



**ENVISIONING AN ICT LED
APPROACH** TO THE NATIONAL
TRANSFORMATION PROGRAM FOR
THE KINGDOM OF SAUDI ARABIA

Prepared by:

Sponsored by:



Envisioning an ICT led Approach to the
"National Transformation Program" for the
Kingdom of Saudi Arabia



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FOREWORD

Economic transformation has become a common theme for economies and enterprises across the globe in recent times. Digital transformation is a manifestation of that, set in the context of a modern high-tech society. However, many entities – from national governments to the smallest business entrepreneurs – are struggling to formulate clear strategies for enabling such transformation to take place.

Saudi Arabia's leadership has taken the unique step of articulating a clear vision for the country by drafting a comprehensive strategic plan to achieve those goals. The National Transformation Program is confirmation of the Kingdom's commitment to driving change, and has the potential to cement Saudi Arabia's leading position long into the future, even as global markets continue to experience uncertainty.

With the successful execution of the National Transformation Program, and the ultimate achievement of Saudi Vision 2030, the Kingdom's national leaders, business executives, and citizens will enjoy heightened prosperity, international prominence, and quality of life.

Against the backdrop of a complex and rapidly evolving ecosystem, my team and I have documented some of the many ways that the Program can bring improvements to Saudi Arabia's institutions, economy, infrastructure, and people. Numerous possibilities are being explored around the world, with many examples already set by other nations – in the Far East, in the West, and closer to home in the Gulf; but the Saudi solution will be uniquely Saudi, tailored specifically to address the needs and opportunities of the Kingdom.

IDC is honored to present this overview of the National Transformation Program, and to reaffirm our commitment to the Kingdom and the friendships and partnerships we have established there. Our thanks go to HH Deputy Crown Prince Mohammed bin Salman, the leadership team within the Council of Economic and Development Affairs, and the many ministers, leaders, and innovative thinkers that have shaped the Program and will be instrumental in delivering its potential.

We look forward to supporting future reports with IDC insights and analysis of the transforming landscape in Saudi Arabia.

A handwritten signature in black ink, reading "Kirk Campbell". The signature is fluid and cursive, with a long horizontal stroke at the end.

Kirk Campbell
President and CEO
IDC

ACKNOWLEDGEMENTS

This report would not have been possible without the support of IDC's partners, the key stakeholders responsible for driving digitization initiatives in the Kingdom, and the IDC team that collaborated across four continents to extrapolate relevant case studies and best practices from around the world and link them to Saudi Arabia's current transformation initiatives. We are grateful to the Ministry of Communication and IT (MCIT) for the invaluable contributions they made by sharing their visions in relation to the National Transformation Program during these transitioning times, and for the support of our sponsors – Wareef, Hewlett Packard Enterprise, Mobily, and Dell EMC.

ABOUT IDC

International Data Corporation (IDC) is the premier global provider of market intelligence, advisory services, and events for the information technology, telecommunications and consumer technology markets. IDC helps IT professionals, business executives, and the investment community make fact-based decisions on technology purchases and business strategy. More than 1,100 IDC analysts provide global, regional, and local expertise on technology and industry opportunities and trends in over 110 countries worldwide. For 50 years, IDC has provided strategic insights to help our clients achieve their key business objectives. IDC is a subsidiary of IDG, the world's leading technology media, research, and events company.



INTRODUCTION:
SAUDI ARABIA'S NATIONAL
TRANSFORMATION PROGRAM:
A DETAILED ROADMAP FOR
VISION 2030

01



INTRODUCTION: SAUDI ARABIA'S NATIONAL TRANSFORMATION PROGRAM: A DETAILED ROADMAP FOR VISION 2030

Saudi Arabia's Vision 2030 initiative is a long-term economic blueprint designed to curtail the country's dependence on oil. The initiative outlines the regulatory, budgetary, and policy changes that will have an impact on all major aspects of the Saudi economy.

The Vision 2030 initiative sets out plans for developing "a vibrant society, a thriving economy, and an ambitious nation". At a macroeconomic level, Saudi Arabia aims to increase non-oil government revenues from SAR 163 billion (\$43.5 billion) to SAR 1 trillion (\$267 billion) by 2030, and to raise the share of non-oil exports in non-oil gross domestic product (GDP) from 16% to 50% over the same period.

Other key goals span economic acceleration and social development:

- Increase foreign direct investment from 3.8% to 5.7% of GDP in line with more developed economies.
- Increase the private sector's GDP contribution from the current 40% to 65%.
- Increase small and medium-sized enterprise (SME) GDP contribution from 20% at present to 35%.
- Lower unemployment from 11.6% to 7%.
- Improve the participation of women in the workforce from 22% to 30%.
- Raise government effectiveness and efficiency and improve Saudi Arabia's position in the Government Effectiveness Index published by the World Bank, from 80th place in 2015 to at least 20th by 2030.
- Improve Saudi Arabia's position on the annual Global Competitive Index published by the World Economic Forum. The government aims to be listed as one of the top 10 countries by 2030, from its current ranking of 25th.

Where Vision 2030 describes the ambitious economic and societal goals for Saudi Arabia, the National Transformation Program (NTP) provides detailed roadmaps – based on milestones and targets – to get there. The NTP is one of several executive programs supporting Vision 2030; others include the Saudi Aramco Strategic Transformation Program, the Public Investment Fund Restructuring Program, the Human Capital Program, the Strategic Partnerships Program, the Privatization Program, and the Program for Strengthening Public Sector Governance.

The NTP was devised to set out strategic objectives and milestones for government bodies to ensure that the goals of Vision 2030 are met. The NTP was initially

drawn up with detailed roadmaps for 24 government organizations, with the intention of annually expanding its remit beyond the initial group of 24 government bodies.

The NTP provides a granular, detailed assessment of each government organization, the objectives it should achieve every year, the benchmarks and metrics by which improvement will be measured, and the comparative regional and global targets. The objectives will be constantly reviewed and updated, ensuring that resources and support are aligned to meet the objectives. New bodies will coordinate programs under the NTP, including the National Center for Performance Measurement, the Delivery Unit, and the Project Management Office of the Council of Economic and Development Affairs.

Government entities participating in the NTP will be encouraged to share best practices, identify common goals, engage in joint planning, and transfer and share expertise as needed. It is anticipated that, through initiatives implemented as part of the NTP, more than 450,000 jobs will be created in the private sector.

Technology will be a key enabler and driver of the numerous changes envisaged by Vision 2030, with the goal of developing the nation's digital infrastructure and stimulating the related economic sectors, industries, and private sector entities. Digitization will also play a central role in achieving the milestones of the NTP. The program identifies a number of digital transformation areas to support the NTP's initiatives, including five common digital platforms, 29 essential digital initiatives for key sectors, and a number of national digital assets that may be developed to support government digital transformation.

Countries around the world view digitization as an opportunity to enhance the lives of citizens and drive economic and social progress. Similarly, Saudi Arabia expects ICT usage and digitization to accelerate the execution of the programs and plans envisaged in the Vision 2030 blueprint and the NTP, and help drive economic and social development, promote good governance, and enhance national security.

For this to happen, a concerted effort must be made by organizations across demographics and industries to align their ICT strategies with the Vision and its overarching executive programs, as a lack of alignment could adversely impact the goals outlined by the government. However, such alignment may prove particularly challenging for various demographics and industries, so strategic overview and constant review will be essential.

ICT can enable, facilitate, and accelerate the transformation envisioned by the NTP and Vision 2030 initiatives. If implemented with sufficient diligence, Saudi Arabia can be expected to have a vibrant domestic IT industry by 2030. The country can further be expected to have a highly efficient and effective government, a digitally transformed private sector, and public eservices that rank among the best in the world.

According to IDC's Saudi Arabia CIO Survey 2016, over 80% of government CIOs currently expect their IT budgets to increase from, or remain the same as, the levels recorded in 2015. This indicates that, despite the pressure on organizational budgets in general, IT remains a key priority for organizations in the country, a position that will lead to public services enablement and efficiency improvements. IDC estimates that public sector spending on IT in the Kingdom will surpass \$2 billion in 2016.

To achieve these outcomes, telecommunications providers will need to provide a highly developed and resilient communications infrastructure, SMEs will need to rapidly embrace ICT solutions and services, and the local IT industry will need to innovate and develop more valuable products and services. The education system will also need to refocus its efforts on nurturing the existing ICT skills base.

The digitization of industries will ultimately lead to improved competitiveness, with ICT proving invaluable in automating end-to-end business processes across the entire value chain. Manufacturing is one obvious beneficiary, where the Internet of things (IoT) will enable manufacturers to leverage a combination of software, sensors, and IP-enabled connectivity to drive innovation around their products and processes. ICT is vital in automating end-to-end business processes across the entire supply chain. Since a tremendous amount of data is created and captured by procurement, sales, shipping, and customs and regulations processes, ICT is key to improving supply chain performance. Government systems (e.g., customs and payment systems) can provide an open interface that facilitates integration with all private sector players in the supply chain ecosystem.

Saudi Arabia's healthcare and tourism industries are also poised to embrace emerging technologies in order to enhance the services they offer. Integrating healthcare service delivery by enhancing collaboration across the ecosystem of formal and informal caregivers will deliver considerable benefits while reducing costs, particularly in long-term care. IoT could be a key driver in the development of remote health monitoring and personal wellness services, and it will improve access to healthcare. Such services and improvements will help the Saudi government to increase average life expectancy from 74 to 80 years of age, as outlined in Vision 2030.

Today, tourism authorities worldwide are embracing digital initiatives. Through location-based services, and with augmented reality on the horizon, the smartphone has become an indispensable tool that incentivizes tourists to spend more money during their stay and offers a wide range of entertainment irrespective of location, thereby creating opportunities to maximize tourist activity and revenue. An omnichannel tourism strategy that involves every major player in the ecosystem will encompass social networks as well as mobile technologies.

At present, SME contribution in Saudi Arabia lags behind comparative global markets, contributing only 20% of the GDP. Vision 2030 calls for this figure to increase to 35%, with the associated growth of business scope, employment, and opportunity. This will also be a major contributor to the goals of reducing Saudi unemployment and increasing women's participation in the workforce.

These transformations will require sweeping changes in the private and public sectors. The newly formed SME Authority will be responsible for implementing suitable strategies and monitoring the success of initiatives across the NTP in supporting SME development. The implementation of a sophisticated nationwide digital infrastructure will be integral to empowering the citizens of the future and providing businesses of all sizes with the tools required to drive greater growth, agility, and competition for the benefit of Saudi Arabia as a whole.

Deputy Crown Prince Mohamed bin Salman visited Silicon Valley in 2016, highlighting the role that digital technology, and particularly entrepreneurs and startups, can play in a growing economy. Uber is an example of a modern champion of digital transformation; the company grew from a small startup into a major international player, and is a recipient of funding from Saudi Arabia's Public Investment Fund. Uber offers transportation services in numerous countries, including Saudi Arabia, with its services powered by the latest mobile applications and Internet technologies.

In summary, ICT can be a key enabler of the national programs outlined in Vision 2030, and described in detail in the NTP. Saudi Arabia is the largest spender on ICT in the Middle East, with spending estimated at \$35 billion in 2015 and expected to surpass \$39 billion by 2019. The adoption and use of ICT by individuals and enterprises in the public and private sectors has been rising rapidly in recent years, and IDC has identified a number of strategies, described in detail further in this document, that Saudi Arabia could employ in order to facilitate its Vision 2030 goals and thereby develop a thriving digital economy and digital society.

"ICT is vital in automating end-to-end business processes across the entire supply chain. Since a tremendous amount of data is created and captured by procurement, sales, shipping, and customs and regulations processes, **ICT is key to improving supply chain performance.**"



**INTERVIEW WITH MINISTRY
OF COMMUNICATION AND
INFORMATION TECHNOLOGY:**
SAUDI CITIZENS AND
GOVERNMENT WILL DRIVE
TRANSFORMATION HAND IN HAND

02



INTERVIEW WITH MINISTRY OF COMMUNICATION AND INFORMATION TECHNOLOGY: SAUDI CITIZENS AND GOVERNMENT WILL DRIVE TRANSFORMATION HAND IN HAND

Eng. Ali Bin Saleh Al-Soma

Ali Bin Saleh Al-Soma is the advisor to the Minister of Communications and IT, and the Secretary General of The National ICT Plan. He also acts as the leader of the ICT sector's vision realization office (VRO) within the NTP and has occupied several leadership positions including the Director General of the Saudi e-Government Program (Yesser), IT Director in The Royal Commission of Jubail & Yanbu and he is a member of many government committees. He holds master degree in computer science from California State University, Long Beach, USA.

The National Transformation Program was developed to help fulfill "Saudi Arabia's Vision 2030", could you briefly highlight why the NTP should be considered as a landmark initiative in the evolution of the Kingdom?

The NTP is one of 13 other programs to realize vision 2030, it has a great socio-economic impact as it mobilizes and concentrates the country's resources and efforts in an unprecedented way to achieve an ambitious vision. The way the NTP is planned, governed, executed, and monitored is unprecedented too. Each ministry and government entity has identified a list of challenges to focus their efforts on resolving during 5 years. The execution of the program will be tracked and monitored by a governance body to resolve any conflicts or issues across all entities as they arise. In addition, coordination between entities and between public and private sector has increased and shared cross-cutting initiatives are planned with all related stakeholders sitting at the same table. Transparency is built into the whole process as well. KPIs were developed and adopted by entities and they were published to the public too. In a nutshell, the NTP has a great momentum to help the Kingdom fulfill its 2030 vision through the concentration of resources and collaboration between public and private sectors to achieve a shared set of ambitious goals.

Being a key stakeholder responsible for driving digitization within the Saudi public sector, how would you describe the current state of digitization in the kingdom?

Any observer can realize that the Kingdom has achieved a big leap in digitization during the last decade. Some indicators are significant: Internet penetration has reached 68%, mobile penetration has reached 167%, PC penetration is above 80%, 5 million active Saudis on Twitter, 7 million on Whatsapp, 8 million on Facebook, 90 million YouTube views per day. In the government sector, the e-Government Program (Yesser) has played a vital role in transforming the government to adopt digitization. More than 2,500 e-Services are available online now through Saudi e-Government portal. The Kingdom has reached rank 36 in the UN eGov Index in 2014 (despite a slight setback that happened in 2016 to 44). The private sector has also started the digitization journey since a long time, especially in sectors such as oil and gas, petrochemical and financial services.

