30/06/22

WHAT ON EARTH IS THE VALUE OF SPACE?

GLOBAL REPORT

Foreword by Scott Kelly

inmarsat

CONTRIBUTORS

BEN DIXON

PARTNER,
SYSTEMIQ

GEORGE FREEMAN MP

MINISTER FOR SCIENCE, RESEARCH
AND INNOVATION, INCLUDING CIVIL SPACE,
UK GOVERNMENT

IWAO IGARASHI

VICE PRESIDENT AND GENERAL MANAGER,
BUSINESS DEVELOPMENT, SPACE SYSTEMS,
MHI

DR. JOSEF ASCHBACHER

DIRECTOR GENERAL,
EUROPEAN SPACE AGENCY

PROF. SINÉAD O'SULLIVAN

PROFESSOR OF AEROSPACE ENGINEERING,
FORMERLY AT ILLINOIS INSTITUTE OF TECHNOLOGY

SCOTT KELLY

FORMER NASA ASTRONAUT AND INTERNATIONAL
SPACE STATION COMMANDER

CONTENTS

FOREWORD

SCOTT KELLY

SCOTT JOSEPH KELLY IS AN AMERICAN ENGINEER, RETIRED ASTRONAUT AND NAVAL AVIATOR. HE FLEW HIS FIRST MISSION TO SPACE IN 1999, PILOTING THE SPACE SHUTTLE DISCOVERY AND CARRYING OUT UPGRADES TO THE HUBBLE SPACE TELESCOPE. BETWEEN 2015-16, HE SPENT NEARLY AN ENTIRE YEAR IN ORBIT AS COMMANDER OF THE INTERNATIONAL SPACE STATION.

It was an ordinary Saturday afternoon, and there I was, chatting with people on Twitter when suddenly Barack Obama got in touch.

"Hey @StationCDRKelly, loving the photos. Do you ever look out the window and just freak out?"

I should probably just explain, this was August 2015. And I was four months into my year-long mission on the International Space Station.

"I don't freak out about anything Mr. President. Except getting a Twitter question from you."

No sooner had I paused to admire my amply respectful and amusing reply than Buzz Aldrin leaped into the conversation.

"@POTUS @StationCDRKelly @NASA He's 249 miles above the earth. Piece of cake. Neil, Mike & I went 239,000 miles to the moon. #Apollo11."

So, I'm floating in space, tweeting with the President of the United States, while simultaneously getting trolled by one of my heroes – the second man to walk on the Moon. It was one of the most bizarre, yet wonderful episodes of my life.

More recently, I've come to reflect on this story. You see, people are often astounded that I could

>>

"I WONDER HOW MANY PEOPLE UNDERSTAND THE REAL POTENTIAL OF ADVANCES LIKE UBIQUITOUS CONNECTIVITY."

"DO THEY KNOW SUCH BREAKTHROUGHS COULD TIP THE BALANCE IN OUR FIGHT AGAINST POVERTY OR CLIMATE CHANGE?"

SCOTT KELLY

>>

log on to Twitter at all. Let alone email or video call people while commanding the ISS. Satellite communications, and the work of companies like Inmarsat, enable such extraordinary capabilities – none of which were available to Dr. Aldrin back in 1969.

(ABOVE) SCOTT KELLY'S ISS YEARLONG MISSION PATCH

I think my Twitter exchange exemplifies the transformation that has occurred between the Space Age epitomised by Buzz Aldrin and the period we're living through now – a period that's justifiably being labelled as 'the second Space Age'.

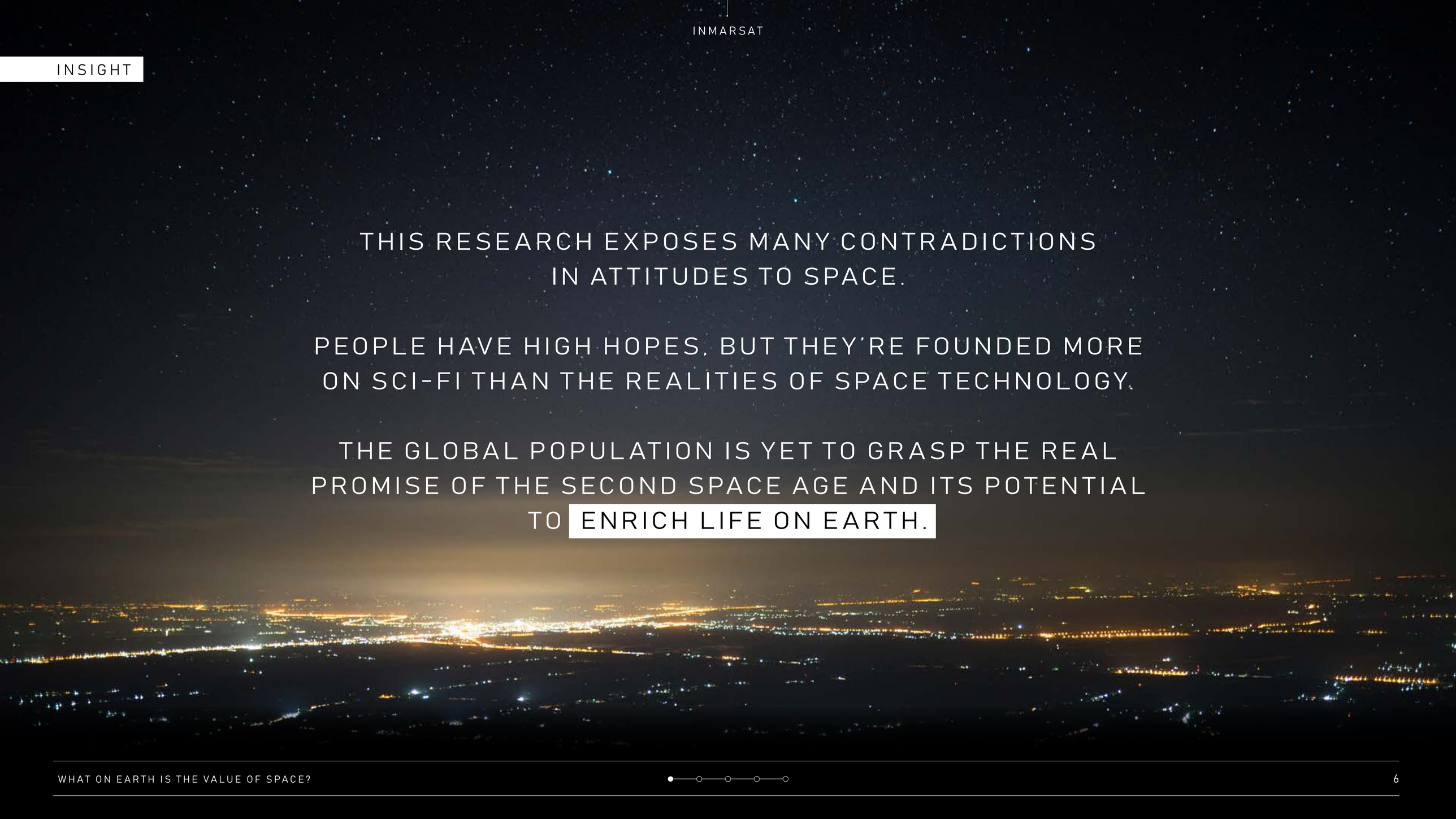
Right now, space is attracting record levels of investment, and I couldn't be more excited by the new innovations coming online in the sector. However, I'm not convinced the public are fully aware of them. I wonder how many people understand the real potential of advances like ubiquitous connectivity, space-based solar power or Mars exploration. Do they know such breakthroughs could help to tip the balance in our fight against poverty, ill-health or climate change? Are people inspired by the astonishing opportunities in space – just as I was inspired by Buzz Aldrin in Apollo 11?

"THE TRUTH IS, I DON'T KNOW. I DON'T KNOW HOW PEOPLE PERCEIVE THE VALUE OF SPACE TODAY."

I don't think anybody really does. Which is why I'm delighted Inmarsat has chosen to undertake this vital and timely piece of research. I'll be fascinated to see reactions to the results.

SCOTT KELLY

INSIGHT



THIS RESEARCH EXPOSES MANY CONTRADICTIONS IN ATTITUDES TO SPACE.

PEOPLE HAVE HIGH HOPES, BUT THEY'RE FOUNDED MORE ON SCI-FI THAN THE REALITIES OF SPACE TECHNOLOGY.

THE GLOBAL POPULATION IS YET TO GRASP THE REAL PROMISE OF THE SECOND SPACE AGE AND ITS POTENTIAL TO ENRICH LIFE ON EARTH.

INTRODUCTION

RAJEEV SURI

RAJEEV SURI WAS APPOINTED AS INMARSAT'S CEO IN MARCH 2021. HE JOINED FROM NOKIA WHERE HE WAS PRESIDENT AND CEO FOR SIX YEARS. RAJEEV IS A NON-EXECUTIVE BOARD DIRECTOR OF SINGTEL AND STRYKER. RAJEEV IS CHAIR OF THE GLOBAL SATELLITE OPERATORS ASSOCIATION, A MEMBER OF SEVERAL COMMITTEES AT THE WORLD ECONOMIC FORUM AND A COMMISSIONER OF THE UNITED NATIONS BROADBAND COMMISSION. HE IS ALSO A RECIPIENT OF THE MARCO POLO AWARD - CHINA'S HIGHEST HONOUR AWARDED TO AN INTERNATIONAL BUSINESSPERSON.

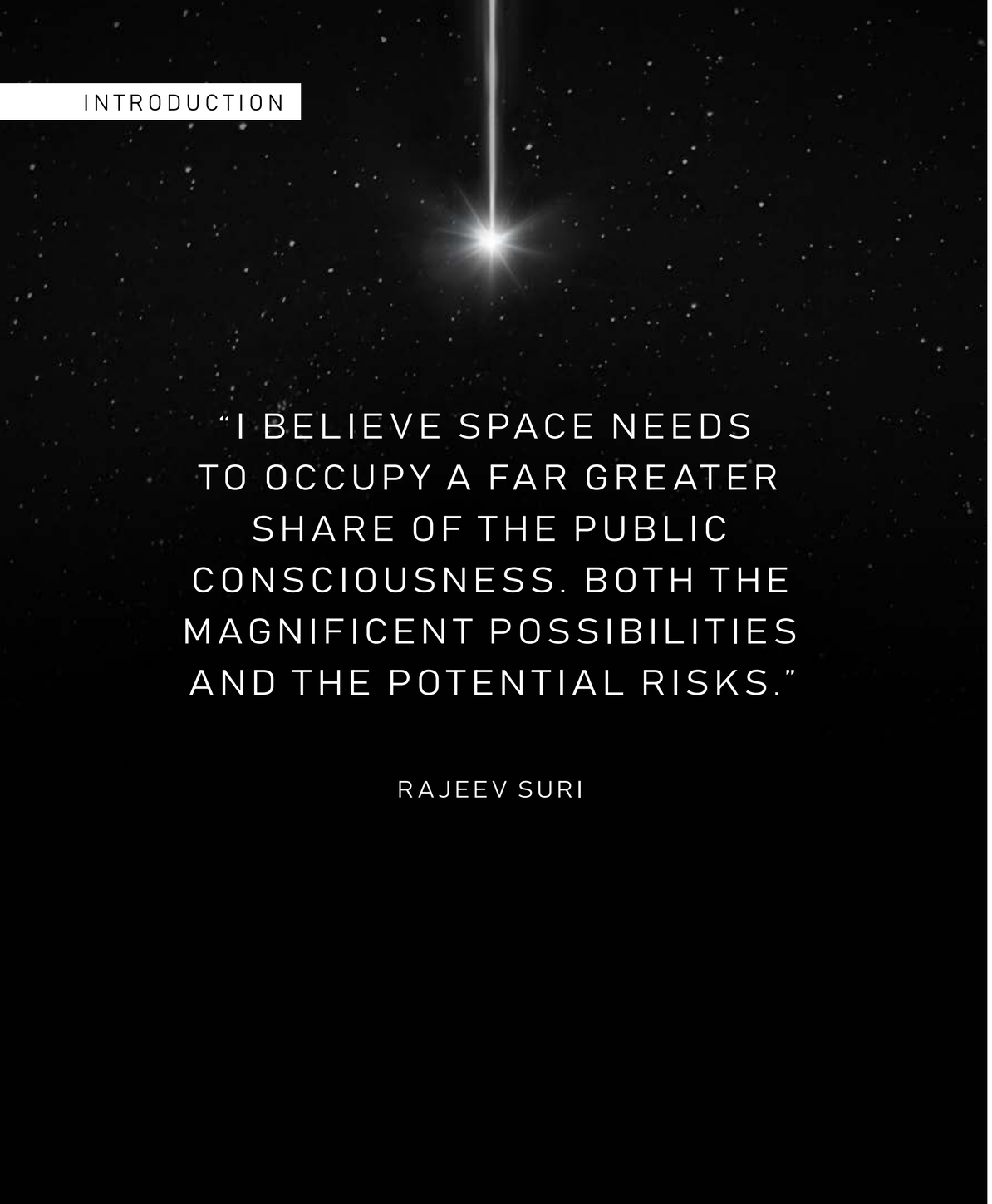
The first Space Age inspired generations of engineers, scientists, innovators and businesspeople – myself included. And as a result, our species continues to benefit from an amazing array of breakthroughs.

Take solar panels, which NASA developed to help power space missions and shared with other companies to accelerate the technology. Similarly, the water-filtration systems that so many rely on today were first invented in the 1970s to provide astronauts with safe drinking water. It is often forgotten that such innovations came as a direct result of space exploration.

Today, the sector is, I would argue, even more exciting. Space offers us the chance to build a better future for humanity and tackle some of the biggest challenges we face here on Earth.

I feel privileged to work in satellite communications. I am proud of Inmarsat's long history in emergency communications and disaster recovery, as well as our newer position as a driver for digital transformation across entire industries through global mobility. What I find most rewarding, however, is the part we are already playing in the fight against climate change – and there is much more to come. Satellites are reducing

>>



"I BELIEVE SPACE NEEDS TO OCCUPY A FAR GREATER SHARE OF THE PUBLIC CONSCIOUSNESS. BOTH THE MAGNIFICENT POSSIBILITIES AND THE POTENTIAL RISKS."

RAJEEV SURI

>>

emissions in many different sectors. In aviation we are enabling planes to optimise flight paths and travel safely in congested airspace, and every day, satellites help container ships boost both efficiency and profitability.

Elsewhere, space technology is helping us effectively measure global carbon emissions and ensure power grids never waste a kilowatt. It is allowing the agriculture sector to boost yields and help the world to feed itself efficiently and sustainably. Satellites could even be a source of abundant clean energy in the future, through space-based solar power.

However, to provide sustainable support on Earth, our industry needs to foster sustainable development in space. We cannot afford to destroy the gift of space through carelessness or lack of foresight. The myriad of low-Earth Orbit mega-constellations now being built present an opportunity. However, without proper oversight, they will create a massive amount of space debris, not to mention the issue of orbital congestion or even the possibility of damaging the Earth's atmosphere. Such risks must be properly understood and addressed through robust and enforceable regulation.

While I believe people are amazed by advances in space technology today, I fear they are blind to long-term issues like space debris. As a species, we have been here before. Problems have always followed when new technologies are deployed on Earth without due care and scrutiny. In space, we already know the potential risks, and without undermining the growth trajectory of the industry, we have a duty to look at these opportunities with clear eyes. We must appreciate that space – just like our planet – needs to be protected for future generations.

That is precisely why Inmarsat chose to commission this report: because we believe space needs to occupy a far greater share of public consciousness – both the magnificent possibilities and the potential risks.

The results mark something of a wake-up call for many in our industry. It is clear that people have minimal understanding of the breadth and richness of the work we do. Perhaps because the technology is essentially invisible, people do not appear to understand the role space is already playing in their everyday lives, nor its potential to deliver a brighter future for humanity.

Our industry must continue to raise the profile of its pioneering work and re-instil a sense of wonder. Only then can we inspire and educate the world about the value of space and ensure it benefits all of us down here on Earth.

20,000 PEOPLE SURVEYED.
11 COUNTRIES COVERED.

THE LARGEST REPORT OF
ITS KIND EVER PRODUCED.

GIANT LEAPS

On a drizzly Washington, D.C. morning in November 1962, two NASA officials pulled up to the front door of the White House. Soon they were ushered into the Oval Office, where President John F. Kennedy was waiting.

