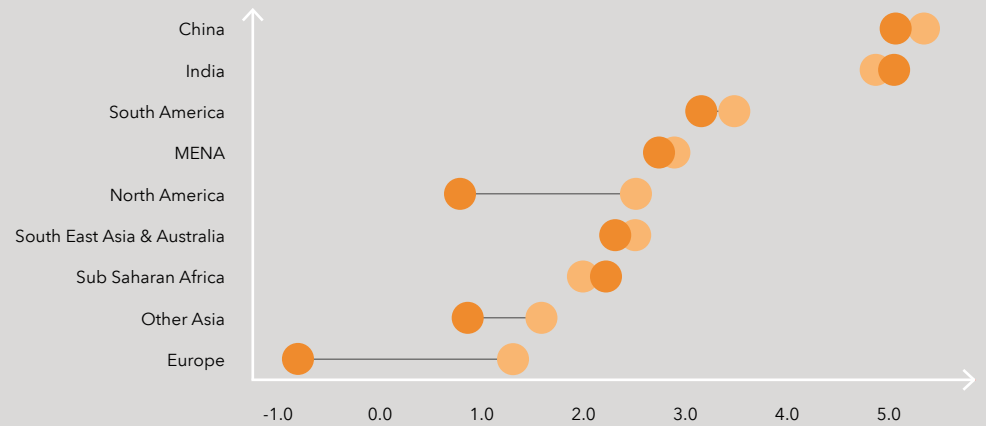
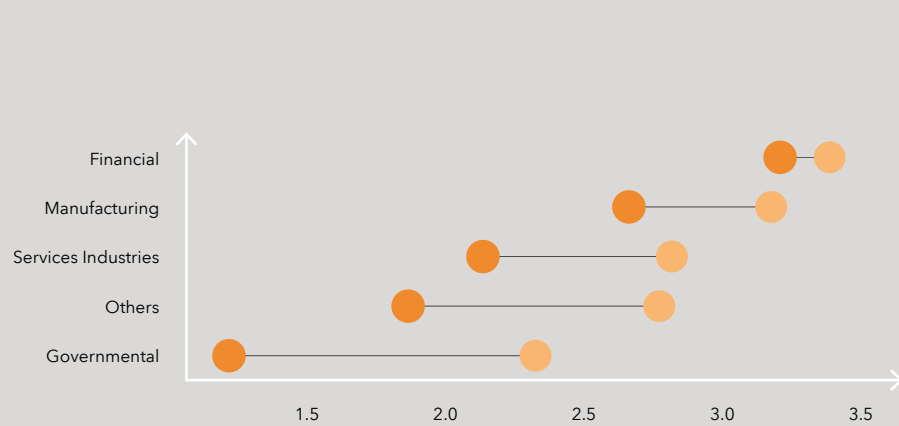
**CHARACTERISTICS OF OPPORTUNITY**



**Strong support from business respondents in China**

**PURSUE AND IMPACT**

● Likelihood of pursuing    ● Positive impact on business



RISK

# CYBER THREATS

In an ever-more connected and digitised world, the threat of cybercrime is becoming increasingly important to address. While the digitalisation of our fundamental infrastructure is providing huge prospects, such as the internet of things, it also poses a threat to everyday operations, highlighting the need for increasingly sophisticated cyber security opportunities to maintain the functionality of digital infrastructure.





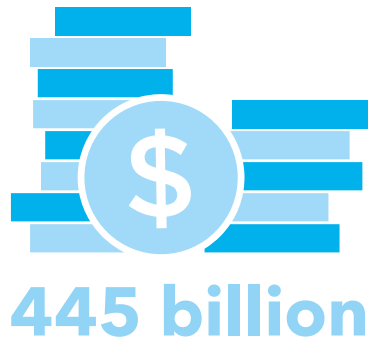
## RISK

# CYBER THREATS

Though silent and often invisible, cybercrime is an exploding threat to businesses globally. The internet economy generates up to 3 trillion USD annually, and estimates find that cybercrime is costing businesses 400-500 billion USD a year. According to leading experts, every business connected to the internet can expect to fall victim to cybercrime, and the projected cost to the global economy is expected to reach 2 trillion USD each year by 2019.

While the internet of things is making our cities, products, and services increasingly smart, this ease of communication and high level of connectivity also increases the threat of outside entities breaching secured and private systems. Billions of low-cost connected devices will be introduced into our daily lives, few of them built secure by design and with security as part of the operational support model. In 2014, the U.S. Director of National Intelligence ranked cybercrime as the top national security threat in the U.S. – higher than that of terror. And in 2015, IBM's CEO Ginni

### CYBERCRIME - A COSTLY AFFAIR



Source: Morgan S. "Cyber Crime Costs Projected To Reach \$2 Trillion by 2019". Forbes. Jan 17, 2016. Online: [www.forbes.com](http://www.forbes.com)

Romett described cybercrime as "the greatest threat to every company in the world".

According to the 2016 Global Economic Crime Survey, cybercrime jumped from 4th to 2nd place among the most-reported types of economic crime compared to the year before. Nonetheless, the survey also showed a general lack of preparedness. Only 37 percent of respondents – most of them in the heavily regulated financial services industry – have a fully operational incident response plan. Three in 10 have no plan at all, and of these, nearly half don't think they need one.

The cybercrime ecosystem has evolved and organisations specialize in different parts of the value chain. This includes a range from vulnerability research to marketplaces where a variety of stolen assets or illegal services are offered to the end user in a streamlined manner, organised with support as professional services by a regular corporation.

The severity of the threat has made cyber security professionals some of the most sought after forms of talent on the market. Locating the right cyber security talent is challenging for business and the public sector, and this hunt for qualified candidates is only becoming more difficult.

Government estimates put the total number of available and unfilled cyber security jobs at 210,000 in the U.S. alone.

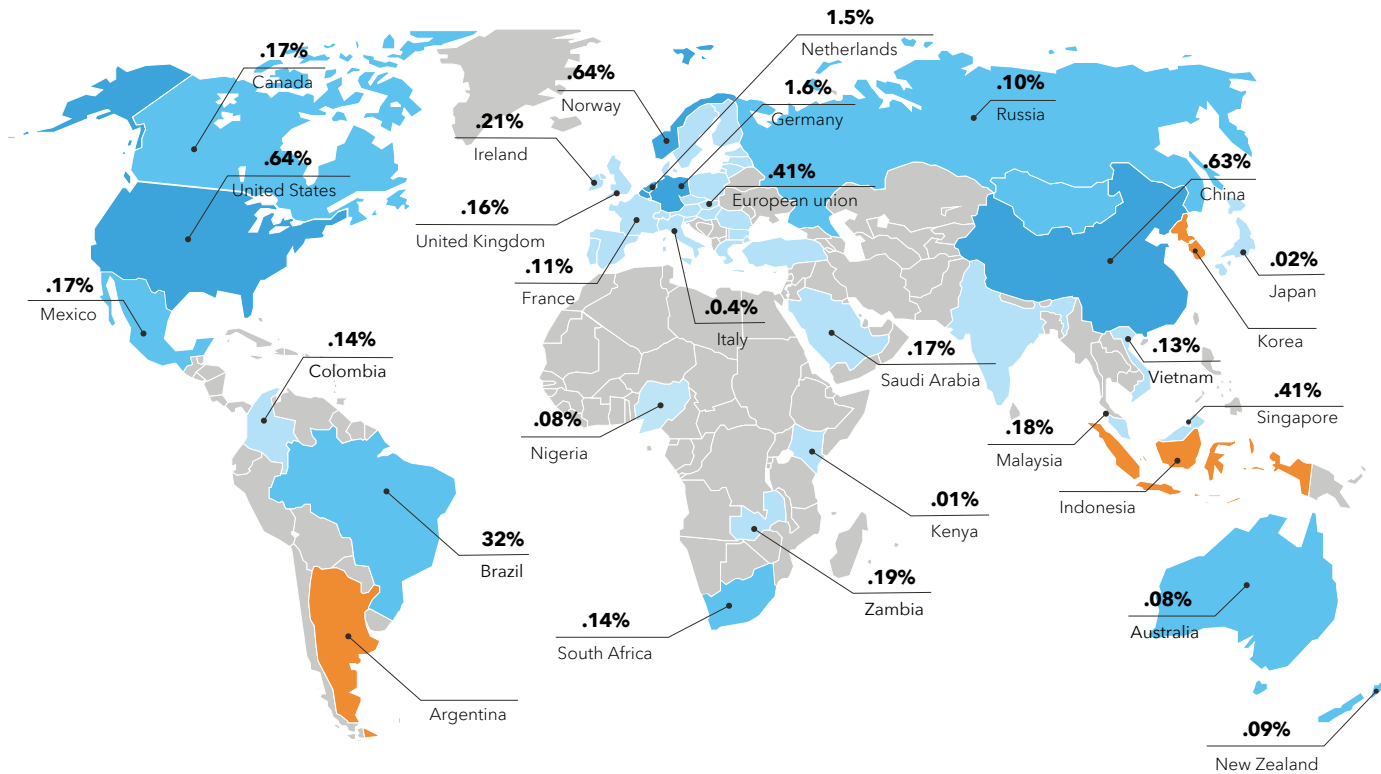
It is estimated to be up to 12 times more difficult to find specialised cyber security professionals than it is to find general IT professionals. The demand is so high that cyber security jobs pay an average of 15,000 USD more per year than similar non-security IT jobs.

Besides the costs to businesses, cybercrime also poses a great threat to essential infrastructural systems. On a global scale, for example, the average annual cost incurred by enterprises in the energy sector is 12.8 million USD annually, making it second only to the financial services sector. A study by the U.S. Department of Homeland Security found that of the approximately 200 breach incidents handled by the DHS cyber security team, a majority targeted the energy sector. The critical manufacturing sector appears as the second-most targeted industry, which includes vendors of critical control systems to the energy sector.

Though existing in the digital rather than the physical world, cybercrime has proven to be a very real danger, threatening innovation in businesses and the safety of societal infrastructure. Cybercrime is thriving as companies and governments are struggling to cope with the situation as the breaches are getting bigger.

## ATTACKING THE ECONOMY

Loss in GDP per country because of cybercrime. There are strong correlations between national income levels and losses from cybercrime.



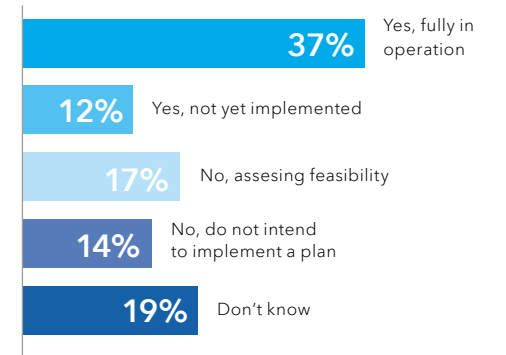
CONFIDENCE  
(Current tracking of cybercrime)



Sources: World Map (above) - CSIS. Economic Impact of Cybercrime 2. 2014. Chart (upper right) - PWC. Global Economic Crime Survey. 2016. Chart (lower right) Cowan J. "Energy sector tops list of US industries under cyber attack". IoT Now. Mar 12th, 2015. [www.iod-now.com](http://www.iod-now.com)

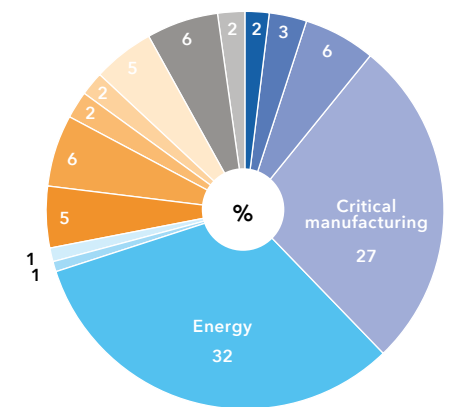
## ONLY 37% OF ORGANISATIONS HAVE A CYBER INCIDENT RESPONSE PLAN

Many companies are not prepared or even understand the risks faced.



## ENERGY SECTOR UNDER ATTACK

In the US, energy is the sector with the most reported cyber attacks.