However, there are some challenges that need to be addressed in order to achieve the next stage of digitization. For instance, high-speed broadband coverage is still low with FTTH coverage of 12% in urban areas and 4G coverage of also 12% in rural areas. Zooming at the fixed broadband market, the dynamics of penetration are different on the Consumer and the Enterprise markets. On the Consumer market, fixed broadband penetration reached 50% in 2015 with around 3.5 million subscribers; yet the majority is still on low speeds below 20Mbps. On the enterprise side, the market is very promising and the growth will be mainly driven by the SME segments, yet fiber penetration is still low in this segment, and the uptake of ICT services is still lagging behind. Another challenge to tackle is the low adoption of e-Commerce from local enterprises which requires efforts to boost the appetite of specific segments to transform their businesses and adopt e-commerce strategies. The limited digital content that is developed locally is another challenging area in the digitization agenda and it is estimated that the IT industry economic leakage in the Kingdom is 80%. At the same time many of the digitization initiatives cannot be realized effectively without the required human capital capabilities. Demand for ICT professionals in Saudi Arabia is expected to exceed supply by around 56,000 individuals between 2016 and 2020, and thus the need to further increase the efforts for preparing and equipping Saudis with the right tools and qualifications to reduce this gap and develop the skills for next generation technologies to meet market demands. Last but not least, in order to accelerate digitization at a national level, there is a need for a unified governance to drive and synergize all efforts towards this goal. And the good news is the NTP has initiatives to address all these challenges inshaAllah.

What are the potential challenges you envision facing during this phase of transition / lifecycle of the NTP?

NTP calls for a transformation in the government culture and the way things are done. NTP requires a fast-paced and execution-oriented mentality which requires some time to develop. Some entities might face the challenge of shortage

in qualified human resources who can execute the initiatives and achieve results. This challenge is already being tackled by the government through various programs. Additionally, although the level of coordination between the government entities has increased remarkably during the NTP planning phase, there is a challenge to continue this coordination along the execution process and prevent unwanted bureaucracy from slipping into the process. Another thing to note is that the NTP encourages a new level of public/private partnership which requires both parties to enhance the way of communication and collaboration between each other to develop creative solutions for existing challenges, and create new win-win models that benefit the society.

What are some of the key ICT initiatives that will help the Saudi government achieve its key strategic objectives listed in the NTP?

MCIT has played a vital role during the NTP planning phase by leading the center of excellence that helped other government entities introduce digitization into their own initiatives and ensured synergy between digitization initiatives as well. In addition, MCIT led the ICT and Post sectors LABs and adopted initiatives that contribute to helping NTP achieve Saudi vision 2030. To highlight some:

1. The Broadband expansion program: which aims at stimulating operators to invest in broadband and increase FTTH coverage to 80% of dense urban areas and 55% of low-dense urban areas, as well as increase higher speed wireless broadband to 70% of rural areas. These initiatives include:
 - Introduce regulatory mechanisms to incentivize private sector investment in high speed broadband infrastructure
 - Launch stimulus fund to accelerate operators' fiber deployment in suburban area
 - Introduce partnership framework with municipalities to support local deployment
 - Expand scope of USF to support entry-level broadband investment in rural areas
 - Evacuate frequency bands for LTE deployment based on the National Frequency Plan
 - Modernize civil works standards that facilitate high-speed broadband deployment
2. A comprehensive ICT Human Capital program that aims at promoting ICT interest, elevate ICT skills and ensure ICT employability readiness. This program targets employing 20,000 Saudi human cadre between 2016 and 2020 in order to bridge the supply and demand gap in the ICT sector, in addition to increasing the Internet users in the Kingdom to 85%, thus reducing the digital gap in the ICT skills of users.
3. Establish a dedicated independent entity to develop the local IT industry and double its contribution to non-oil GDP from 1.12% to 2.24%. The entity aims at supporting local IT market to develop and grow. It helps entrepreneurs to create more startups, supports SMEs to achieve sustainable growth, and encourages large enterprises to enter the export markets with high quality products and services.
4. An ecommerce program to encourage the retail sector as a start and other

sectors in general to adopt e-commerce and remove any legislative barriers and obstacles that may hinder the growth of e-commerce in the kingdom.

5. The re-structuring of the post sector and the transformation of the Saudi Post Corporation in order to prepare it for corporatization and privatization.

What kind of support from the private sector will assist MCIT in achieving the digitization goals that will eventually help transform the overall landscape in Saudi Arabia?

MCIT believes the private sector is the main partner in the digitization journey. The communication with the private sector started early during the NTP planning phase and HE MCIT minister has conducted several meetings with the private sector leaders including telecom operators, international ICT vendors, local IT companies and Saudi entrepreneurs to communicate the MCIT objectives and initiatives and listen to their opinions and feedback and discuss ways of partnership to execute the initiatives. The meetings were fruitful and MCIT received positive feedback from the private sector and companies showed enthusiasm and commitment towards the objectives.

In the broadband stream, MCIT has started an open dialog with telecom operators on the partnership model and introduced the new broadband stimulus fund that will encourage operators to increase their investments in broadband. Also there have been extensive meetings with international ICT vendors and local large enterprises to partner around building ICT human capital capabilities for Saudi citizens and professionals. Some agreements have been drafted and some MOUs are in the final stage to be signed off. At the same time there are undergoing discussions with the private sector on how to support IT SMEs and entrepreneurs to grow and flourish and identify the best approach to implement the next generation of e-Government initiatives.

The ministry is so keen to sustain this spirit by keeping and encouraging open communication with the private sector. At the same time, the government expects the private sector to embrace those national goals that were set to develop the ICT sector and to direct investments towards areas that serve the vision and intensify the socio-economic impact, especially when it comes to deploying the necessary infrastructure and employing Saudi citizens.

More specifically, with regards to broadband infrastructure, the government expects the private sector to advise on required regulatory incentives in return of deployment commitments, and facilitate sharing on commercial basis, commit to accelerate fiber deployment in dense urban and urban areas over the next years leveraging the stimulus fund, contribute to shaping the partnership model and engage with municipalities to aggregate demand and optimize digging permits, commit to expand wireless broadband coverage to deeper rural areas leveraging the extended USF, commit to deeper LTE coverage and better services leveraging freed spectrum, advise on broadband infrastructure specifications to be included in construction codes, and enhance overall broadband quality of experience throughout Saudi Arabia.

And with regards to human capital development, the government expects large ICT vendors to actively contribute to the human capital program led by the ministry, mobilize the required capabilities to contribute to the development of Saudi ICT human capital, and double down on their commitments in terms of training, internships and participation in nation-wide ICT events. The collaboration between the government and private sector shall cover different dimensions including investments, infrastructure and facilities, capabilities and awareness campaigns, which shall be in sync with international benchmarks and best practices as in the case of Singapore TechSkills Accelerator which is driven by the IDA and supported by major ICT companies, such as Singtel, to help fresh and mid-career ICT professionals get better jobs and grow their careers by developing their core and sector-specific ICT skills.

This is a new era of the public/private sector partnership and it is the right time to drive the sector transformation. The government is committed to creating the right environment for the private sector, and there is no doubt the private sector is equally committed to cooperating and driving this transformation hand-in-hand with the government.

MINISTRY OF COMMUNICATION AND INFORMATION TECHNOLOGY'S INITIATIVES

NATIONAL TRANSFORMATION PROGRAM

"Saudi Arabia's Vision 2030" was adopted as a methodology and roadmap for economic and developmental action in the Kingdom of Saudi Arabia. In its aim to grant the Kingdom a leading position in all fields, Saudi Arabia's Vision 2030 sought to identify the general directions, policies, goals, and objectives of the Kingdom.



1 Introduce regulatory frameworks to stimulate public telecommunications service providers to invest in the broadband infrastructure.



2 Launch the "Broadband Stimulation Fund" to raise the competitiveness of operators and accelerate the deployment of fiber optics in urban areas.



3 Develop a regulatory framework for operators and municipalities to facilitate the deployment of the service and overcome operational difficulties.



4 Expand the work scope of the Universal Service Fund to support investment in broadband in remote areas.



5 Avail frequencies related to telecommunications services delivery as a result of the national plan for frequency spectrum.



6 Develop civil works standards of networks and buildings, introduce these standards in construction and development systems and utilize existing infrastructure.



7 Develop indicators to measure the quality of broadband services and make such indicators available to the public to motivate providers to improve the quality of their services.



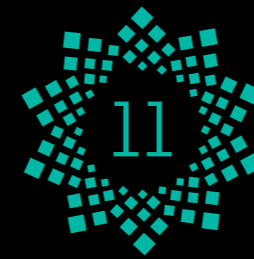
8 Launch and activate ICT training centers in partnership with major companies in the ICT sector.



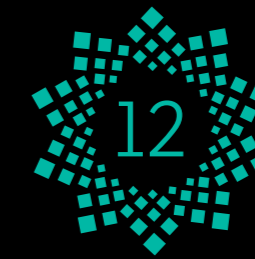
9 Implement a program to provide vocational guidance and awareness campaigns for graduates and job seekers in the ICT sector.



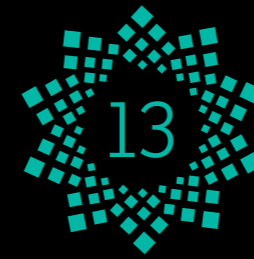
10 Activate career training program for graduates and job seekers in ICT companies.



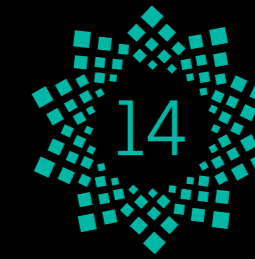
11 Launch a comprehensive digital literacy program.



12 Organize digital innovation contests for Saudi students in the secondary grades.



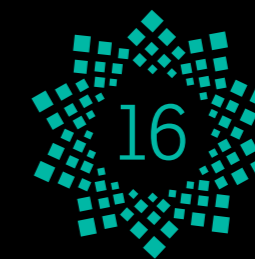
13 Create an independent body to take care of the development of the IT industry in the Kingdom and to develop and implement the vision.



14 Lead and guide IT business incubators in the Kingdom through a governance model that introduces requirements, incentives and performance indicators necessary to raise the quality of incubators and efficiency of outputs.



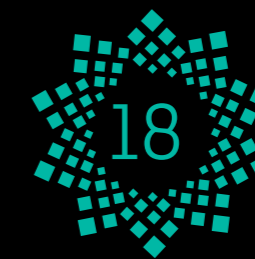
15 Introduce appropriate legislation to ensure that local small and medium IT enterprises receive a specific share of government IT contracts.



16 Facilitate lending terms from banks to small and medium Information Technology enterprises with active government engagement to co-guarantee loan amounts.



17 Organize exhibitions and workshops bringing together IT entities and private sector entities to promote awareness of SMEs about the importance of key IT services and products, and to promote awareness of large companies on the importance of the next generation of IT services and products.



18 Implement the program to assess and classify the capabilities of small and medium enterprises in order to identify the maturity level of these enterprises and develop strategic transformation program for each enterprise in support of its growth.



Transfer "Yesser" Program to an independent entity both administratively and financially, increasing its capacity and resources to fulfill national digital transformation requirements.



Integrate with the unified electronic access service.



Develop government human capabilities and manage change to cope with government digital transformation.



Launch integrated systems and applications for government transactions.



Launch the government cloud and increase the level of government integration.



Rationalize government spending and avoid duplication of investment on IT.



Develop and advance the IT department at Ministry of Communication and Information Technology.



Establish, manage and operate The Transformation Center for one year.



Establish the E-commerce Council which includes members of the concerned government agencies to coordinate efforts and to eliminate obstacles.



Design a program to stimulate e-commerce among individuals and businesses and to provide the technical and legal support necessary to start-ups, small and medium-sized enterprises and logistics companies.



Restructuring and regulation of the postal sector.



Accelerate the transformation of the Saudi Postal Corporation.



Privatize the Saudi Postal Corporation.





OPPORTUNITIES
PRESENTED BY
**DIGITIZATION AND
3RD PLATFORM
TECHNOLOGIES**

03

OPPORTUNITIES PRESENTED BY **DIGITIZATION** AND **3RD PLATFORM** **TECHNOLOGIES**

The 3rd Platform is IDC’s description of the third major evolution in computing platforms, after mainframes and client-server computing. The 3rd Platform comprises the transformative technology pillars of cloud computing, mobility, social networks, and big data analytics. The Internet of things can also be considered to be part of the 3rd Platform.

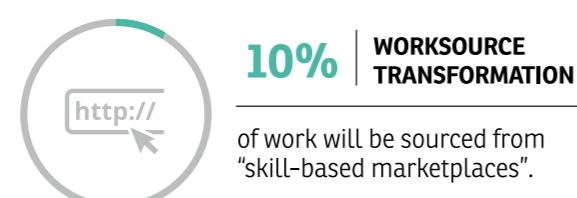
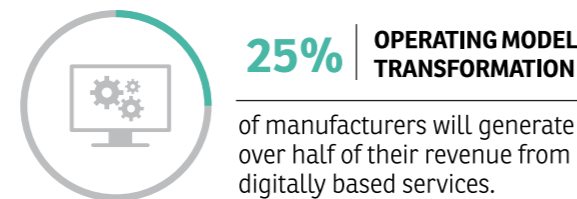
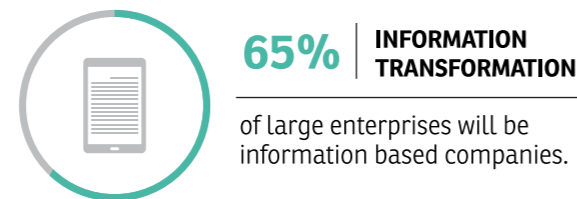
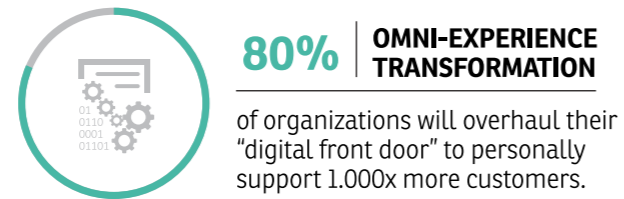
Taken individually, each pillar is a strong disruptive force, empowering organizations to improve their business practices. In combination, 3rd Platform technologies create transformative and disruptive opportunities for both new and established businesses alike. These opportunities align strongly with the ambitious goals of the NTP and Vision 2030; in short, digital services using 3rd Platform technologies offer greater scale, reach more people, and enable closely coordinated managed-services delivery.

New Tech, New Business

The most obvious new business opportunities are those presented by emerging technologies. The key pillars of the 3rd Platform – cloud, social, mobility, and big data analytics – are empowering a new generation of businesses such as Facebook, Uber, and Amazon. These businesses are surrounded by a thriving ecosystem of smaller companies that add value by exploring new solutions and developing niche markets.

Localization is a form of such added value for which organizations across the Middle East are particularly well positioned; they provide a local context for and cultural awareness of global trends, and develop industries to create products for domestic use as well as export. Entertainment and communication, e-commerce, and financial services are examples of industries where these opportunities are growing rapidly.

Digitization offers many new avenues for established businesses to explore. IDC predicts that in the near future, 25% of manufacturers worldwide will generate over one-half of their revenue from digitally based services, many of which do not exist today. The agility of SMEs in identifying and taking advantage of such opportunities will become essential for the success of larger Saudi organizations in the region and the broader global economy.



