MOONSHOT MENA

Making The Middle East
The New Cradle Of Innovation

WORLD GOVERNMENT SUMMIT 2023

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MOONSHOT MENA: MAKING THE MIDDLE EAST THE NEW CRADLE OF INNOVATION

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CONTACTS

BEIRUT

Dr. Yahya Anouti
Partner
+961-1-985-655
yahya.anouti
@strategyand.pwc.com

Ramzi Hage
Principal
+961-1-985-655
ramzi.hage
@strategyand.pwc.com

DUBAI

Dima Sayess
Partner
+971-4-436-3000
dima.sayess
@strategyand.pwc.com

Dr. André Duerrbeck
Principal
+971-4-436-3000
andre.duerrbeck
@strategyand.pwc.com

Sarah Al Feghali
Senior Fellow, Ideation Center
+971-4-436-3000
sarah.alfeghali
@strategyand.pwc.com

Supriya Kumar, **Dr. Mark Esposito**, and **Jonathan Blair Miller** also contributed to this report.

EXECUTIVE SUMMARY

The Middle East and North Africa (MENA) region has the potential to become a new cradle of global innovation.

The region has the potential to pioneer actions of global significance, including transforming energy into food on a massive scale, and leading a new era of space and ocean exploration. It has the aspiration, the potential—and the need—to tackle massive global and regional challenges, most importantly water scarcity.

Laying the groundwork for this radically different future will take more than big thinking: the Middle East will need to embrace a new and disruptive way of conceiving of ideas and turning them into practical reality. Instead of striving for incrementally better outcomes, MENA nations need to challenge the boundaries of technological possibility and human ingenuity in pursuit of audacious goals that could possibly improve the lives of millions or billions of people worldwide.

We call this type of off-the-charts thinking and doing 'Moonshot MENA.' Its namesake mission, the NASA Apollo program, conjures the scale and impact of moonshot innovation, as well as the extent of resources, coordination, and imagination required to make it successful. A more recent example is the rapid development of effective COVID-19 vaccines—the first vaccines to be commercialized in less than a year.

Programs such as Saudi Arabia's Vision 2030 and the UAE's Vision 2071 illustrate MENA's eagerness to act boldly in pursuit of a technology-fueled future, one that will transform regional economies into efficient, knowledge-driven engines of prosperity.

Turning such visions into reality is a high-stakes undertaking that calls for a paradigm shift in the way the MENA region approaches innovation. Not only does it need to create a culture that invests in human capital, it needs to do so by working across borders and focusing on long-term, ultra-high-risk projects. This report examines what MENA countries need to nurture disruption, develop talents and capabilities (in particular in science, technology, and innovation), collaborate across boundaries, and carry out complex, long-term projects.

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THE CASE FOR MOONSHOT MENA

As it looks to the future, the MENA region has abundant talent and resources to scale up its inventiveness. Governments around the region are already stepping into action. Four areas will be key focus priorities:

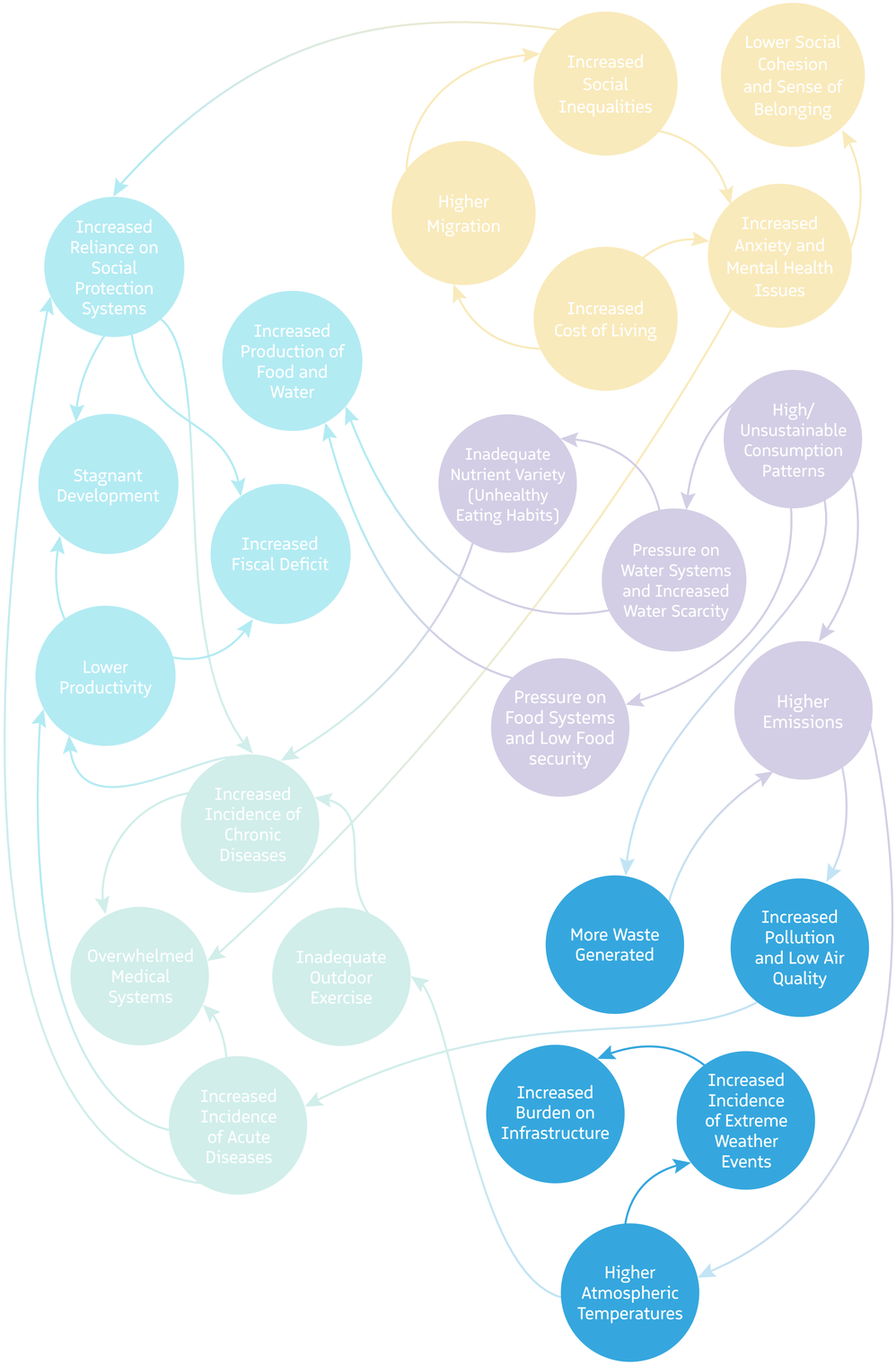
1 'WICKED' CHALLENGES

The MENA region faces a set of 'wicked' challenges—that is, systemic, highly complex, and interlinked problems—that pose obstacles to the region's development and are natural targets for moonshot innovation (Exhibit 1).

EXHIBIT 1:
MOONSHOT MENA 'WICKED' CHALLENGES MAP

VIEW ALL | RESOURCES | ECONOMY | HEALTHCARE | SOCIETY | INFRASTRUCTURE

Click to highlight



Disclaimer: This challenge map is not comprehensive. It is an example that is used to showcase the interconnectedness of the systemic challenges of the MENA region.

For example, MENA is the most water-scarce region in the world. Home to more than 6 percent of the world's population, the region contains less than 2 percent of the world's renewable fresh water.[1] At the same time, the region is highly dependent on other countries to meet its food and nutritional requirements; in the Gulf Cooperation Council (GCC), for example, on average, 90 percent of food is imported.[2] These resource constraints are exacerbated by unsustainable consumption of food, water, and resources. They are also related to high incidences of chronic health issues such as obesity, diabetes, and cardiovascular disease. The prevalence of obesity in the region is 23%—nearly double the global prevalence of 13%.[3] Meanwhile, rising pollution[4]—the result of a growing urban population, fossil-fuel-powered electricity generation, and extreme weather events—deters exercise and further aggravates existing public health challenges. These sub-optimal conditions can also result in increased social inequalities and lower social cohesion, which in turn put pressure on social protection systems and on the economy.

Solving this web of 'wicked' challenges requires radical problem-solving and innovation that is geared toward 'moon shooting' rather than simply relying on troubleshooting to resolve endemic problems piecemeal within current structures.

2 BIG ASPIRATIONS AND OPPORTUNITIES

The region is already making the leap toward the next technological frontier in areas such as the digital world, space and ocean exploration, and sustainability. Dubai aims to create a metaverse economy worth US$4 billion in five years—with pillars that include AR and VR, digital twins, machine learning, IoT, AI simulation, and blockchain.[5] Saudi Arabia has plans to colonize the moon, and the UAE plans to send people to live on Mars by 2117.[6] NEOM and OceanX have carried out pioneering work in the deep sea and shallow reefs of the Red Sea by 3D mapping 1,500 square kilometers of seabed.[7] Egypt aspires to lead the green hydrogen revolution by launching a $40 billion national hydrogen strategy plan.[8]