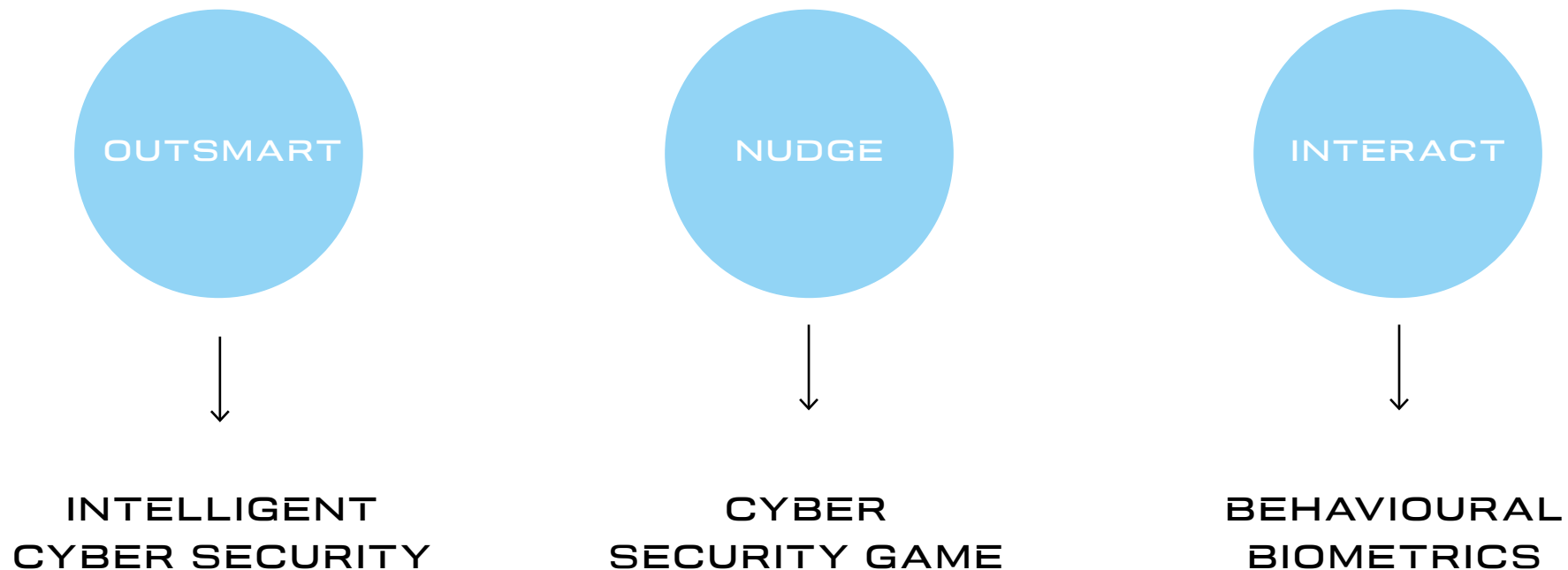


- Chemical
- Commercial Facilities
- Communications
- Critical Manufacturing
- Energy
- Food and Ag
- Finance
- Government facilities
- Healthcare
- Information Technology
- Nuclear
- Transportation
- Water
- Unknown

## OPPORTUNITIES

# OPPORTUNITIES TO SECURE THE IT INFRASTRUCTURE

Every cyber breach potentially costs businesses millions of dollars and risks leaking sensitive personal and corporate information. As cyber attacks become increasingly advanced, so too must the solutions to combat them. The opportunities in this chapter showcase how artificial intelligence, behavioural fingerprints, and gamification can help safeguard digital information and improve cyber security.



## INTELLIGENT CYBER SECURITY



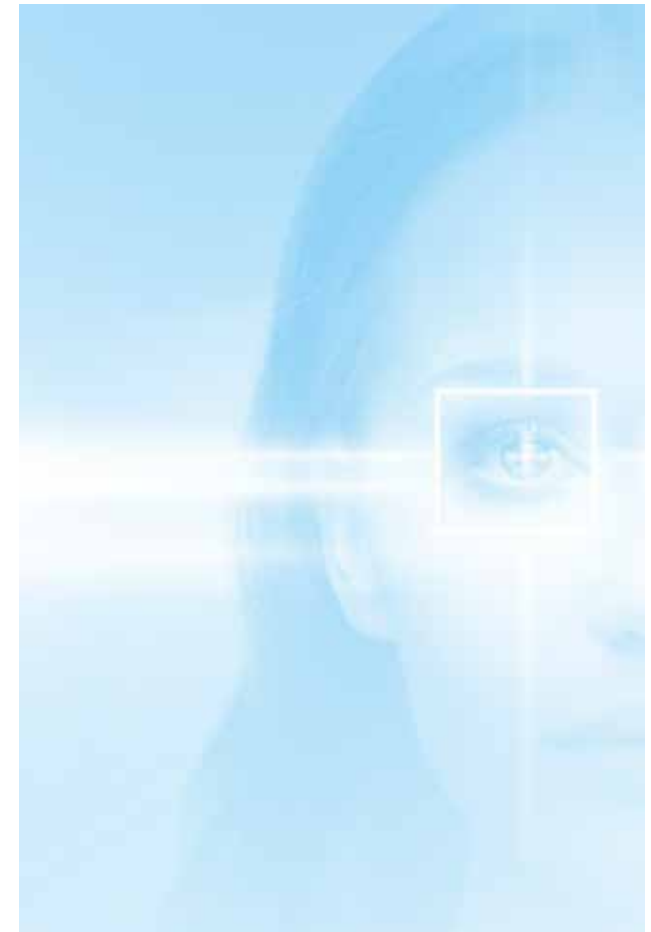
As cyber attacks become increasingly complex, we require even more advanced solutions to stop them. Intelligent cyber security offers a promising opportunity in this space, as it employs adaptive algorithms that can detect and respond to threats in real time, potentially stopping breaches before serious damage can be done.

## CYBER SECURITY GAME



Pin codes and passwords, today's standard for digital security, are becoming increasingly inefficient and vulnerable as cyber criminals become even more stealthy. The most advanced form of security, behavioural biometrics, uses measurable behavioural traits to verify identity, providing a new layer of security for businesses and individuals and opening up a new market for personalising security products.

## BEHAVIOURAL BIOMETRICS



With "password" being the most common online password, it is no wonder so many cyber breaches are the result of poor digital security behaviour. To get employees to take better care with sensitive digital information, many companies are turning to cyber security games. Nudging people with these games, and inviting professional hackers to test system security measures, is designed to make cyber security a bit more appealing, and ultimately, make workplaces and individuals more secure against digital intrusions.

## OPPORTUNITY

# INTELLIGENT CYBER SECURITY

Artificial intelligence (AI) is an opportunity space offering to move institutions, businesses, and individuals two steps ahead of the next cyber attack. In our increasingly connected world, the risk of cyber attacks is on the rise, which means making cyberspace secure is a near impossible task. But by implementing artificial intelligence, it is possible to manage this increasing data stream with adaptive software that learns from every cyber attack.



Cyber threats to individuals, corporations, and infrastructure are becoming increasingly complex and frequent, leaving traditional cyber security methods in the dust. The market for artificial intelligence-led cyber security technology is responding to the rising need to react to increasingly complex cyber security threats. Products in this market space are “thinking machines” with adaptive algorithms that have the ability to keep learning.

These products can study large data sets to predict threats and either give moment-by-moment responses to an attack or prevent it from materialising.

### PRODUCTS AND SERVICES

The market for AI-based security products is still nascent, and machine learning in cyber security software is a part of an evolving security landscape. Products in this opportunity space are systems and software capable of acting intelligently and doing things normally done by people.

Products include immune system appliances, which monitor a network’s data and provide instant notification of an attack by leveraging machine learning algorithms. Products are also emerging with the ability to predict future attacks.

Other products include deep learning devices and systems offering real-time risk assessment, letting businesses and government departments focus their attention on responding to the most high-risk cyber attacks. Deep learning is a novel branch of AI inspired by the brain’s ability to learn to identify an object. Additionally, the AI cyber security opportunity space also includes products enabling companies to secure and manage their sensitive data whether stored in the cloud or on digital devices.

### MARKET SIZE AND DEMAND DRIVERS

In 2015, the global market for AI was worth 126.24 billion USD and is projected to reach a value of 3,061 billion USD by the end of 2024. The market is anticipated to exhibit an impressive 36.1 percent CAGR between 2016 and 2024.

Several factors are driving the demand for AI-based cyber security products. The ubiquity of the internet and constant need for employees to be online is contributing to the increased vulnerability to cyber attacks, as is the fact that ever-more physical items are connected to the Internet of Things. Another factor driving demand for AI-based security solutions is the shortage of cyber security professionals. In the U.S. alone, there is a shortage of more than 200,000 cyber security professionals. The shortage is expected to increase globally, too, as demand for cyber security increases. AI-based cyber security solutions can, by their very nature, cover much of the need for cyber security professionals.

# INTELLIGENT SOLUTIONS TO FIGHT OFF CYBERCRIME

**IDENTIFY AND PREVENT BOTH KNOWN AND UNKNOWN CYBER THREATS**

A mathematical approach to malware identification utilizing machine learning techniques, CylancePROTECT renders new malware, viruses, bots and unknown future variants useless.

+ [Global](#)

**SECURING THE CONNECTED SMART HOME**

Dojo from DojoLabs is a consumer-friendly security and control interface at the network layer that is capable of spotting and blocking anomalous behaviour.

+ [Global](#)

**HARNESSING AI TO MAKE-UP FOR HUMAN MISTAKES**

Using machine learning, Invincea's endpoint security software can remove human fallibility from the equation so companies are protected.

+ [Global](#)

**MIMIC A SECURITY ANALYST IN REAL TIME**

PatternEx seeks to solve the lack of analysts by mimicking an analyst using Artificial Intelligence with their AI-Squared solutions.

+ [Global](#)

**REAL-TIME OPERATIONAL AND ALERTS FOR INDUSTRIAL NETWORKS**

Continuously monitoring the industrial network, CyberX's XSense collects real-time data, ensuring detection of unfamiliar activity using its machine learning.

+ [Global](#)

**SELF-LEARNING AND ACCUMULATE KNOWLEDGE**

DeepAmor from SparkCognition uses a battery of AI technologies to constantly learn new malware behaviours.

+ [Global](#)

**AUTOMATING THE HUNT**

BluVector, a product of Acuity Solutions Corporation, delivers fast, highly scalable and integrated detection of malicious software targeting enterprise networks.

+ [Global](#)

**HOLISTIC ASSESSMENT TOOL COMBINES MULTI-SECTOR BEST PRACTICE**

DNV GL developed a multifaceted risk assessment tool of the cyber security of vessels that identifies threats and strategies and integrates best practices from maritime, oil & gas and energy sector.

+ [Global](#)

**23%**  
plan to invest in  
cyber artificial intelligence

**85%**  
of all cyber attacks predicted  
by using AI

**36.1%**  
is the expected yearly market growth  
between 2016 and 2024 for AI



SUSTAINABLE DEVELOPMENT GOALS

Sources: 1. PWC. Towards New Possibilities in Threat Management. 2016. 2. Conner-Simmons A. System predicts 85 percent of cyber-attacks using input from human experts. MIT News. Apr 18th, 2016. [www.news.mit.edu](http://www.news.mit.edu) 3. Globe News Wire. Global Artificial Intelligence Market to Exhibit 36.10% CAGR from 2016 to 2024 Driven by Diversified Application to Enhance Productivity. Jun 16th, 2016. [www.globenewswire.com](http://www.globenewswire.com)

# BEST BUSINESS CASE OF ALL OPPORTUNITIES

Business leaders who took part in our survey see the use of artificial intelligence to boost cyber security as a great business case. On the overall ranking, looking at benefits for society and the capacity to pursue the opportunity, it is the third most preferred opportunity across all regions. In North America and Other Asia (covering Japan and Russia), it is the top opportunity.

### Capacity to Grow the Market

The market can be expected to mature rapidly, as leaders worldwide believe there is a significant capacity to grow. Out of all 15 opportunities surveyed, Intelligent Cyber Security scores highest across all three capacity parameters (economic, political, and technological). China is the only region where leaders do not believe there is sufficient capacity to develop this market, rating the current capacity third lowest of all opportunities.

### Opportunity Business Case

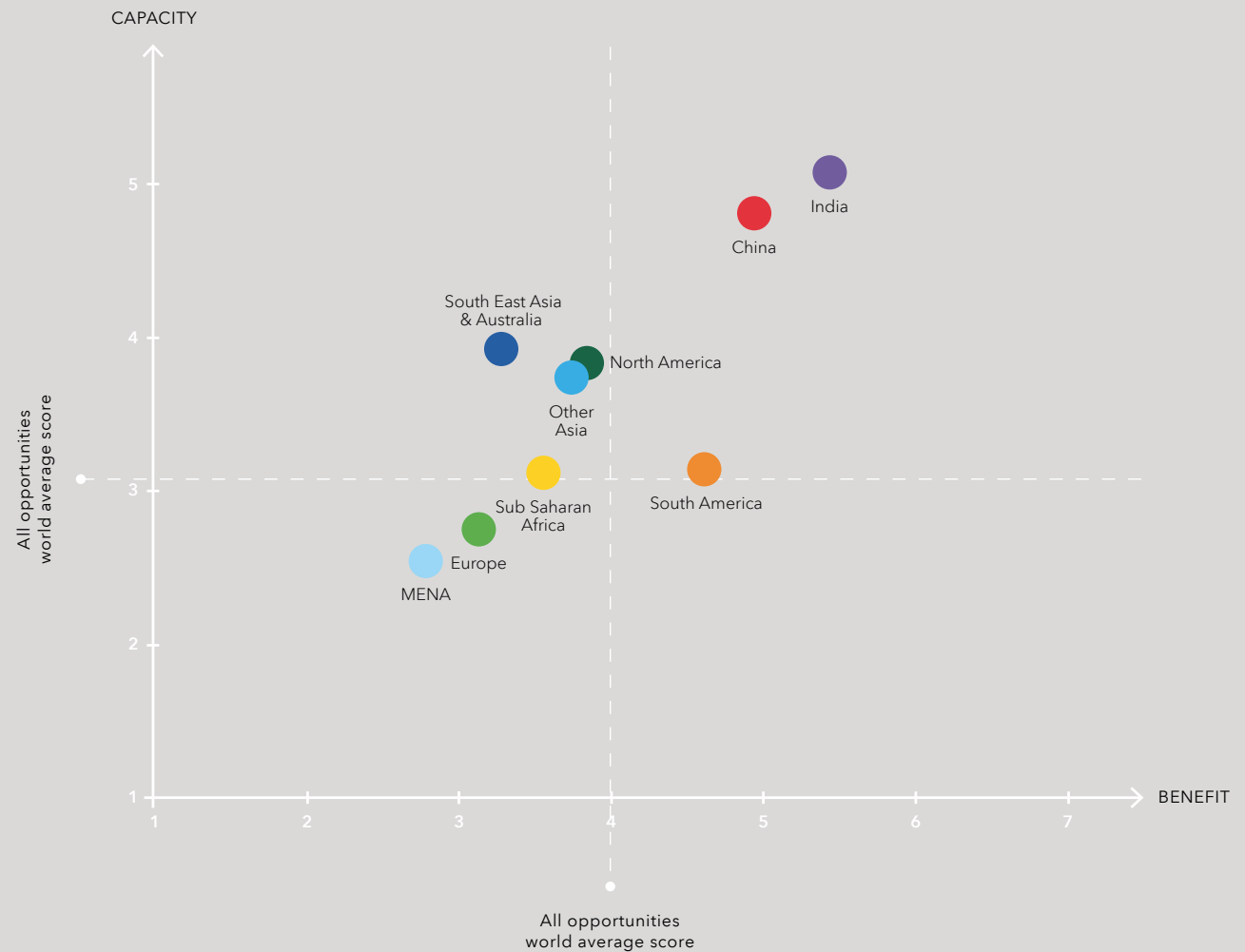
Leaders in general expect this opportunity to have the greatest impact on business and believe it holds the greatest business case. Hence, we can expect business to take the lead in developing this market because it offers a clear business case and clear benefits. From a management perspective, the perceived positive impact from implementing this opportunity is much lower for respondents working as managing directors than other levels. Looking across all 15 opportunities, the survey indicates business in North America, Other Asia, South America, South East Asia & Australia, and Sub Saharan Africa will take the lead in developing this market, as leaders in these regions generally responded they are ready to pursue it.