DIGITAL TRANSFORMATION, LEADING IN 3D

Source: IDC Global Research, 2016

Improved Efficiency Across Supply Chains

Supply chain networks are essential to Saudi Arabia's international trade and commerce, and will make an increasingly significant contribution to the nation's GDP as the NTP unfolds.

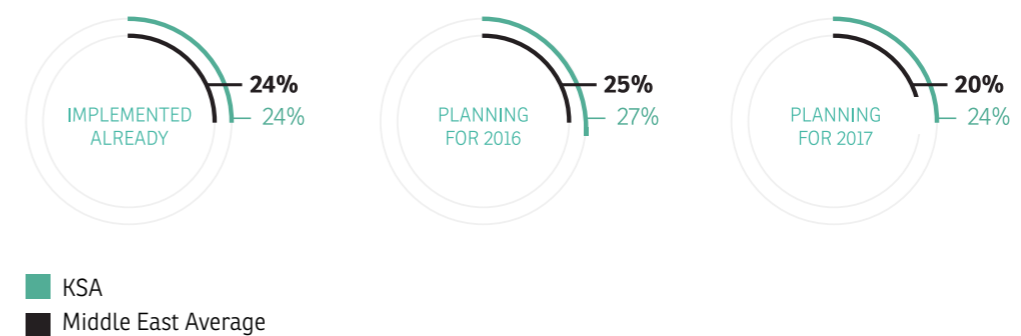
Digitization is the key to improving integration and efficiency in supply chains, and to identifying new opportunities for expansion. The 3rd Platform technologies of cloud, mobility, and big data analytics are essential components for this expansion to occur.

As the SME community grows, it will benefit from modern integration platforms that allow providers to contribute quickly and easily to supply chain projects without lengthy and costly integration exercises.

Manufacturing, tourism, transport, and logistics are key industries that stand to benefit from heightened SME inclusion in Saudi Arabia; these sectors, which are currently making significant contributions to GDP, are those in which the adoption of transformative technology is highest. Saudi Arabia is already ahead of the regional average in the adoption of each pillar of the 3rd Platform; this momentum should be encouraged as the market grows and matures.

Mobile

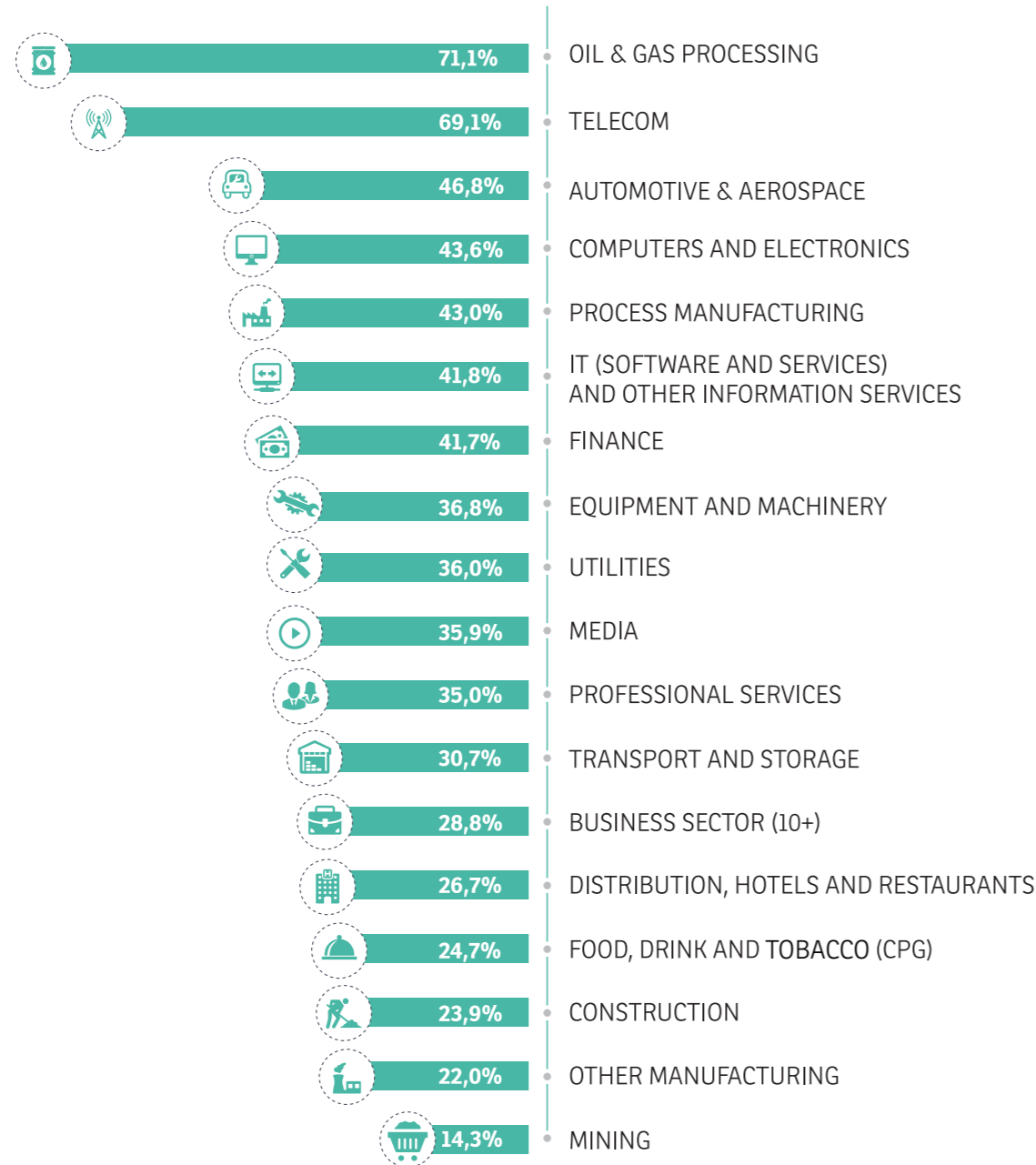
Mobile telephone penetration in Saudi Arabia is high and still growing, and as coverage expands, it will continue to transform the business landscape. Arab countries rank highly in general, which is indicative of the broad market opportunities for mobile-based business. According to the World Economic Forum's Global Competitiveness Index, Saudi Arabia ranked fourth worldwide in 2016 in terms of the number of mobile subscribers (179.6 per 100 citizens), behind Kuwait in second place (218.4/100), and followed closely by the United Arab Emirates (178.1/100).



ADOPTION OF ENTERPRISE MOBILITY SOLUTIONS

Source: IDC CIO Survey 2016

Enterprises have been quick to embrace mobile solutions. User-facing applications are transforming the way mobile workers interact with customers and back-end systems, while automated systems, including remote sensors and other Internet of things (IoT) technologies, leverage mobile networks to improve industrial performance. In Europe, the oil and gas industry leads the market in the adoption of enterprise mobility, with telecommunications close behind. Logistics and manufacturing are also increasing their adoption of mobile solutions.



MOBILITY ADOPTION BY VERTICAL MARKET

Source: IDC European Vertical Markets Survey

However, mobility adoption in small businesses lags behind that of large businesses, since the latter have an established portfolio of applications which are easily adapted to mobile interfaces. In IDC's European survey of mobility adoption in 2012, only 27.9% of SMEs had embraced mobile applications, compared to 60.3% of large businesses.

As small businesses are encouraged to find niches within the key industries listed above, they will be able to use mobile solutions to offer competitive services without the overhead of enterprise IT systems. Mobile solutions are particularly

well supported in customer-facing systems, field-service applications, industrial automation in manufacturing and logistics, professional services, and public service delivery (e.g., utilities and business services). SME mobility adoption will grow along with the rise of cloud computing services, particularly in fundamental business applications, including customer management, collaboration, and project management.

Mobile communication is a transformative technology; its impact on society and industry is substantial and should be encouraged and embraced. New technologies (e.g., 5G) will continue to improve performance, enabling new applications and services, particularly multimedia-heavy uses including entertainment, ehealth, and elearning.

Saudi Arabia's mobile networks and service providers – Saudi Telecom Company, Mobily, Zain, and their partners – will be well positioned to offer mobile solutions aligned with the emerging market opportunities for SMEs. The strategic focus on small businesses is a common theme in IDC engagements with mobile operators in many territories, particularly across the Middle East and Africa region; operators are hungry to stimulate SME mobility and revenues.

The NTP's goals of reducing the bureaucratic overheads of starting and running small businesses will be essential in increasing the SME contribution to Saudi Arabia's GDP, and mobile applications and interfaces are likely to be a key part of that process. The government will be able to take a leading role in supporting mobile engagement through apps and online portals.

Cloud

Cloud services are computing resources that are consumed over a network (e.g., the Internet). Classifications of cloud services vary, but they have certain characteristics in common, which make these services particularly attractive to small businesses.

Cloud computing services, whether delivered by service providers or by an enterprise IT department, offer standard interfaces, usage-based pricing, scalability to grow and shrink on demand, and standard user interfaces (e.g., web browsers).

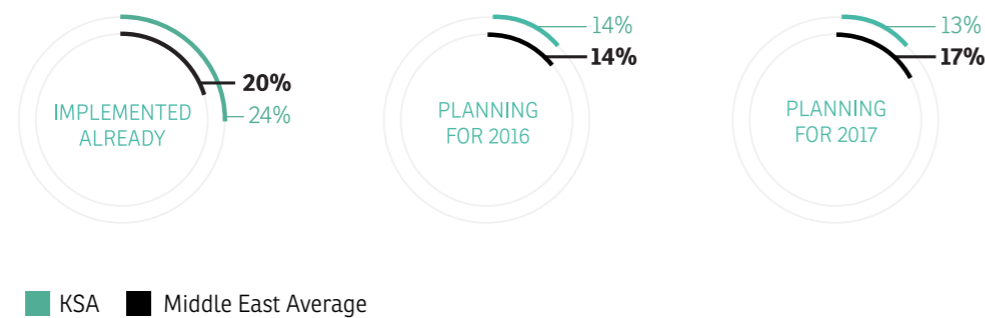
For small businesses, this means that enterprise-grade computing resources can be purchased with a minimum setup cost and even a minimum of specialist skill. And with elastic pricing, the company pays only for what it uses, keeping costs not only low, but also predictable and contained.

Key applications in cloud are communications and collaboration, customer relationship management (CRM), document/data storage, HR, and payroll. Increasingly, components of enterprise resource planning (ERP) and procurement are moving to cloud as well, in enterprises (large and very large businesses) as well as small businesses.

Cloud is not essential for the SME segment. The EU contains millions of small businesses, but the adoption of cloud technology by them has been relatively low. However, cloud computing can be a critical catalyst of SME growth; as small businesses scale up, they quickly develop the need for more mature systems and processes, including human resources, procurement, and financials. Cloud computing provides a rapid and cost-effective way to deploy these solutions, given that the overheads of hosting similar applications in-house can be prohibitive, requiring external funding and increasing the small business owner's risk.

Even in cloud, customization remains complex and skills-intensive, prompting SMEs to seek pre-configured applications suitable to their specific market needs. As a result, ample market opportunities exist for cloud providers to offer complete, localized solutions with Arabic language support and full compliance with Saudi Arabia's legal requirements.

IDC's interaction with Saudi businesses shows that businesses in the Kingdom will continue to adopt cloud, and SMEs in particular will be able to compete more effectively by leveraging the infrastructural advantages of cloud platforms.



ADOPTION OF PUBLIC CLOUD SERVICES

Source – IDC CIO Survey 2016

Cloud services infrastructure should also continue to grow in Saudi Arabia, with telecommunications and Internet services providers exploring numerous opportunities arising from services provided by international vendors, as well as home-grown cloud products including local hosting, cloud brokers, and IT consulting services. Regulation and legislation (for example, around data protection), will be important in encouraging cloud adoption.

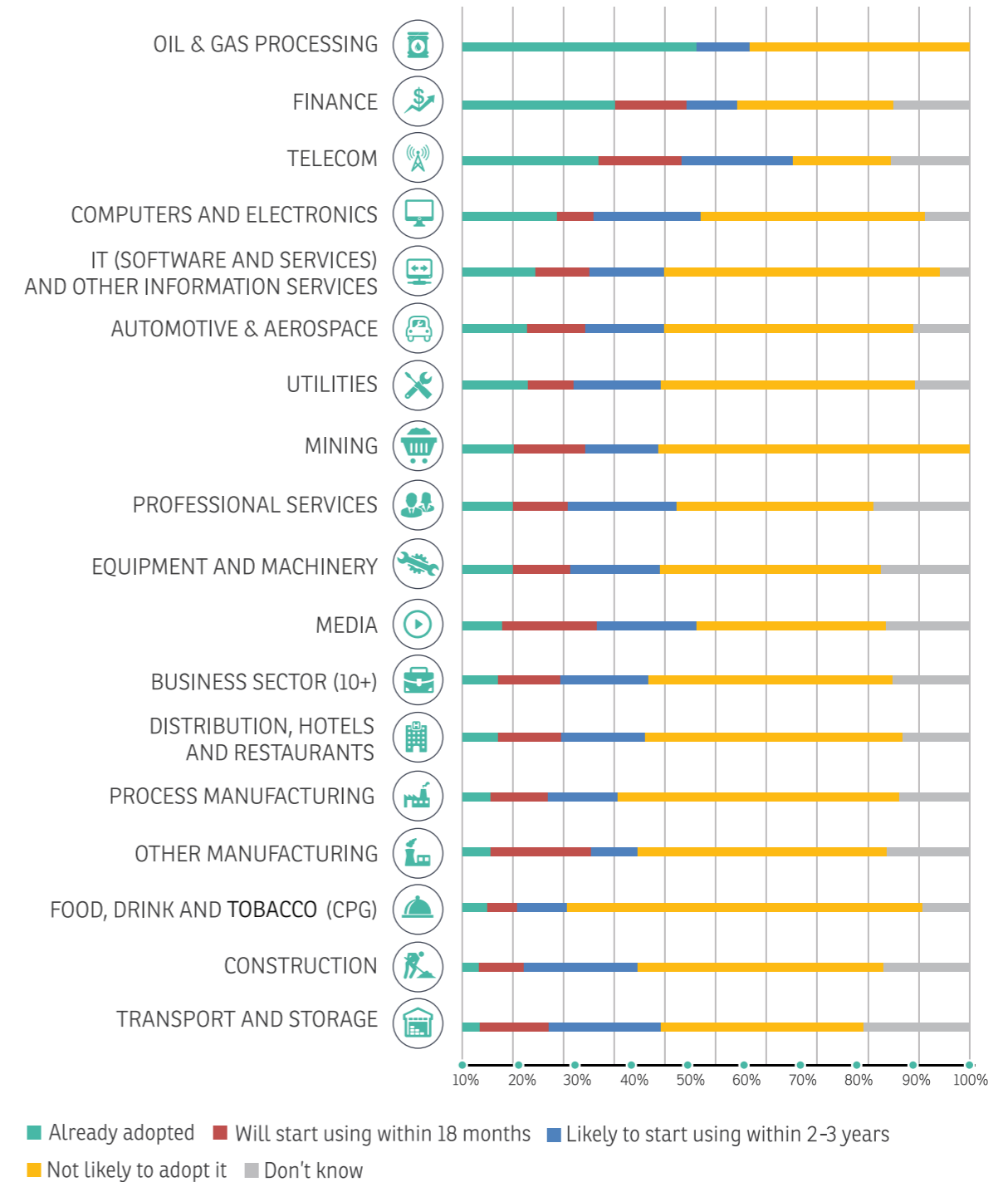
Niche IT opportunities also exist for SME cloud players; some major software ecosystems have active programs in place to encourage small developers and innovators to offer niche services as part of larger enterprise software suites, which also generates domestic revenue on top of (often foreign) cloud computing services.