3 AMBITIOUS RESEARCH DEVELOPMENT AND INNOVATION (RDI) AGENDAS

In seeking to become key players in the global economic landscape, MENA countries in recent years have launched flagship national Research and Development (R&D) initiatives to spearhead innovation, with the goal of creating sustainable, knowledge-based economies. For example, Saudi Arabia's Vision 2030[9] aims to create a competitive, self-sufficient economy, and includes ambitious technology and infrastructure 'giga' projects, such as NEOM. NEOM aims to build a $500 billion futuristic city on the Red Sea billed as "the first cognitive city" in the world, a digitally and AI-enhanced human-centric city focalized on improving livability, encouraging socialization, and fostering connectedness. NEOM recently announced plans to launch revolutionary transport technology for public transit and to partner with global car manufacturers to drive electric motorsports.[10] The UAE launched Vision 2071[11] "to make the UAE the best country in the world," providing excellent education and nurturing a happy and cohesive society, with a strategic focus on science, innovation, and technology, as well as investments in advanced technology education and space exploration. For example, the UAE government recently set up Area 2071, an innovation ecosystem focused on facilitating collaboration between government and startups, scaleups, and innovative SMEs in the technology field and beyond.[12]

In July 2022, Saudi Arabia announced a new RDI program that aims to add $16 billion to GDP by 2040.[13] In September 2022, Dubai set up its RDI program, which it sees as "key to achieving Dubai's futuristic vision for a robust knowledge-based economy."[14] The Qatar Research, Development, and Innovation Strategy 2030 (QRDI 2030) aims to transform the country's RDI ecosystem to address national challenges.[15] And under Operation 300bn, the UAE's Ministry of Industry and Advanced Technology is developing the country's industrial sector to grow to more than $80 billion by 2031.[16]

4 TALENT AND RESOURCES

With its abundant resources, investments in talent and technology, and deep-rooted culture of knowledge and discovery—for example, a 9th century Arab scholar pioneered algebra and algorithmic sciences—the Middle East has a base on which to build up to moonshot innovation. The number of patent applications from the MENA region has risen sixfold in the past two decades.[17] Entrepreneurs, innovators, and researchers have access to growing R&D resources, and they are championed by public- and private-sector institutions across the region. However, spending on R&D as a percentage of GDP was well below the global average of 1.9% in 2020, with the highest percentages in the UAE (1.5%), Egypt (1.0%), and Saudi Arabia (.5%). Similarly, despite gains in recent years, the region still has a relatively low concentration of researchers. In 2020, the Arab states had 614 researchers per million inhabitants—compared with more than 4,000 in Australia, New Zealand, and North America, and more than 7,000 in Singapore and Scandinavia.[18] Both R&D spending and the research talent pipeline will need to be scaled up to enable moonshot innovation.

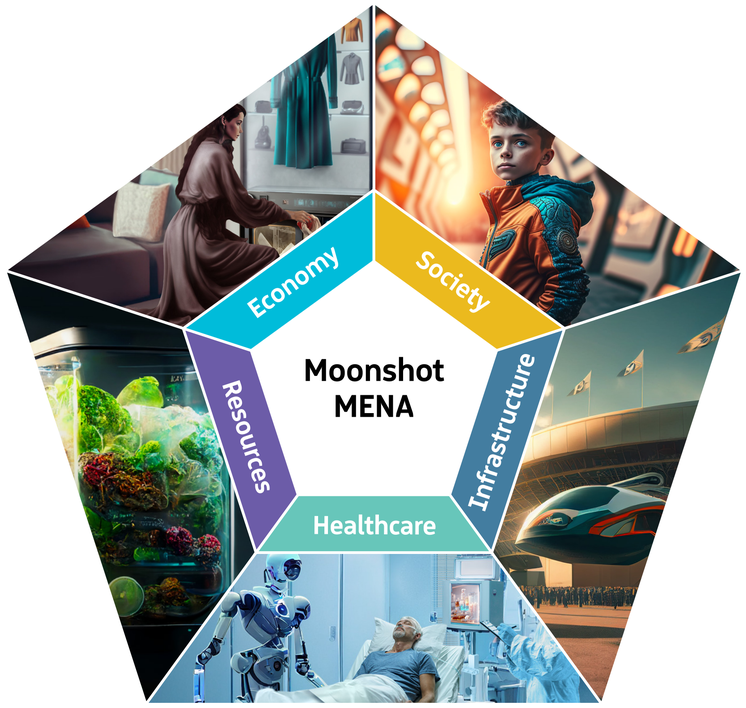
Taken together, the 'wicked' challenges confronting the MENA region—combined with its large-scale ambition, talent, and resources—create a strong foundation for Moonshot MENA. Exhibit 2 outlines five potential moonshot missions and objectives that correspond to the region's systemic challenges. All five have a target date of 2040, which allows time for the discovery and development of new technologies and coincides with many existing RDI targets in the region. They are:

- Redefining the economy to ensure more inclusive rising prosperity
- Rehumanizing society to improve social cohesion
- Achieving resource equilibrium by providing universal adequate nutrition while simultaneously ensuring preservation of natural resources
- Reinventing healthcare with the goal of extending life expectancy by at least five years (based on global historical trends[19] and assuming no further pandemics)
- Rethinking space and building 50 cognitive net-positive cities, cities that not only achieve zero emissions but make a positive contribution to their environment

Critically, each mission would have significant spillover effects on the entire system.