### Sector Impact

The survey shows the business case in this opportunity is attractive to nearly every sector. Manufacturing is the only sector that does not perceive it to represent the best business case of all 15 opportunities. Financial, service, and the others business sectors perceive this opportunity to have the greatest positive impact for society. In addition, it is the opportunity for which the financial and public sectors will advocate the strongest.

### BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



## NUMBER 3 ON THE OPPORTUNITY RANKING

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
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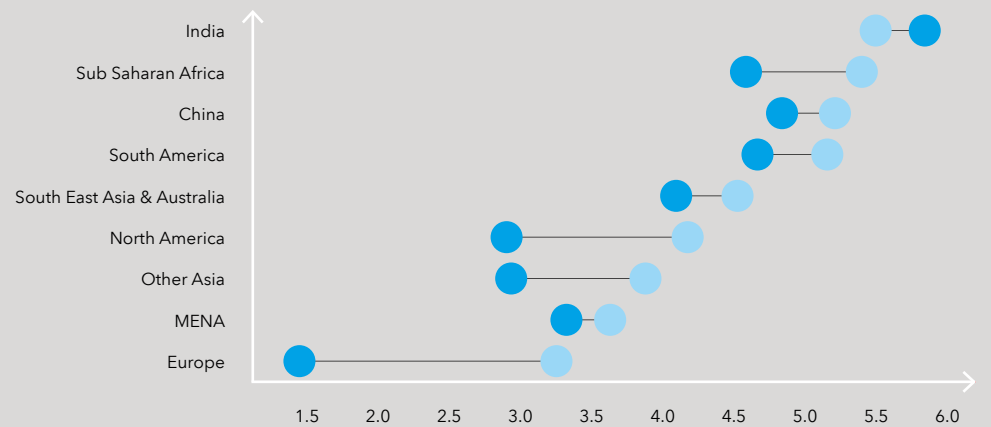
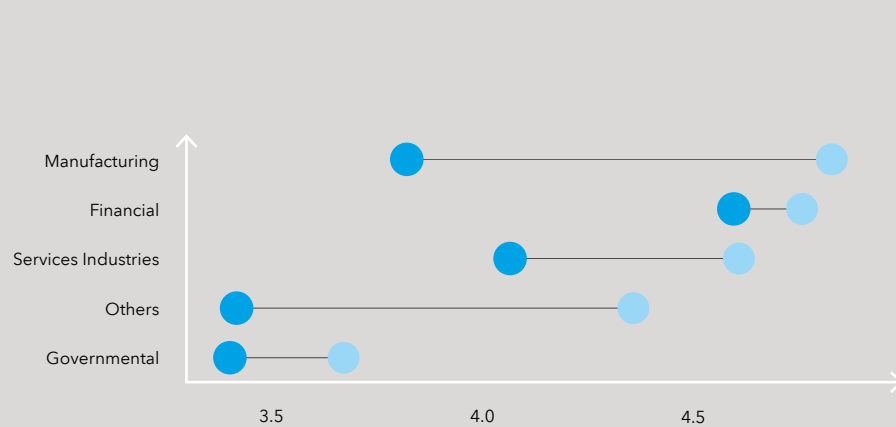
## CHARACTERISTICS OF OPPORTUNITY



Most favourable opportunity for business to pursue

## PURSUE AND IMPACT

● Likelihood of pursuing    ● Positive impact on business





## OPPORTUNITY

# CYBER SECURITY GAME

Utilising gamification tools, companies can transform employees from cyber security risks into assets. This opportunity space protects businesses and individuals from cyber threats by teaching smarter digital behaviour in an engaging way, and creates a new market for ethical hackers, hired by companies to find weak spots in cyber networks. Not only does this protect users and create a new market, it overcomes the shortage of cyber professionals.



Human error represents one of the biggest vulnerabilities for cyber security; studies show 95 percent of successful cyber security breaches involve human error. Gamification offers a series of attractive market opportunities for companies to develop cyber security products and services. Simply put, cyber security is not a top priority for most employees relying on digital technologies to perform their jobs, but using mechanics and methods from games increases awareness of cyber security and nudges users into secure cyber behaviour.

### PRODUCTS AND SERVICES

Gamification products, with their fundamental focus on user experience design, can motivate and engage employees in safer cyber behaviour, thereby diminishing one of the greatest threats to cyber security: ourselves. Many games allow people to play the role of either attacker or defender and compete against each other by investing in skills, tactics, talent, and tools. Games can be set up as competitions within businesses where employees are rewarded for good behaviour, instead of being punished for bad habits, heightening motivation.

A new development in the cyber security gamification opportunity space are products enabling companies to invite so-called “ethical hackers” onto a treasure-hunt styled game, working through their systems to spot and report bugs in return for a prize, usually money. Digital and tech companies have been early adopters, but the acute shortage of cyber security professionals is pushing more traditional industries to follow. It is an opportunity space for bug bounty hunters to maintain a good a business, as well as a promising space for companies managing the programs and corporations seeking help in improving employees’ online security.

Similar to this approach are changes within more innovative organisations that are sensitive towards cyber security competency building and retaining skilled personnel. In red team-blue team exercises, for instance, skilled security

experts form a red team tasked with executing an attack on certain assets of the company while a blue team defends against it. Taken from military war gaming, these exercises are used not only to test the effectiveness of security barriers but also create a gaming atmosphere that stimulates the company’s skilled personnel, who could otherwise lack motivation or sense of purpose when, for example, being tasked to read security incident logs all day round.

### MARKET SIZE AND DEMAND DRIVERS

The security awareness training market exceeds 1 billion USD in annual revenue globally, and is growing by approximately 13 percent per year. The growing market demand for these products is driven by the persistent increase in the number of cyber attacks. In 2015, the total number of cyber security incidents rose by 38 percent.

Demand drivers in this opportunity space include the increased digital complexity of day-to-day work processes that increase the risk of security breaches. Companies and organisations will continue to demand more and better products for securing their assets and for improving their employees’ digital security behaviour. Developing products and services to meet these challenges is a growing business opportunity for companies in the cybersecurity sector.

# SOLUTIONS INCREASE CYBER AWARENESS AND SECURITY

**KASPERSKY SECURITY AWARENESS**  
Teachable lessons through gamification and competition with their Kaspersky Security Awareness solution.  
+ [Global](#)

**PLAY THE CHALLENGE**  
Cyber Security Challenge UK is a series of national competitions, learning programmes, and networking initiatives designed to identify, inspire and enable more people to become cyber security professionals.  
+ [Global](#)

**THE TOOLWIRE GAMIFICATION PLATFORM**  
A customized, self-paced digital courseware solution that enables learners to complete their skill development plans faster and more effectively.  
+ [Global](#)

**WORKFORCE RISK INTELLIGENCE PLATFORM**  
Workforce Risk Intelligence Platform from Apozy continuously assesses and monitors security practices in order to nurture and maintain optimum corporate security posture.  
+ [Global](#)

**TRAINING DAY**  
Training Day from eSentire is an adaptive, gamified, and fully-mobile security awareness training solution that aims to arm employees against cyber-attacks.  
+ [Global](#)

**DATA DEFENDER**  
Digital Guarding is with the Data Defender introducing a fun and interactive way for employees to learn about handling sensitive data properly.  
+ [Global](#)

**BUG BOUNTY PROGRAMS**  
Uber is gamifying bug finding to keep the best researchers engaged. The hackers get rewarded for their hard work and Uber builds a more secure platform.  
+ [Global](#)

**PHISHNET**  
Teaching employees to take an “outside-in” learning approach, essentially allowing them to get into the mind of the hacker.  
+ [Global](#)

**\$1BN**  
global revenue for security awareness market

**13%**  
is the annual growth of the security awareness market

**52%**  
of security breaches are enabled by human error



SUSTAINABLE DEVELOPMENT GOALS

Sources: 1. CyberSecurity Ventures. CyberSecurity Market Report. 2016. 2. CyberSecurity Ventures. CyberSecurity Market Report. 2016. 3. Greenberg A. "Human error cited as leading contributor to breaches, study shows". SC Media. Apr 1st, 2015. [www.scmagazine.com](http://www.scmagazine.com)

# BUSINESS IN NORTH AMERICA IS READY TO PURSUE

The opportunity of cyber security games has been received with moderate to low enthusiasm across all regions, rated the 11th-highest opportunity on the overall ranking. Leaders in Europe are most positive about this opportunity, ranking it the 7th-best opportunity, while respondents in China rate it at the very bottom of the list. It is the lowest-ranked opportunity to address the cyber security risk.

### Capacity to Grow the Market

Globally, respondents believe the technological capabilities already exist to make this market opportunity grow, while they perceive the economic and political capacity to be lower. MENA, Sub Saharan Africa, and North America are the three regions where we can expect the market to mature the fastest, as respondents believe the overall capacity is significant enough to enable the opportunity to grow. Respondents with mid-level management responsibilities are more positive towards the overall capacities to pursue this opportunity than C-level management, which is different from most of the other opportunities.

### Opportunity Business Case

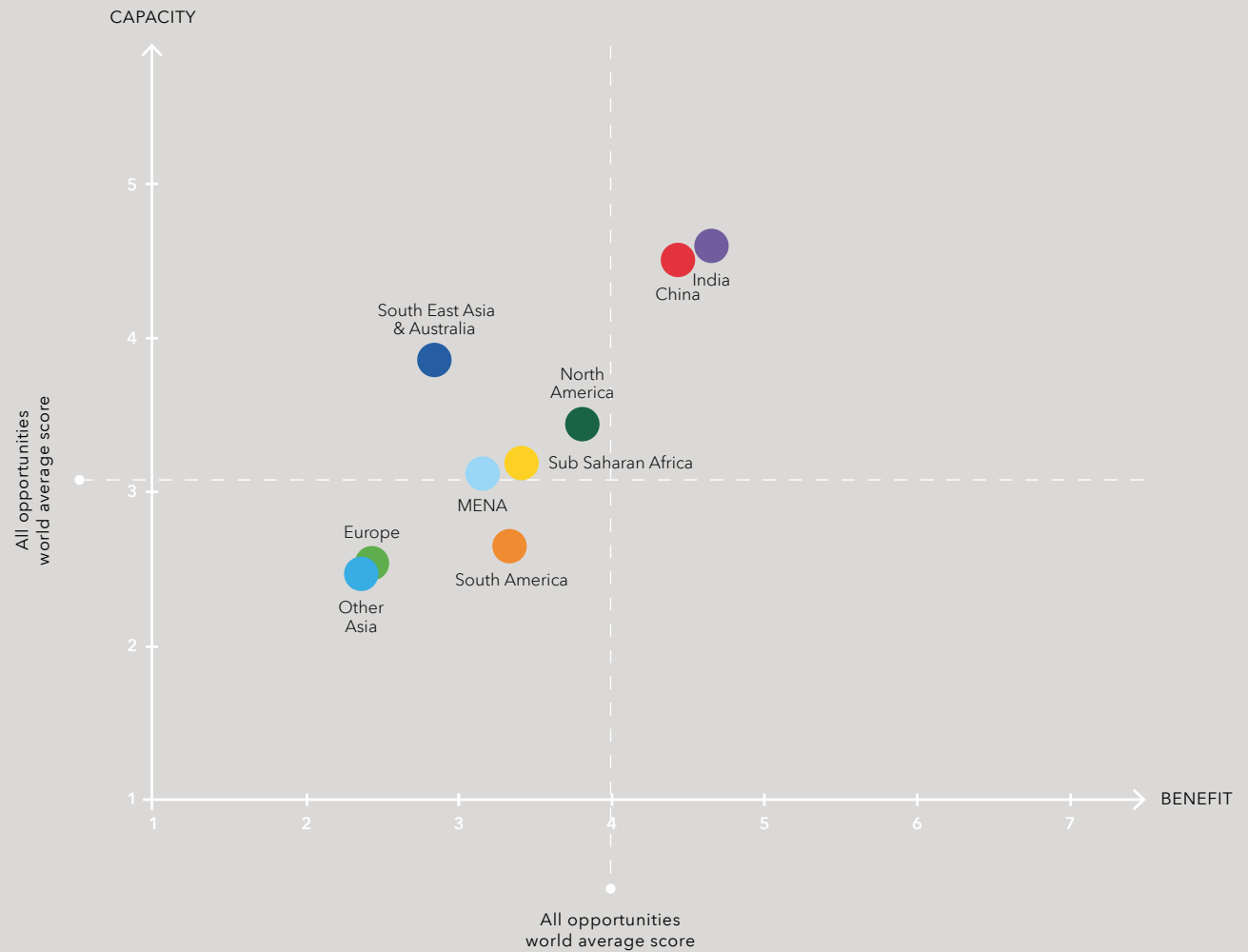
In North America, leaders see a strong business case in this market opportunity, believing it will have a positive impact on business. Business leaders in Europe are also ready to pursue it, while business leaders in China see a weaker business case in this market opportunity.