Big Data and Analytics

Big data is a term encompassing the rapid growth of data, and the speed at which it must be processed in order to offer business value. By 2020, over 50 billion

smart devices will be online, all producing and sharing data (and one-third of this data will pass through clouds). IDC has predicted that worldwide data will exceed 40,000 exabytes (40 trillion gigabytes) by 2020.

Even a small increase in the percentage of data being processed for business gain would result in substantial revenue gains, particularly in data-heavy industries (e.g., oil and gas, manufacturing, financial services, and telecommunications).



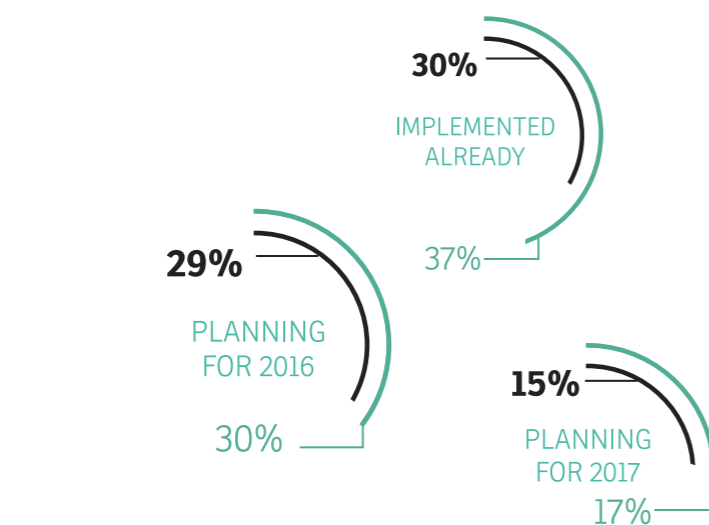
IDC EUROPEAN COMPANIES' CURRENT AND PLANNED ADOPTION OF BIG DATA BY SIZE

Source: IDC 2016

Most market data is owned by large organizations, both public and private, and the adoption of big data technologies is, consequently, far higher in large companies than SMEs. However, many opportunities exist for SMEs. Big data platforms will be critical tools in helping SMEs engage with complex supply chains, ensuring that they are meeting performance and quality metrics in real time. And opportunities are emerging as large organizations, and notably public sector bodies, make data sets available for consumption either to the public or within their business communities. This creates both demand-side and supply-side opportunities as they seek partners to improve business processes and identify entirely new products and services.

Open data initiatives are a way for innovators and entrepreneurs to take publicly available data (census data, geospatial information, etc.), and find ways to create value. The University of Babylon in Iraq hosts the Arab world's first open-access data repository; Qatar issued an open data policy in 2014; and the UAE followed suit in 2016. These laws ensure that government data is open to analysis, thereby improving transparency and encouraging innovation.

Similar projects are under way in many countries around the world. Governments can play an active role in such research by ensuring that data generated by public bodies is available for research, and providing safeguards to protect personal data as necessary. For example, Digital New Zealand (a division of the National Library of New Zealand) encourages entrepreneurs to use public geospatial data to offer unanticipated community services; initiatives have helped identify crime hotspots, improved maritime navigation, and helped accelerate rental property transactions.



■ KSA ■ Middle East Average

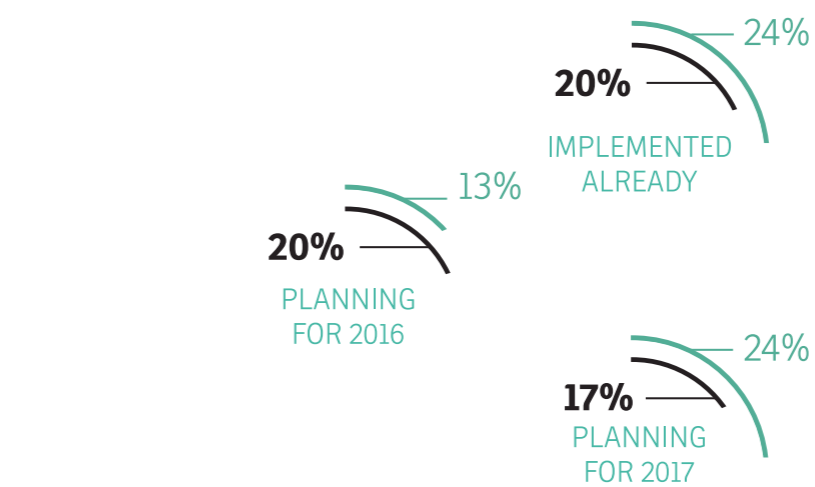
ADOPTION OF ANALYTICS AND BUSINESS INTELLIGENCE

Source: IDC CIO Survey 2016

Social

Social networks have profoundly altered the business and social landscape globally, changing how companies interact with customers and how communities interact with each other, offering up a wealth of data for analysis and insight in the process. In particular, social networks have helped SMEs engage with communities far more easily and affordably than traditional marketing methods.

Saudis are active on social networks, ranking seventh globally in terms of social network adoption, and accounting for 40% of Twitter users in the Middle East and North Africa (MENA) region. Numerous opportunities will emerge for individuals, communities, and businesses in the social media sphere. It will be essential for the underlying regulatory and legal regimes to be kept up to date, providing appropriate protection for citizens and businesses operating in social networks, particularly those hosted internationally; this in itself presents an opportunity for local networks to emerge.



■ KSA ■ Middle East Average

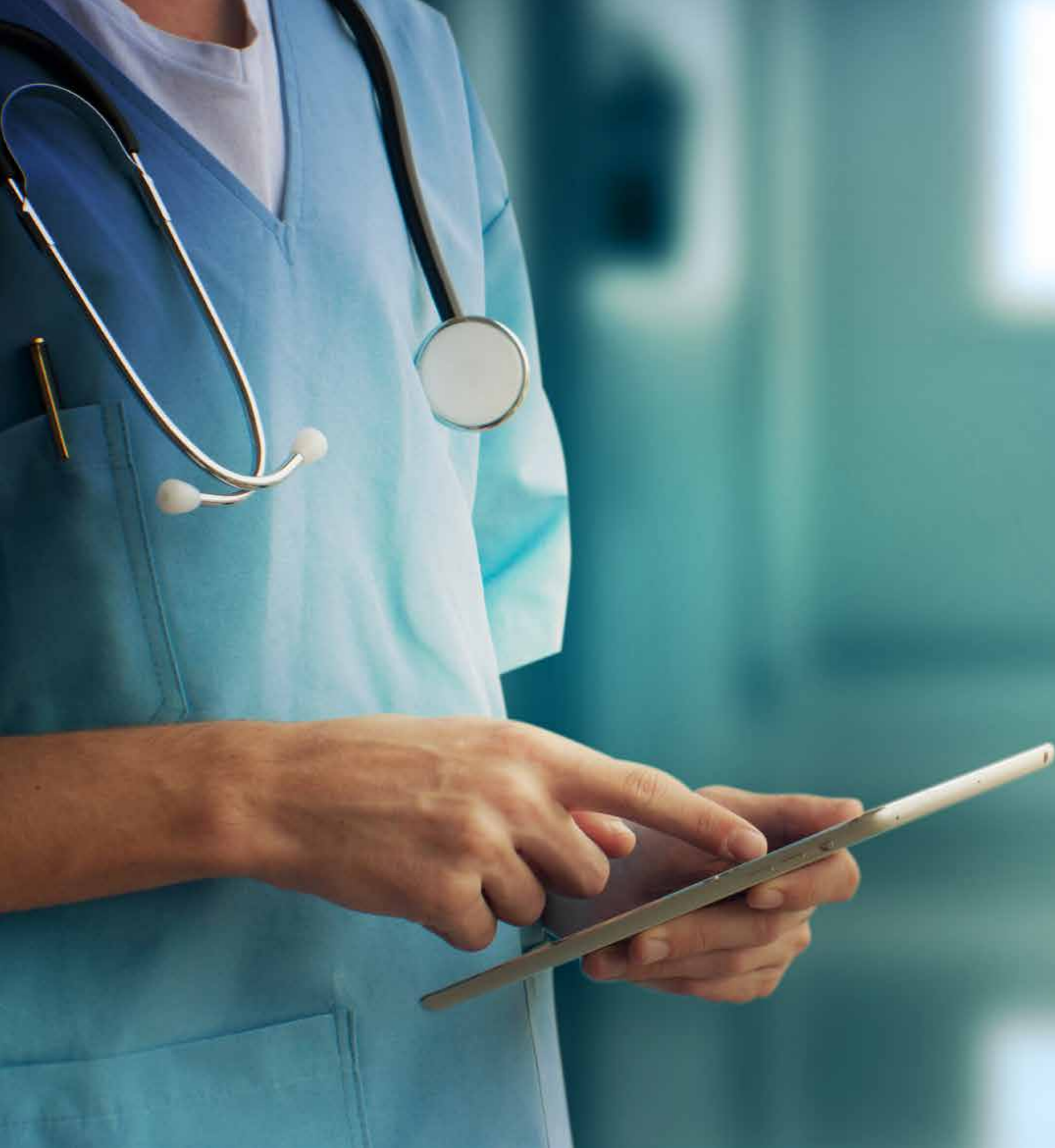
ADOPTION OF SOCIAL MEDIA/SOCIAL BUSINESS

Source: IDC CIO Survey 2016

IDC has identified several supply-side social media business opportunities, many of which are open to development by SMEs, either as innovators or within a defined market segment. These include:

- Creating communities of interest around specific issues or causes.
- Leveraging communities of interest to offer marketing services, advertising, market research, and more.
- Leveraging communities of interest to develop social analytics.
- Providing new platforms for content creation, distribution, and consumption.
- Enabling new forms of content creation based around social interaction and co-creation.
- Changing the economics of content creation and distribution.
- Facilitating ecommerce transactions by adding a purchasing function to a seller's social platform or by adding social recommendation features based on activity in the purchaser's social network.
- Developing software and tools for building new social networks or extending existing networks with value-added capabilities (e.g., monitoring, analytics, and business process integration).
- Crowdsourcing research and development (R&D) through social networks, using reward mechanisms to encourage participation. This can also be a powerful tool for public services, where it is sometimes referred to as "citizen-sourcing"; this is a modern, social-media powered, evolution of citizen R&D.





Impact of Digitization on
Key Sectors in Saudi Arabia

THE POWER
OF DIGITAL
TECHNOLOGY
ENABLES
**INTEGRATED AND
PERSONALIZED
CARE**

04

THE POWER OF DIGITAL TECHNOLOGY ENABLES INTEGRATED AND PERSONALIZED CARE

The emergence of digital technologies is enabling transformation of the health-care industry. Applying digital technologies effectively and efficiently can revolutionize patient engagement and harness the value of data to deliver better outcomes to patients at more affordable costs for healthcare systems. This digital revolution comes at a time when healthcare systems worldwide are under tremendous pressure to change.

Healthcare Systems in Transition

Healthcare systems have gone beyond a fundamental inflection point in terms of service demand. They were designed 150 years ago to deal with communicable diseases and injuries; the focal points of the system were hospitals, where experts would converge to treat acute episodes in a highly specialized environment. Nowadays, according to the World Health Organization (WHO):

- Non-communicable diseases (NCDs) were responsible for 38 million (68%) of the world's 56 million deaths in 2012. The four major groups of NCDs are: cardiovascular diseases, diabetes, cancers, and chronic respiratory diseases. More than 40% of these (16 million) were premature deaths (patients under the age of 70). Almost three-quarters of all NCD deaths (28 million), and the majority of premature deaths (82%), occur in low- and middle-income countries.
- In 2011–2025, the cumulative economic losses due to NCDs under a "business as usual" scenario in low- and middle-income countries were estimated at \$7 trillion. This sum far outweighs the annual \$11.2 billion cost of implementing a set of high-impact interventions to reduce the NCD burden.
- Often neglected, in terms of other NCDs, mental health conditions are also taking a toll on patients' quality of life and healthcare systems' finances. An estimated 47 million people worldwide are affected by dementia; nearly 60% of them live in low- and middle-income countries. Their estimated health-care cost was \$604 billion in 2010, and these cases are forecast to triple by 2050. In addition, 800,000 people commit suicide every year, 75% of them in low- and middle-income countries; appropriate mental health treatment for depression and other conditions can make a positive impact.



Dealing with demand for better outcomes for patients affected by NCDs and mental health conditions requires a different approach that addresses two pitfalls of the current service delivery model:

- **Integration:** By horizontally integrating multiple players across the health ecosystem, including hospitals, primary care and community care centers, social care and public health authorities, life-science research, and payers, multi-disciplinary teams are better positioned to deal with the frequent cases of patients affected by multiple NCDs (e.g., cardiovascular diseases and diabetes, or cancer and depression). Horizontal integration goes hand in hand with vertical integration of the patient’s end-to-end journey, from prevention, to treatment, to disease management, in order to deal with the risk factors that determine the surge of NCDs or make them worse (e.g., tobacco use, unhealthy diet, and physical inactivity) and to focus on the long-term outcomes of care.
- **Personalization:** By personalizing the patient’s end-to-end experiences, healthcare providers can contextualize clinical pathways to optimize the efficiency, quality, and safety of prevention, medication, surgery, and long-term therapy for the specific circumstances of individual patients. This will, in turn, reduce unnecessary testing and treatment, which harm the patient and increase the cost of care.

Healthcare systems that do not transform will enter a vicious cycle of budget cuts (which are already being imposed in many countries, including several in Western Europe), and an endless search for productivity enhancements linked to quantity indicators, including length of hospitalization, bed turnover, and waiting times. This, in turn, will result in repeated readmission for NCD patients, particularly for frail elderly patients suffering from multiple NCDs. Hence the long-term outcomes – including patient safety and quality of life – will worsen dramatically, while costs spiral out of control.

Simply pumping more money into the healthcare industry, without changing the business model, will not help either. The United States is the quintessential example of the drawbacks of high healthcare expenditure. The country spends over 16% of its gross domestic product (GDP) on healthcare, the highest of all the Organisation for Economic Co-operation and Development (OECD) countries; but the life expectancy, potential years of healthy life lost per 100,000 population, and other indicators are worse than those of the other OECD countries.