EXHIBIT 2:
MOONSHOT MENA MISSIONS AND MOONSHOT EXAMPLES

Experience moonshots of epic ambition on **ideationcenter.com/Moonshots.**



MISSIONS	MOONSHOTS
REDEFINE THE ECONOMY	
By 2040, redefine wealth and value to make economies more inclusive	1. Redefine consumption habits and models, such as sustainable fashion 2. Pilot the care economy—an economy centered on care, trust, generosity, and collective intelligence 3. Launch the Planetary Boundary Index to recalibrate countries' performance and replace national income statements
REHUMANIZE SOCIETY	
By 2040, reduce social inequalities and improve social cohesion	1. Build the first anti-fragile kid emotion simulator to foster a resilient society 2. Introduce the collective action quotient to incentivize corrective actions for the collective benefit
RETHINK SPACE	
By 2040, build 50 cognitive net positive cities	1. Adopt antigravity to revolutionize movement[20] 2. Build 15-minute hyperloop cities
REINVENT HEALTHCARE	
By 2040, enable every person to lead a healthier life and live five years longer	1. Eradicate diabetes with pancreas implants made from algae 2. Eradicate the need for organ donation with 4D organ factories 3. Establish genetic clinics to eradicate genetic diseases before children are born
ACHIEVE RESOURCE EQUILIBRIUM	
By 2040, provide adequate nutritional resources for every person in MENA countries while preserving natural resources	1. Invent net-positive nutrition canisters that provide sufficient nutritional value with zero emissions 2. Genetically alter plants to require less water 3. Build a reverse ecosystem in which the natural environment is regenerated by production systems

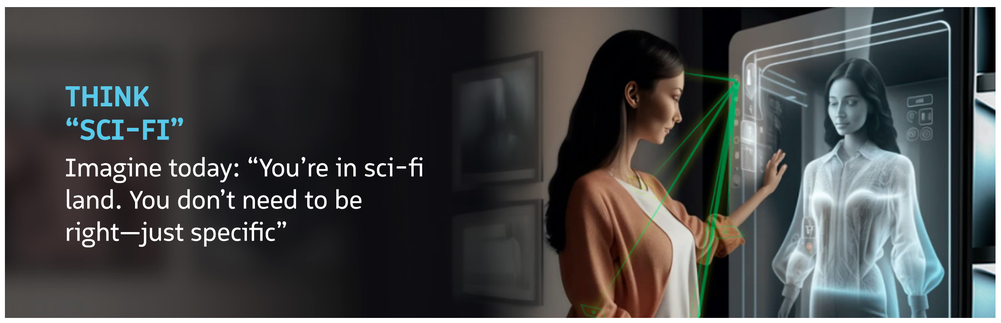
FOUR PARADIGM SHIFTS TO ACHIEVE MOONSHOT MENA

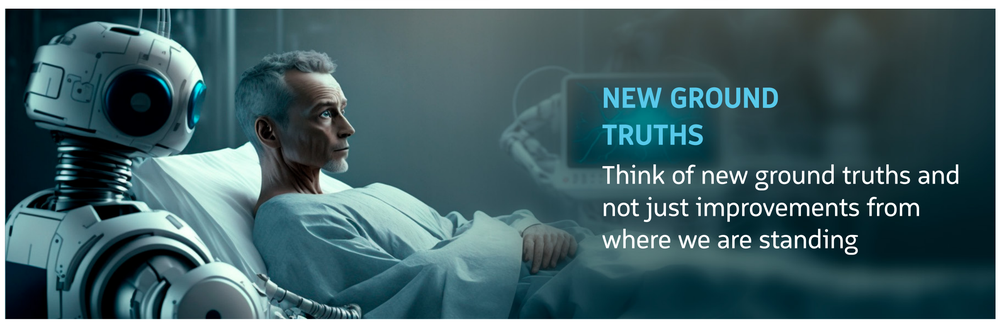
We envision Moonshot MENA as a grand program to innovate radical, breakthrough technology in pursuit of ambitious, large-scale missions—and to position MENA as a world leader in moonshot innovation. To succeed, moonshots require radical change. That starts with a change in thinking and carries on through a change in how projects are managed, funded, and overseen.