### Sector Impact

The "other" business sector is the group that assessed this opportunity to have the greatest ability to positively impact business sectors, while the service industry ranked this opportunity highest with respect to the likelihood of pursuing it. The financial sector can be expected to actively advocate for the development of this market. From a regional perspective, business leaders in the MENA region will advocate most actively for this market.

### BENEFITS AND CAPACITY

Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



## NUMBER 11 ON THE OPPORTUNITY RANKING

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
10	GENDER EQUALITY - IT'S ABOUT TIME
11	CYBER SECURITY GAME
12	INSTANT REFUGE
13	UPGRADING INFORMAL HOUSING
14	CONFLICT FREE NATURAL RESOURCES
15	CLEVER CODES DISRUPT INEQUALITY

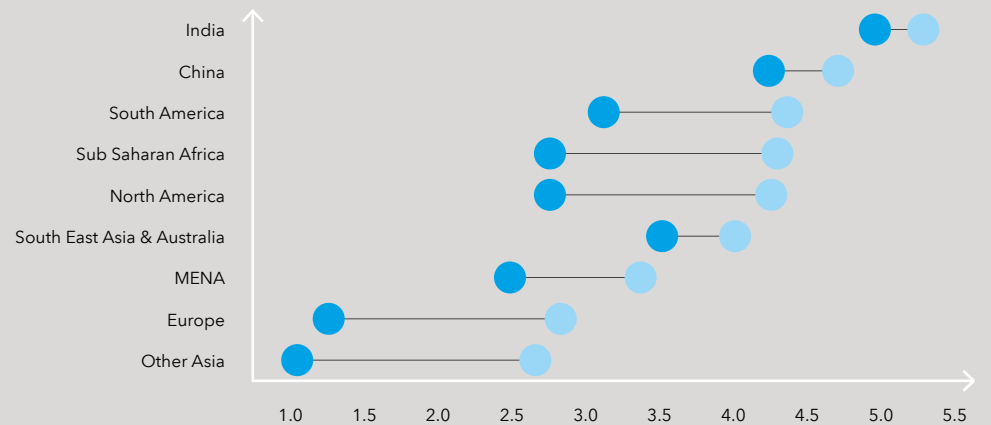
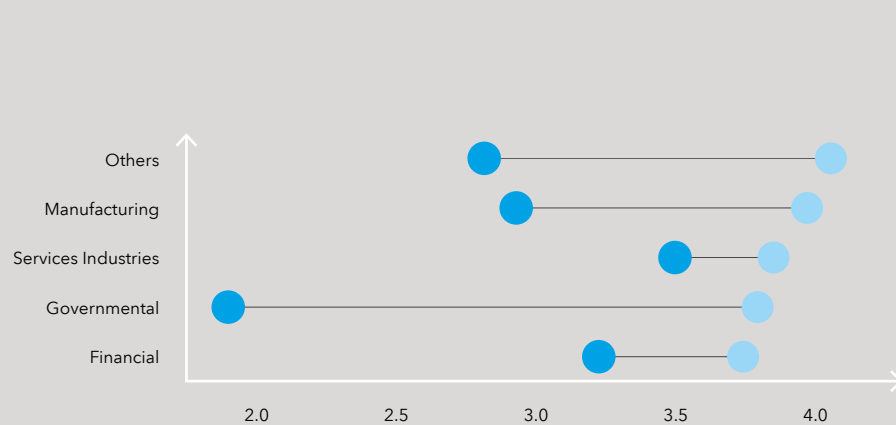
## CHARACTERISTICS OF OPPORTUNITY



**Opportunity in North America with the most positive impact on business**

## PURSUE AND IMPACT

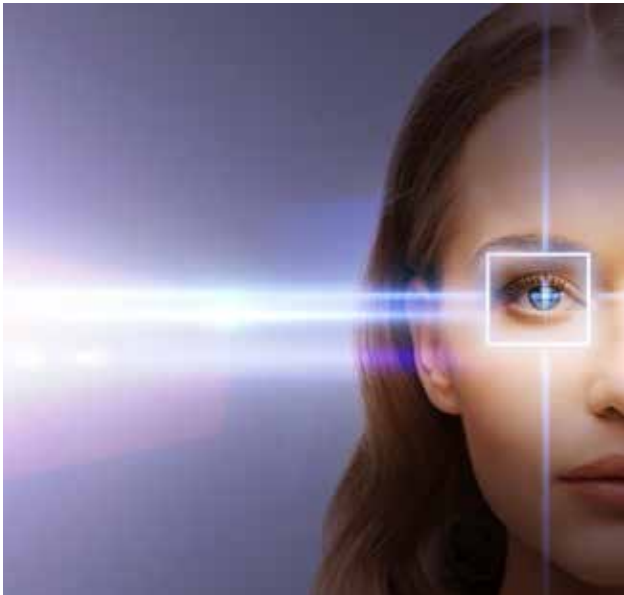
● Likelihood of pursuing ● Positive impact on business



## **OPPORTUNITY**

# BEHAVIOURAL BIOMETRICS

Behavioural biometrics analyses specific human behaviour with intelligent software, adding a new layer of security to verifying identification that is nearly impossible to replicate, without any additional stress for the user. Products and services in this market are moving digital security beyond simple passwords and pin codes, ensuring that as cyber criminals become more advanced, so too do everyday users.



Behavioural biometrics analyses patterns of human interaction with electronic devices to design new security tools unique to the individual. It identifies concrete and measurable patterns of human traits such as keystroke analysis and voice authentication. Therefore, as a measurable behaviour that is used to verify a person's identity, behavioural biometrics offers a safer method of authentication than the current use of passwords and pin codes, and even more security than standard biometrics,

such as fingerprints or face scans. This opportunity space is, therefore, taking cyber security to a completely new level.

### **PRODUCTS AND SERVICES**

Products and services in this opportunity space do not measure who you are in terms of, for example, your fingerprints but rather how you act. The products and services are software and applications that can be used across digital devices such as smartphones and computers. It can be keystroke or typing recognition software, which, when installed onto a computer, analyses how you type in terms of speed and rhythm and can determine when other users suddenly appear.

There are also software products in this space with algorithms that constantly learn about users' behaviour and adapts the specific behavioural ID to increase the level of protection. These software products are invisible to the human eye and therefore do not interfere with the user experience. In addition to software integrated into digital devices, other products are wearables such as wristbands that detect a heart's electrical activity to positively identify a user.

Behavioural biometrics can often be gathered using existing hardware, only needing new software for analysis, making it simpler and less costly to implement. It is a dynamic global market for behavioural biometric solutions consisting of numerous large and small players.

### **MARKET SIZE AND DEMAND DRIVERS**

The Biometrics Research Group Inc. predicts the global biometrics market will grow to 35.5 billion USD by 2020, from its 2015 value of 15 billion USD, making it a significant space for the development of new technology and service delivery. Technavio's analysts forecast the global behavioural biometric market to grow at a CAGR of 17.34 percent from 2016 to 2020.

The governmental sector has been early adopter of behavioural biometrics, accounting for 40 percent of the market in 2015. The application of behavioural biometrics in electronic devices such as smartphones and laptops is expected to drive growing demand across various private sectors, where the financial services industry is currently driving up the demand.

The behavioural biometrics market is in a nascent stage compared to biometrics, such as fingerprints and face scans, but the advantages of the new technology give it a strong edge.

# SOLUTIONS WHICH ARE USING BEHAVIOURAL READINGS TO INCREASE SECURITY

**MIMICS THE WAY A HUMAN BRAIN IDENTIFIES INDIVIDUALS**  
FST Biometrics uses a fusion of biometric identification technologies, including facial, voice and body behavioural analytics, to identify user in motions.  
+ [Global](#)

**CONTINUOUSLY ADJUSTED USER BEHAVIOUR PROFILE.**  
Blindspotter, a product from Balabit, collects user related events and user session activity in real-time or near real-time, to spot anomalies in their behaviour.  
+ [Global](#)

**ADAPTIVE BEHAVIOURAL SECURITY**  
Evaluating the user's unique kinetic interaction signature, Zighra KineticID can recognise a user based on habits and interaction patterns.  
+ [Global](#)

**MEASURABLE BEHAVIOURAL PATTERNS**  
Behaviour ID SDK, from Telesign, continuously monitors and recognizes the identity of a user based on behavioural patterns.  
+ [Global](#)

**CYBERSECURITY WITHOUT THE HASSLE OF PASSWORDS**  
BioCatch's cognitive technology identifies the behaviours that are consistent and unique to an individual and is used to detect when anomalies occur.  
+ [Global](#)

**TRUST THE BEHAVIOUR**  
NuDetect, a product from NuDataSecurity, identify the real user based on hundreds of behavioural attributes.  
+ [Global](#)

**KILL THE PASSWORD**  
With the right biometric for the right activity, banks and other institutions can ensure that they are not unnecessarily inconveniencing their customers with AimBrain.  
+ [Global](#)

**CONTINUOUS ADAPTIVE AUTHENTICATION**  
Behaviosec uses an algorithm which stays up to date with user behaviours and skills, so that as they change and improve, so does the security layer.  
+ [Global](#)

**\$35.5BN**

market size in 2020

**40%**

of the market share is in governmental sector

**10**

fold more secure than the best fingerprint sensors



Sources: 1/2. Technavio. Global Behavioral Biometric Market 2016-2020. 3. King R. Companies Move Beyond Passwords With Human Behavior Algorithms. The Wall Street Journal. Sep 28th, 2015. [www.wsj.com](http://www.wsj.com)

SUSTAINABLE DEVELOPMENT GOALS

# A FAVOURITE FOR SOUTH AMERICA & A STRONG GLOBAL BUSINESS CASE

Utilising behaviour to provide a unique digital ID, and thereby achieve improved cyber security, is the top-rated opportunity in South America, as well as one of the most preferred in the Other Asia region (covering Japan and Russia). However, the opportunity has achieved lower ratings in other regions. The market associated with the opportunity seems to be more appealing to consumers above the age of 30.

### Capacity to grow the market

In general, survey respondents agree there already exists a necessary capacity to grow this market. Political capacity is perceived to be particularly higher than technological and economic capacity across all regions. This points to the fact that the public sector is a significant consumer of behavioural biometrics products. Leaders in South America have rated their technological capacity to further develop this market higher than leaders from other regions.

### Opportunity Business Case

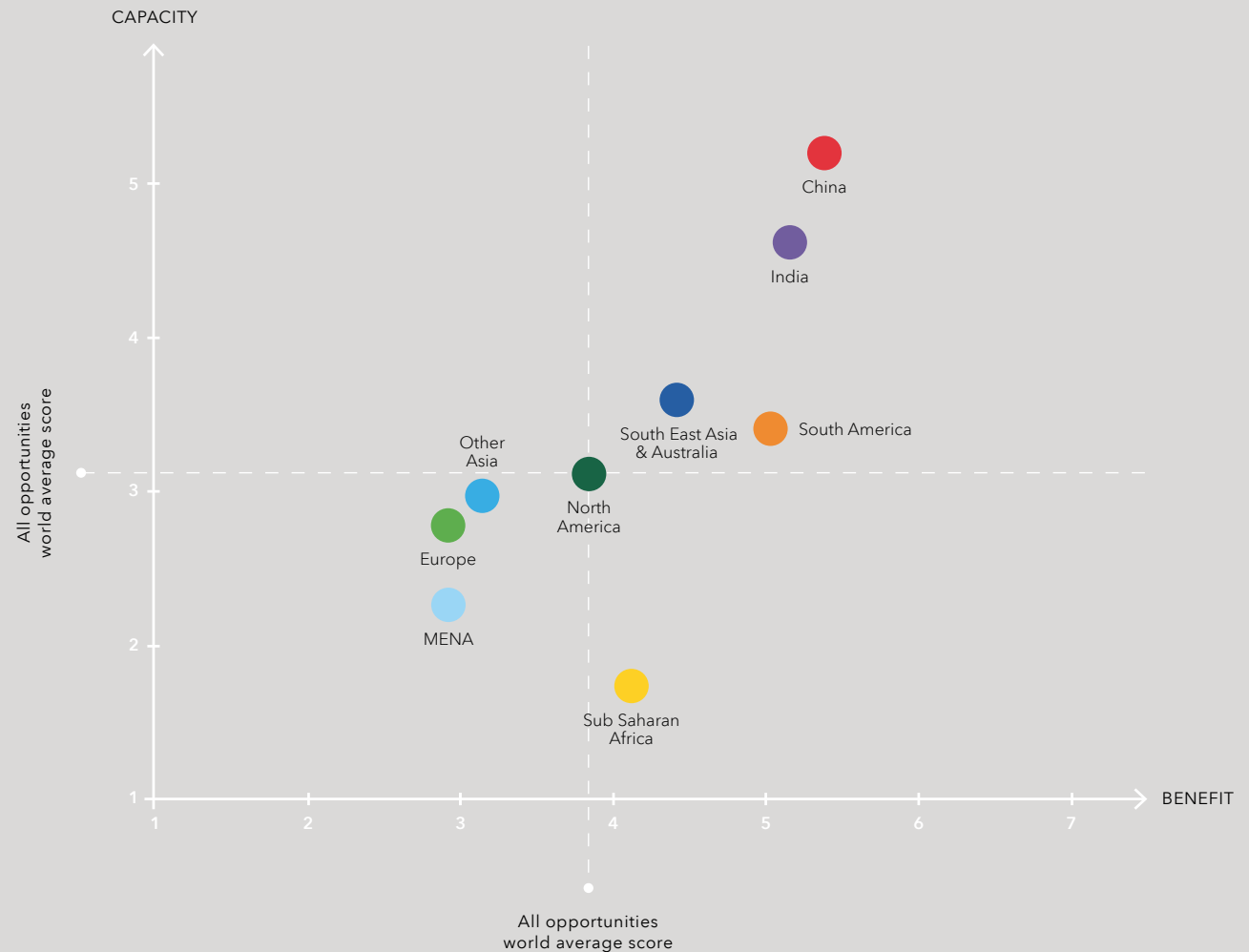
Business leaders across all regions believe there is a strong business case in entering this market. Only the market for intelligent cyber security is perceived to hold a stronger business case than behavioural biometrics. While leaders in Europe seem to be most ready to develop this market opportunity, those in Other Asia and South America also perceive this market to hold a significant business potential. Making use of behavioural patterns to improve cyber security is expected to provide a significant positive impact on business across all regions - for South America and South East Asia & Australia it is the opportunity with the highest perceived positive impact on business.