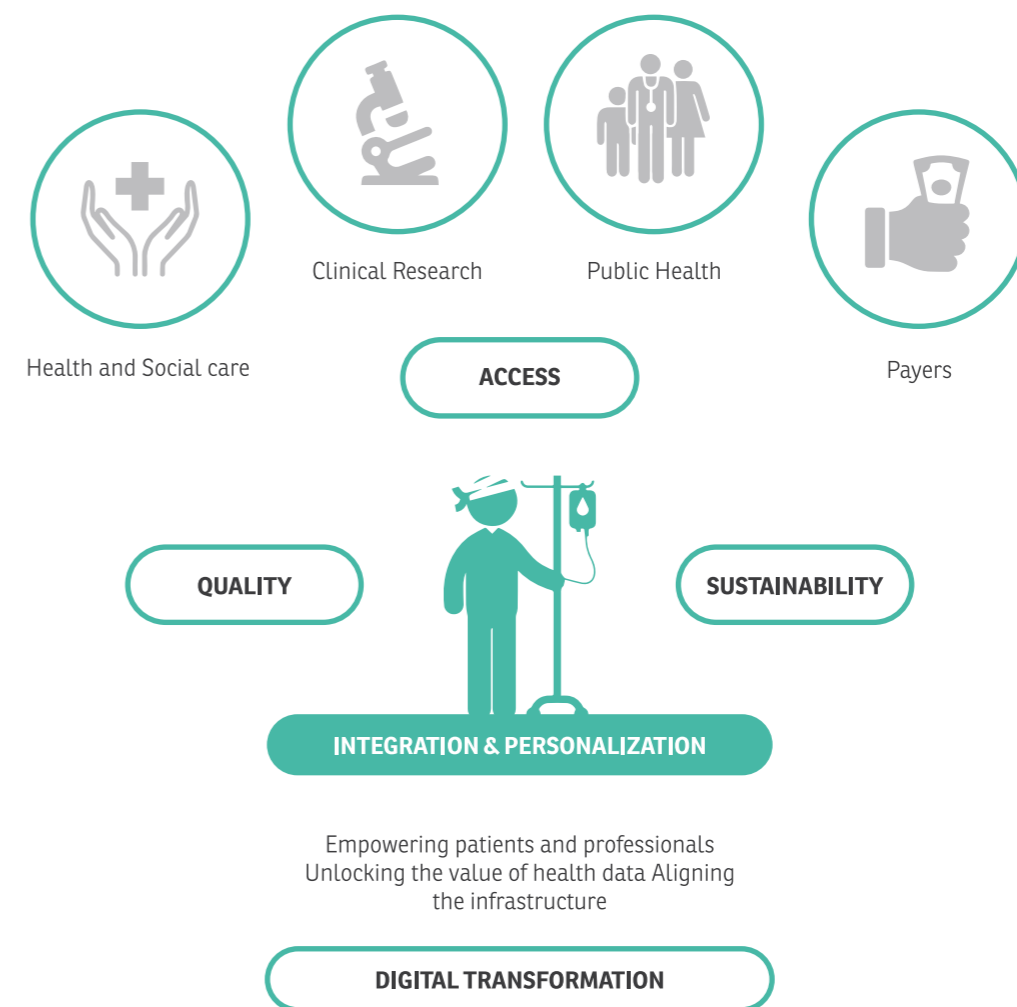
Digital Transformation to the Rescue

Integrated and personalized care will require changing reimbursement models to foster collaboration across the ecosystem and lead to better long-term outcomes. It will require continuing to discover new forms of treatment through genomics, proteomics, and metabolomics. It will require better engagement on the part of the patients (and their informal caregivers) in the end-to-end journey from prevention, to care, to disease management. Healthcare systems that are able to realize the benefits of this transformation will improve the quality, access, and financial sustainability of the services they provide.

Digital transformation brought about by what IDC calls 3rd Platform technologies (cloud computing, mobility, big data and analytics, and social) and the further innovations these technologies enable (e.g., more ubiquitous use of robotics, cognitive computing, 3D printing, and virtual reality) will support the journey to integrated and personalized care in two fundamental ways:

1. They will empower the patient and the clinicians.
2. They will enable harnessing the real power of the data.

These must be supported by a resilient digital infrastructure (see Figure below)



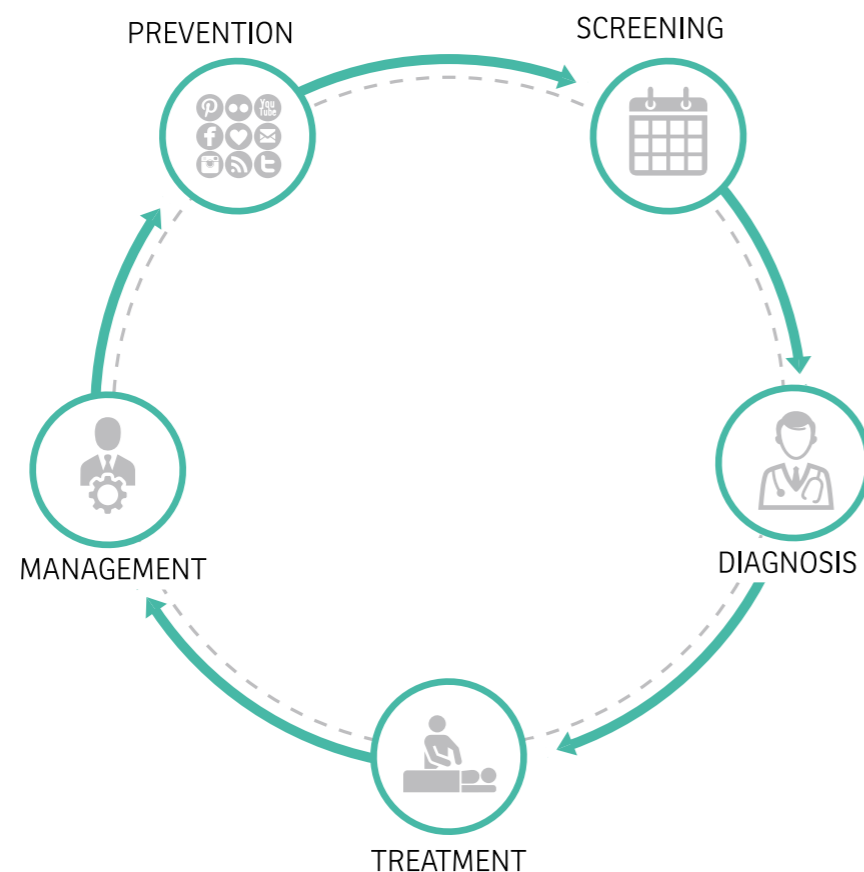
DIGITAL TRANSFORMATION AT THE HEART OF INTEGRATED AND PERSONALIZED CARE

Digital Transformation Empowers Patients and Professionals

Patient experience spans the entire patient care journey and its multiple touch points. Today, proactive digital patients are more demanding and want to engage with professionals to personalize their care pathways. They expect:

- Convenience: Simplification, clear and relevant information, and advice.
- Choice: The chance to select their preferred doctor and care plan based on a wide and informed list of proposals.
- Customization: The feeling of receiving personalized treatment according to the changing needs of specific diseases and personal expectations.
- Control: An active role during care.

The digital transformation of the healthcare industry is changing the way these benefits can be achieved. The figure below shows the five stages of a traditional patient's journey, emphasizing how digital technologies are changing it and re-shaping the patient experience.



THE DIGITALLY ENABLED END-TO-END PATIENT EXPERIENCE

Prevention: Patients' digital journeys usually begin with an Internet search. They are increasingly seeking information online to learn about prevention tips and lifestyle habits to better maintain health and prevent diseases. Modern technologies help them track various health-relevant parameters, including calorie intake, sleep cycle, step count, and weight through wearable health and wellness monitoring devices, and they often share their data on social media. The data collected from these devices can alert individuals to abnormal trends in tracked health parameters and prompt them to come for a medical examination in time.

Screening: Digital patients search online to learn about early signs and symptoms of various diseases, which may prompt them to go for timely medical check-ups and detect diseases at early stages, when medical intervention is the most effective. People at high risk of certain diseases can be reached by targeted messages through social media (or personalized notifications via text message), encouraging them to go for respective screening tests early enough (for example, young women can be reached through social media and encouraged to undergo screening for cervical cancer).

Treatment: Digital patients are usually well-informed about their diseases as well as the treatment options before seeing a doctor, and they are actively engaged in planning and managing their own medical care. When they are ready to contact a medical professional, ebooking systems are handy: according to IDC, over 50% of healthcare executives in Western Europe have already invested, or are planning to invest, in ebooking/escheduling systems. The widespread adoption of these solutions is also outlined by the numerous websites that, in addition to traditional booking systems, provide integrative functionality (e.g., reviews of the doctors or feedback on the service). Further, patients use digital technologies to stay connected during treatment process itself, for example, to view information and keep tabs on medication, diet, and exercise regimens. They search for medical references and clinical decision support materials to understand better the treatment options offered by their care providers. In addition, the adoption of eprescribing solutions enhances patient safety, as prescriptions are more legible and manual errors are reduced. In Italy, for example, eprescribing has been in effect since March 2016, and it will become fully mandatory by 2017.

Management: Digital patients use a combination of wearable sensors, telemedicine, and artificial intelligence tools to facilitate self-managed care. These solutions facilitate communications with clinicians, empower the involvement of patients, and support the prevention and management of chronic and long-term conditions outside traditional settings. Hospitals continue to add new services delivered via telemedicine and remote monitoring to make the discharge and follow-up processes easier and more effective.

Remote monitoring and wearables

Stockholm County Council is deploying patient monitoring systems and software for the Karolinska University Hospital, which is implementing a patient-centric approach to healthcare and deploying care pathways in which patient care, clinical research, and training have been integrated.

A joint team formed by the University of California, Berkeley and Stanford University School of Medicine combined two separate technologies to create a health-monitoring device that is noninvasive, does not interfere with strenuous outdoor activities, and can continuously track a user’s health at the molecular level. The two-part system of flexible sensors and a flexible circuit board sticks to the skin, then detects and analyzes the profile of chemicals in the sweat to provide insight about an individual’s physiological state at molecular levels.

Patient Data as a Strategic Asset

The need to move toward integrated and personalized service delivery models requires access to a complete, relevant, 360-degree view of patient information that is securely available anytime, anywhere. Western European countries, including the U.K., France, and the Nordic countries, are at the forefront of building this horizontally and vertically integrated view of patient data; however, other countries in Europe, the Middle East, and Africa are quickly catching up. For example, the Qatar National Health Strategy 2011–2016, in alignment with the health goals and objectives of Qatar National Vision 2030, defined specific programs that take into account the demand for integrated and personalized care.

The Qatar Healthcare Facilities Masterplan 2013–2033, which provides the first guide for managing the country’s growth of key healthcare infrastructure, recommends that healthcare providers consider transformation of the care model in terms of: “Availability of clinical information at all clinical encounters (electronic health record support): The extent to which there is a level of commonality and interoperability of patient medical record information, making it available at all patient encounters.” (Qatar Healthcare Facilities Masterplan 2013–2033.)

Similarly, the Dubai Health Authority has launched a program, to be implemented by 2018, to integrate patient information across all 2,700 public and private healthcare facilities in Dubai. The electronic medical record (EMR) or Salama system will create a single electronic record for patients across all public hospitals, primary healthcare centers and other facilities, while the electronic health record (EHR) or NABIDH system will extend this medical record across all private hospitals, integrating the medical records of the patients.

Healthcare systems that achieve a 360-degree view of the patient more rapidly will be able to provide more evidence-based, personalized treatment, to accelerate the path from the discovery of the condition to the delivery of new treatment, to identify and stratify the risks of developing NCDs for different population cohorts. Hence, they will be able to carry out more efficient and effective prevention campaigns. To achieve these objectives, many technical, skills, and process challenges still need to be addressed, including:

- The sheer growth of healthcare data, including clinical notes, diagnostic images, laboratory result reports, medical device readings, and, increasingly, videos, wearable devices, and patient reported outcomes.
- The lack of technical, semantic, and process interoperability of legacy IT systems.
- The complexity of governance processes set up to ensure the efficiency and compliance of information management.

Healthcare organizations must treat data as a strategic asset and design a consistent approach to information management that aligns strategic intent, governance, and architectural models.

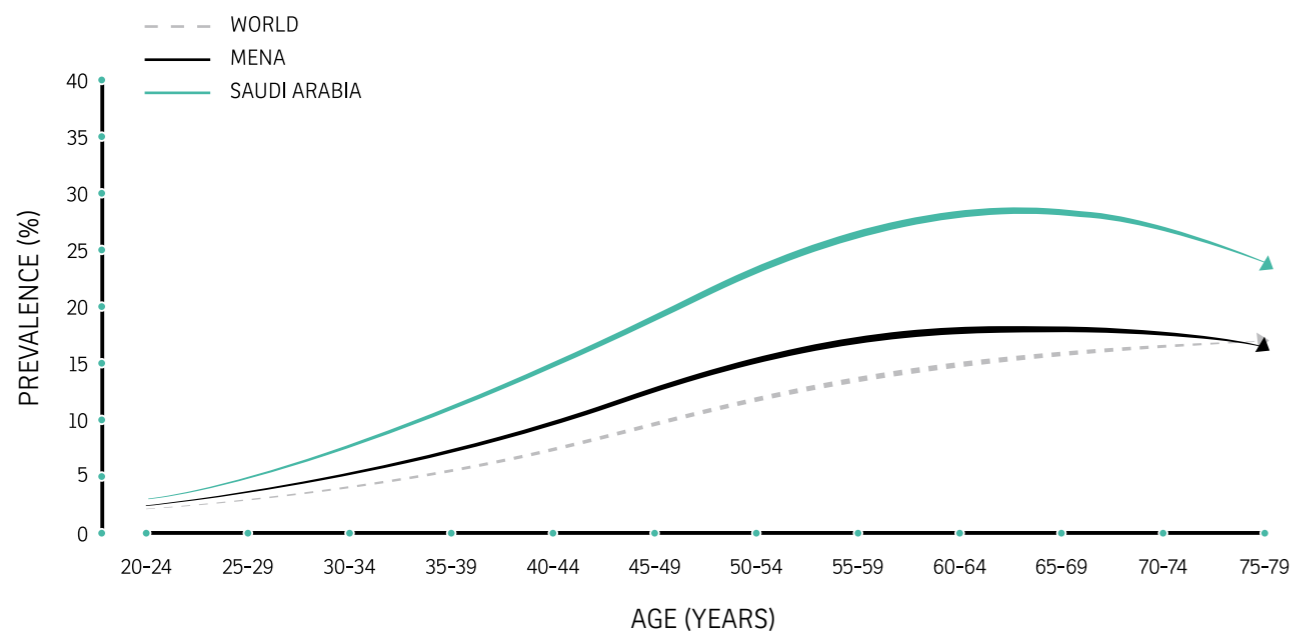
Aligning the Digital Infrastructure

Healthcare systems must future-proof their digital architecture to support patient and clinician empowerment and unlock the value of data. Future-proof digital health architectures do not necessarily rely on ripping and replacing legacy systems, or embarking on a quest for a “silver bullet”, such as a national electronic health record relying on a single application suite. Future-proof digital health architectures must invest in standardization to foster the interoperability of systems that can cope with the increased demands of data sharing, data analysis, and a resilient hybrid infrastructure capable of supporting agile innovation and ubiquitous access, while complying with the severe security requirements of the healthcare industry.