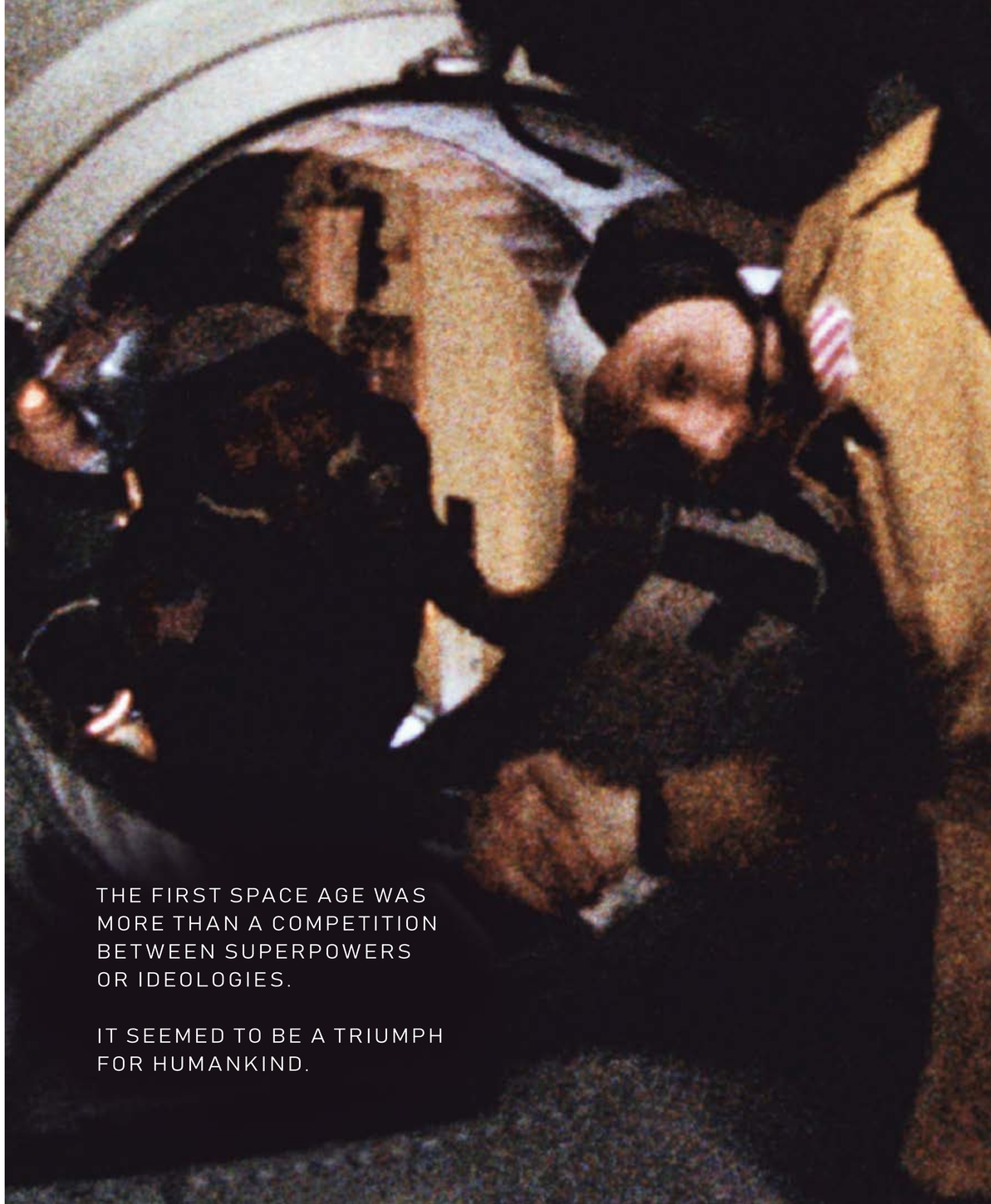
In an off-the-record meeting, they outlined the priorities for their agency. They intended to focus on scientific experiments and research beyond the Earth's atmosphere. Their aim was to make the USA 'pre-eminent in space'.

Halfway through the presentation, Kennedy suddenly interrupted them. He ordered that all NASA's efforts should be directed towards placing a man on the moon instead. Six years and eight months later, Neil Armstrong and Buzz Aldrin took that 'one small step' out of their lunar module.

The first Space Age – which began with the launch of Sputnik 1 in 1957 – had undeniably reached its climax.

IN 1975, SOVIET COSMONAUTS AND AMERICAN ASTRONAUTS MET IN ZERO-GRAVITY FOR THE FIRST TIME. THEIR FAMOUS HANDSHAKE WAS HAILED AS A SYMBOL OF HOPE FOR THE WORLD, MARKING A NEW PERIOD OF INTERNATIONAL COLLABORATION IN SPACE.

For those who witnessed it, the first Space Age was captivating. Perhaps because it seemed, above all, to be a triumph for humankind. A testament to our imagination and ingenuity. As a species, we could suddenly think beyond Earth to a great expanse of opportunity above.



THE FIRST SPACE AGE WAS MORE THAN A COMPETITION BETWEEN SUPERPOWERS OR IDEOLOGIES.

IT SEEMED TO BE A TRIUMPH FOR HUMANKIND.

THE SECOND SPACE AGE BEGINS

On 5th April 1990, a rocket named 'Pegasus' was air-launched by Orbital Sciences Corporation. A few minutes later, it became the very first vehicle fully developed by a private company to reach orbit. A new Space Age had begun – this time driven more by businesses than governments.

Since then, continuous innovations in space have empowered more and more improvements on Earth. Take aircraft safety for example: for decades now, satellite communications have enabled faster and more precise positioning data for air-traffic management, meaning that planes can securely fly closer together.

But are people aware how much we rely on space technology today? Do they know the startling advances it has enabled – let alone the fact there is a second Space Age underway right now? Surely, it's time to re-assess how people perceive the value of space.

That's why in April 2022, Inmarsat embarked on the largest ever global survey on the public's perception of the value of space. We questioned 20,000 people across 11 countries to get a clear picture of how space is regarded. We aimed to explore how the industry can protect space for future generations and ensure this second Space Age delivers for the entire global population.

TIME FOR A WORLDWIDE SURVEY ON THE VALUE OF SPACE

Our hypotheses for this research were:

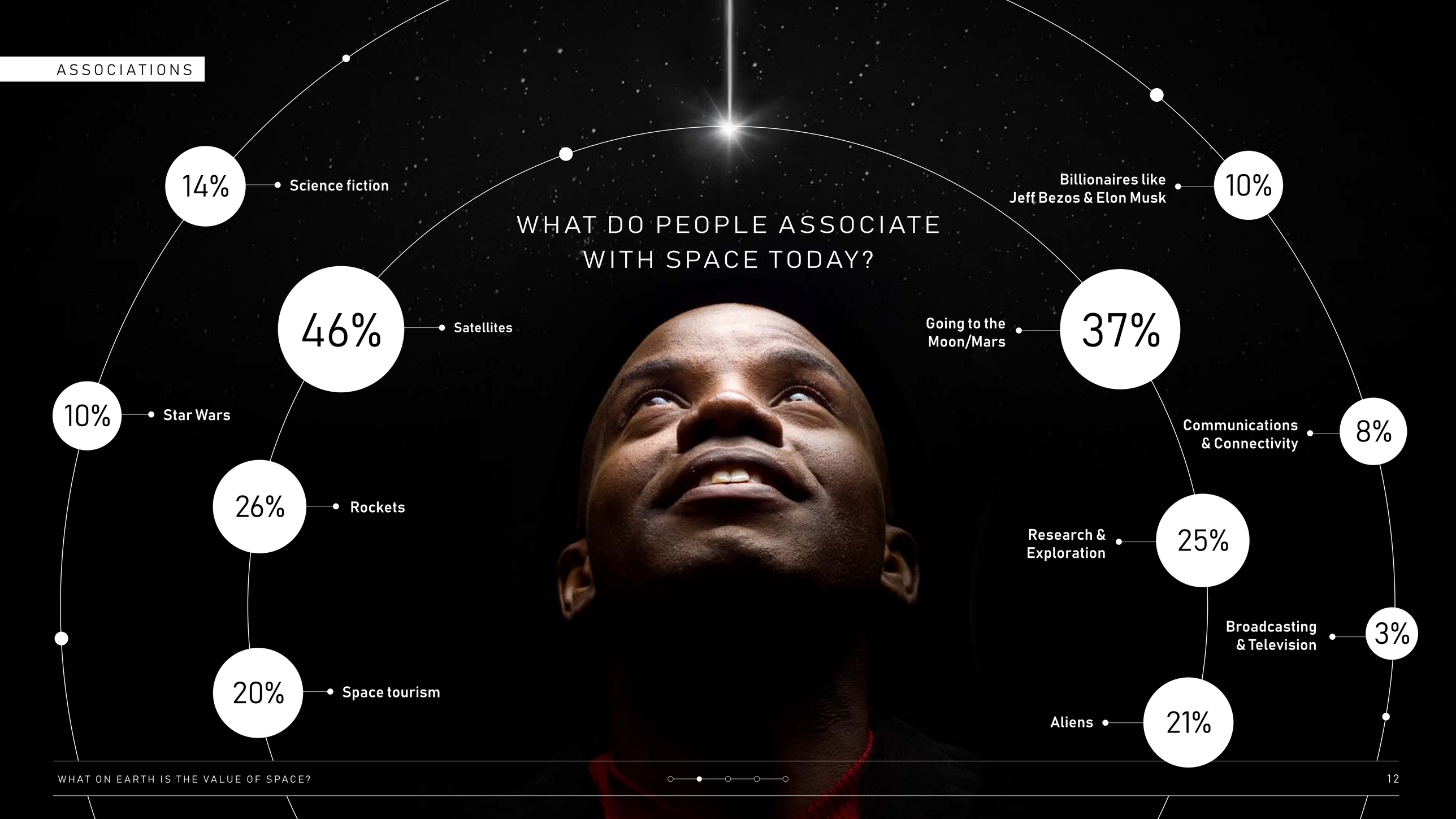
01 The digital generation has benefitted from technological advances that were by-products of the first Space Age. However, these innovations are so embedded in everyday life that they're taken for granted.

02 The second Space Age has arrived, but the public are not wholly aware of its significance. Astonishing innovations in recent years are not welcomed with the sense of wonder, curiosity and hunger for knowledge that accompanied the first Space Age.

03 Space is attracting huge amounts of investment. We need to ensure that investment goes into activities that will improve the lives of everyone on the planet.

04 Some of our fears *about* Space have turned more into fears *for* space.

WHAT DO PEOPLE ASSOCIATE WITH SPACE TODAY?

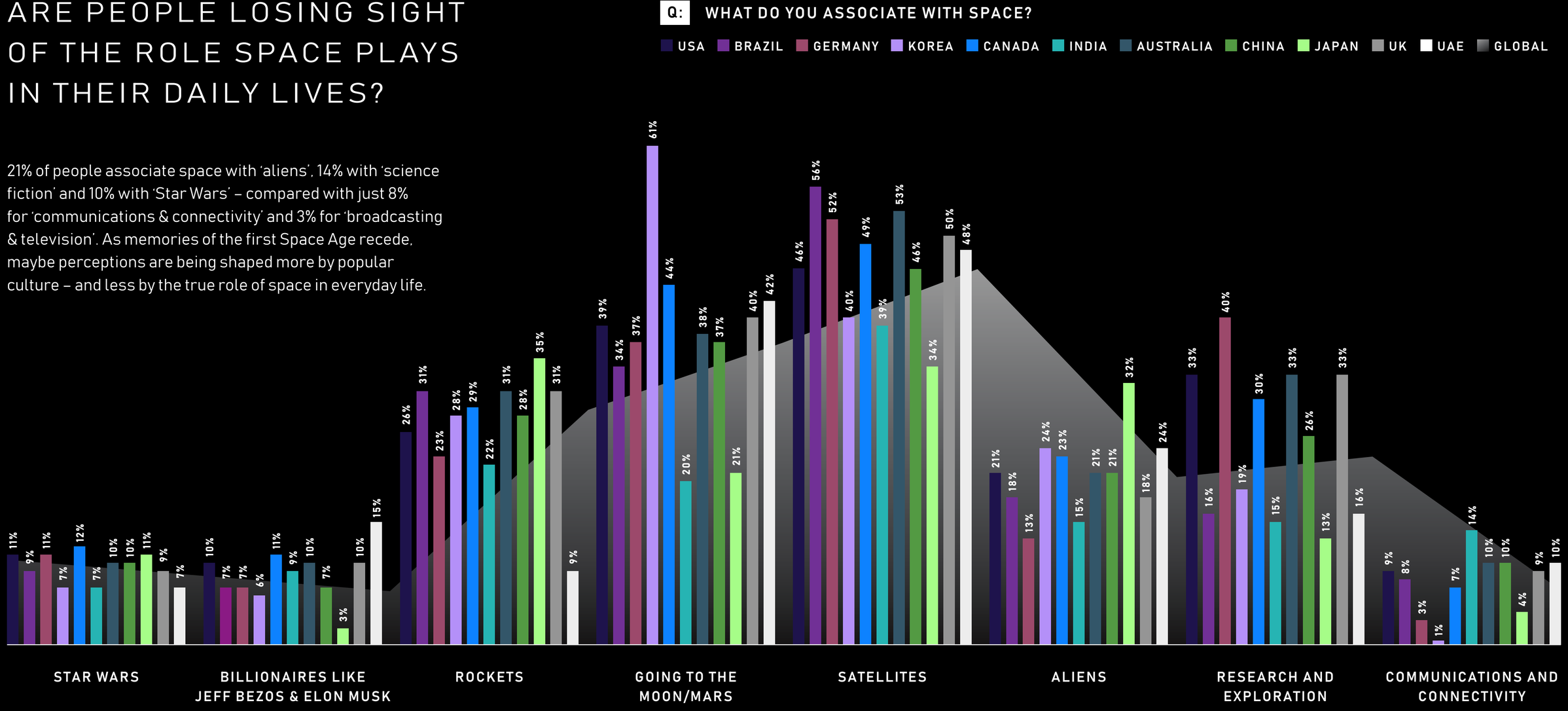


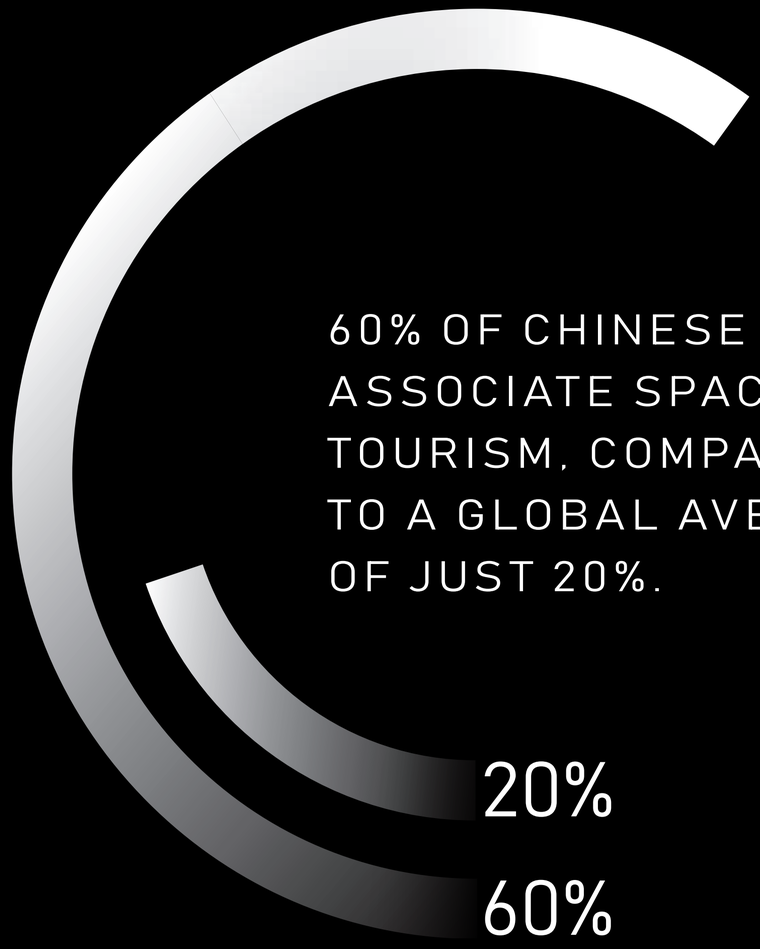
- 14% Science fiction
- 46% Satellites
- 10% Star Wars
- 26% Rockets
- 20% Space tourism
- Billionaires like Jeff Bezos & Elon Musk 10%
- Going to the Moon/Mars 37%
- Communications & Connectivity 8%
- Research & Exploration 25%
- Broadcasting & Television 3%
- Aliens 21%

ASSOCIATIONS

ARE PEOPLE LOSING SIGHT OF THE ROLE SPACE PLAYS IN THEIR DAILY LIVES?

21% of people associate space with 'aliens', 14% with 'science fiction' and 10% with 'Star Wars' – compared with just 8% for 'communications & connectivity' and 3% for 'broadcasting & television'. As memories of the first Space Age recede, maybe perceptions are being shaped more by popular culture – and less by the true role of space in everyday life.





DO DIFFERENT COUNTRIES THINK DIFFERENTLY ABOUT SPACE?

There were clear regional differences in the results, which may reflect contrasting cultural associations with space.

Globally, 25% of respondents associated space with research and exploration. However, this number rose to 40% in Germany, 33% in the USA, UK and Australia and 30% in Canada. Perhaps this is a result of the role those countries played in the first Space Age, when they were heavily involved in pioneering research into rocket technology.

60% of respondents in China associate space with tourism, compared to a global average of 20%. That's a fascinating divergence. It may be explained by China's attempts to generate interest in space tourism by opening its soon-to-be-completed space station to private citizens.

10% of people globally associate space with billionaires like Jeff Bezos and Elon Musk. This reflects a larger point that the new Space Age is being driven more by companies than governments. In the UAE, this number rises to 15%, possibly because of the increasing cachet space commands as a signifier of wealth and status.

HOW DO PERCEPTIONS OF SPACE DIFFER WITH AGE?