1 FROM INCREMENTAL TO MOONSHOT THINKING

Moonshot innovation starts with moonshot thinking. This means shifting the goalposts from incremental to exponential improvements, from existing truths to new ground truths or 'zeroth' principles (Exhibit 3). Moonshots do not pursue innovation for the sake of 'more' or 'bigger,' but aim to disrupt the current accepted limits and turn fiction into reality. Prior to NASA's Apollo program and its successful 1969 mission, putting a man on the moon was largely considered to be out of reach. It took persistent ambition, vast resources, and a high appetite for risk—but it all began by reimagining what was possible (see "Types Of Moonshots" sidebar, page 13).

EXHIBIT 3: FOUR PRINCIPLES OF MOONSHOT THINKING





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Moonshot thinking is a journey with impact. It begins with setting a grand goal or mission—one that has universal and significant impact on the entire region—with a clear definition of success. For example: providing adequate nutritional resources for every person in MENA while preserving natural resources by 2040, or enabling every person in MENA to lead a healthier life and extending the life expectancy in the region by five years. This is the why, or the motivating force that will captivate the imagination and passion of stakeholders, including governments, entrepreneurs, researchers, innovators, and private-sector investors, among others. The next step is to imagine possible futures through a 'sci-fi' lens, and then turn those ideas into tangible reality, grounded in science and technology. The goal is to unleash the full extent of creative thinking to build moonshot simulations where the grand goal is achievable. Using these destinations as a starting point, the final step is to connect these imagined futures to the present: Based on the region's current capacity, what needs to hold true and what needs to exist for the moonshot to become a reality? These briefs are then scaled and refined, through extensive testing and experimentation, to generate missions—project-driven initiatives with a clearly established, scope, and time horizon.

TYPES OF MOONSHOTS

Moonshots exist across a spectrum of urgency—some are reactive and driven by an immediate need, while others are aspirational and emerge from a desire to challenge existing constraints.

THE PFIZER-BIONTECH COVID-19 VACCINE is a prime example of a reactive moonshot that was launched as a result of external challenges. As the pandemic threatened lives and livelihoods around the world, Pfizer and BioNTech took a bet on existing yet unproven breakthrough mRNA technology.[21] Their extraordinary efforts resulted in an effective vaccine developed in record time. Spillover benefits include new forms of logistics and new mRNA applications.

THE ORIGINAL APOLLO MOONSHOT falls on the other end of the spectrum. Born of national ambition and pride, NASA's mission to put a man on the moon was partly aspirational and partly political, spurred on by a challenge to transcend the boundaries of humankind and compete against the Soviet space program.[22] Its legacy—in the realms of space suits, food and water provision in space, computation, communication, remotely piloted rovers, and atmospheric control, to name a few—proves that individualistic aspirations do not compromise the far-reaching spillover effects of the resulting technological breakthroughs.

BETWEEN THESE TWO EXTREMES lie proactive moonshots such as self-driving cars and Google Brain—the artificial intelligence used to power Google Translate. These projects were initially breakthrough inventions designed to solve real-world, large-scale problems, and, in doing so, to push the boundaries of applied science.

MOONSHOT MENA would embrace a diverse portfolio of moonshots, from reactive to proactive to aspirational. While the impetus for these different types of projects varies, they all require similar paradigm shifts in mindsets, capabilities, funding, and governance to succeed.

The success of Moonshot MENA will depend on the adoption of a learning and experimental mindset across the innovation ecosystem. This involves being flexible and willing to change course when necessary, recognizing that the journey is as important as the result. Progress is often nonlinear, and any successes or spillover benefits should be recognized and celebrated along the way.

Moonshot thinking requires a high tolerance for risk and an understanding that failure is a necessary, and often productive, part of the process. For example, the $2.5 billion investment in the Concorde, the world's first supersonic aircraft, amounted to a significant financial commitment when it was first developed in the 1960s, equivalent to about $25 billion today. The aircraft ultimately failed to revolutionize international travel and was discontinued in 2006 due to high operational costs, flagging demand, and safety concerns.[23] However, the positive ripple effects have continued to shape the future of aviation. Building on the lessons from the Concorde, a new generation of carbon-neutral supersonic jets is being developed by Boom Supersonic, with major airlines already placing preorders. One of the core tenets of moonshot thinking is also a tenet of Silicon Valley today, namely that it is better to fail than not to have tried at all. Indeed, learning from failure is often cited by tech icons, including the late Steve Jobs, as the first step to great innovations, because it creates and reveals new paths of discovery along the innovation journey.[24]

As a result, moonshot missions must have well-defined risk management guardrails and clear processes for discontinuing and learning from projects when they do fail. For example, X, Alphabet's "Moonshot Factory" (formerly Google X) discards more than 100 project ideas a year at various points in the development phase.[25] But the time and resources invested in these projects often lead to new and useful insights that can be applied to other technologies. One example is X's Loon project, which sought to use balloons to bring connectivity to remote areas. It was discontinued by X in 2021 after eight years, for lack of commercial viability. However, the lessons learned and more than 200 of its patents are being used in new projects.[26]