Saudi Arabia's Healthcare Context

Saudi Arabia is among the world's most affected countries in terms of the rise in the rates of modifiable health risk factors and lifestyle-related diseases: some chronic diseases (also called NCDs), have demonstrated more dramatic increases in Gulf Cooperation Council (GCC) countries, including Saudi Arabia, than in most other parts of the world.

The steep rise in chronic disease rates has been largely due to a surge in lifestyle health risk factors, including poor diet and a lack of physical activity. Perhaps the most prominent and disturbing health issue in Saudi Arabia, and the larger region of the GCC, is diabetes. According to the International Diabetes Federation, Saudi Arabia recorded 3.4 million cases of diabetes in 2015. The rate is alarming: 17.6% of the adult population, which means about 1 in 6 adults (aged 20–79), has diabetes.



PREVALENCE OF DIABETES IN ADULTS BY AGE, 2015

The rise in morbidity and mortality associated with other NCDs (e.g., cancer and cardiovascular diseases), is also alarming. Overall, chronic diseases are estimated to account for over 70% of all deaths in Saudi Arabia (WHO).

Certain circumstances further aggravate the healthcare situation in the region: first, while the burden of diagnosing, treating, and preventing chronic diseases is increasing, communicable diseases are still excessively widespread and continue to affect people and healthcare systems. Paradoxically, some of the positive attributes of the epidemiological transition observed in other countries (e.g., in

Europe and the U.S.) are not yet there: namely, the rise in NCDs is outpacing the improvements in life expectancy. Furthermore, Saudi Arabia is experiencing an alarmingly high mortality associated with "unnatural" causes (e.g., violence and road injuries), which account for as much as 5% of all deaths (according to the latest available data by WHO).

Overall, the coexistence of these epidemiological patterns creates a double (or even triple) burden of diseases that is creating massive healthcare needs in the country, with the importance of preventing and controlling chronic diseases increasing. Population growth trends also contribute to rising healthcare demand, with population growth estimated to average 2.25% per year in the 2011–2020 timeframe (EIU projections).

In this context, the healthcare system in Saudi Arabia is struggling to keep pace with rising demand for healthcare services and the rapid population growth, given its limited experience, insufficient infrastructure, and lack of qualified human resources. Saudi Arabia's healthcare system is experiencing a severe lack of qualified human resources, relying largely on expatriate workers. The number of physicians is estimated at 2.8 per 1,000 people, which is low in comparison with most OECD countries. Uneven geographical distribution further aggravates this problem, with qualified healthcare workers largely concentrated in major cities (mainly Riyadh, Jeddah, Dammam, and Khobar).

As concerns hospital infrastructure, despite heavy investments in hospital development in recent years, the supply of both inpatient and outpatient healthcare facilities in Saudi Arabia still falls well behind the levels needed for adequate coverage of the population with healthcare services. In 2010, the Ministry of Health (MoH) estimated that the supply of hospital beds would need to be at least doubled by 2020 to ensure adequate coverage of the population; the plan was to increase the number of beds to 70,000. The government is currently running an ambitious hospital construction program, with up to 120 hospitals currently under construction.

The quality of state medical facilities is also a matter of concern; many hospitals do not meet quality standards. It has been estimated, that only 40% of the medical facilities in Saudi Arabia are licensed by the MoH (Saudi Central Board for Accreditation of Healthcare Institutions). The government is also seeking to increase the private sector share of spending in healthcare.

In summary, the major healthcare issues affecting Saudi citizens are the lack of healthcare professionals, the lack of physical access to medical care of adequate quality, and the steep rise in health risk factors and the resulting increase in the number of people affected by chronic diseases. There is an urgent need to focus on enabling disease prevention and control, as well as on providing access to quality healthcare to the fast-growing population. Indeed, the need for enhanced prevention and control of chronic diseases in Saudi Arabia is now more critical than ever before.

ICT as a Major Enabler for Saudi Arabia's Vision for Healthcare: Saudi Arabia's Vision 2030

Saudi Arabia's Vision 2030 provides a roadmap for economic and developmental action to bring the country to a leading position in all fields, and achieve a "prosperous future and sustainable development." In order to achieve the ambitious goals set out in Saudi Vision 2030, and translate the Vision into an actionable plan, National Transformation Program (NTP) 2020 was launched in 2016.

For the main strategic objectives of the Vision, the NTP determines sector-specific strategic objectives, sets key performance indicators (KPIs), and the interim targets for the respective government bodies, to be achieved by 2020. The document also lists certain initiatives to be undertaken by the governmental entities involved in the implementation, together with the total cost of the initiative for five fiscal years (borne by the government).

In the healthcare sector, NTP 2020 sets 15 specific strategic objectives for the Ministry of Health, with the aim of realizing some of the longer-term objectives defined in Saudi Arabia's Vision 2030.

Strategic Objectives for the Ministry of Health of Saudi Arabia

Set by the National Transformation Program 2020 to realize Saudi Arabia's Vision 2030

Strategic Objective (1)	Increase the private sector share of spending through alternative financing methods and service provision
Strategic Objective (2)	Increase the efficient utilization of available resources
Strategic Objective (3)	Improve the efficiency and effectiveness of the healthcare sector through the use of information technology and digital transformation
Strategic Objective (4)	Increase training and development both locally and internationally
Strategic Objective (5)	Increase the attractiveness of nursing and medical support staff as a preferred career path
Strategic Objective (6)	Improve healthcare provision prior to hospitalization and in the main hospitals (ER and ICU)
Strategic Objective (7)	Improve integration and continuity in service provision by developing primary care

Strategic Objective (8)	Improve the infrastructure, facility management, and safety standards in healthcare facilities
Strategic Objective (9)	Achieve acceptable waiting times across all stages of service delivery
Strategic Objective (10)	Improve governance in the healthcare system in order to enhance accountability with regard to quality issues and patient safety
Strategic Objective (11)	Adopt a national plan for emergency response to public health threats as per international standards
Strategic Objective (12)	Identify additional sources of revenues
Strategic Objective (13)	Improve public health services with a focus on obesity and smoking
Strategic Objective (14)	Improve the quality of life and healthcare service provided to patients outside hospitals
Strategic Objective (15)	Improve the quality and safety principles as well as the skills of service providers

Source: Saudi Arabia's National Transformation Program 2020

Each of these strategic objectives is linked to one or more long-term objectives defined under Saudi Arabia's Vision 2030. Also, for each of these objectives, targets are set for 2020, and the KPIs and international benchmarks are defined.

The Use of ICT in Healthcare: How It is Addressed by Saudi NTP 2020

The NTP aims to achieve widespread use of unified digital medical records, as set under Strategic Objective 3, which reads as follows: "Improve the efficiency and effectiveness of the healthcare sector through the use of information technology and digital transformation." The aim is to increase the percentage of Saudi citizens that have a unified digital medical record from zero to 70% by the year 2020.

This goal is linked to several objectives of Vision 2030, namely:

1. Improve the quality of healthcare services (preventive or therapeutic).
2. Achieve the highest levels of transparency and good governance in all sectors.
3. Improve the performance, productivity, and flexibility of public authorities.

Strategic Objective 3 of the Ministry of Health of Saudi Arabia

Strategic Objective (3)	Improve the efficiency and effectiveness of the healthcare sector through the use of information technology and digital transformation				
Relevant Vision 2030 Objectives	Improve the quality of healthcare services (preventive or therapeutic). Achieve the highest levels of transparency and good governance in all sectors. Improve the performance, productivity, and flexibility of public authorities.				
Key Performance Indicators	Baseline	2020 Target	Unit	Regional Benchmark	International Benchmark
Percentage of Saudi citizens who have a unified digital medical record	0	70	Percentage (%)	Not Applicable	100

Source: Saudi Arabia's National Transformation Program 2020

Notes:

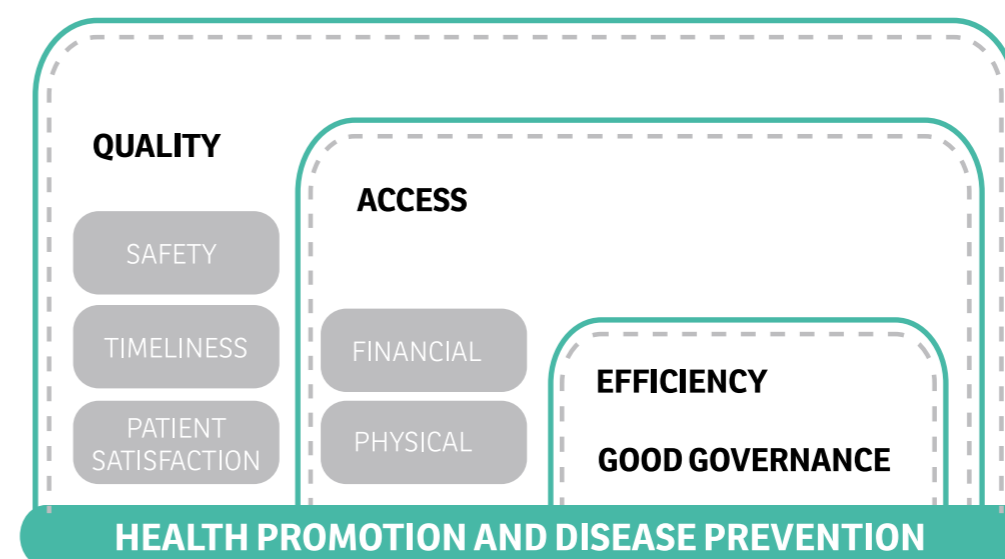
- Strategic objective: A desired state or goal which the entity aspires to achieve, in order to realize "Saudi Vision 2030".
- Key performance indicator: A numerical value measuring the extent to which the entity has succeeded in achieving its strategic objective.
- Key performance target: The desired value of the key performance indicator which the entity aims to achieve.
- Benchmark: The key performance target other leading countries achieved.

This is the only objective under NTP 2020 that is directly related to the use of ICT in healthcare. However, as discussed in the next sub-chapter, ICT has an immensely important role to play in achieving better access to care, better quality of care, and more efficient allocation of scarce healthcare resources and in many cases, the role of ICT is central to the achievement of the respective objectives of Saudi Arabia's healthcare vision.

ICT to Play a Crucial Role in Realizing Saudi Arabia's Vision for Healthcare

In the context of Saudi Arabia's healthcare trends and challenges, information and communications technology (ICT) will play a key role in achieving the country's vision for healthcare.

Given the main pain points of the Saudi healthcare system, each of the healthcare objectives defined under the NTP can be thought of as ultimately addressing one or more of the interrelated aspects of healthcare, as depicted here:



Applying information technologies effectively and efficiently will be crucial to support the achievement not only of Strategic Objective 3, specifically addressing digital health issues, but more importantly, of many other major goals and objectives that will be part of Saudi Arabia's national healthcare agenda for years to come, including those related to the productivity of healthcare workforce, training healthcare professionals, building human capacity, fighting lifestyle-related diseases, and improving access to healthcare services.

The transformational technologies (briefly discussed in Chapter 1, including cloud, mobility, social media and big data and analytics, and further innovative technologies including IoT, 3D printing, and cognitive computing) have immense

potential to support virtually all of the MoH strategic objectives defined by the NTP. For example, for Strategic Objective 7, which aims to improve integration and continuity in service provision, ICT will play a central role, as utilizing health information exchange platforms is essential for supporting vertical and horizontal integration across the healthcare ecosystem.

The role of ICT is also obvious in overcoming access barriers to care. Telemonitoring and telehealth solutions have an unparalleled role to play in improving timely access to quality care and reducing waiting times, thus achieving Strategic Objective 6 (“Improve healthcare provision before hospitalization and in the main hospitals [ER and ICU]”) and 9 (“Achieve acceptable waiting times across all stages of service delivery”), as well as 14 (“Improve the quality of life and healthcare service provided to patients outside hospitals”). Telehealth and telemonitoring technologies have proven effective in managing patients with various chronic diseases (e.g., diabetes, heart disease, and certain mental disorders) that are increasingly prevalent in the overall region, including Saudi Arabia.

These systems can also be used effectively for patient monitoring after hospital discharge (see Strategic Objective 14), as well as in assisted active living and social care for elderly and patients with mental and physical disabilities. Telemedicine solutions in general have much to offer Saudi healthcare, helping to mitigate the problems of physical access to medical care and extending the reach of healthcare services to remote rural areas. These solutions are invaluable particularly when it comes to specialized care for rare diseases in remote, underserved areas.

1. Avera eCARE

Need: Rural hospitals and healthcare providers have less access to specialty care support.

Intervention: A service that provides 24-hour access to specialty care physicians, nurses, and pharmacists.

Results: Rural patients can receive specialist care without leaving their communities, and rural healthcare providers can get the necessary support in providing quality care to their patients.

2. Rural Telemental Health (RTMH) Program

Need: To provide high-quality mental health services to rural veterans.

Intervention: The Rural Telemental Health (RTMH) program, stationed at the Portland VA Medical Center, reaches rural veterans in Idaho, Oregon, and Washington via telehealth.

Results: From 2010 to 2013, 1,754 veterans received diagnoses, therapy, medication management, and other mental health services.

3. Project ADEPT (Applied Diabetes Education Program using Telehealth)

Need: To provide diabetes education services to the people of rural south-east Georgia.

Intervention: A telehealth diabetes education program was implemented in the Georgian counties of Candler, Emanuel, Tattnall, and Toombs.

Results: Participants showed improved control of diabetes and body mass index.

Even in low-resource settings, telehealth solutions based on simpler and cheaper platforms (e.g., low-cost mobile phones) can be used effectively to facilitate access to care (e.g., by providing teleconsultations) and raising health awareness (e.g., using SMS notifications and reminders for vaccinations and medications). These mhealth solutions have been used effectively for several years now. Such simpler solutions can also be used to provide remote clinical decision support to low-skilled health workers in remote rural areas.