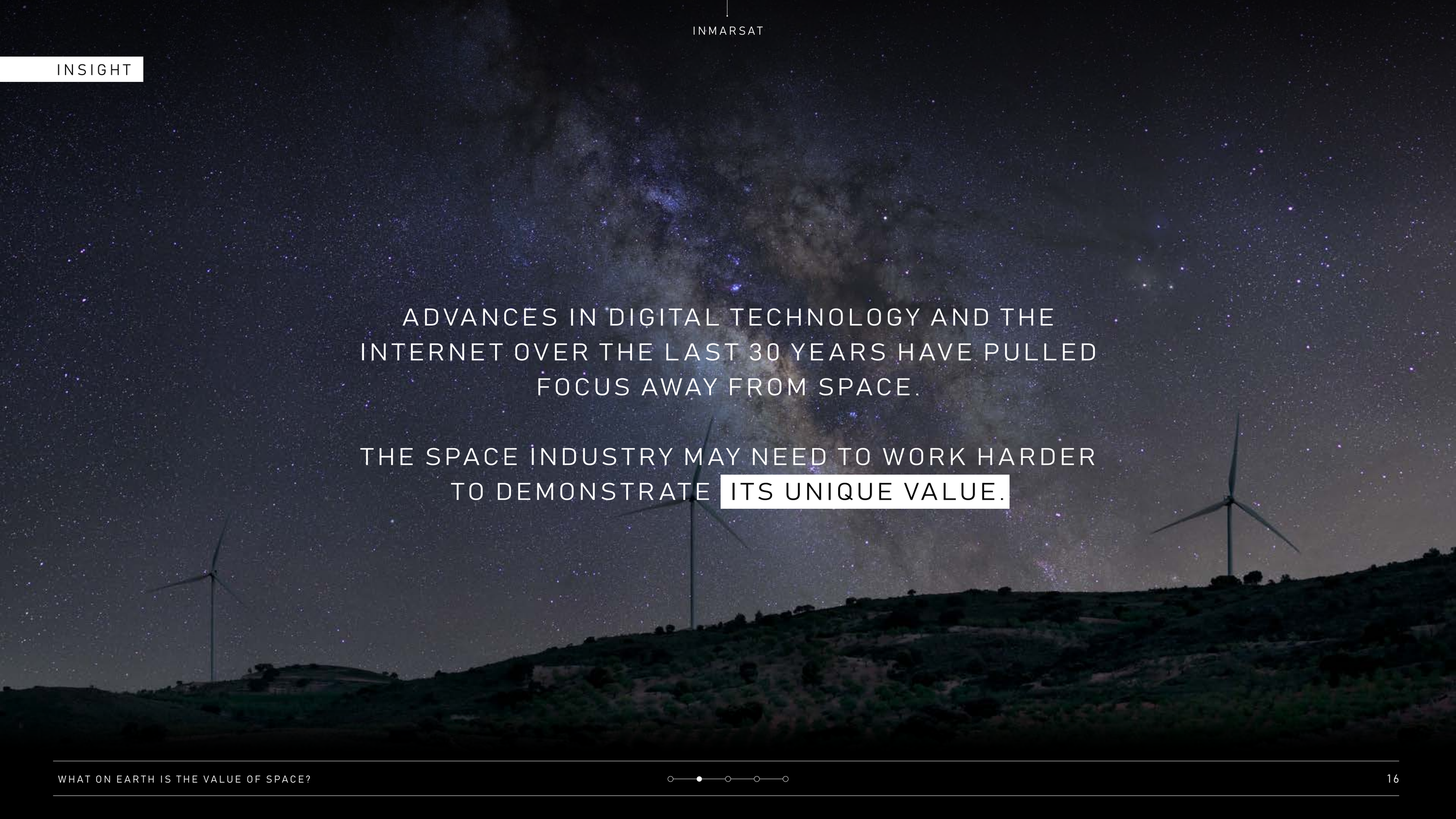
Younger people (18–24) are more likely than their seniors to associate space with aliens (24% of 18–24 vs. 11% of 65+) and Star Wars (14% of 18–24 vs. 8% of 65+). It's also clear that young people place more emphasis on billionaires like Jeff Bezos and Elon Musk, as they were nearly twice as likely to link them with space as 55–64 year olds (11% of 18-24 vs. 6% of 55-64). This may be connected to differing patterns of media consumption between generations. 18-24 year olds have grown up associating the wonders of technology with the internet and are more likely to follow billionaires like Musk and Bezos on social media than read about them in traditional newspapers.

In contrast, the 65+ year olds – who grew up during the first Space Age – are much more likely to associate space with research and exploration (33% of 65+ vs. 19% of 18-24), rockets (31% of 65+ vs. 26% of 18 - 24), and satellites (63% of 65+ vs. 38% of 18 – 24).

The 65+ generation is also more likely to associate space with communications and connectivity (13% of 65+ vs. 7% of 18-24). This is perhaps because, unlike 18-24 year olds, they remember a time before these innovations became ubiquitous and ordinary, so they understand the life-changing improvements the technology has made.

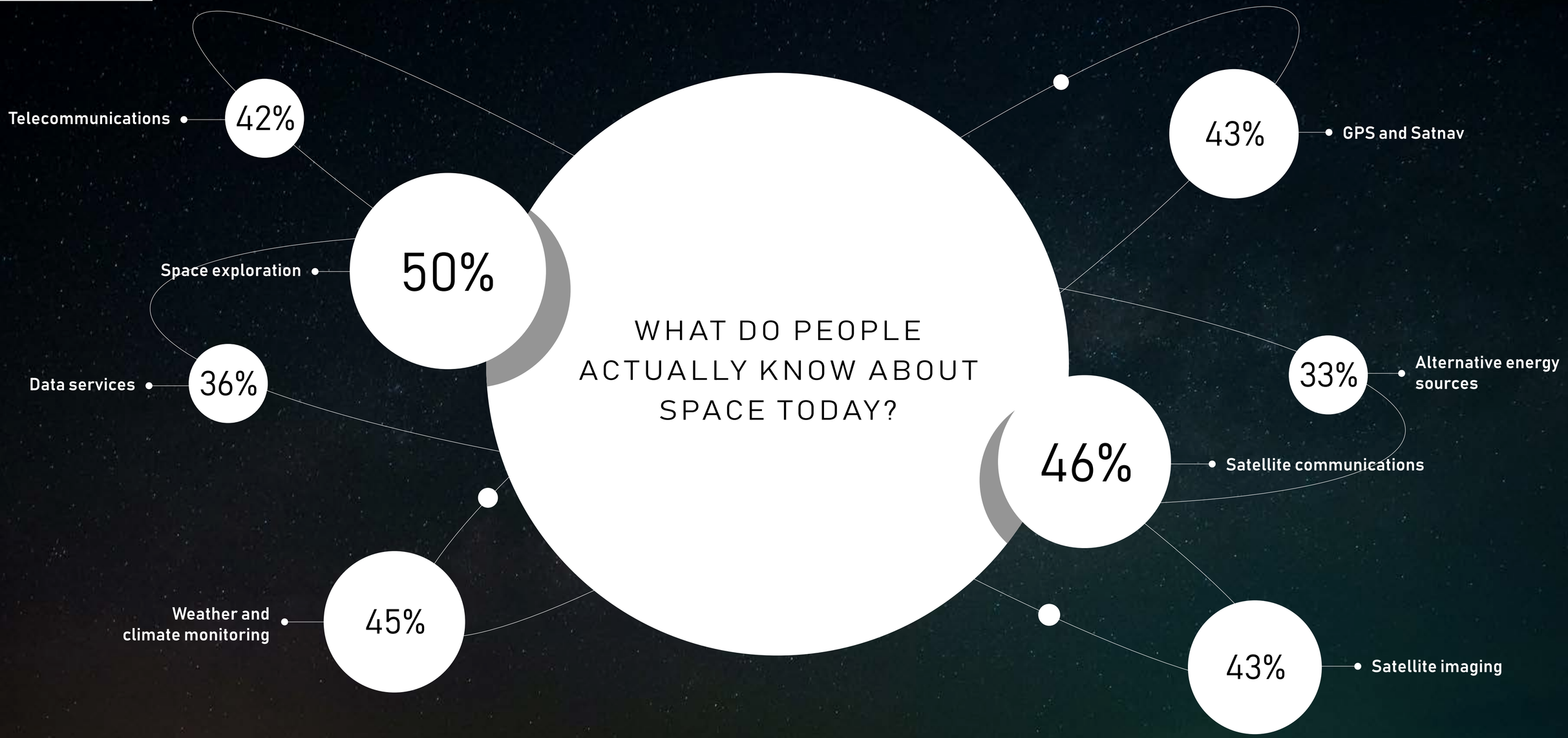
'Gen Z' is more likely to associate space with aliens, while 'Boomers' think of satellites and rockets.

INSIGHT



ADVANCES IN DIGITAL TECHNOLOGY AND THE INTERNET OVER THE LAST 30 YEARS HAVE PULLED FOCUS AWAY FROM SPACE.

THE SPACE INDUSTRY MAY NEED TO WORK HARDER TO DEMONSTRATE ITS UNIQUE VALUE.

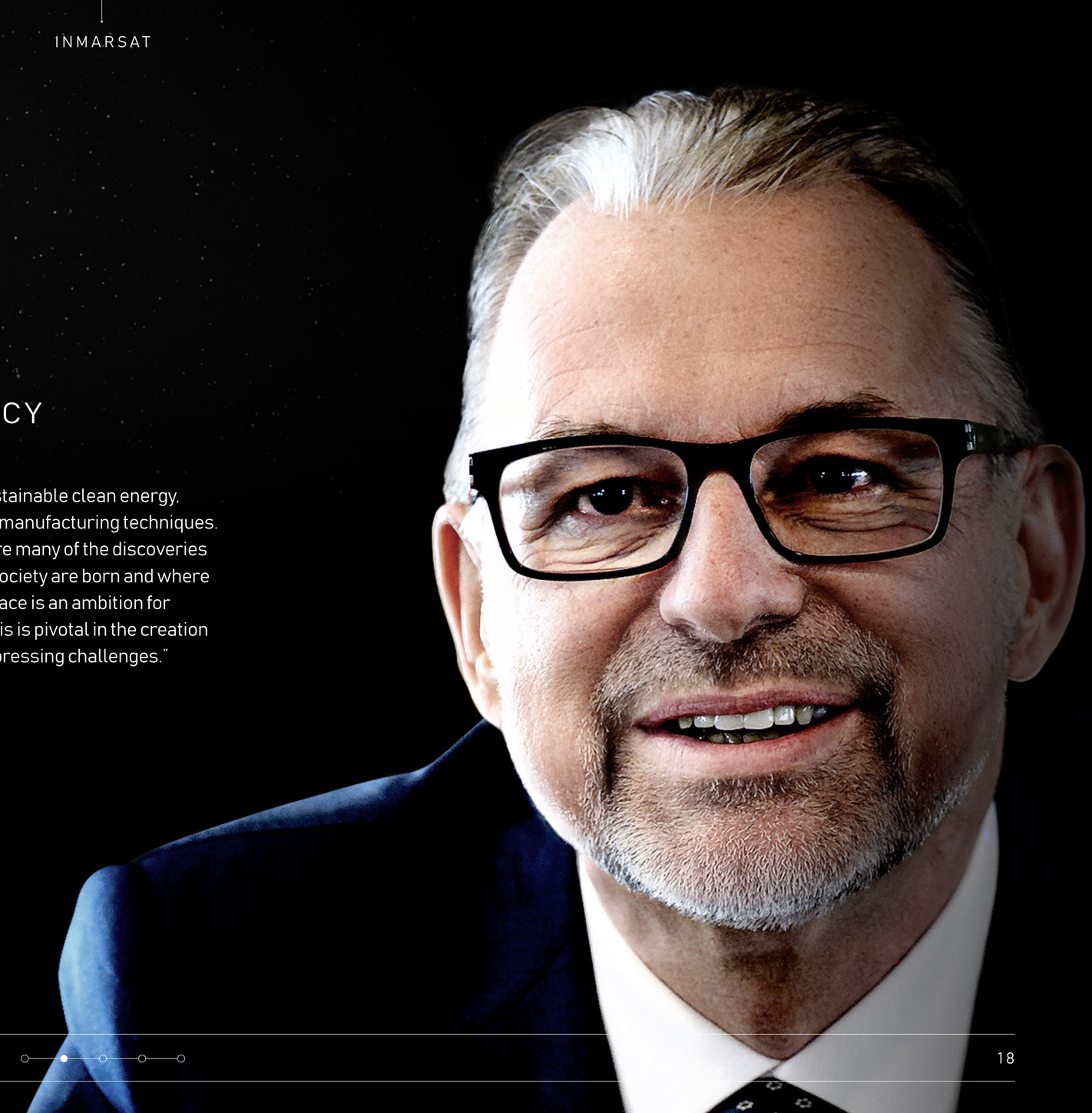

WHAT DO PEOPLE ACTUALLY KNOW ABOUT SPACE TODAY?
Telecommunications
42%
Space exploration
50%
Data services
36%
Weather and climate monitoring
45%
GPS and Satnav
43%
Alternative energy sources
33%
Satellite communications
46%
Satellite imaging
43%

CONTRIBUTOR

DR. JOSEF ASCHBACHER

DIRECTOR GENERAL, EUROPEAN SPACE AGENCY

"This survey highlights that, for many of citizens, the huge success of space-based resources has already been seamlessly accepted and integrated into their daily lives. ESA and its partners have helped develop space-based technologies, which already provide constant monitoring of our climate, global high-speed communications and reliable navigation solutions. Very soon they will provide new sources of raw materials, sustainable clean energy, and the birth of innovative, zero-g manufacturing techniques. As always, space is the place where many of the discoveries needed for science, industry and society are born and where they grow. Europe's ambition in space is an ambition for all society, and an awareness of this is pivotal in the creation of solutions for our planet's most pressing challenges."



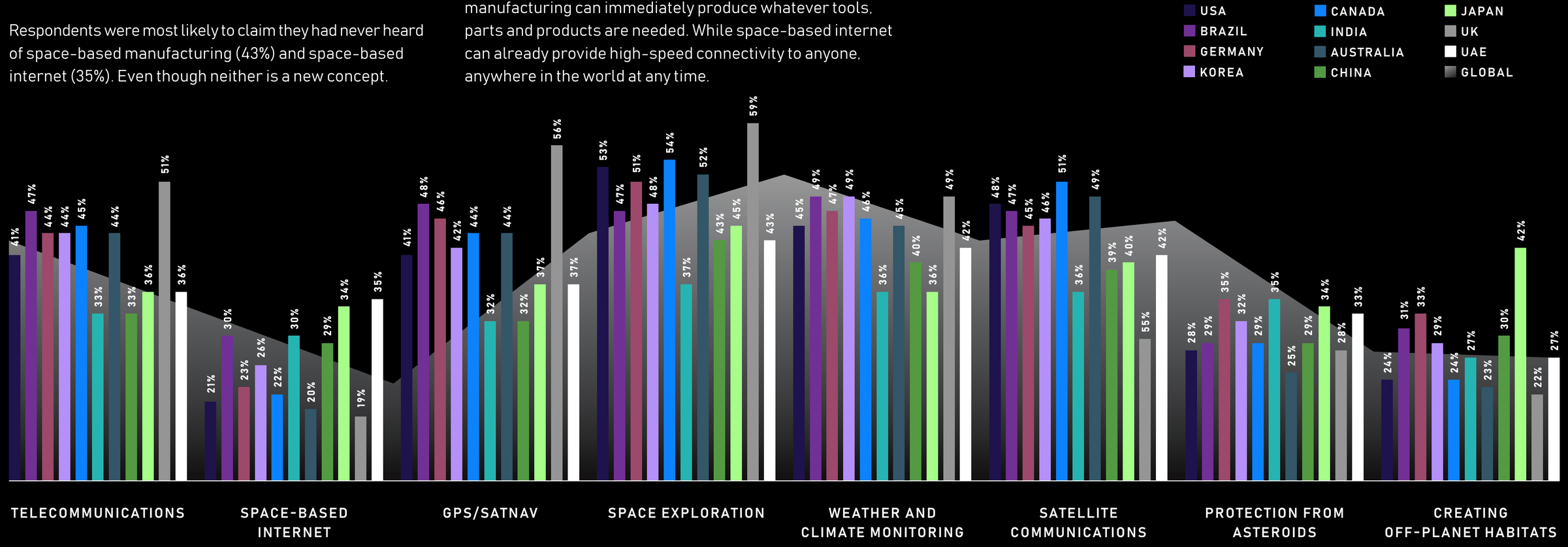
WHERE ARE THE GAPS IN PEOPLE'S KNOWLEDGE?

Most people know little or nothing about the space innovations that are likely to have a major positive impact on our lives in the future.

Respondents were most likely to claim they had never heard of space-based manufacturing (43%) and space-based internet (35%). Even though neither is a new concept.

In fact, the International Space Station (ISS) has been using 3D printing since 2014, setting the stage to support long-term expeditions where on-demand digital manufacturing can immediately produce whatever tools, parts and products are needed. While space-based internet can already provide high-speed connectivity to anyone, anywhere in the world at any time.

Q: WHAT NATIONS KNOW ABOUT ACTIVITIES IN SPACE



KNOWLEDGE

WHICH COUNTRIES CLAIM TO KNOW THE MOST ABOUT SPACE?