2 FROM SILOED EFFORTS TO CROSS-BORDER COLLABORATION

Moonshot innovation is achievable only if the countries of MENA break out of research silos. These can be national silos, with little coordination or cooperation between researchers in one country and other stakeholders, including governments and companies that could put their findings to use. The silos can also be international ones, in which individual countries work alone rather than working together to solve common problems. Some countries in the region have already spearheaded their own ambitious initiatives (such as the Mars Hope Probe, which aims to be the first probe to provide a complete picture of the Martian atmosphere and its strata,[27] and NEOM). Given the commonality of challenges, the level of risk taking needed, and the scale of investments required, multilateral collaboration can be a fruitful approach to a range of challenges. To that end, we propose the formation of a regional Moonshot MENA Lab with the mandate to champion and coordinate efforts to support breakthrough innovation toward a grand goal. Such an initiative would ensure both cross-sectoral and cross-country collaboration.

A Moonshot MENA Lab would represent a new kind of regional governance model—one that deepens and goes beyond existing cross-border collaboration (such as the Arab Space Discovery Program and the Middle East Green Initiative). Moving past sectoral and national silos would enable Moonshot MENA to make the most of each country's competitive advantage, create a larger and more diverse resource pool, and pool the risk of moonshot missions. At the same time, collective action toward an audacious goal can contribute to a sense of regional pride and help secure the future of the Middle East.

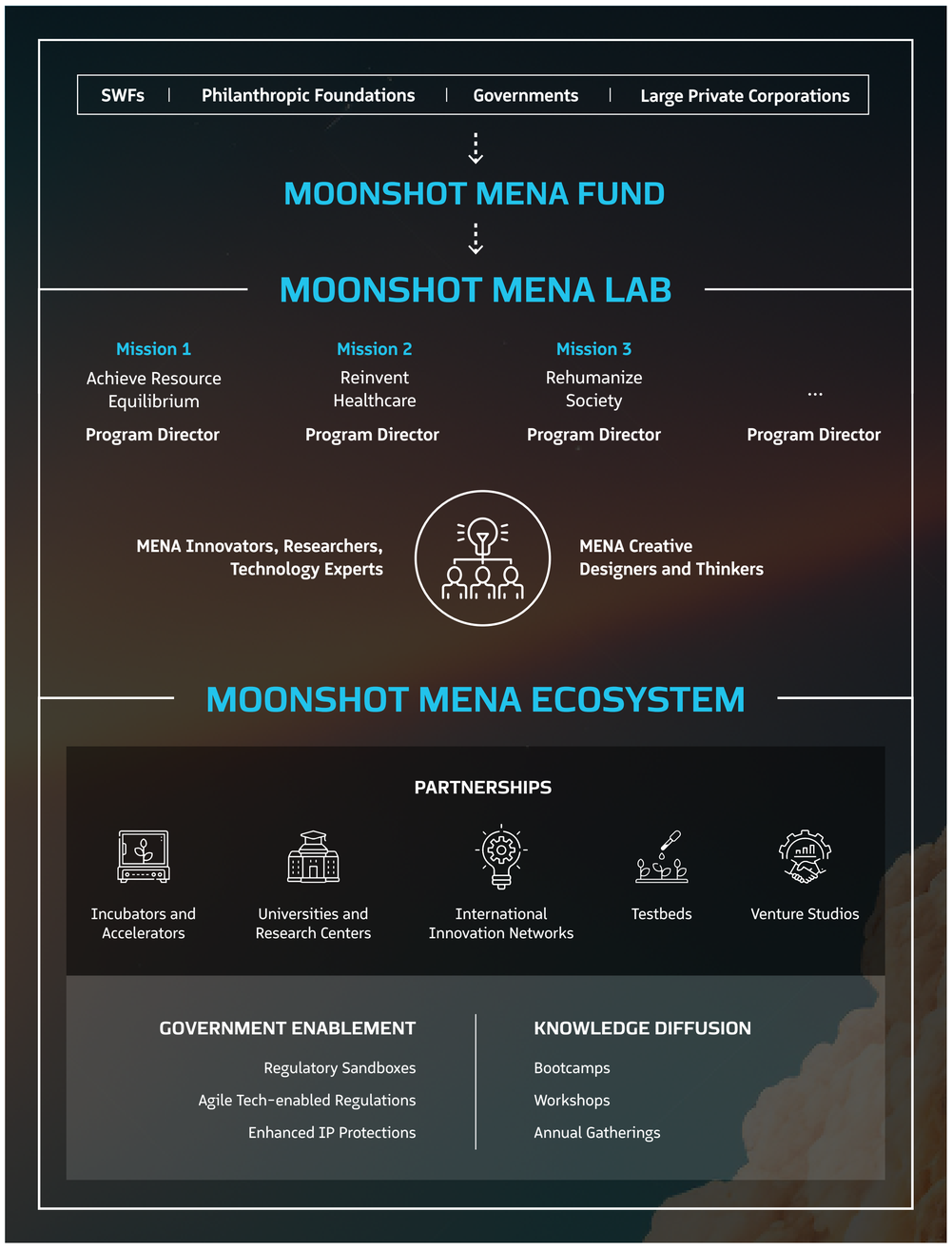
The establishment of the Moonshot MENA Lab must be a joint decision and commitment by governments within the region, and its leadership body should be made up of senior government leaders of all countries involved. The Lab would be organized around individual programs—each led by an institutional leader and each with its own grand goal. Additionally, these program areas could be aligned with each country's RDI priorities and existing research base (possible clusters include health and well-being, resource sustainability, energy and industrial leadership, space exploration, and augmented human-machine intelligence).