The objectives targeting timely access to adequate specialized medical care (Strategic Objectives 6 and 9) as well as 15 (on improving patient safety), can be supported by ICT solutions utilizing IoT, mobile, and analytics technologies. Innovative solutions can greatly improve the quality and efficiency of emergency and critical care at all levels, including pre-hospital emergency medical services (EMS) and in-hospital care in emergency rooms and intensive care units. Remote triage, smart medical transport (e.g., via mobile monitoring of patients by qualified hospital ER staff), EMS device integration platforms, ICU integration platforms, and ER job assignment systems are all great examples. Further, solid evidence has already been accumulated regarding the effectiveness of analytic systems for clinical decision making, as well as “traditional” clinical suites like EHRs, picture archiving and communication systems (PACS), and radiology information systems, in terms of reducing medical errors and improving clinical outcomes.

In fact, many of these solutions have also been found to improve overall staff productivity and efficiency, which would also be important in terms of achieving NTP MoH Strategic Objective 2 (which aims to increase the efficient utilization of available resources and maintain the OPEX for hospitalized patients at the current levels, as a target for 2020). Additional digital systems for hospital enterprise operation management that support booking, planning and scheduling, clinical logistics, and patient flows are all about advancing the efficiency of hospital care. These systems can be further supported by IoT technology; for example, to support task management based on the staff or equipment location and availability status.

Multiple other opportunities to support hospital operations and thus increase efficiency and patient safety can be found in sensor-based technologies and the IoT. For example, applying radio frequency identification (RFID) tags, near-field communication, and bar codes to various objects can be used for managing not only hospital assets and medical supplies, but also for tracking patients and hospital staff. These technologies can also be used for monitoring staff behavior (e.g., monitoring hand washing and laundry turnover, for hospital infection control) and environmental parameters (e.g., sensor-based solutions can be used

Automated Medication Management System, Annecy Genevois Hospital, France

A fully automated medication management system has been piloted at Annecy Genevois Hospital, France.

RFID tags are applied to medication, the patients, and the managing doctors to support closed loop medication management.

Based on the data from the EHRs, a pharmacy robot picks the relevant pills, at the right time, in the right amount for the right patient, and a unit dose system packs it.

The medication, now ready to use, is transported to the nursing unit. Everything is tracked and monitored by RFID tags, temperature measurement, and other IoT technologies

to monitor lightning, temperature, and air conditioning) to support quality standards. These technologies can be leveraged to help achieve various healthcare targets related to care quality and patient safety, including those implied under NTP Strategic Objectives 8 (Improve the infrastructure, facility management, and safety standards in healthcare facilities) and 15 (Improve the quality and safety principles as well as the skills of service providers).

Sensor-based connected solutions of various complexity, sometimes in combination with decision-support systems and robotics, can be used, for example, to support automating medication and pharmacy management processes. As an example, closed loop medication management systems are aimed at automating all steps of the medication cycle, so that all items and people involved (the provider, the bar-coded drug, the patient, and his/her medical records) are matched electronically with each other. As a result, the process is more efficient, and medication errors are virtually removed. Connected sensor-based technologies are also used in personalizing treatment regimes (for instance, via monitoring medication dosage using connected ingestible sensors).

Developing human resources in healthcare is another broad area where the role of digital technologies cannot be overemphasized (MoH Strategic Objectives 4 and 5 target the training of Saudi physicians and nurses). Various digital options offer exciting opportunities to train and educate medical professionals, building on a wide range of technologies, from simpler forms of elearning mobile apps to truly advanced systems involving sensor-based technologies, cognitive computing, and virtual reality.

In terms of raising citizens' health awareness and fighting chronic diseases, the recent explosion of sensor-based connected devices has shown very promising results for supporting individual lifestyle improvements, as well as providing numerous new opportunities for vast improvement of the overall effectiveness of

nationwide public health interventions. With regard to Strategic Objective 13, in particular, which aims to improve public health services with a focus on obesity and smoking, various preventive technologies, the utilization of IoT, mobile, and social media technologies have been used successfully to support lifestyle changes in an enjoyable way for individuals.

Affordable devices can be worn on the body or installed in external objects, including furniture or building infrastructure, and track a broad range of physiological, environmental, and activity-based parameters. Many of these monitoring devices are available over the counter and can be used by healthy individuals for health maintenance and wellness (primary prevention), as well as by people with various chronic health conditions (e.g., hypertension and diabetes) to self-manage their diseases and improve their health outcomes (secondary prevention). In the longer term, the use of consumer health and wellness wearables may expand to incorporate larger-scale preventive programs. The data generated by consumer sensors could be reused for screening and early detection of various diseases as part of ongoing population health management efforts.

And, last but not least, emergency preparedness systems (referred under Strategic Objective 11, aiming to adopt a national plan for emergency response to public health threats as per international standards) can be enhanced by a combination of transformational technologies, including mobility and social media, coupled with big data analytics systems. This will provide unique opportunities for the timely detection of disease outbreaks and the organization and management of emergency responses to public health disasters.

IDC Advice

In summary, the smart use of modern ICT is essential for addressing Saudi Arabia's most pressing public health needs. ICT can be viewed as a major enabler for achieving healthcare goals and objectives defined under Saudi Arabia's NTP 2020, helping to address not only Strategic Objective 3, directly related to the use of ICT in healthcare, but nearly all of the other strategic objectives on the country's national long-term agenda. The 3rd Platform technologies (cloud computing, mobility, big data and analytics, and social media) and innovation accelerators (e.g., IoT, cognitive computing, 3D printing, and robotics) should be leveraged to accelerate the pace of progress on this journey to Saudi Arabia's Vision 2030.

The MoH, hospital executives, and other stakeholders across the healthcare ecosystem must recognize the crucial importance of digital transformation to accomplish the Saudi vision for healthcare in line with the country's Vision 2030. To do so, they will:

- Take into account the lessons learned from the past and from abroad.
- Build a comprehensive and consistent business case with appropriate budgets and expectations.
- Put in place governance that supports efficient and agile execution.
- Design and deploy an architecture that ensures adequate performance, security, and innovation.

Lessons Learned from the Past and from Abroad

As discussed above, Saudi Arabia's NTP is a well-elaborated document, with a comprehensive set of clearly defined objectives, targets, and KPIs for the year 2020, defined separately for each governmental implementing body. These objectives are carefully linked to the longer-term goals defined under the country's Vision 2030. However, the document makes no reference to the accumulated experience and existing foundations for ehealth, such as to the national strategies and programs that were launched in the country before NTP 2020. Those foundations are important to consider. In fact, Saudi Arabia started developing ehealth more than a decade ago. Although the government had no comprehensive ehealth strategy before 2011, solid governmental efforts to develop ICT in healthcare started long before this. As WHO reported in 2006 (Building Foundations for eHealth: Progress of Member States, WHO Global Observatory for eHealth, 2006, available at: www.who.int/goe/data/country_report/sau.pdf).

"Public funding norms and standards for eHealth systems, and the promotion of inclusiveness and equitable access to ehealth, were implemented in 1990 and 1991... Procurement policies were introduced in 2001 and a national ePolicy in 2002. The most effective initiative is described as the provision of ongoing public funding for the deployment of ICT in the health sector..."

ICT infrastructure development for the health sector had been supported in Saudi Arabia since 1988 through a national plan for the development of ICT in health, and by intersectoral and nongovernmental collaboration. Since 1985 a national policy has been in place to reduce the costs of ICT infrastructure for the health sector... The most important action is described as being enhancing health sector connectivity (according to a national technology roadmap)...

ICT skills courses as a part of university curricula for health sciences students have been offered since 1990 and have been rated as moderately effective. ICT skills programmes were introduced in the ongoing training of health-care professionals in 2003 and have been very effective..."

National ehealth efforts were renewed with a wholly new impetus in 2011. In April of that year, the Ministry of Health, in collaboration with private and public sectors, developed a comprehensive ehealth strategy (the National eHealth Strategy of the Kingdom of Saudi Arabia). The MoH’s bold vision for ehealth focused on standardizing information management systems and processes across facilities and regions and strived to achieve wider deployment of ICT in healthcare. The strategy included a roadmap of more than 80 ehealth projects to be implemented over the course of five years. Large-scale national and regional projects were launched, including those aiming to deploy interoperable integrated electronic health records and PACS systems across the country.

To execute NTP Strategic Objective 3 and improve the efficiency and effectiveness of the healthcare sector through the use of ICT and digital transformation, the MoH should consider the lessons learned from those past programs and projects. In fact, the execution of the older ehealth strategy involved numerous challenges, particularly in the areas of governance, interoperability, skills shortage, user acceptance issues, and resistance to organizational change. Nevertheless, solid progress has been made, particularly with regard to developing ICT infrastructure and hospitals’ physical infrastructure.

Starting the execution of the new strategy without considering the continuity across plans and efforts (which often change with changes in leadership, and are developed by contractors brought from foreign countries, who leave after a project is complete), is one of the key reasons that the older plan struggled to achieve some of the targets previously set for the year 2016. This gap needs to be carefully addressed now, in order to succeed in the future. Adopting a more incremental approach is particularly important in the current economic context of Saudi Arabia, when the government needs to prioritize investments more carefully than in the past, and strive to improve efficiency of investments in preparation for the post-oil era. And duplication of efforts is certainly something Saudi government should work to avoid, striving to make the best use of existing resources.

Examples from other countries, particularly in the field of nationwide deployments of unified digital medical records, such as the U.K. National Program for IT (www.nao.org.uk/wp-content/uploads/2013/06/10171-001_NPfiT_Review.pdf) and the U.S. Veterans Affairs’ VistA (www.gao.gov/assets/670/661207.pdf), provide ample evidence of the kind of governance and architectural interoperability challenges that must be overcome to benefit from these technology investments. Both examples indicate that a big bang approach that includes simultaneous implementation across healthcare providers in an entire country, especially if done by ripping and replacing legacy solutions with a unique system, is virtually impossible.

Business Case

The NTP has earmarked SAR 5.99 billion of central government investments in electronic health for the next five years. This is approximately \$320 million every

year for a population of 29 million; or \$11 per inhabitant. The U.K.’s NHS spent £7.3 billion over the first nine/ten years of its ehealth program, according to the National Audit Office, for the National Programme for IT. This equals \$950 million per year for a population of 53 million, or \$18 per inhabitant, without achieving all of the program’s objectives. Thus in relative terms, the budget indicated by the NTP is smaller than the U.K. budget, but not by a wide margin. Whether or not it is sufficient to achieve the intended goals will depend on how the business case objectives are articulated and how the program is executed. It will be important to define at the granular level what is included in the electronic health investment:

- Is it to provide a unified digital medical record for 70% of the citizens by 2020, or does it include other projects?
- If it is only for the unified digital medical record, what will be included? Will it be a summary care record with enough information for emergency care, but not enough detail to manage patients with a long-term condition in a coordinated manner between doctors and hospitals?
- If it is only for the unified digital medical record, what will be the architectural approach? Will it be a brand-new system, built from scratch, or will it be a record viewer that uses a portal to provide federated access to legacy electronic medical records in each hospital and doctor’s office?

Different answers to these questions will yield different levels of feasibility of the business case within the allocated budget.

Governance

Digital transformation works only if the appropriate governance is in place to ensure effective and efficient execution. Governance structures and processes shall take into account policy changes, organizational changes, and project execution.

From a policy change perspective, reimbursement models and data protection guidelines must be revisited. For instance:

- If doctors are to use telemedicine to assist patients with long-term conditions remotely to make sure they comply with their dietary requirements and medication regime, a mechanism must be in place to ensure that they are reimbursed for the time they spend on a telemedicine consultation.
- If a patient affected by depression is using a personal wellness device to share sleeping patterns with his doctor, who owns what data? The patient? The manufacturer of the device controlling the application programming interface (API)? The telecommunications provider transmitting the data? The hospital/practice attaching the data to the electronic patient record? The doctor analyzing the data?

From an organizational change point of view, performance management must be reconsidered. For instance, if hospitals are measured by bed turnover, they will have an incentive to reduce the length of stay for each episode and quickly discharge patients into primary and community care for follow-up care and re-

habilitation; but if the objective becomes to improve the long-term condition of the patient, rather than to quickly solve the one episode, the length of the stay must be considered in the context of the performance of the hospital and primary care taken together.

From a project execution perspective, close collaboration between IT staff and the clinical professionals using the systems will be necessary to redesign processes and design user interfaces and training programs.

Architecture

The healthcare sector, including major government and foreign-funded hospitals in the Kingdom of Saudi Arabia, is characterized by a wide variety of legacy systems. Some have consolidated the basic patient data into electronic medical records, but these are usually based on proprietary technology that presents certain challenges, including:

Expensive integration with ancillary systems, including computerized physician order entry, laboratory, PACS, and patient administration systems (PAS).

- Limited flexibility in accommodating mobile access to information, because the systems were designed for a desktop environment.
- Reduced performance when trying to integrate new types and sources of data (e.g., patient reported outcomes through portals and mobile apps, or real-time remote monitoring of data from fitness wearables and medical devices).

As mentioned above, the lessons learned from the past and from other countries show that a hybrid approach that includes new core components and web-oriented architectures (e.g., APIs to federate data from legacy systems) is the most feasible. However, this requires strategic portfolio choices on the use cases to be supported, and relies on the adoption of technical interoperability standards (e.g., HL7 and DICOM for imaging) and semantic interoperability standards (e.g., ICD-10 and SNOMED CT).

The need to maintain the agility of the architecture to support innovative business capabilities as new use cases emerge and as professionals and patients want to access data from a wider variety of devices, increases the security risks. Furthermore, healthcare data is particularly valuable in the black market (10 to 20 times more than a credit card number, according to some estimates). This is resulting in an increasing number of attacks; for instance, ransomware has become a particularly prevalent threat for hospitals across the globe. The digital medical record architecture must take those security risks into account and apply the latest technologies for identity management, threat analysis, and fraud detection.

Estonian Government Uses Blockchain to Secure Medical Records

The Estonian government's eHealth Foundation is deploying blockchain-based management of patient healthcare records.

It will integrate the Guardtime Keyless Signature Infrastructure blockchain into the Oracle database engine to provide real-time visibility into the state of electronic systems to ensure the lifecycle management integrity of patient records.



**INTERVIEW WITH
WAREEF: NTP OPENS THE
DOOR TO NEW EXCITING
OPPORTUNITIES**

05

QUALITY

“Quality means doing it right when no one is looking” - Henry Ford



INTERVIEW WITH WAREEF: NTP OPENS THE DOOR TO NEW EXCITING OPPORTUNITIES

Safwan Khuzai

Safwan Khuzai is a Harvard Business School Alumni with over 18 years of experience in the ICT sector across multiple verticals. He has been the CEO of Wareef since 2012. Prior to joining Wareef, he served as senior manager at Emaar Economic City, deputy chief operating officer and head of quality at SADAD, and quality manager at Hewlett Packard. He delivers consulting work for firms across the globe, he also works closely with various ventures in Silicon Valley-USA. Safwan's core focus is on cost rationalization, operational efficiency and optimization of IT investments.

How would you describe the value created by the National Transformation Plan (NTP) for Saudi Arabia?