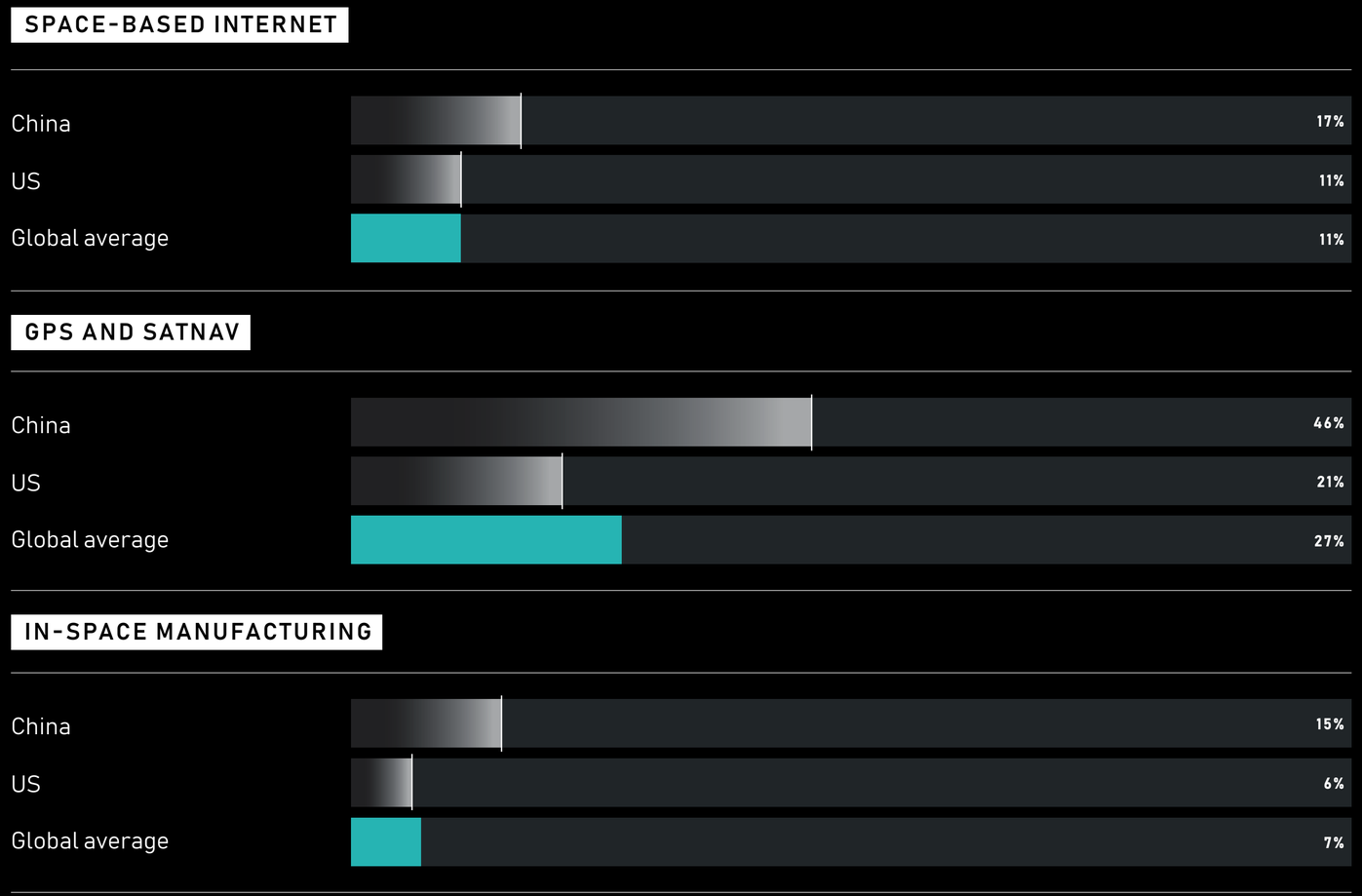
Predictably, awareness of space activities is strongest in markets which are focusing on space as part of their long-term ambitions.

Take India, for example. Like China and Japan, it now sees itself as a major space-faring nation. As a result, people in India are much more likely to claim knowledge on key space technologies. Compared to the global average, they are twice as likely to say they know a lot about space-based internet (25% vs.11%) and alternative energy sources (28% vs.15%).

Conversely, in markets which were key players in the first Space Age (e.g. the US), people claimed to have less knowledge about human activities in space.

(Right) These figures may indicate that the space industry in the US is not doing enough to increase broader public perceptions of the value of space.

Claim they know a lot about:



HOPES

ARE PEOPLE LOOKING TO SPACE FOR SOLUTIONS TO EARTH'S PROBLEMS?

Despite variable levels of knowledge and understanding of space technology and the second Space Age, overall there is a great deal of hope for what space can deliver for Earth.

Research showed that, globally, the top three ambitions for space are:

1. RESEARCHING AND FINDING NEW ENERGY SOURCES
2. MONITORING AND HELPING TO SOLVE CLIMATE CHANGE
3. NEW SOURCES FOR ESSENTIAL RESOURCES

The next generation of space-faring nations (South Korea, China, the UAE) are strongly aligned with these ambitions – probably driven by the potential for this second Space Age to support economic growth.

Respondents from China believed more strongly than any other nation that space can provide a new source for essential resources (41% vs. a 33% global average).

Respondents from South Korea were also more likely to value space for helping us find new energy sources (57% vs. a 42% global average).

Respondents from the UAE were more likely than average to see space as a place for monitoring and helping solve climate change (49% vs. a 41% global average).

THE TOP THREE AMBITIONS FOR SPACE GLOBALLY

Results:

01 RESEARCHING AND FINDING NEW ENERGY SOURCES

02 MONITORING AND HELPING TO SOLVE CLIMATE CHANGE

03 NEW SOURCES FOR ESSENTIAL RESOURCES

CONTRIBUTOR

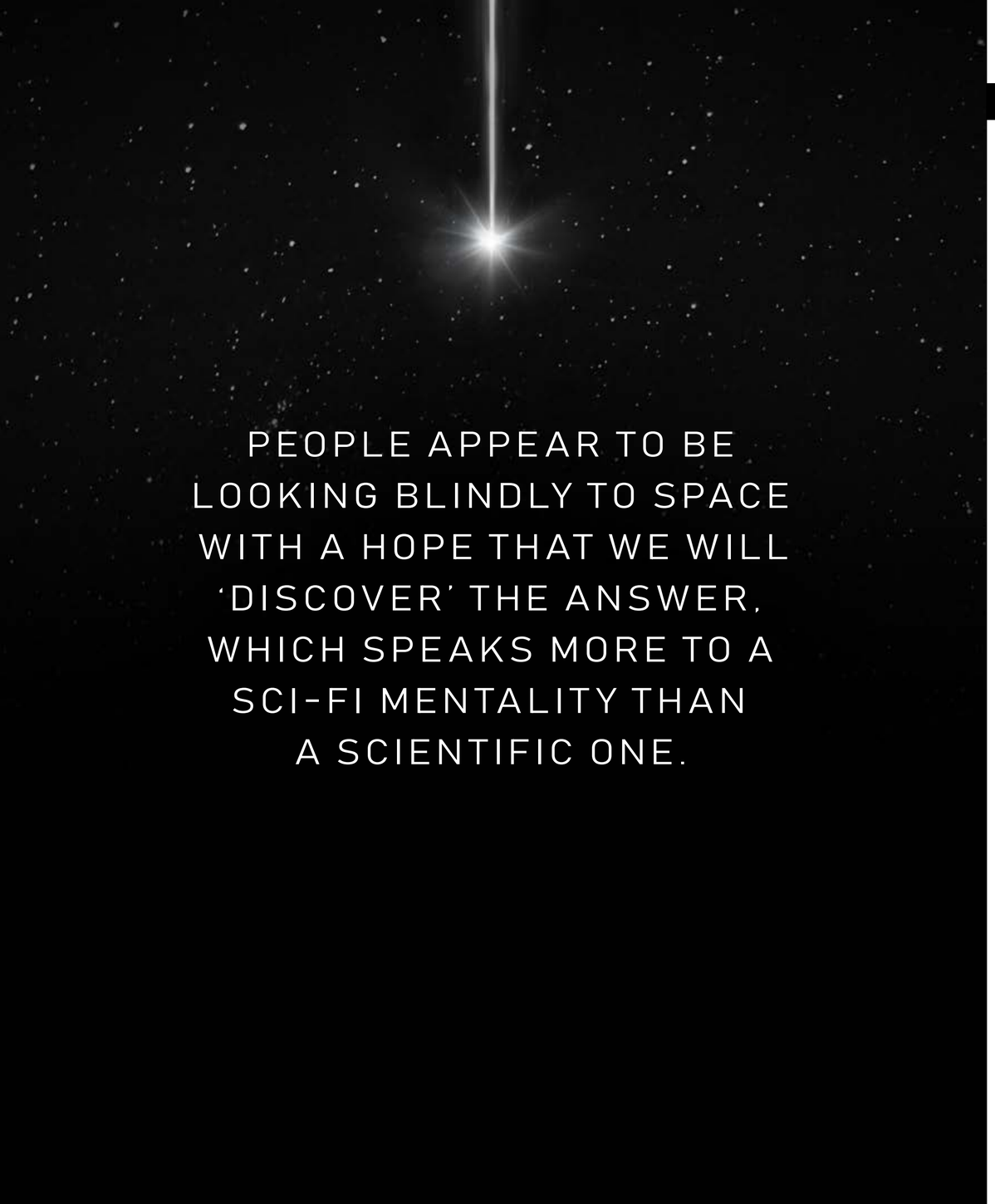
PROF. SINÉAD O'SULLIVAN

PROFESSOR OF AEROSPACE ENGINEERING

"Respondents correctly see that space gives us a valuable perspective on the complex crises that require a planetary response, such as novel energy sources and climate change.

To a large degree, this mirrors the mission-driven nature of emerging space nations such as the UAE, Brazil and India, whose public- and private-sector goals focus on planetary and national climate resilience. These results indicate a close alignment between the space sector and public perception in those countries, which suggests their space agencies have been successful in their messaging so far.

Although space is only one dimension of many needed to bring about positive change on Earth, policy-makers and indeed the private sector should look for ways to harness the public's enthusiasm for space and put it to good use."



PEOPLE APPEAR TO BE LOOKING BLINDLY TO SPACE WITH A HOPE THAT WE WILL ‘DISCOVER’ THE ANSWER, WHICH SPEAKS MORE TO A SCI-FI MENTALITY THAN A SCIENTIFIC ONE.

DO DIFFERENT SOCIETIES HAVE DIFFERING HOPES FOR SPACE?

Space as a location for cutting-edge research only ranked sixth (a 27% global average) as a benefit. This indicates that, although there is a great deal of public ambition for what space can deliver to us, there is little belief in space as a vast laboratory to pioneer future technological breakthroughs.

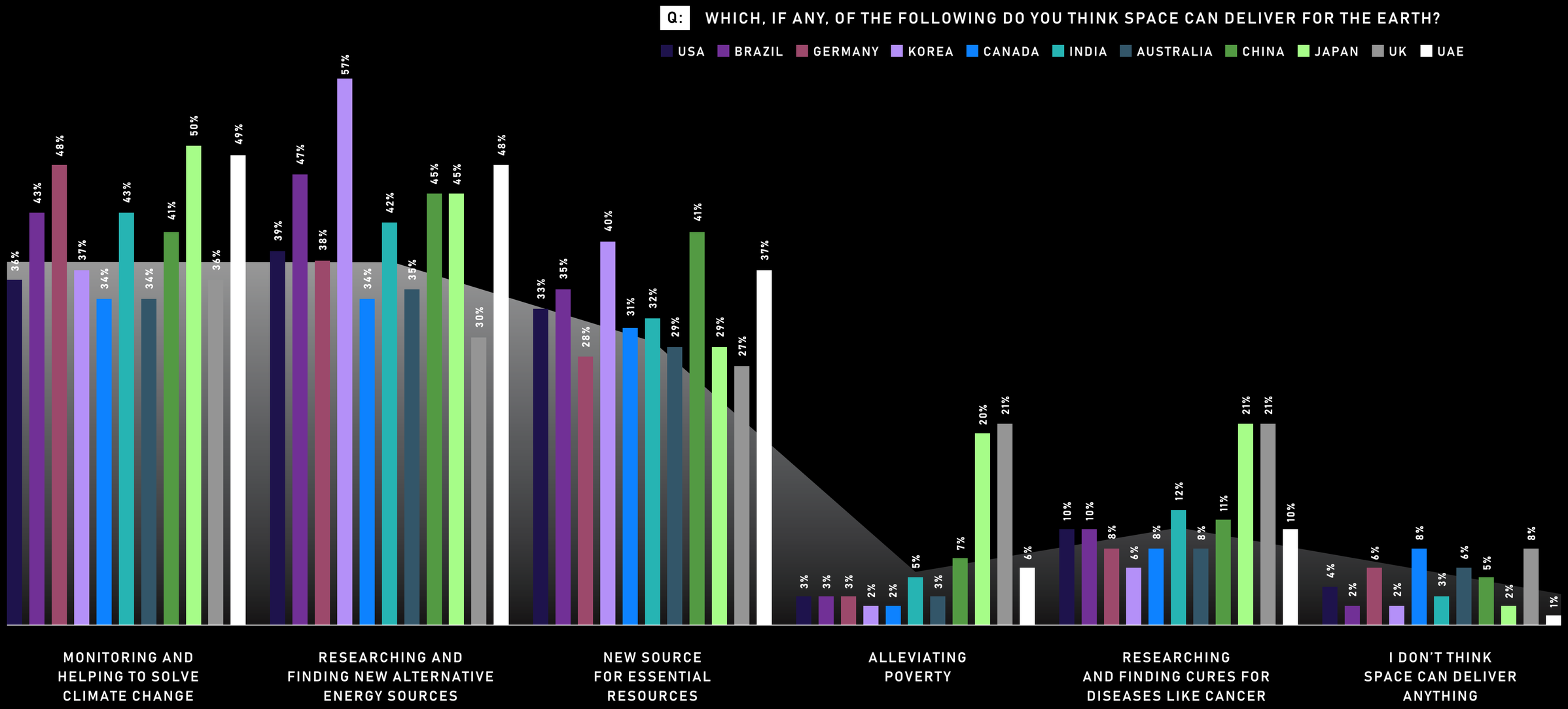
Some markets put more emphasis on space as a stage for cutting-edge research. 40% of respondents in South Korea valued space as somewhere to support scientific enquiry, while only 4% of respondents in the UK and 9% in Japan agreed.

Globally, there is a small core of people who are aware of the potential for space to answer many of the world’s challenges. For example, 7% believe space can alleviate poverty; 7% think space can support the goal of producing enough food to feed our growing population; and 11% imagine space will have a role in researching and finding cures for diseases like cancer.

In fact, the UK and Japan are more likely to agree that space could deliver a cure for cancer (21% of the UK and 21% of Japan vs. an 11% global average). The UK and Japan are also more likely to see space as playing a role in alleviating poverty (20% of Japan and 21% of the UK vs. a 7% global average).

A clear theme emerging from the research is that respondents are pinning their hopes on space to solve many of our problems here on Earth. However, that optimism is not based on a strong understanding of the role that space can and is already playing in areas such as scientific research and exploration. People appear to be looking blindly to space with a hope that we will ‘discover’ the answer, which speaks more to a sci-fi mentality than a scientific one.

HOPES


Q: WHICH, IF ANY, OF THE FOLLOWING DO YOU THINK SPACE CAN DELIVER FOR THE EARTH?
USA
BRAZIL
GERMANY
KOREA
CANADA
INDIA
AUSTRALIA
CHINA
JAPAN
UK
UAE
36% 43% 48% 37% 34% 43% 34% 41% 50% 36% 49%
39% 47% 38% 57% 34% 42% 39% 45% 45% 30% 48%
33% 35% 28% 40% 31% 32% 29% 41% 29% 27% 37%
3% 3% 3% 2% 2% 5% 3% 7% 20% 21% 6%
10% 10% 8% 6% 8% 12% 8% 11% 21% 21% 10%
4% 2% 6% 2% 8% 3% 6% 5% 2% 8% 1%
MONITORING AND HELPING TO SOLVE CLIMATE CHANGE
RESEARCHING AND FINDING NEW ALTERNATIVE ENERGY SOURCES
NEW SOURCE FOR ESSENTIAL RESOURCES
ALLEVIATING POVERTY
RESEARCHING AND FINDING CURES FOR DISEASES LIKE CANCER
I DON'T THINK SPACE CAN DELIVER ANYTHING

CONTRIBUTOR

IWAO IGARASHI

VP & GENERAL MANAGER, BUSINESS DEVELOPMENT, SPACE SYSTEMS, MHI

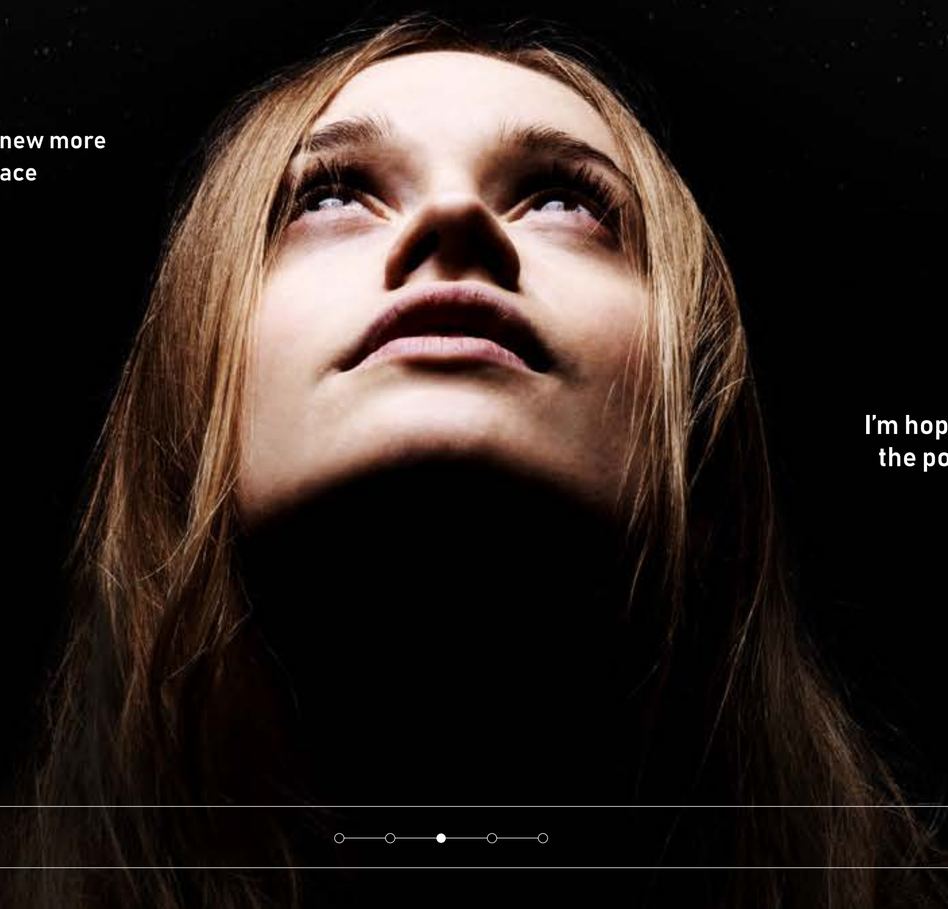
"As a lifelong space enthusiast, I'm delighted Inmarsat has undertaken this research project. It's certainly time our industry deepened its knowledge of the public perception of space.