The Lab's primary responsibilities would be to formulate moonshot missions in pursuit of an agreed-upon grand goal, cultivate moonshot thinking, oversee and support the execution of moonshot missions, and diffuse knowledge and discoveries throughout the region. The Lab should maintain a core team of experts and benefit from special hiring authorities and alternative contracting vehicles that can attract the right level of talent. Moreover, the Lab should have a clear exit strategy to mitigate the downside in the case of failure.

As part of the governance structure, dedicated regulatory sandboxes can oversee the testing and experimentation of new technologies. Additionally, different countries can enable regulatory sandboxes in different focus areas to expedite the research agenda. For example, if DNA testing is prohibited in one country, this research may take place within a sandbox in another country. The Lab will also need to partner with relevant government agencies to ensure that policies and regulations (such as IP protections and innovative financing) are forward-looking, data-driven, and enabled by regulatory technology (Exhibit 4).

Perhaps the most prominent example of a moonshot lab is the US government's Defense Advanced Research Projects Agency (DARPA).[28] The agency actively supports and prioritizes projects with the highest-impact, highest-risk, and most forward-looking technology, allowing recipients to leapfrog technical barriers and demonstrate proof-of-concept solutions. The model has successfully contributed to moonshot innovations (such as GPS and the internet), many of which have widespread commercial applications. Other examples include the Advanced Research and Invention Agency (ARIA)[29] in the UK and the EU's Horizon Europe, a cross-border research and innovation program that facilitates cross-country collaboration, knowledge sharing, and funding for disruptive innovation across five mission areas.[30]

EXHIBIT 4: MOONSHOT MENA LAB GOVERNANCE



3 FROM SOURCING TALENT TO BUILDING A TALENT ECOSYSTEM

Moonshot innovation requires a talent and knowledge ecosystem that facilitates the cross-pollination of ideas from a diverse range of stakeholders across the region—innovators, entrepreneurs, researchers, technology experts, government and regulatory agencies, private corporations, risk capitalists, and creative thinkers.

Today, there is limited knowledge transfer and collaboration within the MENA region. Although new patent technology tends to converge around a similar set of topics (including construction and construction materials, specialty chemicals, and oil), most researchers who opt to collaborate do so with those outside the region's borders. Between 2016 and 2020, 56 percent of the more than 20,000 patents in the MENA region were filed locally, and only 2% were jointly filed with researchers in MENA countries.[31] As they transition into full-fledged knowledge economies, MENA countries should focus in the short term on fostering collaboration to harness the full potential of existing knowledge and capabilities within the region, in parallel with longer-term investments in capability building (see "Example of Successful Talent Ecosystems," below).

Leaders could grow this intra-regional talent ecosystem by creating formal networks and spaces in which to convene—including incubators, accelerators, venture studios, and testbeds, in addition to workshops, bootcamps, and annual gatherings. A diversity of different backgrounds and expertise is a priority, since this can breed divergent thinking, which is vital to the success of moonshot innovation. Though the focus should remain on developing talent within MENA countries, rather than sourcing talent from abroad, the region can also benefit from partnerships with international research centers, innovation bodies, and networks for knowledge transfer and capability building.

EXAMPLE OF SUCCESSFUL TALENT ECOSYSTEMS

An example of a successful talent ecosystem can be found in the Cascadia Innovation Corridor[32]—a cross-border initiative (among the cities of Vancouver, B.C., Seattle, and Portland) with the goal of enhancing the region's position as a global hub of innovation and commerce. The main governance body engages in coordinated partnerships to facilitate knowledge exchange, attract capital and top talent, and build a network of connected people, companies, universities, colleges, and researchers. Within the UK, the Catapult Network[33] brings together researchers and innovators across public and private sectors to supercharge innovation.