### Sector Impact

From a sector perspective, the financial sector and the service industry look most positively at the business case presented by this market. Across all regions, the opportunity is expected to be strongly supported by the financial sector, by policy initiatives, and by business, whereas civil society is not going to be a strong advocate.

### BENEFITS AND CAPACITY

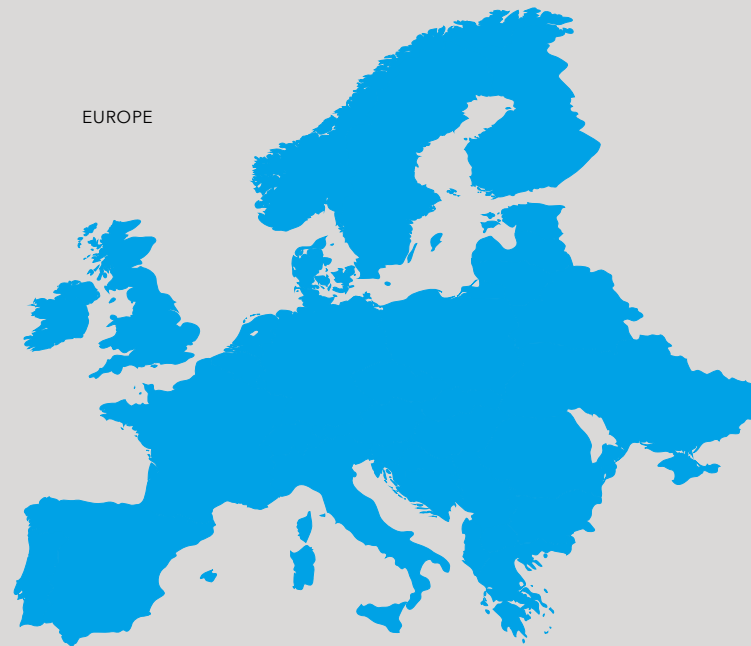
Perceived benefits from pursuing this opportunity (x), and capacity to do so (y), geographic regions. Scale goes from -10 to +10.



## NUMBER 7 ON THE OPPORTUNITY RANKING

1	SMART WATER TECH
2	KNOWLEDGE FOR PEACE
3	INTELLIGENT CYBER SECURITY
4	BUSINESS OF POWER
5	KEEPING OUR SOILS ALIVE
6	MOISTURE TECH
7	BEHAVIOURAL BIOMETRICS
8	INTERNET OF PEOPLE
9	LIVING ON AIR
10	GENDER EQUALITY - IT'S ABOUT TIME
11	CYBER SECURITY GAME
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14	CONFLICT FREE NATURAL RESOURCES
15	CLEVER CODES DISRUPT INEQUALITY

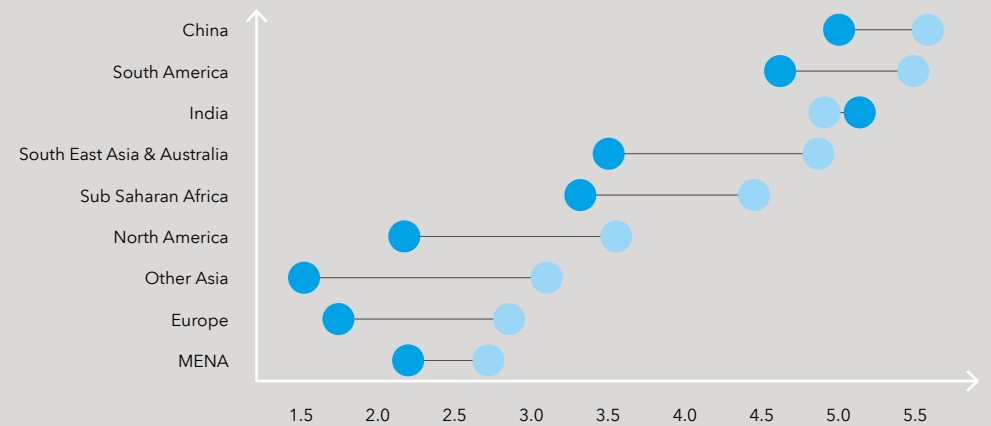
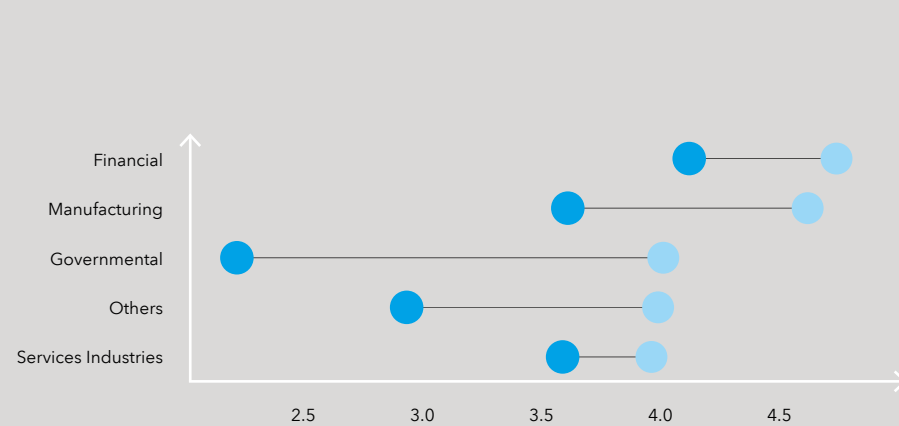
## CHARACTERISTICS OF OPPORTUNITY



**Most likely  
to be pursued  
by business  
in Europe**

## PURSUE AND IMPACT

● Likelihood of pursuing    ● Positive impact on business





# OPPORTUNITY TRENDS





# OPPORTUNITY TRENDS

## Intersection of technology and sustainability

For the past three years, DNV GL, UN Global Compact, and Sustainia have joined forces to produce the annual Global Opportunity Report. This yearly report is created based on extensive research and consultation with business leaders around the world. In all, we have analysed how 45 opportunities can emerge from 15 leading global risks. We have done this by conducting 17 opportunity panels with industry experts across five continents and gathering insights from surveys conducted with more than 17,000 business leaders from around the globe. The results reveal that challenges facing our society, planet, and business communities can actually be turned into opportunities if we adopt the right mindset.

As every risk assessed in the Global Opportunity Report is global in its reach, the potential for these market opportunities is enormous. No longer is responsible and sustainable business a small niche industry. Rather, these markets have the potential to be the key drivers of business growth in the coming decades.

From this wealth of data and knowledge, we are able to extract two important overall mega-trends across three years of the Global Opportunity Report.

### **TECH + SUSTAINABILITY RISKS = NEW MARKETS**

Based on three years of Global Opportunity Report data, it is clear that at the intersection of technology and sustainability risks emerge new market opportunities. The vast majority of our 45 opportunities employ technological innovations, but digitalisation of certain products and services won't be enough to remain competitive in the future market universe. True innovation

lies in finding the intersection of a business sector and technology. We've showcased this trend in the illustration on the following page, highlighting how four key markets: health, food, water, and energy, interact with technology in order to push the boundaries of innovation.

#### **Examples of Intersections:**

##### 1. Health > Internet of People

The internet of people is opening up new opportunities to deliver healthcare to low-income, remote communities via mobile solutions.

##### 2. Food > Smart Farming

Utilising technological advancements like drip agriculture and access to real-time weather data is helping both large- and small-scale farmers produce more with less.

##### 3. Water > Smart Water Tech

Innovative sensor technology and smart grids enable cities to manage their water supplies more efficiently and prevent disruptions to service delivery.

##### 4. Energy > Business of Power

Decentralised, peer-to-peer platforms and innovative energy storage technologies are disrupting the conventional concept of utility delivery and better preparing cities for energy and climate resilience.

#### **LIVE ON THE EDGE**

While it's clear that all industries must digitalise in order to remain relevant, they'll have to do even more to capitalize on new market spaces. The second trend we've

witnessed is that businesses need to move beyond their core and live on the edge of their markets. As evidenced on the next page, increasingly market opportunities exist at the edge where innovation and experimentation exist. The edge markets that exist between health and food; food and water; and water and energy signify that all industries need to move beyond their core comfort zones and operate on the fringes to capitalise on future opportunities.

#### **Examples on Market Overlap:**

##### 1. Health + Food > Antibiotic-Free Food

Growing concern over health issues is creating a drive for greater demand for antibiotic-free food. Therefore, the antibiotic-free food market is growing rapidly as these two sectors overlap to offer opportunities to protect people.

##### 2. Food + Water > Water-Efficient Agriculture

Techniques like effective rainwater harvesting and gravity powered irrigation allow for the continuation of high-yield agriculture while still saving water.

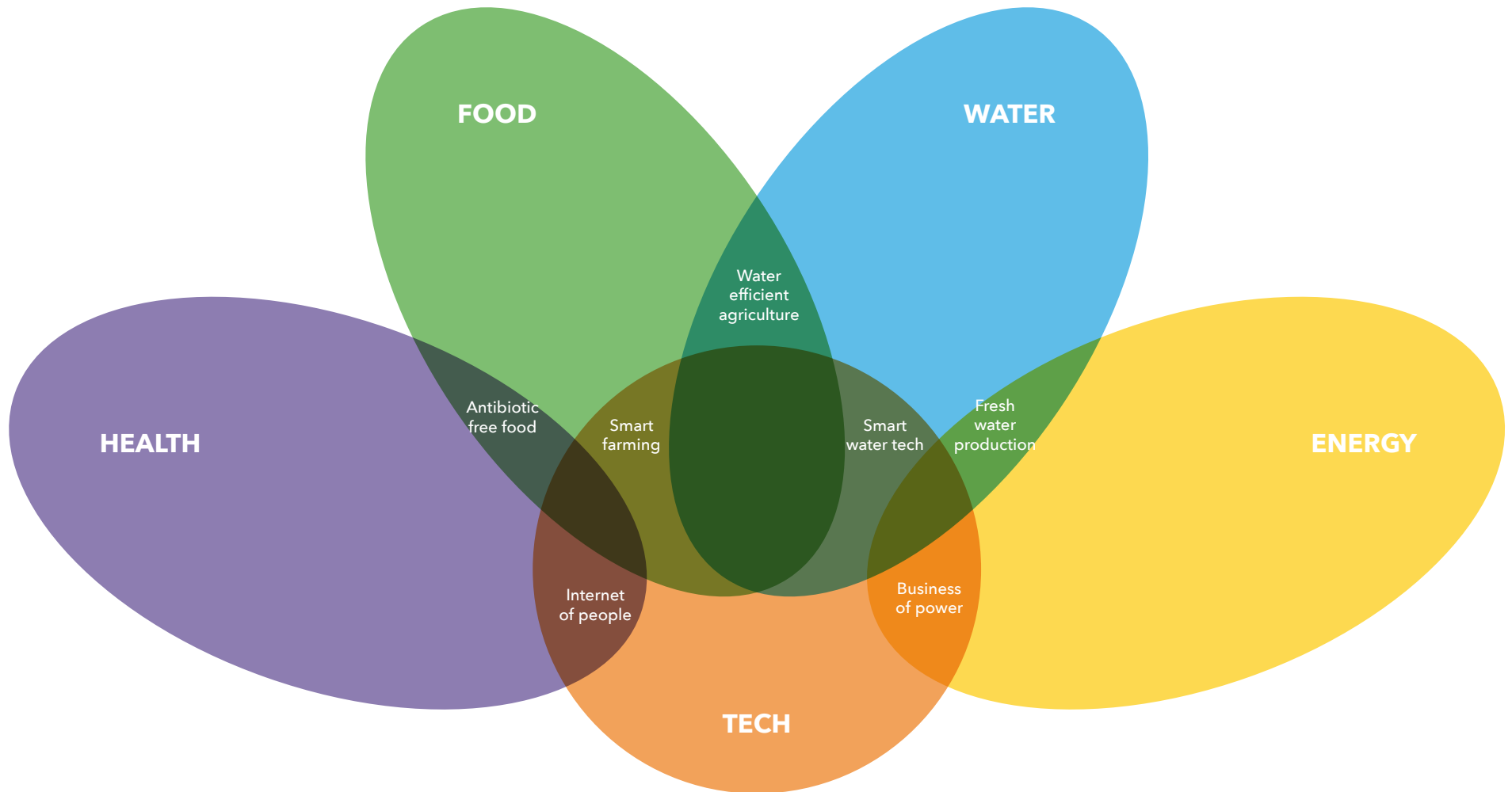
##### 3. Water + Energy > Fresh Water Production

Creating new freshwater sources using renewably powered wastewater treatment and desalination offer a crucial opportunity to meet the demand for fresh water while providing new and essential markets for clean energy.