I'm often struck by the way people talk about space, as if it exists in a different reality, quite apart from our own. I explain to them that space is well within our reach – just 100km away, in fact.

Space is so simple and compelling, yet challenging. It's filled with unlimited potential and promise for our species. And this research shows our industry should be far more confident in saying so."

MITSUBISHI HEAVY INDUSTRIES, LTD.

HOW DO PEOPLE ACROSS THE WORLD FEEL ABOUT SPACE?



24% I feel overwhelmed when I think about space

38% I wish I knew more about space

34% I feel excited about what could happen in space

I feel nervous about what could happen in space 18%

I feel terrified about what could happen in space 11%

I'm hopeful about the possibilities of space 35%

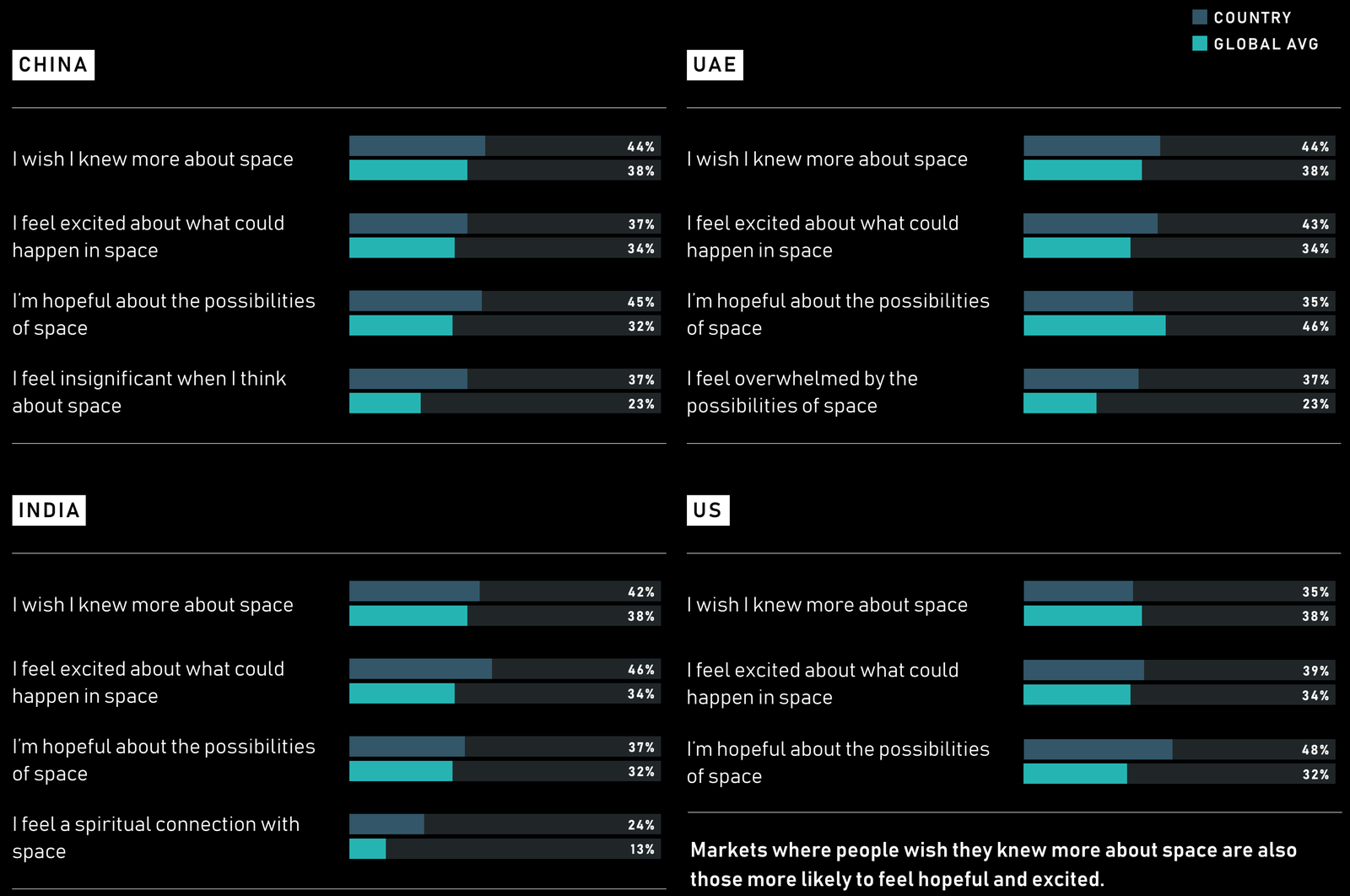
FEELINGS

HOW DO DIFFERENT MARKETS FEEL ABOUT SPACE?

The UK and South Korea are most likely to feel nervous about what could happen in space – 28% and 26% of respondents, respectively, vs. 18% of the global average. South Koreans are very concerned about the problem of space junk and pollution, whereas UK respondents were significantly more likely than average to be concerned about satellites falling to earth (a 29% global average. vs 43% of the UK).

Nearly 1 in 5 respondents were worried about the introduction of new diseases from space onto Earth. However, this anxiety was most present in countries that had a particularly negative experience during COVID-19: South Korea (26%), China (25%), Brazil (24%) vs. a 20% global average.

(Right) Markets like China, India and the UAE, where respondents feel overwhelmed when thinking of space but still feel excitement or hope about the possibilities, are probably those that still have a sense of wonder when thinking about space. Space makes them feel small, but they are excited about the possibilities it holds and are keen to know more.



Markets where people wish they knew more about space are also those more likely to feel hopeful and excited.

WHICH GENERATION IS MOST HOPEFUL ABOUT SPACE?

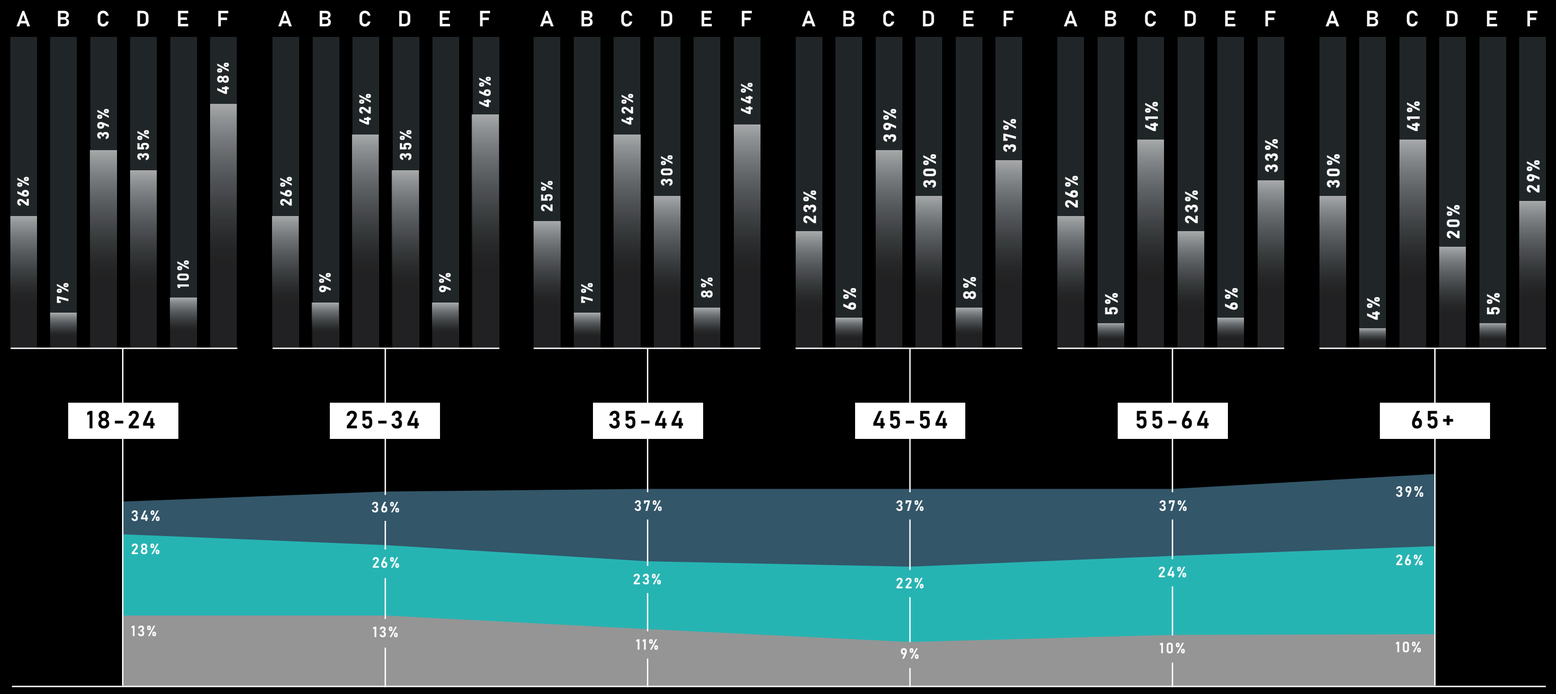
Every generation appears to be hopeful about space. However, they're hopeful in their own way, shaped through the lens of their own experiences.

Younger people appear to be projecting their hopes for Earth onto space. They believe the source for new essential resources is above our heads and they are more likely to say they are excited about what could happen in space (35% of 18–24 year olds vs. 28% of 65+). They are also more likely to wish that they knew more about space. Perhaps younger people, whose experience of space has been shaped more by science fiction, feel a greater sense of space's potential. The space industry and governments should feed this enthusiasm by telling stronger stories about what space is and what it can achieve.

Older generations have direct experience of the first Space Age, so they're marginally more likely to be hopeful about the possibilities of space (39% of 65+ vs. 34% of 18–24 year olds). As a result, they believe space can deliver solutions to problems we are facing here on Earth, such as "ensuring that everyone in the world has access to internet and telephone services", and "monitoring to help solve climate change". But now we're in the second Space Age, they are more likely to say they don't understand much about space (25% of 65+ vs. 17% of 18–24 year olds). Clearly, we need to make space feel more tangible for them and re-instil their sense of wonder.

Q: WHICH, IF ANY, OF THE FOLLOWING DO YOU THINK SPACE CAN DELIVER FOR THE EARTH?

A) ENSURING EVERYONE IN THE WORLD HAS ACCESS TO THE INTERNET
B) ENSURING THERE IS ENOUGH FOOD TO FEED OUR GROWING POPULATION
C) MONITORING AND HELPING TO SOLVE CLIMATE CHANGE
D) NEW SOURCE FOR ESSENTIAL RESOURCES
E) RESEARCHING AND FINDING CURES FOR DISEASES LIKE CANCER
F) RESEARCHING AND FINDING NEW ALTERNATIVE ENERGY SOURCES



Q: WHICH, IF ANY, DESCRIBE HOW YOU FEEL WHEN YOU THINK ABOUT SPACE?

I'M HOPEFUL ABOUT THE POSSIBILITIES OF SPACE
I'M OVERWHELMED BY THE POSSIBILITIES OF SPACE
I'M TERRIFIED BY WHAT COULD HAPPEN IN SPACE

ANXIETIES

ARE PEOPLE WORRIED ABOUT THE FUTURE OF SPACE?

As the previous page shows, people are nervous about what could happen in space, and some even feel terrified.

These anxieties will only grow as the scope and scale of human activity in space increases. Echoing Rajeev Suri's warnings in his introduction to this report, our research found that globally, people consider these as the three biggest concerns about the future of space:

1. SPACE JUNK AND COLLISIONS
2. POLLUTING SPACE
3. DAMAGING THE EARTH'S ATMOSPHERE

Some of these fears were greater in markets that are more focused on space exploration and development:

Germany (57%), Korea (56%) and Brazil (55%) were most worried about space junk.

Korea (52%), Brazil (46%) and India (46%) were concerned above all about polluting space.

The UAE (45%), China (43%) and India (38%) had the highest levels of anxiety about damaging the Earth's atmosphere.

THE THREE BIGGEST CONCERNS ABOUT THE FUTURE OF SPACE

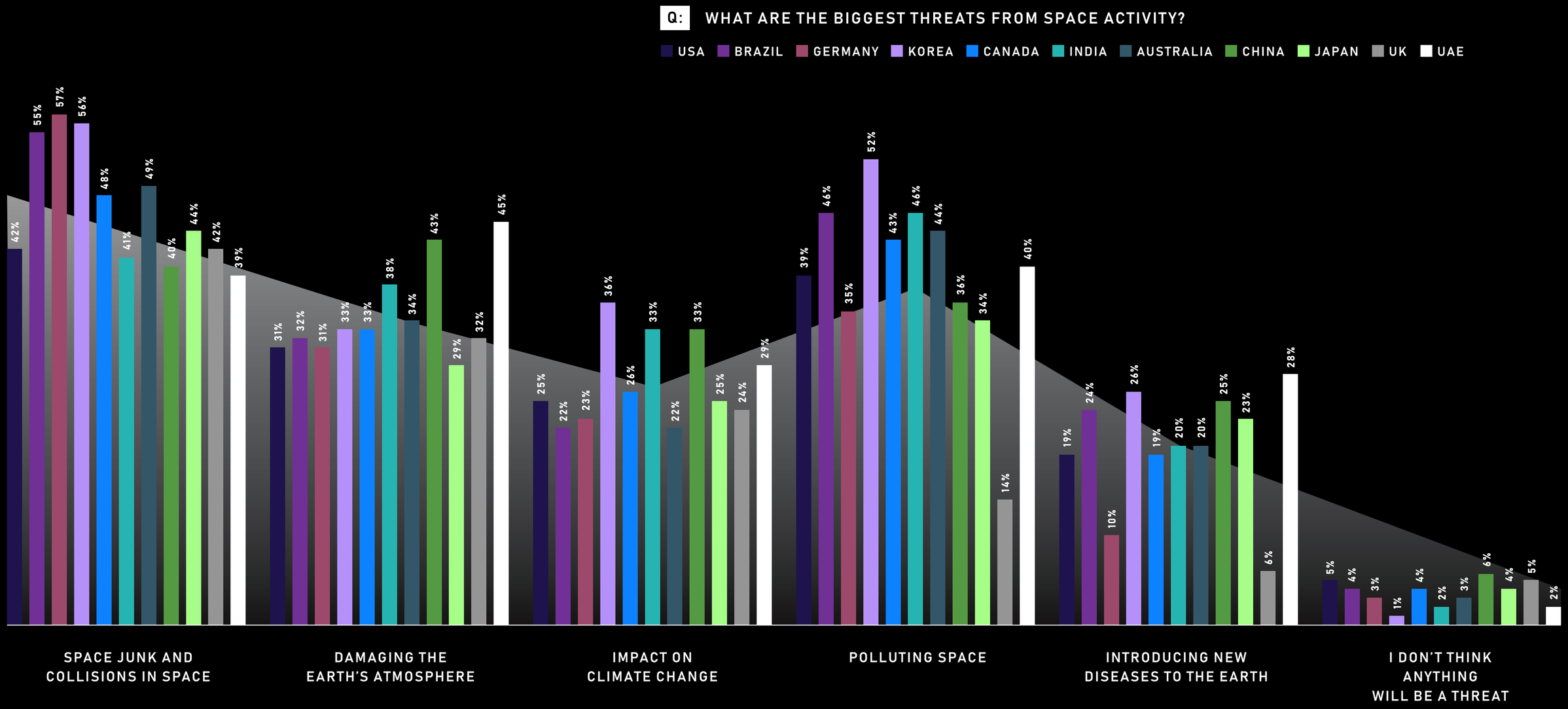
Global results:

01 SPACE JUNK AND COLLISIONS — **47%**

02 POLLUTING SPACE — **39%**

03 DAMAGING THE EARTH'S ATMOSPHERE — **35%**

ANXIETIES


Q: WHAT ARE THE BIGGEST THREATS FROM SPACE ACTIVITY?
USA
BRAZIL
GERMANY
KOREA
CANADA
INDIA
AUSTRALIA
CHINA
JAPAN
UK
UAE
42% 55% 57% 56% 48% 41% 49% 40% 44% 42% 39%
31% 32% 31% 33% 33% 38% 34% 43% 29% 32% 45%
25% 22% 23% 36% 26% 33% 22% 33% 25% 24% 29%
39% 46% 35% 52% 43% 46% 44% 36% 34% 14% 40%
19% 24% 10% 26% 19% 20% 20% 25% 23% 6% 28%
5% 4% 3% 1% 4% 2% 3% 6% 4% 5% 2%
SPACE JUNK AND COLLISIONS IN SPACE
DAMAGING THE EARTH'S ATMOSPHERE
IMPACT ON CLIMATE CHANGE
POLLUTING SPACE
INTRODUCING NEW DISEASES TO THE EARTH
I DON'T THINK ANYTHING WILL BE A THREAT

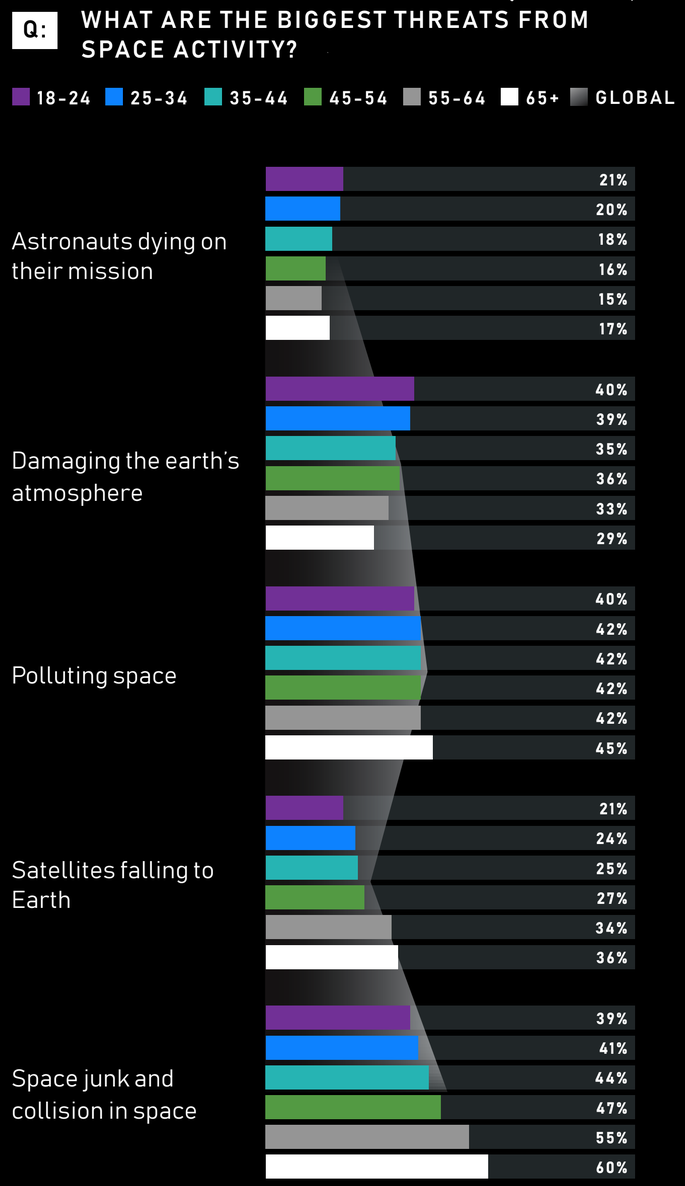
CONTRIBUTOR

BEN DIXON

PARTNER, SYSTEMIQ

"We can already see the growing contribution space technologies are making towards climate and sustainability initiatives. These include precision agriculture, management of Marine Protected Areas and National Parks, prevention of illegal fishing, new mobility systems, zero-carbon shipping, tracking of plastic pollution, monitoring of methane emissions and measurement of deforestation and reforestation. This list will only grow as technologies and applications expand in the future. It's clear that the respondents share our excitement about these opportunities, with more than 80% prioritising the role of space technologies in mitigating climate change and opening up new energy sources."

SYSTEMIQ



ARE YOUNG PEOPLE ESPECIALLY CONCERNED ABOUT THE FUTURE OF SPACE?

As attitudes in society continue to shift, younger people tend to be more concerned about the planet. It is therefore no surprise that they are more anxious about the impact of space activities on the environment.

40% of 18-24 year olds were worried about damaging the Earth's atmosphere vs. 29% of 65+ year olds.

32% of 18-24 year olds were concerned about the impact on climate change vs.17% of 65+ year olds and the global average of 27%.

Conversely, older people were more worried about space junk and collisions (60% of 65+ vs. 39% of 18–24 year olds) and satellites falling to Earth (36% of 65+ vs. 21% of 18-24 year olds and the 28% global average).

ANXIETY OVER SPACE JUNK IS FILTERING INTO THE GENERAL POPULATION.

THE SPACE INDUSTRY NEEDS TO TAKE IMMEDIATE ACTION TO BUILD TRUST AND ALLAY CONCERNS.

HAS FEAR ABOUT SPACE BECOME FEAR FOR SPACE?

Despite our very human tendency to fear the unknown, the research showed that people are much less likely to fear space. Instead, they want to understand it better. A third of people feel excited about what could happen in space and hopeful about the possibilities.

On the other hand, people are increasingly fearful for space. And they see space junk as the number one threat. They worry that space will eventually be subject to the same pollution and exploitation as Earth, with drastic consequences for both. This is potentially a big issue for the space industry to consider – especially satellite companies – as they fight to capture the public's imagination.

Only a tiny proportion of people see no apparent danger from space junk and the by-products of other human activities in space.

ESSENTIALS

WHAT DO PEOPLE CONSIDER ESSENTIAL WORK IN SPACE TODAY?

As this report conclusively shows, most people lack a clear idea of the value of space technologies.

The figures below highlight the importance respondents attached to key space technologies. This shows they see established technologies (such as weather and climate monitoring and communications satellites) as 'essential' or 'very important', but they also see how critical space technology is for keeping us safe. This explains the high degree of importance respondents placed on finding new energy sources and protection from asteroids. What is considered the most essential work in space today?

1. WEATHER & CLIMATE MONITORING **(75% GLOBAL AVG.)**
2. COMMUNICATION SATELLITES **(71% GLOBAL AVG.)**
3. GPS & SATNAV **(67% GLOBAL AVG.)**
4. FINDING ALTERNATIVE ENERGY SOURCES **(67% GLOBAL AVG.)**
5. PROTECTION FROM ASTEROIDS **(64% GLOBAL AVG.)**

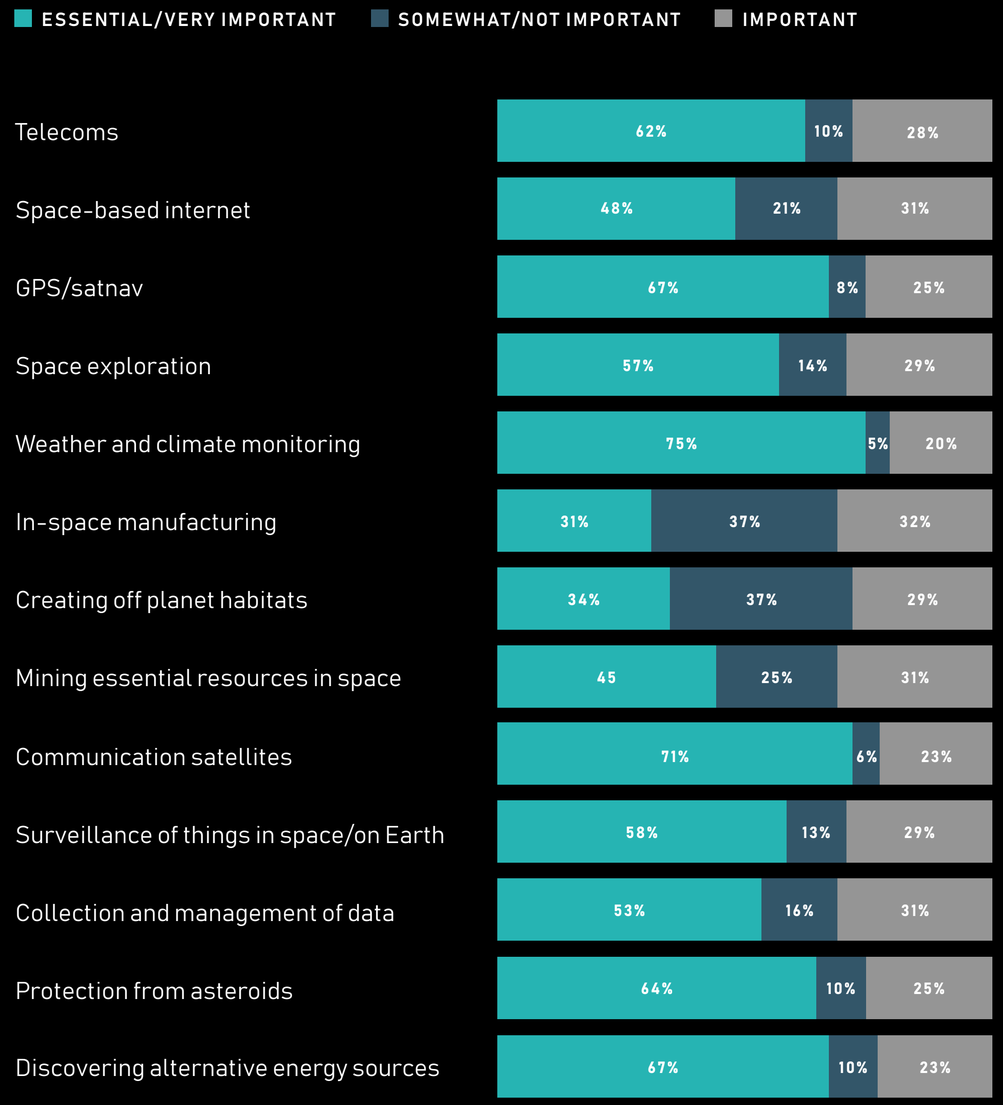
Which markets are prioritising space exploration?

The research indicates that China and India are more focused on space exploration than markets like the US. 75% of respondents in China and 74% in India were more likely to rank space exploration as "essential" or "very important" compared to 61% of respondents in the USA and a 57% global average. This would indicate that markets which are more recent entrants into the space industry are more aware of the value of exploration.

Young people focus on energy

Given the rising cost of energy across the world, it's perhaps unsurprising to find younger people are more likely to label "Finding alternative energy sources" as "essential" (44% of 18-24 year olds vs. 24% of 65+ year olds and a 37% global average). At the same time, 45% of 18–24 year olds also consider "Protection from asteroids" as "essential" vs. 29% of 65+ year olds and a 38% global average. While 20% of 18-24 year olds deem "Creating off-planet habitats" "essential" compared to just 6% of 65+ year olds vs. a 15% global average.

Q: HOW IMPORTANT TO YOU ARE EACH OF THE FOLLOWING ACTIVITIES THAT WE DO IN SPACE?

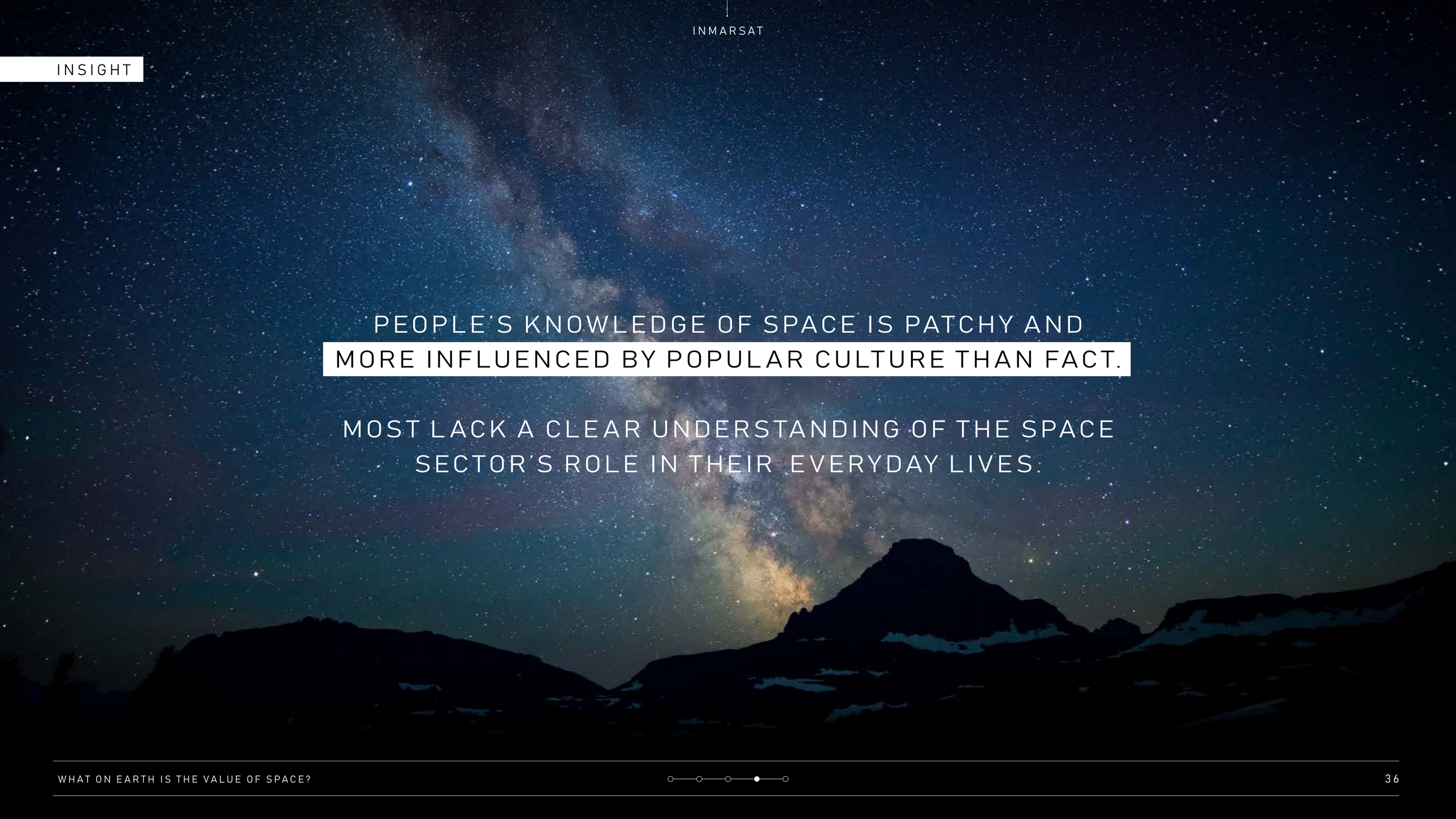


CONTRIBUTOR

SCOTT KELLY

FORMER NASA ASTRONAUT

"The lack of awareness about communications satellites surprises me. 29% of respondents said they don't view them as essential. Plainly they don't realise how the voice and data systems they rely on actually operate. The way they navigate in their cars, the aircraft that carry them off on vacation – all that technology relies on space. Even when people use an ATM, the timing signal comes from a GPS satellite. If we removed this technology, people would notice in seconds. Perhaps the satellite sector needs to work harder to convey its significance to the public."



PEOPLE'S KNOWLEDGE OF SPACE IS PATCHY AND MORE INFLUENCED BY POPULAR CULTURE THAN FACT.

MOST LACK A CLEAR UNDERSTANDING OF THE SPACE SECTOR'S ROLE IN THEIR EVERYDAY LIVES.

‘I believe these industries could not function without space.’

AVIATION	38%
TV & BROADCASTING AND IT	34%
DEFENCE	32%

‘I believe these industries could function without space.’

RETAIL	66%
MINING AND CONSTRUCTION	54%
AGRICULTURE AND FARMING	52%
SUPPLY CHAIN & LOGISTICS	48%
SHIPPING	47%

WHICH INDUSTRIES RELY ON SPACE TO FUNCTION?

The results opposite perfectly illustrate people’s lack of appreciation for space and satellite technology.

Without satellite technology, retailers would be unable to access the internet capabilities which manage their supply chains. That means their business processes would steadily break down – all the way from manufacturing to distribution.

Mining – which takes place in remote and isolated locations – is totally reliant on satellites to ensure efficient and safe operations. Without satellite communications, mines would swiftly grind to a halt.

Farmers increasingly use satellite IoT to create better crop yields and care for their livestock.

Without satellite communications, global food shortages and supply chain problems would have a far greater impact.

Nearly 50% of people think the shipping industry would be able to function without space, even though space has been inextricably connected with the maritime sector for decades now – not just for navigation, but for dozens of other services, too.

This is just the situation as it stands today. With new technologies coming down the line, our reliance on space technologies is increasing as we look to drive more sustainable output from existing resources and activities.