4 FROM PROJECT-BASED TO SCALABLE, LONG-TERM FUNDING

Moonshot innovation calls for a shift away from the classic, performance-based funding model to a more agile and scalable funding model. Moonshots are large-scale, expensive, and high-risk projects with a long time horizon. Funding for such high-risk, high-reward projects should be completely separate from funding for conventional RDI projects.[34] Moonshot investment models must go beyond typical project finance and adopt a much longer-term and less return-oriented approach with a higher tolerance for failure.

The most effective path is to set up a Moonshot MENA Fund specifically designed for moonshot missions. We estimate that a Moonshot MENA Fund would require $1 billion of initial base funding over the next five years, with funding split across multiple moonshot goals. This amount is in line with the investment funding of other developed nations around the world, but will be adjusted depending on the needs of the missions and the programs to be funded. For example, Japan has allocated $1 billion toward its six moonshot goals.[35] The US Advanced Research Projects Agency-Energy (ARPA-E) has an annual budget of around $430 million.[36] And in the UK, ARIA has invested 800 million GBP to fund investors with high-risk, transformational ideas.[37]

The Fund would provide a range of funding tools to match the risk appetites of different members, including sovereign wealth funds, public-sector institutions, private corporations, venture capital firms, and philanthropic organizations. It is worth noting that many of the moonshot missions fit well within the mandate of sovereign wealth funds—such as Mubadala in Abu Dhabi and the Public Investment Fund (PIF) in Saudi Arabia—to invest in projects that diversify their national economies and develop local capabilities. For example, the PIF recently announced plans to invest $24 billion in the broader MENA region to boost regional economies and advance the objectives of Saudi Arabia's Vision 2030.

To allocate funding, the Fund can evaluate each mission on its transformation impact, strength of supporting evidence, potential to scale and generate spillover effects, and long-run value to the existing portfolio of missions. The type of funding will likely evolve as the mission progresses through different maturity levels: early-stage ideas should rely on grants to move into the proof-of-concept stage, while more mature solutions could be eligible for both grants and investments depending on the risk level.

Finally, funding decisions must consider the value and ownership of intellectual property (IP). A Moonshot MENA Fund can work with mission teams and funders early on to create transparency and alignment on IP questions.

The four transformations we have listed above, covering the mindset, governance, capabilities, and funding needed for moonshots, are indispensable, but in some ways, they are by-products of two foundational aspects: aspiration and urgency. The aspiration is for the region to play a much more substantial global role in tackling key issues, whether climate change or chronic disease. The urgency is based in part on intractable problems that the region faces now, especially water scarcity.

CONCLUSION

A moonshot is in many ways a leap of faith. It is time for the MENA region to take that leap now. The timing is propitious: Governments in the region are looking for out-of-the-box thinking to modernize their economies and ensure future prosperity. In global terms, the MENA region is uniquely positioned to move quickly into breakthrough areas including converting energy to food, using algae for biomedical applications, increasing carbon capture and storage, and many others. This moment calls for both private- and public-sector players to step up, embrace the vision, and act. Successful implementation is the best way to grow trust. In a portfolio of missions, one success can feed another, providing the drive is there to achieve the giant leap—one step at a time.

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ABOUT THE AUTHORS

Dr. Yahya Anouti is a partner with Strategy& Middle East, part of the PwC network. Based in Beirut, he is a member of the energy, chemicals, and utilities practice in the Middle East. He specializes in resource-based sustainable development and energy-related strategies, and he supports governments, national oil companies, international oil companies, and utility companies across Asia, Africa, Europe, the Middle East, and the United States.

Dima Sayess is a partner with Strategy& Middle East and the director of the Ideation Center. Based in Dubai, she has more than 15 years of experience in public-sector consulting in the region, and formerly served as a strategic development advisor for the strategy management and governance sector at Dubai's Executive Council.

Ramzi Hage is a principal with Strategy& Middle East. Based in Beirut, he is a member of the energy, chemicals, and utilities practice in the Middle East. He specializes in the renewable energy sector, with a focus on policy development, program establishment and execution, and manufacturing value chain localization.

Dr. André Duerrbeck is a principal with Strategy& Middle East. Based in Dubai, he is a member of the energy, chemicals, and utilities practice in the Middle East. He focuses on localization strategies for downstream industrial value chains, and he supports government entities and the private sector to shape their advanced technology and innovation road maps.

Sarah Dagher Al Feghali is a senior fellow with the Ideation Center. Based in Dubai, she has more than 14 years of experience in public-sector consulting in the region and formerly served as an advisor to the UAE Prime Minister's Office and the UAE Government Accelerators, focusing on strategy and government innovation.

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