## THE FUTURE OF OPPORTUNITIES

Health, food, water, and energy are four of the biggest markets featured in the three years of the Global Opportunity Report. They touch on several of our 45 total opportunities and, therefore, serve as excellent illustrations of how future markets will emerge in two key areas:

- 1 At the intersection of existing markets and technology
- 2 When the edges of existing markets meet one another

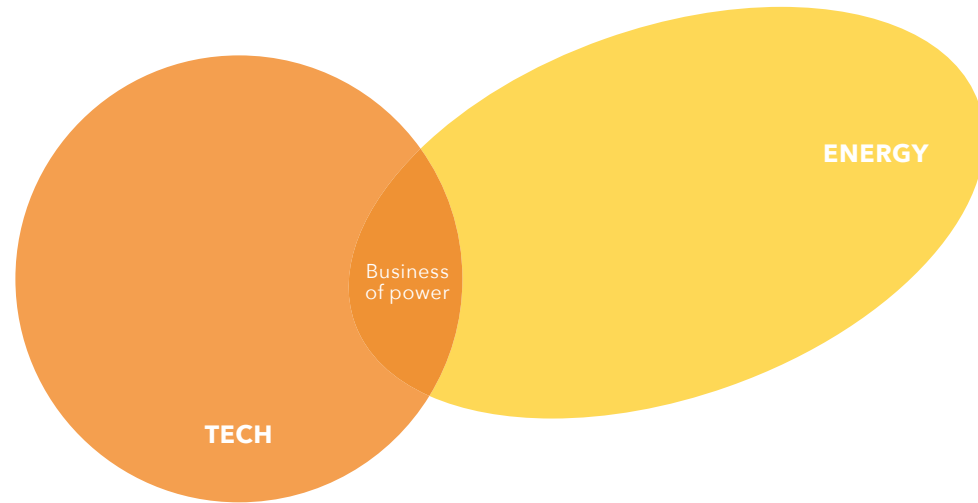


# THE MARKETS OF TOMORROW

## EXAMPLE 1: INTERSECTION OF EXISTING MARKETS AND TECHNOLOGY

Zooming in on our illustration, it's clear the intersection of energy and technology is not a niche opportunity. The opportunity from Global Opportunity Report 2017, Business of Power, showcases how decentralised, peer-to-peer platforms and innovative energy storage technologies are disrupting the conventional concept of utility delivery and better preparing cities and residents for energy and climate resilience. It is responding to the emerging consumer movement on energy self-sufficiency, where consumers are also producers of energy.

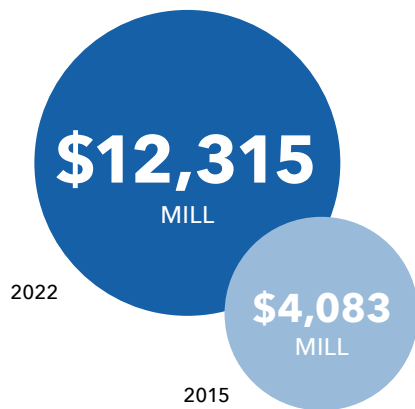
As this market is so new, microgrid and blockchain markets – two essential components of this opportunity – are as used as proxies for its current size and potential growth.



## BUSINESS OF POWER

### Microgrid

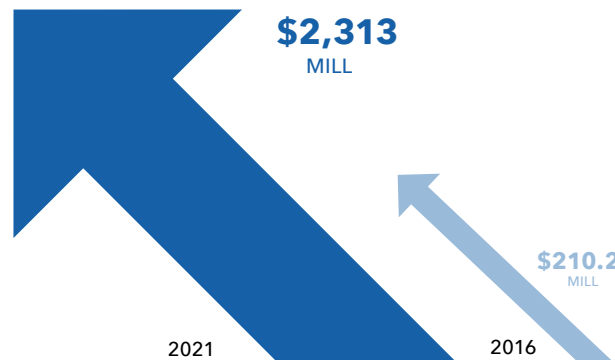
4,083 million USD revenue in 2015.  
12,315 million USD expected revenue by 2022.



Sources: Frost and Sullivan. 'Growing Opportunity in the Global Microgrid Market'. Report. 2016

### Blockchain

210.2 million USD market size in 2016.  
2,313 million USD expected market size in 2021.  
Funding for blockchain reached 1 billion USD between 2012 and 2015.



Sources: Markets and Markets. 'Blockchain Technology Market by Provider, Application, Organization Size, Vertical, and Region - Global Forecast to 2021'. Report. 2016. Frost and Sullivan. 'Blockchain Applications in the Energy Sector'. Report. 2016

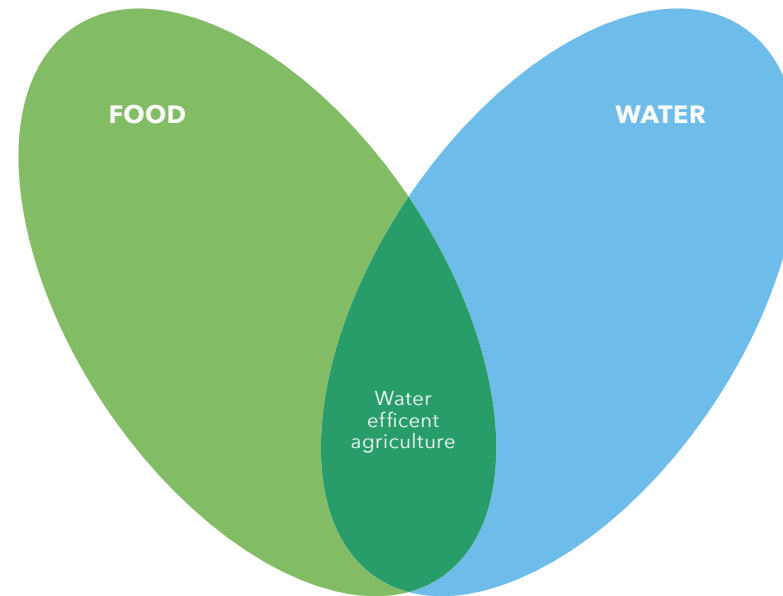
### Regional Market Development

Region most likely to pursue the Business of Power opportunity according to the 2017 Global Opportunity Report's survey of 5,500 business leaders.



**EXAMPLE 2: EDGES OF EXISTING MARKETS MEET ONE ANOTHER**

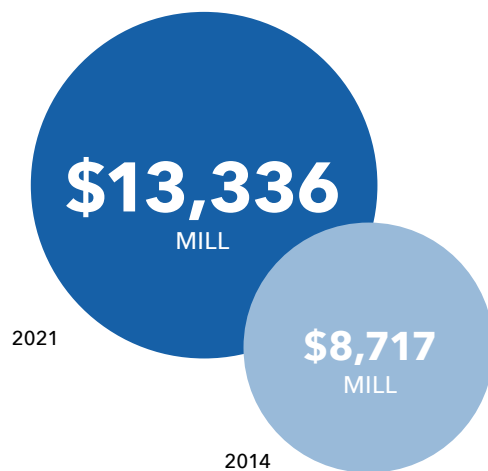
Technology won't be the only factor shaping the markets of tomorrow; so too will the ability for industries to see beyond their core and operate and innovate on the market's edges, where their expertise will mesh with other industries. Our illustration showcases how this is already happening across a number of sectors. Particularly, the overlap between food and water, exemplified here in the case of water-efficient agriculture, an opportunity from Global Opportunity Report 2015, is shaping up to be a booming market in the coming years. Smart irrigation systems, a critical element of the water-efficient agriculture market, is used here as a proxy for the opportunity's current market size and potential growth.



**WATER EFFICIENT AGRICULTURE**

Smart Irrigation Systems

8,717 million USD revenue in 2014.  
13,336 million USD expected revenue by 2021.



Regional Market Development

Region most likely to pursue the water-efficient agriculture opportunity according to the 2015 Global Opportunity Report's survey of 6,160 business leaders.



Sources: Frost and Sullivan. 'CEO 360 Degree Perspective on the Global Irrigation Water Systems Market'. Report. 2016

## YOUR GPS TO NEW MARKETS

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The two mega-trends are clear: Investing in digital innovations and operating on the edges of markets are the keys to success in tomorrow's future market landscape. What might not be so obvious is how businesses should act on these trends. We present three steps business leaders can follow to learn how to capitalise on these opportunities now, and in the future. The steps come from looking across the three global surveys and 45 market opportunities in the past three years.

### **STEP 1. KNOW THE CORE CAN KILL YOU**

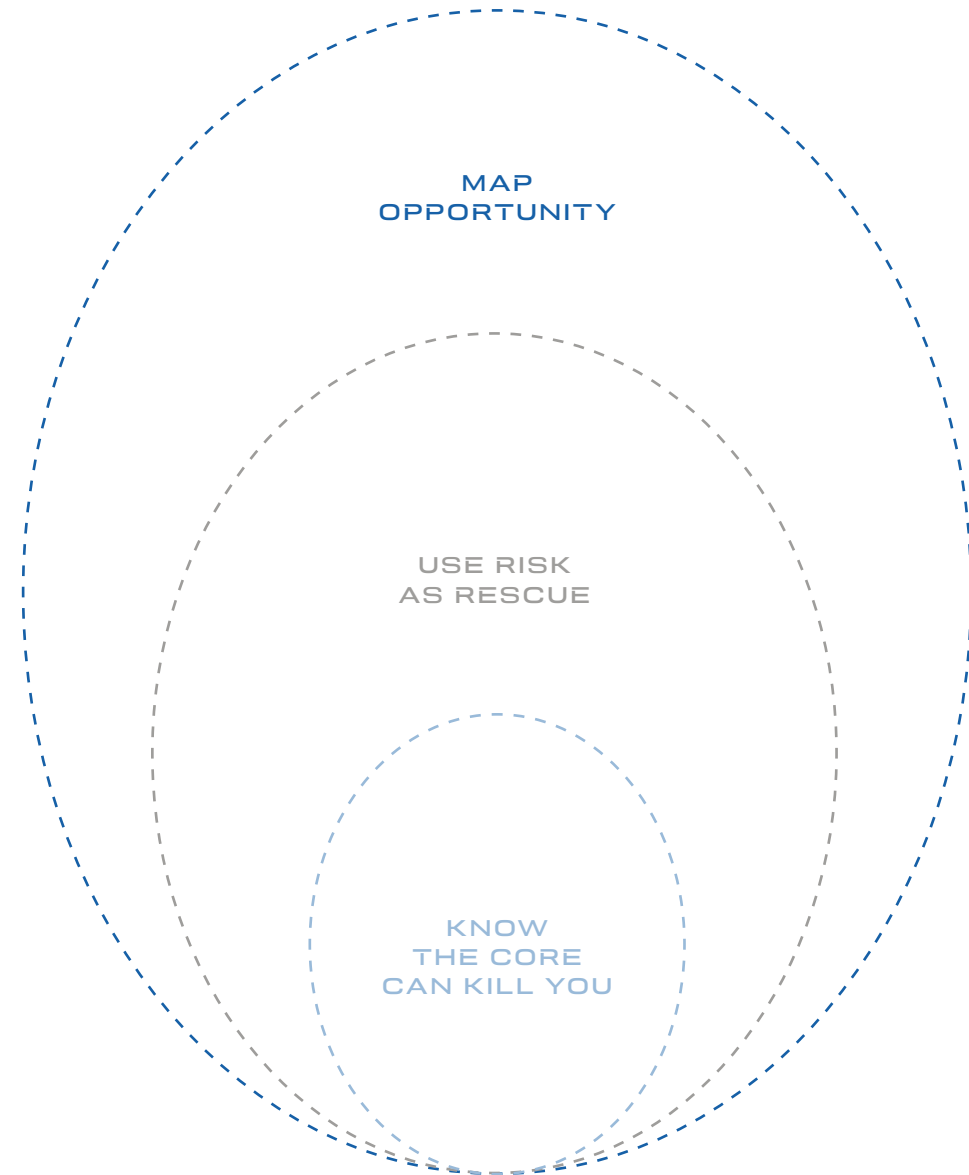
Business leaders need to recognise that previous methods for doing business are no longer viable in the 21st century and must change their corporate strategies accordingly. Zooming in on core business blinds you from seeing new markets. Instead, the business community must look to frontrunners who are able to zoom out and shift their focus from the core to the edges. New, sustainable, and long-term markets no longer emerge at the core of mainstream business; focusing too much on this core will eventually kill you. As illustrated in the Global Opportunity Report, edge markets are the future hotspots of business innovation.

### **STEP 2. USE RISK AS RESCUE**

To capitalise on these trends, business leaders need to undergo a pretty simple yet revolutionary change in mindset, from asking "Why me? Why should my business have to deal with these risks?" to instead asking "Why not me?" Posing this question sparks a shift in business thinking from an apathetic focus on risks to an action-oriented move toward designing and seizing opportunities. This will be the defining factor of the future market landscape, since, as the Global Opportunity Report shows, behind every global risk lies a business opportunity that can also benefit people and the planet.