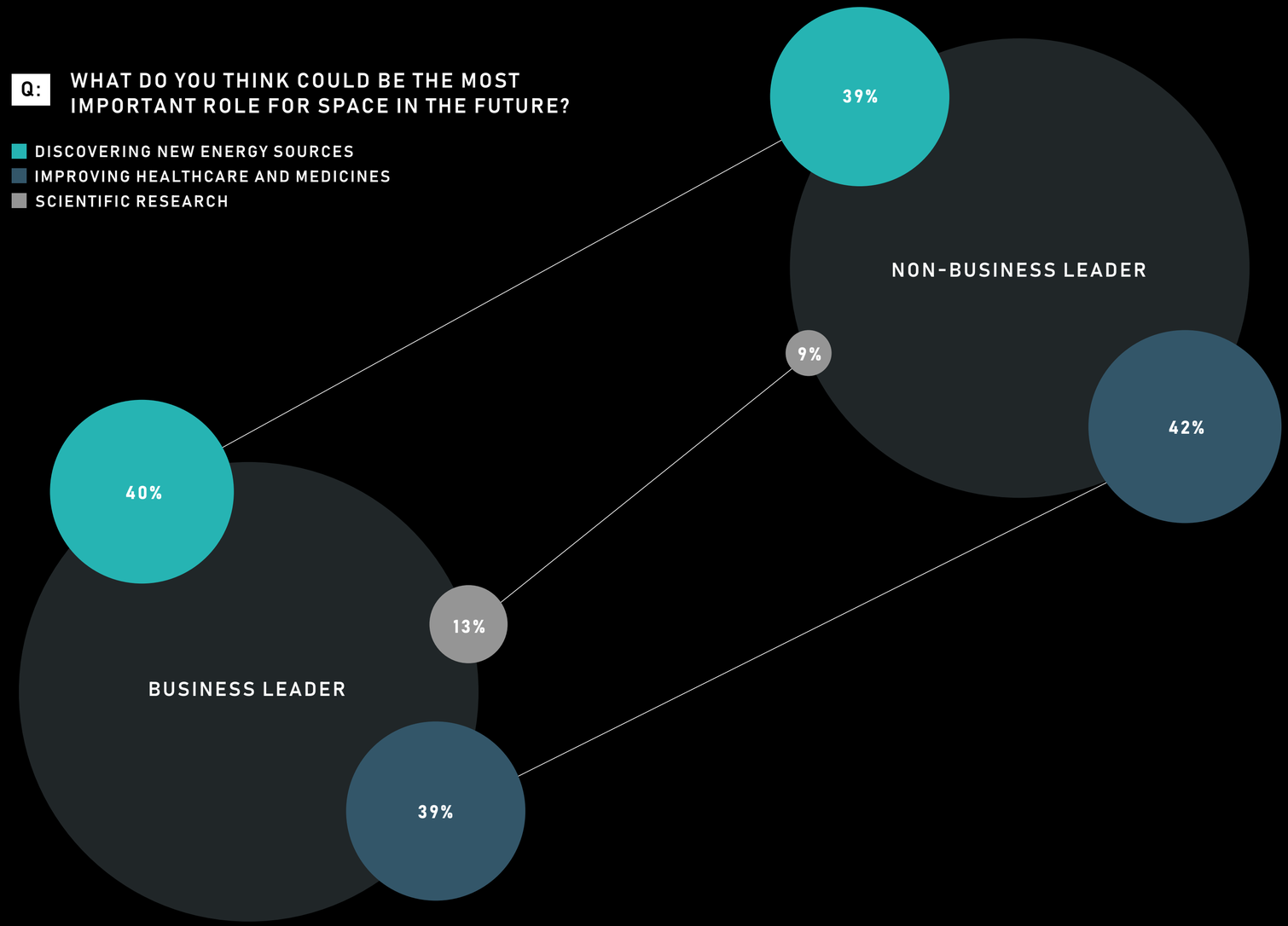
DO BUSINESS LEADERS UNDERSTAND SPACE BETTER THAN THE PUBLIC?

As well as taking in a cross-section of people from 11 countries, the research specifically targeted business leaders to discover their perceptions of the value of space.

The findings show that business leaders are now attaching great importance to space. They are more aware of the vast commercial opportunities – from space tourism to the role of space in healthcare.

Compared with the general public, they claim to be very knowledgeable on the subject, and they are far more likely to see themselves as experts on human activity in space. That includes finding alternative energy sources, in-space manufacturing, mining and satellite communications.

>>



BUSINESS LEADERS

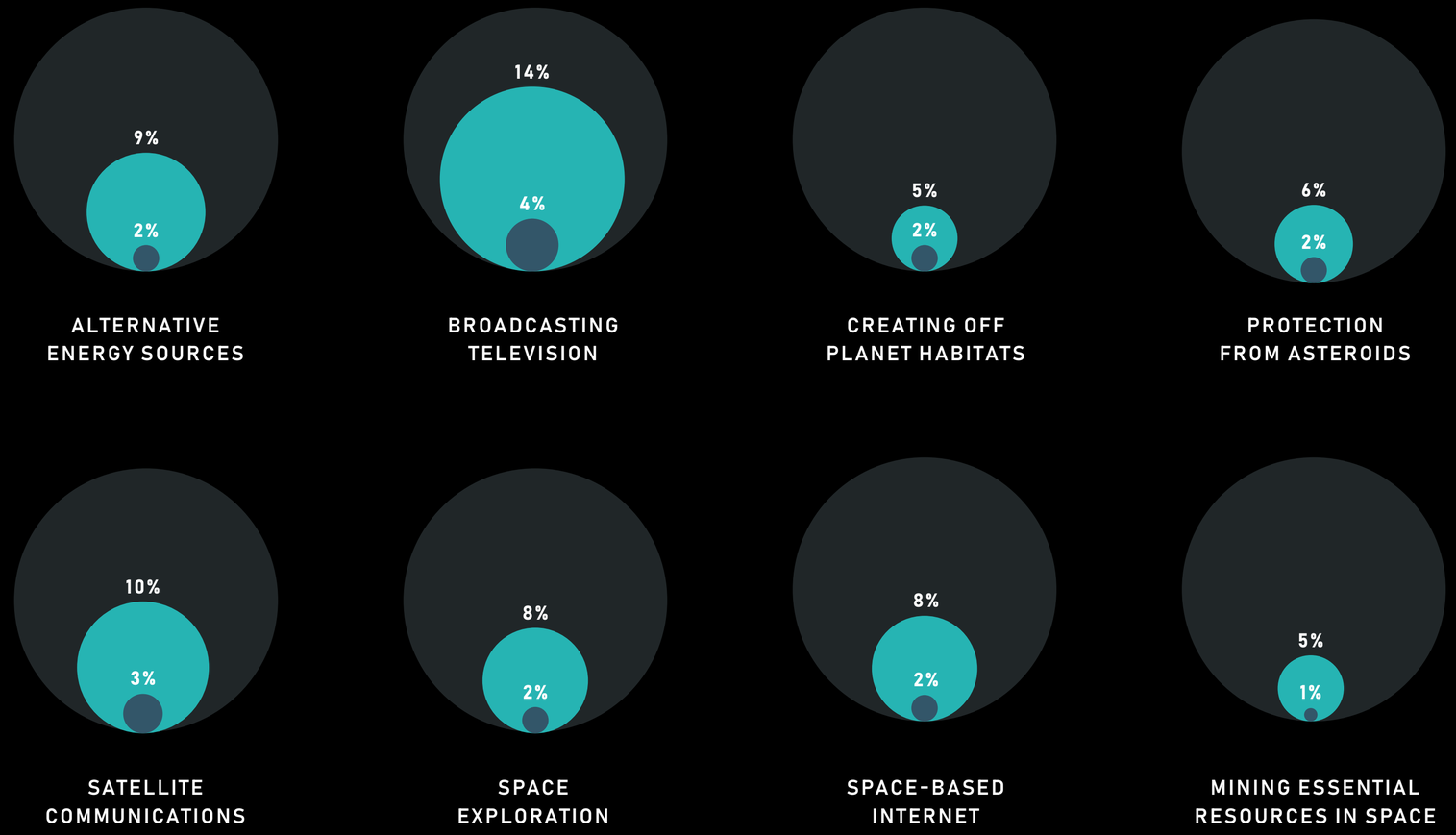
>>

Business leaders are also keener to recognise that many vital industries simply couldn't function without space. Perhaps this is due to personal experience as much as general knowledge.

The only initiatives on Earth which business leaders claim to prioritise above space are communication infrastructures, energy production and transport.

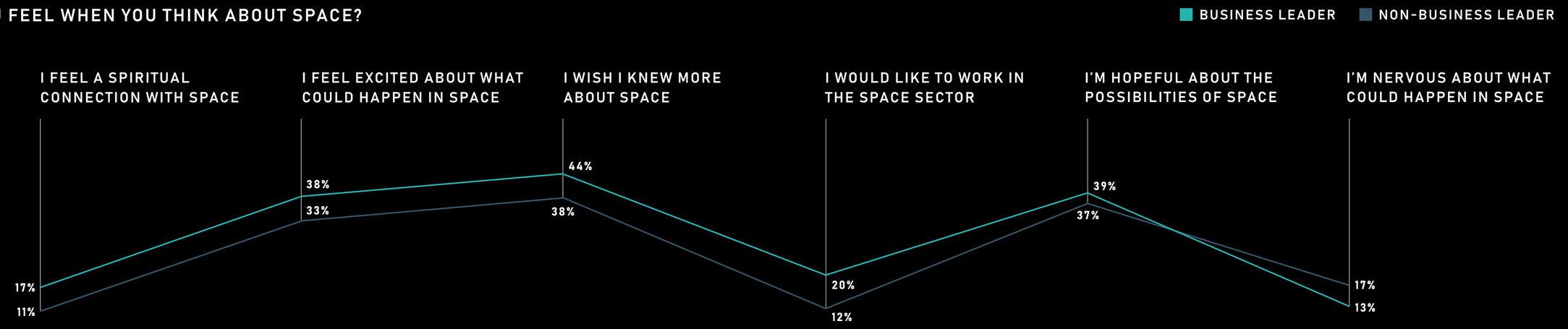
They are the group most likely to wish they knew more about space and express an interest in working in the sector. Interestingly, they are also above average in claiming they feel a spiritual connection to space.

Q: DO YOU SEE YOURSELF AS AN EXPERT ON THE FOLLOWING HUMAN ACTIVITIES IN SPACE?

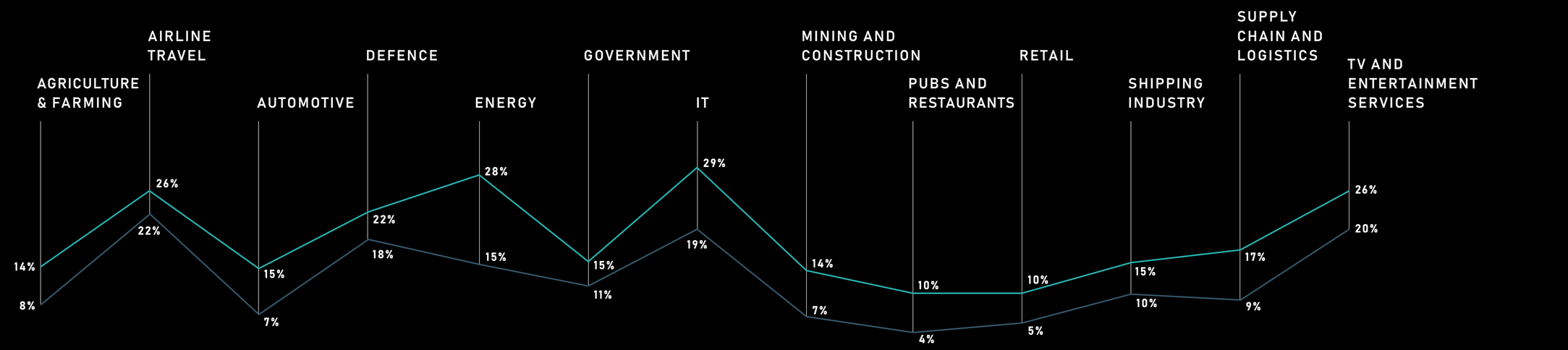


BUSINESS LEADERS

Q: HOW DO YOU FEEL WHEN YOU THINK ABOUT SPACE?



Q: WHICH INDUSTRIES DO YOU BELIEVE NEED ACTIVITY IN SPACE TO FUNCTION



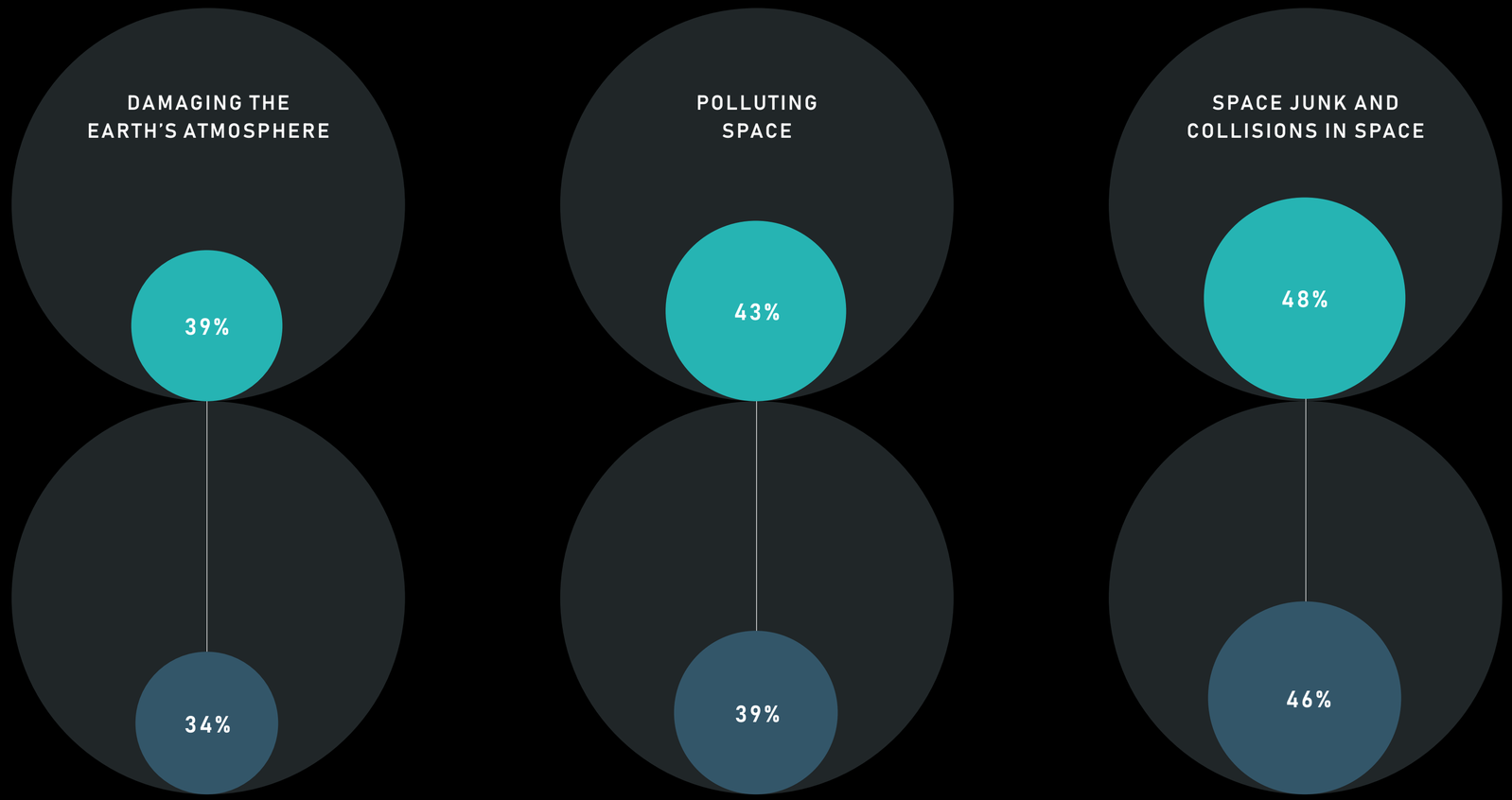
ONE TROUBLING INSIGHT IS THE LACK OF REGARD FOR SPACE JUNK AMONG BUSINESS LEADERS.

Their view of space may be coloured by the current crop of high-profile entrepreneurs, since business leaders are also more liable to associate space with billionaires like Jeff Bezos and Elon Musk.

Clearly the sector must do more to educate the business community on the risks associated with orbital congestion and space debris.

Business leaders are potentially very powerful advocates and allies for the space sector. Without their collaboration, the world may struggle to maximise the value of space as a force for good in the world.

Q: WHICH OF THE FOLLOWING, IF ANY, DO YOU THINK WILL BE THE GREATEST THREATS FROM HUMAN ACTIVITIES IN SPACE?



INSIGHT

BUSINESS LEADERS RECOGNISE THE BOUNDLESS POTENTIAL OF SPACE.

THEY NEED TO UNDERSTAND HOW BEST TO HARNESS IT FOR THE LONG-TERM BENEFIT OF THE PLANET.

THE SPACE SECTOR MUST PARTNER WITH OTHER INDUSTRIES TO COMMUNICATE THE BENEFITS OF ONGOING RESEARCH AND EXPLORATION IN SPACE.

CONTRIBUTOR

GEORGE FREEMAN MP

MINISTER FOR SCIENCE, RESEARCH AND INNOVATION, INCLUDING CIVIL SPACE, UK GOVERNMENT

"As the UK Minister for civil space, I was pleased to launch our ambitious National Space Strategy in September 2021. Alongside our geopolitical commitment to science for global good, the space sector is a fundamental part of our mission to restore the UK as a science superpower through £30bn of additional government funding for Science, Technology & Innovation.

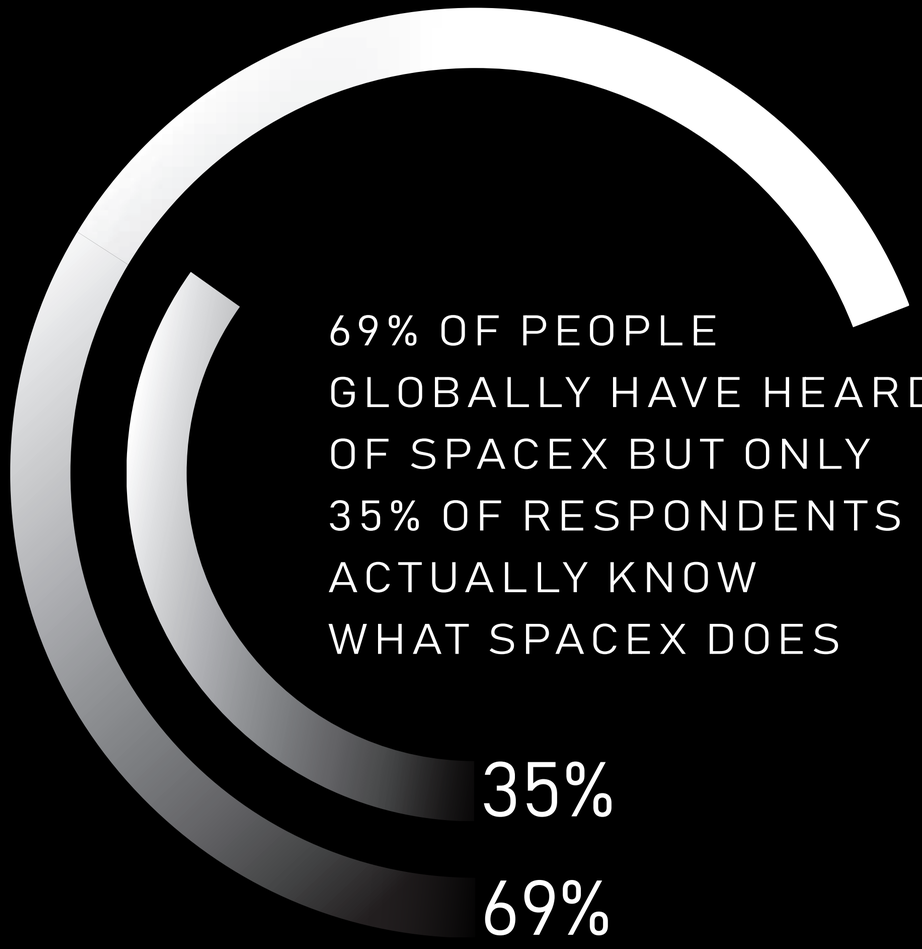
Although the UK has been at the forefront of space science and technology for 50 years, too few of our citizens are aware of how vital the UK sector is. It employs around 47,000 people directly across the country, supports around 190,000 jobs in the supply chain and contributes almost £7 billion to the UK economy each year. It is essential that we promote the success of this sector as widely as possible and build on the commitments of the National Space Strategy to grow these high-quality jobs in the UK for generations to come.

THIS REPORT PROVIDES IMPORTANT INSIGHTS INTO THE CHALLENGE OF MAKING THE BENEFITS OF SPACE VISIBLE TO BUSINESSES AND CONSUMERS TO ENSURE THIS VISION BECOMES A REALITY.

We also need to recognise the growing issue of space debris and the importance of keeping space sustainable, so that future generations continue to benefit from it. That is why I recently launched our new UK Plan for Space Sustainability. It will begin with a review of orbital regulations, so the UK and space industry can work together to develop new industry-led standards. The resulting standards will be backed by Government and will reward responsible practices by reducing insurance and licensing costs, while also accelerating innovative approaches to clearing up space junk already in orbit.

The UK Space Agency will scale up and further its programmes to raise awareness of the applications of space and space-derived data. The aim is to deliver exciting educational resources and training to encourage more students studying STEM subjects to pursue a career in the space sector.

As a result of this report, we now have the impetus to work together to boost the space sector's profile. We must continue highlighting the extraordinary benefits of space, not only to stimulate future demand, but to increase investment in research and innovation. I look forward to collaborating further with the sector to do this."



IS THE SPACE SECTOR FAMOUS ENOUGH?

The first Space Age was driven by governments and politicians. This time round, it is being driven largely by business.

Commercially, the second Space Age is an emerging market, with lots of fresh entrants and start-ups battling for position. Even for companies and organisations the public has heard of, people are unclear what function they perform.

The research shows that 69% of people globally have heard of SpaceX. That is much more than the European Space Agency (ESA), but only 35% of respondents actually know what SpaceX does. Even in the case of NASA – which almost every one of the 20,000 respondents had heard of – 25% still don't know what they do.

This points to a need for a collective effort by the space sector to publicise its work, to inspire the global community and to generate a new sense of excitement.

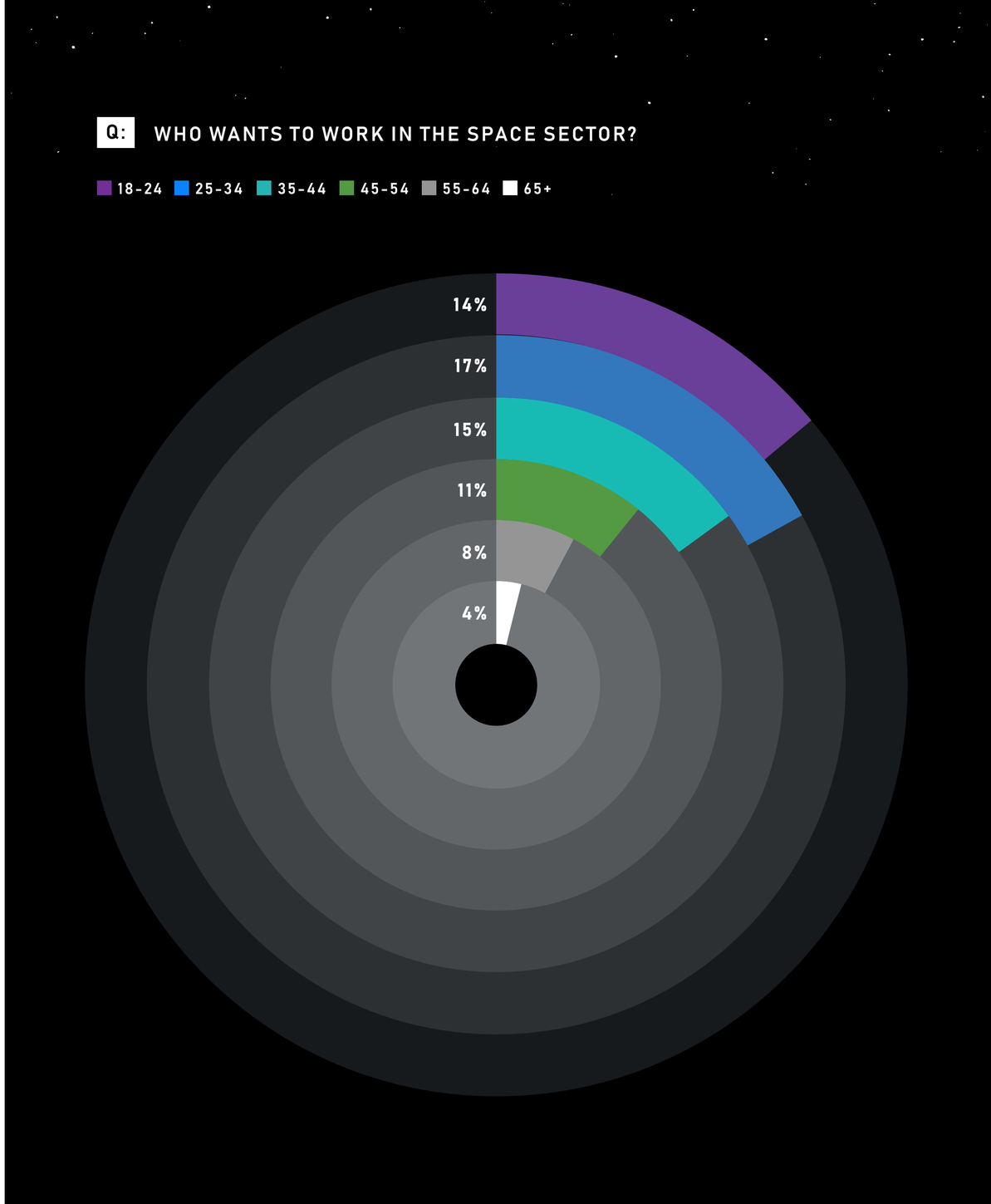
TALENT

CAN THE SPACE INDUSTRY ATTRACT THE TALENT IT NEEDS?

The research shows that younger people are more excited about the potential of space than the older demographics. Likewise, young people tend to wish they knew more about space.

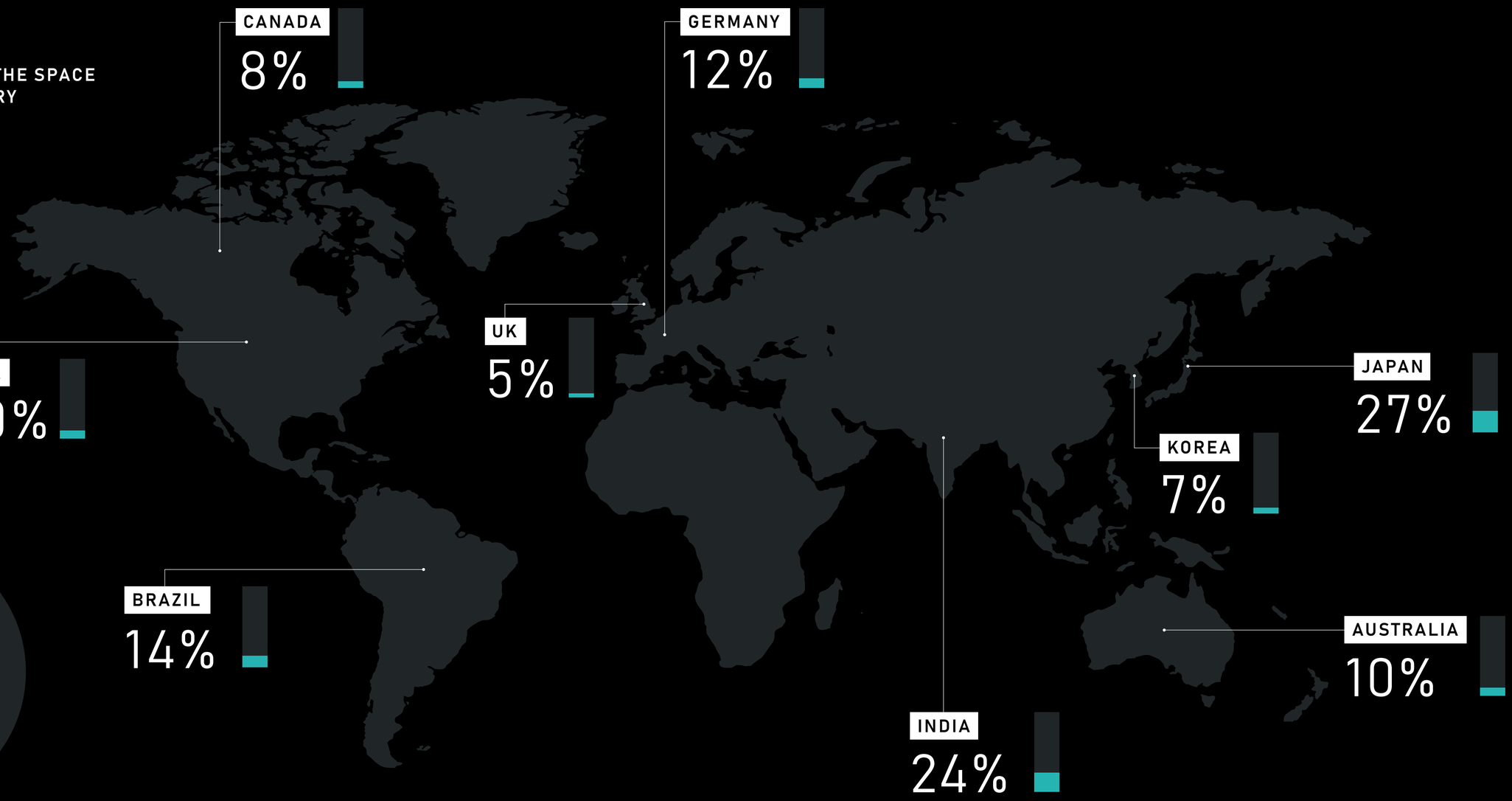
The space sector is attracting record amounts of investment and is set to continue growing at an impressive rate. The sector will need to hire the very best talent to prevent that growth from stalling.

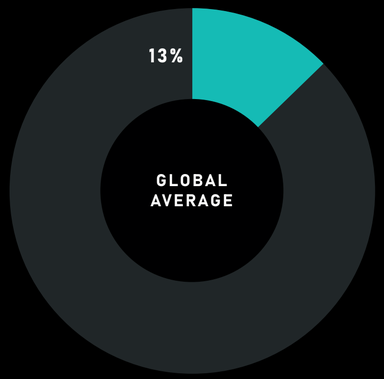
The industry should not squander the well of curiosity and enthusiasm presented by young people today. It should find ways to speak to them, either directly or via their universities, schools and teachers – and recruit the brightest individuals as early as possible.



TALENT

Q: DESIRE TO WORK IN THE SPACE INDUSTRY BY COUNTRY





INSIGHT

PHOTO BY SCOTT KELLY ABOARD THE ISS

THE WONDER OF THE FIRST SPACE AGE INSPIRED A GENERATION OF TALENT TO WORK IN THE SECTOR.

THOSE PEOPLE NOW MAKE UP THE LEADERSHIP OF TODAY'S SPACE INDUSTRY.

WE NEED A NEW SENSE OF WONDER TO INSPIRE THE NEXT GENERATION IN THE SAME WAY.

HOW DO PEOPLE SEE THE FUTURE OF SPACE?

It's clear from the research that people are confused and conflicted about space and its importance for the future. This is in part because the issue can sometimes appear insignificant alongside the other huge questions facing the planet.

Globally, nearly 40% of survey respondents wished they knew more about space, while a third felt excited about what could happen in space (33%) and hopeful about the possibilities (32%). However, respondents are currently preoccupied with the challenges here on Earth – like finding new energy sources (52%) and alleviating world poverty (43%).

"Which of the following priorities is more important than what we do in space?"

1. FINDING NEW ENERGY SOURCES
   53% GLOBAL AVG.

2. ALLEVIATING WORLD POVERTY
   44% GLOBAL AVG.

3. ENERGY PRODUCTION
   42% GLOBAL AVG.

In answering the question above, the USA and the UK prioritised economic growth (42% of the USA and 45% of the UK vs. a 35% global average), perhaps not fully realising that investment in space technology would likely deliver the economic growth they seek.

The issue of alleviating poverty garnered the biggest variance in terms of age: 36% of 18–24 year olds vs. 53% of 65+ year olds. It seems that older people are more concerned about poverty than space. Older people are also more concerned about the lack of housing than younger people (36% of 65+ year olds vs. 19% of 18–24 year olds).

The industry needs to boost awareness of the ground-breaking solutions coming from space. For example, 22% of global respondents claimed they would prioritise communication infrastructures over space, without appreciating that space is a vital component of the very same communication infrastructures.

People are generally unfamiliar with the organisations set to play a pivotal role in space in the coming years. This is a crucial point for satellite companies, who need to generate more interest in the new applications that could make a huge impact.

Whereas once people looked to space and thought of a bright future, it's clear the future now feels clouded and unclear. If the space sector fails to act now and resolve that confusion, it will fail to attract the investment, talent and good will it needs, and the world will miss out on the promised benefits of the second Space Age.

THE WORLDWIDE SURVEY ON THE VALUE OF SPACE

This has been the largest and most comprehensive investigation ever attempted into the public's perception of the value of space, with 20,000 people surveyed across 11 countries. We began with a series of hypotheses which have largely been borne out by the research:

01 People benefit from space technology every day, yet these innovations are so ubiquitous and ingrained in routine life that they're often overlooked.

02 The wonders of the second Space Age are not being met with the same excitement, curiosity or hunger for knowledge as the first.

03 The space industry must ensure that the current record levels of investment go into activities that will improve the lives of everyone on the planet.

04 Many people are experiencing legitimate fears about new technology damaging the Earth's atmosphere and space becoming a celestial junkyard.

IT'S TIME FOR US TO DEFINE THE VALUE OF SPACE

However, the most significant insight from this research is that people across the world are largely unaware of the true value of space: neither its current significance nor the value it holds for future generations.

The industry must be clear that space is no longer a vast stadium for the competition of rival ideologies, rival nations or even rival billionaires.

Today, space is the arena where our species can build a sustainable future, where we can change the planet for the better. Through space we can monitor carbon emissions effectively, we can ensure we put every watt we generate to good use and we can guarantee every journey across sea, land and air is as efficient as it can be.

By harnessing space, green technology can advance at the pace required, and we can look forward to a more stable and balanced future. Without space, the world has no hope of reaching net zero. Without space, we have no hope of making the changes we need to survive.

That's why the space industry must re-capture the public's imagination, address its concerns and re-instil its sense of wonder. This is not solely about economics but also the broader benefits that space is delivering and will deliver to everyone on the planet. To do that, first we must be able to confidently answer the question…

>>


WHAT ON EARTH
IS THE VALUE OF SPACE?
inmarsat

CONTACT

WWW.INMARSAT.COM/CONTACT