### **STEP 3. MAP YOUR OPPORTUNITY LANDSCAPE**

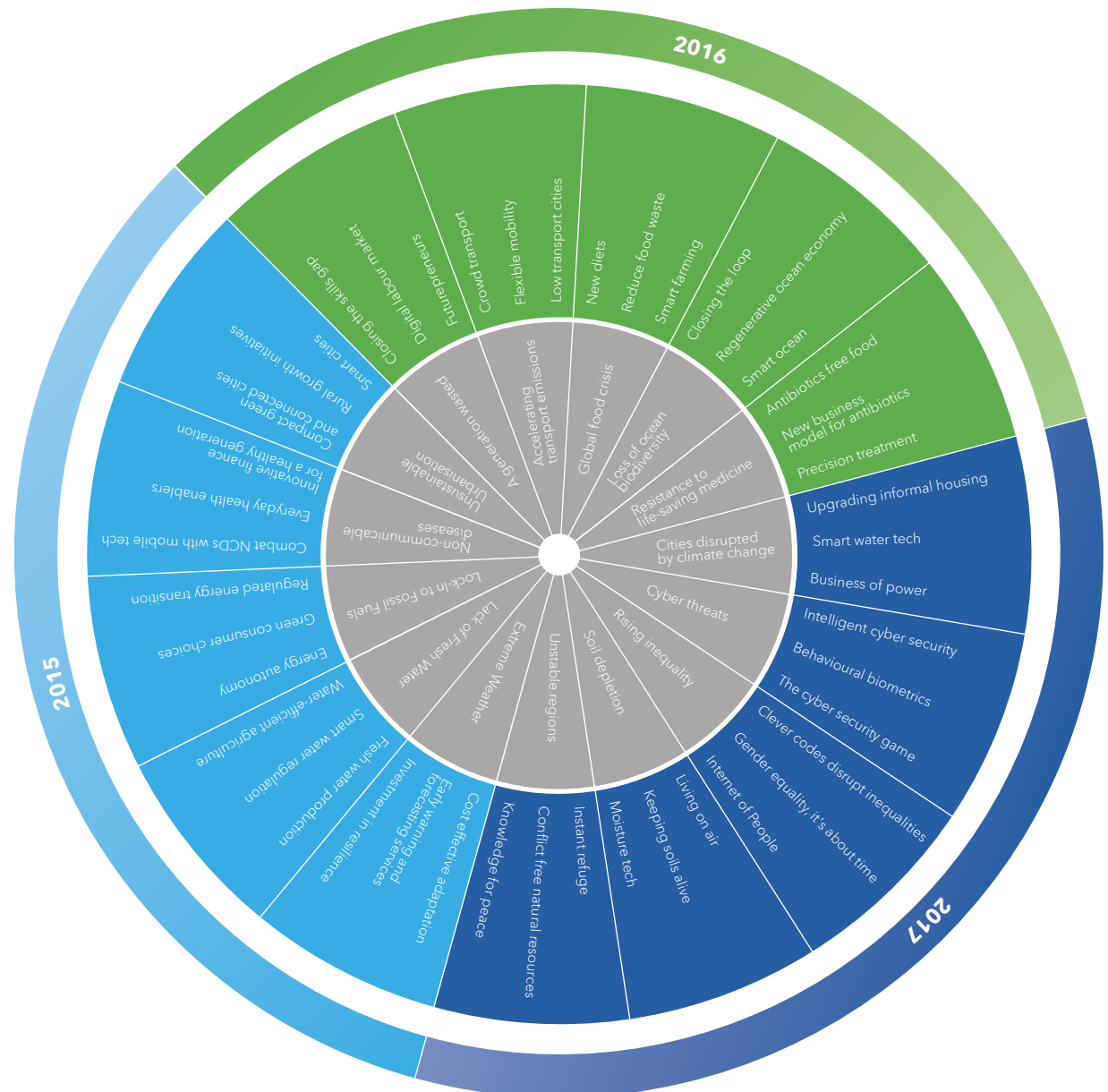
Once business leaders have acknowledged the need to move beyond their core and into edge markets to stay relevant in the future market landscape, they need to find out where, exactly, these new market universes lie. All businesses undertake risk mapping, but the key trends found over three years of the Global Opportunity Report tell us it is time to invest in opportunity mapping. The examples that come from health, food, water, and energy illustrate the size and potential of this trend globally, across all established markets. Individual businesses need to map their opportunity landscape to uncover and capitalise on these emerging edge markets that will shape the future of global business.



# FUTURE OPPORTUNITY OUTLOOK

Three years of the Global Opportunity Report have outlined a number of pressing global risks and avenues to turn them into opportunities that are good for both business and society. As we work towards achieving the UN's Sustainable Development Goals by 2030, new opportunities must continue to emerge in order to tackle these challenges. The Global Opportunity Report indicates we are already well on our way to finding these solutions. In particular, a number of key trends are visible from our vast collection of data from surveys with thousands of global business leaders. Notably, we see the driving force behind the markets of tomorrow is interconnectedness. Tomorrow's successful businesses will be those shaped by the interconnection of traditional sectors and technology and capitalise on the overlap between traditional, individual sectors.

So what does this mean for individuals, business, and society at large? It means that in 2030, your home will be powered by renewable energy, sourced directly from your neighbour's solar panels. An aspiring small business owner will get a much-needed loan thanks to blockchain's identity verification services. New moisture-retention technologies will allow farmers to grow more with less. Major corporations won't live in fear of cyber attacks, as their employees will be well-versed in safe digital behaviour. Smart and robust cities will withstand extreme weather and thrive in the face of climate change impacts. Conflict-ridden regions will regenerate their societies and economies thanks to new and innovative ways of learning. All of these advancements will be driven by incorporating technology into every sector of society and by uncovering once-ignored overlaps between sectors, promoting access for all. This interconnectedness will drive new markets, moving us ever-closer to reaching the SDGs and proving that what is good for the planet and its people can be great for business.







# THE ROAD TO THE REPORT

Further explanation of methodology



# HOW WE SEE IT

## Risk and opportunities

The report is rooted in the tension between global risks and opportunities. The concept of opportunity offers a perspective of the world where change is beneficial, even on a large societal scale.

Allow us to share how we define risk and opportunity and, how via an innovative collaborative process, we have worked with these terms in producing this report.

### **RISK**

To be included in the report, a risk must be global in nature. It is risks with the ability to break down an entire system, as opposed to only impacting individual parts or components of it. Risks are fuelled by globalisation and the rapid rise of technology. Faster communication, digital connectivity, increased mobility, and shorter trade and investment links are bringing people closer together. All these advantages from globalisation render the world more fragile by enabling risks to travel the globe at unprecedented speed, potentially changing entire systems along the way.

The risks discussed in the report were selected based on a number of criteria. They have to be global in reach, which means they are significant enough to make headlines everywhere. In addition, a risk must be felt by multiple stakeholders, as well as being both timely and actionable.

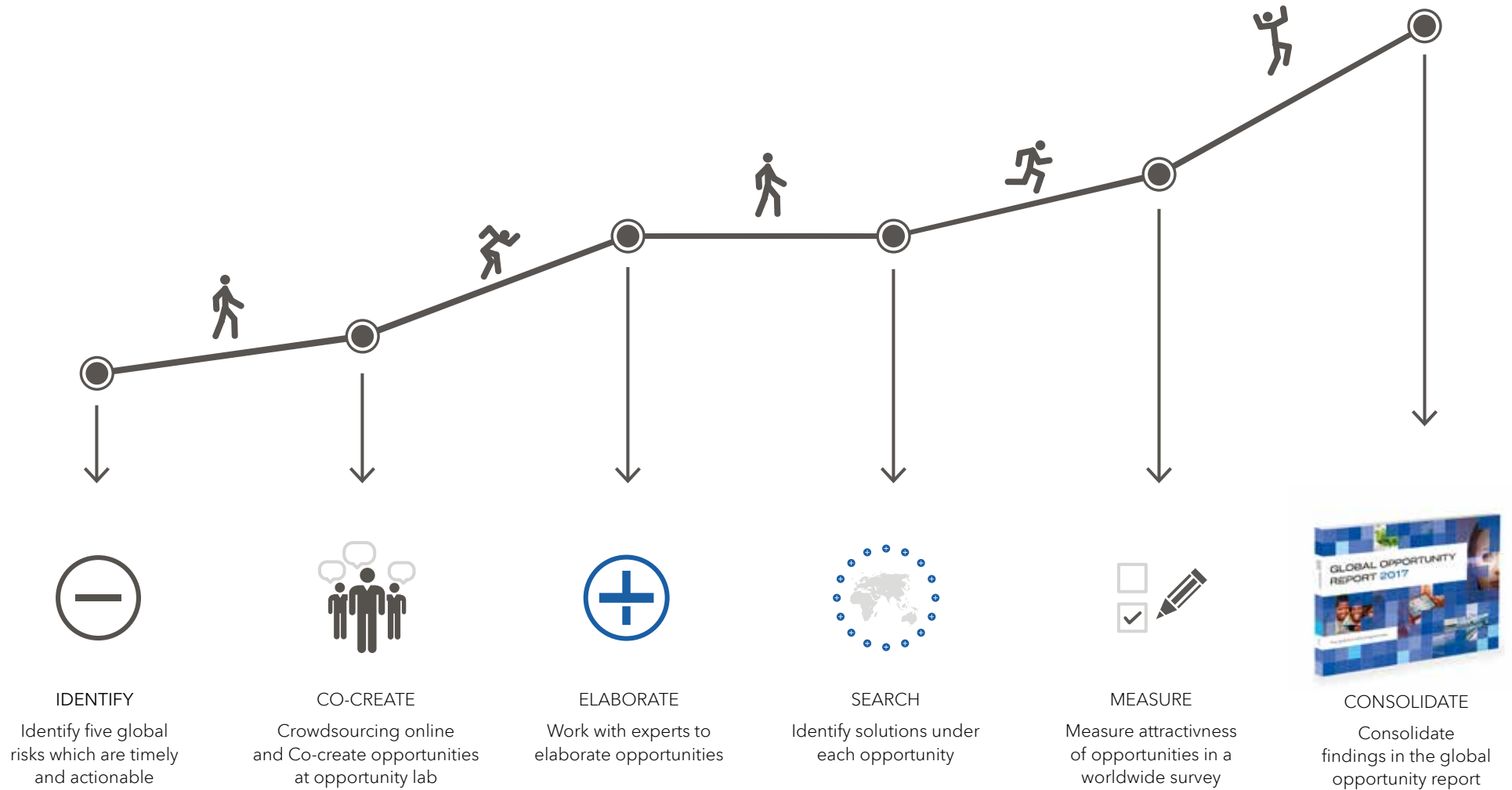
### **OPPORTUNITY**

Opportunities are avenues of action for systemic change that stakeholders in business, politics, finance, and civil society can choose to pursue when addressing global risks. They create value for societies and the planet, not just for individuals or businesses. An opportunity is different from a single business solution, because it creates systemic change via multi-stakeholder collaboration.

An opportunity is always inspired by a global risk and effectively works to address it. Therefore, it has the potential to change an entire system. Policy ambitions, such as the UN Sustainable Development Goals, can pave the way for new opportunities via the development of policies and financial incentives to encourage governments, business, and other stakeholders to engage in systemic change.

Last, opportunities are sustainable. We define sustainability as it was originally phrased in the Brundtland report: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

# PROCESS OVERVIEW



# HOW WE MADE THE REPORT

## Identifying new sustainable market opportunities

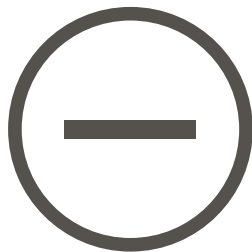
The Global Opportunity Report is the result of a process stretching over almost one year. Aiming to show how risks can be turned into opportunities, we produced the report - by means of a three-stage process.

### 1. IDENTIFY RISKS

The starting point of the analysis is to select a set of global sustainability challenges and risks to inspire the work. The five risks selected for this year's report are:

- Soil Depletion
- Unstable Regions
- Rising Inequality
- Cities Disrupted by Climate Change
- Cyber Threats

We do not claim these risks are the only or necessarily the most prominent challenges facing the world today - but certainly all are of great importance.



### 2. CO-CREATE OPPORTUNITIES

An opportunity lab was convened in New York with more than 25 people taking part in the facilitated sessions - ranging from leading academics, to start-up CEOs - to help define new markets for disruptive business. Within this diverse group, many opportunities were identified. In addition, a digital crowd-sourcing campaign was conducted, where everyone had the opportunity to submit their best ideas for tackling the five global risks. This material formed the basis for identifying the 15 opportunities presented in the report. In this process, both internal DNV GL and UN Global Compact resources as well as external experts provided input.



### 3. SURVEY THE OPPORTUNITIES

The attractiveness of these 15 opportunities was subsequently measured in a global survey involving 5,500 private and public sector leaders from across the globe. We asked respondents how important a particular

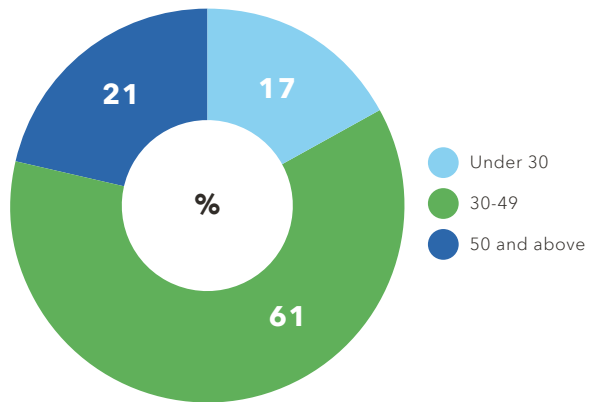


opportunity is for their country. This included evaluating its benefit for society and the capabilities their countries have to pursue the opportunity. The responses to these questions form the basis of the general ranking of opportunities.

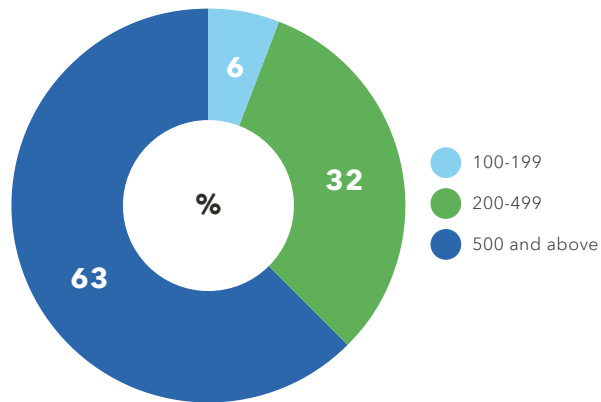
Respondents were also asked to evaluate the value of the opportunities for business by considering two questions. First, respondents were asked to consider the overall expected effect on their own business; second, they were asked how likely their own business is to develop new ventures related to the opportunity. Each of the opportunities is presented together with information on how respondents have measured its attractiveness for society and business.

For all the opportunities, a range of related solutions were also identified. These solutions are examples of how opportunities are already exerting a positive impact on people around the globe.

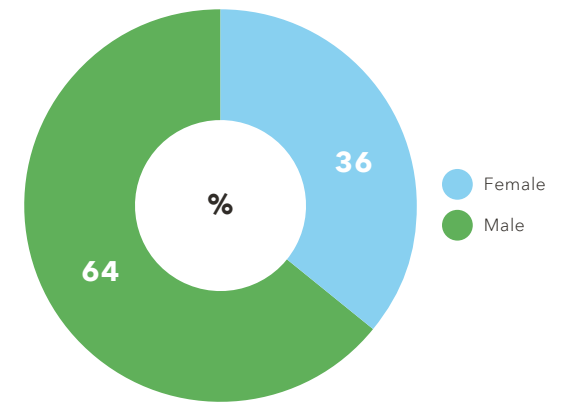
## RESPONDENT PROFILE - DEMOGRAPHICS



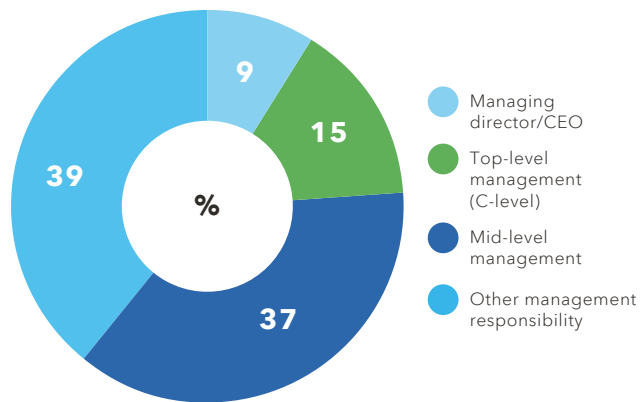
AGE PROFILE



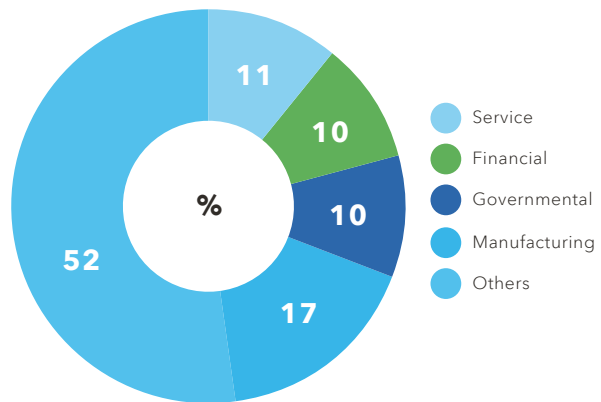
NUMBER OF EMPLOYEES



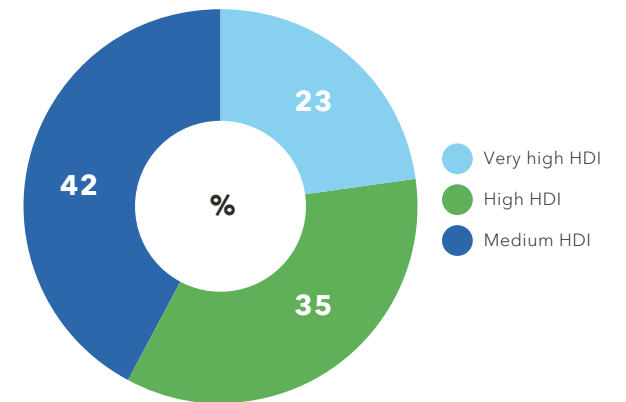
GENDER PROFILE



PRIMARY ROLE



BUSINESS AREA



COUNTRY OF RESIDENCE

Using UN Development Programme definitions. No 'Low HDI' countries are represented in the survey

# WHERE DID WE GO?

## An international endeavour

The insights in the Global Opportunity Report are based on two large investigations: a crowdsourcing campaign for identifying opportunities involving an opportunity lab in New York and an online campaign – and a survey of 5,499 private and public sector leaders.

The survey reported on in this report was conducted in collaboration with the research company YouGov. There are a total of 5,499 completed computer-assisted web interviews (CAWI) with persons with management responsibility working in companies with a minimum of 100-200 employees. The survey was conducted between September 30, 2016, and October 23, 2016. YouGov is responsible for collecting the data and the Global Opportunity Secretariat conducts the analysis of the data. Survey responses are based on perceived behaviour rather than actual metered data.

Respondents to the survey were identified as working within a specific sector of the economy. In this report, we operate with five sectors; brackets indicate the number of respondents:

Finance (579)  
Manufacturing (963)  
Service (595)  
Governmental (545)  
Other Businesses (2,817)

In order to have a solid number of respondents, various sectors were combined into one named “Other Businesses.” Other Businesses is a combination of the following sectors:

Academia (356), Agriculture (50), Construction (313), Food (131), Healthcare (338), Mining and Extraction (77), Trade (241), Transport (228), and Other (1,083).

The survey was conducted globally; in the report, we include nine regions. Some regions are groups of several countries; other regions are single countries with very large populations (China and India). The regional classifications differ from those of the United Nations in order to maintain the validity of the responses by region in the survey. To learn more about how the United Nations classifies regions, please visit the United Nations composition of regions site here: <http://unstats.un.org/unsd/methods/m49/m49regin.htm>

Respondents' management responsibilities, country of residence, sectorial affiliation, gender, and age were also recorded to enable analysis of the survey results along these lines.

When illustrating percentages in the figures, not all of them add up to 100, due to rounding.

In the report, we operate mainly within two areas – the impact on society and the impact on business. These two areas are reported differently:

Each opportunity's impact on society is reported as the percentage of responses it receives that are “most positive” (respondents rating them above 5 on a scale from -10 to 10). When the impact on society is illustrated on a scatter chart, the values are simple averages.

The impact on business is reported as a simple average of the responses, either within a specific sector, region, or

other cross sections of data used throughout the report. Data are indicative and caution should be taken when interpreting them, especially closely positioned data points, as confidence intervals do not allow all rankings to be distinguished.

### WE WOULD LIKE TO THANK

Multiple concrete ideas were developed during the opportunity lab and via the crowd-sourcing campaign, many more than made it into this report. We thank all the participants for lending us their time and thoughts in a process of collaborative and innovative problem-solving. This report would not have been possible without this inspiring global conversation.

All the co-created ideas were reviewed by experts several times during the editorial process. We thank each and every one of them for their critical and constructive comments, which have challenged and strengthened the analysis. In addition, the experts contributed their insights into the highly complex issues addressed in the report. This enabled us to develop a deeper understanding of the risks and enhanced our ability to explain opportunities to the reader in a clear and understandable manner.

A special thank you also goes to the private and public sector leaders who participated in our global survey regarding the opportunities presented here. The support from all those involved means the Global Opportunity Report 2017 represents a body of work with truly global roots.

## WHO HAVE WE ASKED ?

We asked 5,499 private and public leaders from five different continents to evaluate the opportunities presented in this report. Countries in parentheses are included in the survey and the numbers corresponds to the number of respondents in the region.





# THE ROAD AHEAD

The journey towards the opportunity mind-set continues with strategic outlook, open innovation and co-creation - for a safer, smarter, and greener future.



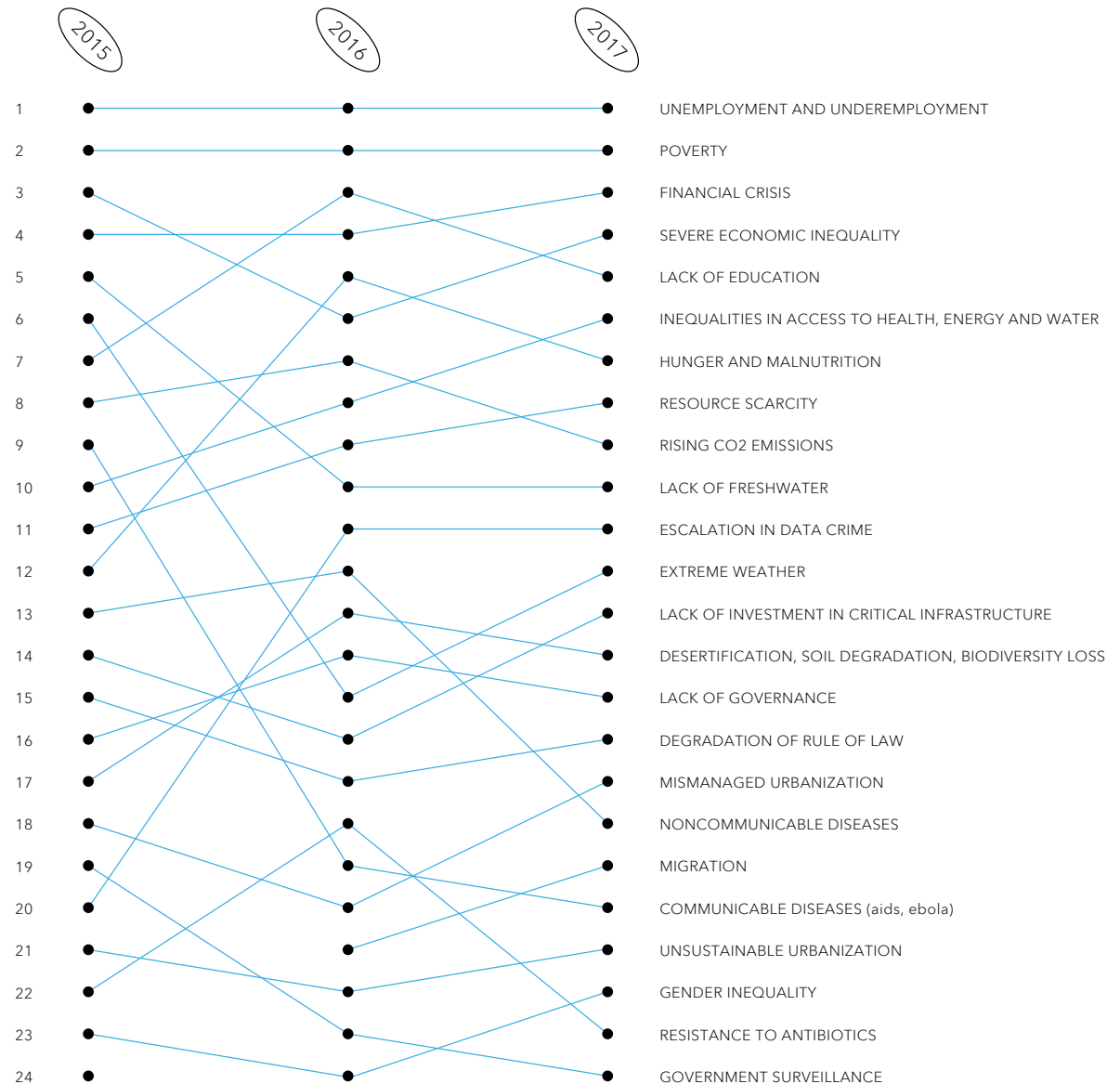


# THE RISK LANDSCAPE

Over the past three years of the Global Opportunity Report, the business leaders who take part in our survey have been asked to select which global risks they perceive to be most pressing. The 24 risks are compiled from the World Economic Forum and other risk rankings, ensuring a broad overview of the global risk landscape.

One trend is abundantly clear: two deeply entrenched societal risks continue to top the list. Unemployment and underemployment and poverty are consistently seen by business leaders to present the most pressing and urgent risks to business and society. This should not come as a complete surprise, as these engrained society risks impact nearly every aspect of life.

From a business standpoint, they also threaten to disrupt commerce, as poverty and unemployment bar many from engaging in the global economy. While the perceived importance of other risks fluctuates based on specific events, and, as in the case of communicable diseases, outbreaks such as Ebola, poverty and unemployment have steadily remained the most pressing risks over the past three years. This signifies the particularly critical role these social risks play in global society, and highlights the need for more opportunities to emerge that will address and mitigate these risks, while improving livelihoods, businesses, and society at large.






## **GET INVOLVED - CHECK OUT THE GLOBAL MARKET EXPLORER**

Based on three years of uncovering new markets in the Global Opportunity Report, and five years of mapping sustainable solutions in the annual report Sustainia100, Sustainia, UN Global Compact and DNV GL are now ready to launch the world's leading digital media platform for sustainable innovation: The Global Market Explorer.

The Global Market Explorer will be your go-to destination for uncovering market opportunities for the Sustainable Development Goals and finding solutions to accelerate action toward a sustainable future. The platform will also serve as a digital meeting room, allowing businesses to engage with one another, as well as with the public and NGO sectors.

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