Definitely big value! The NTP is the first major step to enabling a leadership position for the Kingdom in all fields, with ICT being one of them. In fact, one of the major national goals set by the NTP is the enablement of digital transformation in particular. The Council of Economic and Development Affairs, led by Prince Mohammed bin Salman, has built the door; now it's time for all of us to open it and pass through to the greener side.

The NTP will not only identify challenges, it will also seize opportunities, activate the role of the private sector, enhance the focus on implementation, and help to measure performance. All of these are key success factors for developing digital infrastructure, supporting the government's digital transformation efforts, and enhancing common digital platforms and national digital assets. Ultimately, NTP-led digital transformation will help to reduce costs across various economic sectors, improve efficiencies among government entities by streamlining or eliminating redundant processes, and enable excellence through the provision of high-quality services for individuals, private sector entities, and intra-government operations.

Based on your interactions with customers, what are some of the biggest challenges IT leaders in Saudi Arabia currently face? And how can IT services providers like yourself help enterprises and public sector entities overcome these IT challenges?

While the drop in oil prices has introduced budget constraints, the NTP has unleashed various initiatives that will open unprecedented opportunities for IT leaders to seize. The budget constrains will limit the ability to make new IT capex investments, but they will also motivate IT leaders to become more creative in overcoming challenges by being more efficient in utilizing investments already made in the past.

To this end, Wareef will help public sector entities to increase the lifecycle of their existing IT investments and explore new out-of-the-box options to fulfill requirements without the need for new capital expenditure (such as validating open source, cloud options, in-house development, and outsourcing of non-core IT functions). We will also help them to implement world-class IT quality-assurance frameworks aimed at improving efficiencies, reducing IT operations costs, and increasing end-user satisfaction.

The NTP will necessitate Saudi organizations to embark on transformation in challenging times. How do you see your firm enabling or complementing the digitization efforts of Saudi organizations over the coming years?

Wareef provides Saudi organizations with a basket of services that will definitely increase the success rate of digitization initiatives. Being technology and industry independent, Wareef focuses on the real needs of organizations, rather selling or promoting specific solutions. As such, we architect end-to-end IT solutions that leverage our global know-how while simultaneously providing a local Arabized touch that perfectly fits the culture and specific needs of Saudi Arabia.

As early as the project kick-off, business analysis and need assessments will ensure that the precise requirements and specifications of digital deliverables are captured. By adopting a holistic approach to project management and complementing it with rigorous quality-assurance practices, we are able to ensure faultless execution. The end result is what really matters, so it is the end users who will judge the quality of the final systems and ultimately determine whether a digitization effort has been successful or not.

When digitization initiatives need to be expedited, a doubling of effort becomes necessary. Utilizing Wareef's Saudi-Females Near-Shore, ToT (Train-Operate-Transfer), and Tele-working service models will enable Saudi organizations to exploit these workforces at a competitive cost.

As the NTP gathers momentum and initiatives take shape, what technologies do you see having the maximum impact in Saudi Arabia over the coming 2–3 years?

The digital transformation goal, as set forth by the NTP, will absolutely bring more focus onto citizen-centric portals such as Absher. It will also drive the adoption of cloud solutions such as SaaS and IaaS, thereby eliminating the need for capex and allowing entities to pay as they grow. As a result, mobility solutions will become a necessity.

That said, these technologies will never be implemented successfully and embraced widely without proper user-driven need assessments, excellent execution that leverages a world-class quality assurance framework, and the employment of effective performance-measurement tools. Building up the national IT skills set is another aspect that will provide the required resources on a timely basis to carry the initiatives forward.

How prepared is the Kingdom when it comes to adopting these technologies?

The Kingdom possesses cutting-edge digital platforms and national digital assets that are capable of enabling and supporting the public sector's transformation. These include the Government Service Bus (GSB) by Yesser, Central Banking payment gateways (SADAD, SPAN, and SARIE), MOI & Al-Elm services (Yaqeen, Wathiq, Shomos, Moqem, and Absher), Saudi Post (My Post Online), and MOL employment platforms (Taqat and Istiqdam).

With the availability of such platforms, the pathway to public sector digital transformation has been made easier. More citizen-centric online services can be built on top of these platforms, including mobile applications and fully integrated in-Kingdom cloud solutions.

What could the relevant government authorities do to enable market growth during the lifecycle of the NTP?

Small and medium-sized enterprises play a major role in most economies, typically contributing 45% of total employment and up to 33% of GDP in emerging economies¹. Government authorities need to trust and empower IT SMEs to play an integral role in the country's digital transformation initiatives by giving them priority to execute IT projects. This will enable SMEs to create more national jobs, contribute to the economy's growth, and provide better localized services. This also avoids the transfer of profits to outside the Kingdom, which will be an overall benefit to the economy.

There should also be a considered focus on ensuring quality, as this is a key success factor for enabling successful digital transformation. There is also an increasing need for the introduction of a central quality authority that can act as a governance watchdog for validating, auditing, and approving all completed IT initiatives from a functional, performance, and security point view prior to launching them to the public.



Impact of Digitization on
Key Sectors in Saudi Arabia

TOURISM GROWTH
DRIVEN BY DIGITAL
TRANSFORMATION

06

TOURISM GROWTH DRIVEN BY DIGITAL TRANSFORMATION

Tourism in Saudi Arabia is already a big business, with the Kingdom attracting over 18.2 million visitors in 2014 (World Bank 2015). The majority of these visitors are pilgrims, concentrated during Hajj and Umrah. For example, Hajj saw over 2 million simultaneous visitors in 2015. However, business and leisure tourism has recently become more established and is growing under the auspices of the Saudi Commission for Tourism and National Heritage. This has been spurred by the 2015 announcement of the introduction of tourist visas for foreigners.

Tourism has the potential to grow into a highly profitable industry, not only financially perspective, but also from a social and cultural perspective. The National Transformation Program (NTP) recognizes this with a series of targets for the Commission for Tourism and National Heritage, such as establishing tourism destinations and facilities, creating jobs, and contributing financially to the country's GDP.

By 2020, the NTP calls for the tourism sector to grow its GDP contribution modestly (from 2.9% to 3.1%), but with a substantial increase in capacity that will create opportunities for growth to continue. The number of museums, archaeological sites, crafts centers, and world heritage sites are scheduled to grow by 40–50% in each category, with the capacity of available hotel rooms and apartments set to increase by around 40% in anticipation of increasing numbers of visitors.

Foreign investment is growing, and large international tourism operators such as Six Flags are now looking to develop theme parks in Saudi Arabia. Such investments would help create jobs and opportunities for partnerships, while further increasing the attractiveness of the Kingdom as a tourism destination. ICT is a major component of modern amusement parks and permeates every aspect of their operation, from internal systems that ensure smooth operation and the coordination of the supply chain surrounding the park to targeted promotions and marketing and audience participation via mobile apps, social media, and games.

Religious Tourism Dominates

By far the majority of tourism within the Kingdom will remain religious visits by pilgrims for Hajj, Umrah, and Ziyarah. Although managed by a separate ministry, the NTP's goals in terms of increasing visitor numbers and improving the visitor experience are closely aligned with broader tourism goals. A key NTP objective



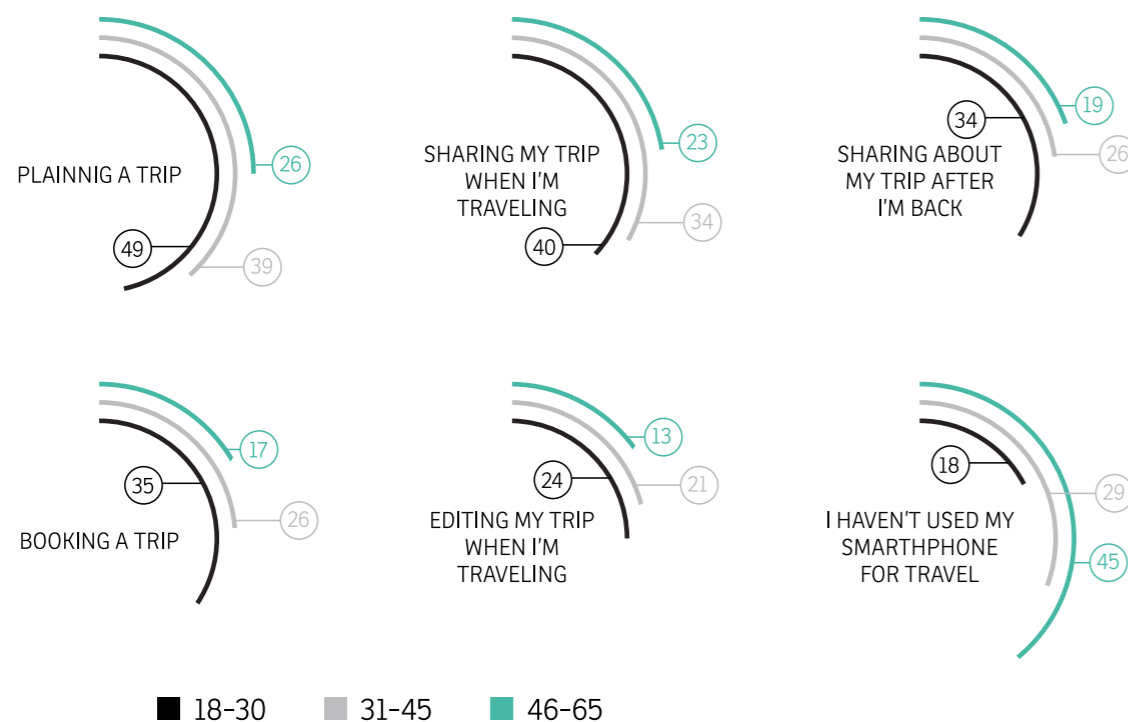
for the Ministry of Hajj and Umrah is to establish a mechanism for improving coordination between participating entities and expanding the number of entities from three to ten. This integrated approach may be achieved through the integrated digital service platform mentioned earlier.

Digital Tourism

Countries with established tourism industries are embracing digital transformation within the industry as they strive to open new tourism markets and reinvigorate the established sector. This strategy is particularly important for attracting younger tourists, where expectations for a connected, well-integrated tourism experience is much higher.

In Malaysia, the government has identified digital tourism as a key area for economic growth. Digital Malaysia is the country's national program for expanding the digital economy, and includes provisions for large investments in telecom connectivity in rural areas and electronic visas for international visitors. The country's Intelligent Tourism Cloud Marketing Platform (ITCMP) provides an integrated digital platform for local operators, helping tourists to select which attractions to visit.

Use of Smartphones Throughout the Journey



YOUNGER TRAVELLERS HAVE HIGHER EXPECTATIONS OF TECHNOLOGY IN TOURISM.

Source: Expedia/Harris Interactive 2013

In particular, there is now a pervasive use of digital services to plan trips, including end-to-end reservation services and interactions with online communities and social networks to seek recommendations and share experiences. The evaluation and selection of popular sites and attractions is quickly evolving from web marketing to embrace next-generation technologies like virtual reality (VR).

Integration services in particular are critical, particularly in real-time services like augmented reality (AR) and social network communications. High-demand events like the Hajj require high levels of coordination, information processing, and security. There are numerous smartphone apps for visitors on Hajj or Umrah; integrating emergency services with the flow of data from such apps can provide valuable information to emergency and service services, while providing communications channels to push notifications to visitors when necessary. By building integrated platforms capable of scaling horizontally across organizations, and vertically to millions of simultaneous visitors, Saudi Arabia will be positioned to deliver a strong digital tourism value proposition. Visa applications, travel permits, and security checks already form the natural starting point for such an integrated digital platform.

Digital tourism services are evolving quickly, with existing Internet and smartphone technologies providing the platform for new innovations and user experiences.

Everything Online

The Internet is fundamental to every part of modern tourism, from the planning stage through to the experience itself and sharing memories after the visit. Millennial visitors (the largest and fastest-growing segment of travelers) demand high-quality, fast, reliable connectivity at every part of their journey. Consequently, the expansion of tourist facilities and sites is also closely coupled to the expansion of telecommunications access, 4G mobile networks, and supporting infrastructure. This creates opportunities and challenges for service providers and their partners, which will be required to build additional capacity in anticipation of unpredictable growth; government support will be instrumental in providing access to funding, as well as to accurate planning and forecasting data.

Virtual and Augmented Reality

VR provides an immersive experience for a user, wearing a headset, to experience surroundings as if he/she were there.

Oculus (now a division of Facebook) is one of several firms pioneering VR headsets and software, and has established proof-of-concept demonstrations of its technology with several tourism organizations based in South Africa, British Columbia, and Las Vegas, among others. Through these demonstrations, tourists can experience immersive samples of their desired destinations before making a final decision on their itineraries.

Another technology similar to VR is AR, which overlays images of the real world with additional real-time components. For example, a view of a heritage site may include overlays of key information in various languages, highlight directions for tours, or showcase emergency facilities. AR technology ranges from complete headsets to mobile phone apps, and is seeing high levels of investment from companies including Google and Microsoft due to its immediate relevance (and revenue potential) to many industries.

Tourism Growth Driven By Digital Transformation

The establishment and growth of a strong tourism sector is expected (as per the NTP) to materially contribute to the nation's GDP, and in particular to employment: the target is to grow the number of tourism-related jobs from 0.83 million to 1.2 million by 2020, exceeding the NTP's international benchmark comparison of 1.13 million. Many of these jobs will be created in small and medium-sized enterprises (SMEs) that provide the specialized services, digital services, smart-phone apps, tourism marketing, planning, hospitality, and entire support ecosystem that underpins a thriving tourism sector.

Those organizations will be greatly empowered by digital technology, whether that is to deliver their own services to tourists or other agencies, or to gain expedient access to the necessary systems within government agencies.

This sector will be highly reliant on other digital services, notably telecommunications to provide high-speed, reliable mobile connectivity and Internet access, and financial services for the high-volume day-to-day tourism transactional environment as well as access to business support and financing.

Numerous opportunities will emerge for organizations to build Saudi-specific tourism services, online applications, smartphone apps, content, and skills, as well as to establish integration services between them. The Commission for Tourism and National Heritage will play a key role in providing guidance for these operators and setting standards for services to ensure that the tourism experience in Saudi Arabia is of a high global standard.

Encouraging local tourism operators to adopt these new technologies should be a top priority for the Kingdom as it bids to leapfrog to the forefront of digital-enabled tourism and expand the local industry. In particular, these services need specialized technical skills, content creation, IT services, and support infrastructure.

Such an initiative can be found in the European Union, where a very long-established tourism industry is facing digital disruption.

European Commission's Digital Tourism Network

The European Commission launched its Digital Tourism Network in 2015. Fea-

turing representatives from multiple EU countries, the goal of the network is to explore new ways for innovative technology to improve tourism and increase the revenue of tourism-related organizations, particularly SMEs. Specific focus areas include digital marketing and social media, and tourism services for mobile devices. The Commission invited presentations from technology firms known for their disruptive influence on incumbent tourism operators, including Airbnb and Expedia.

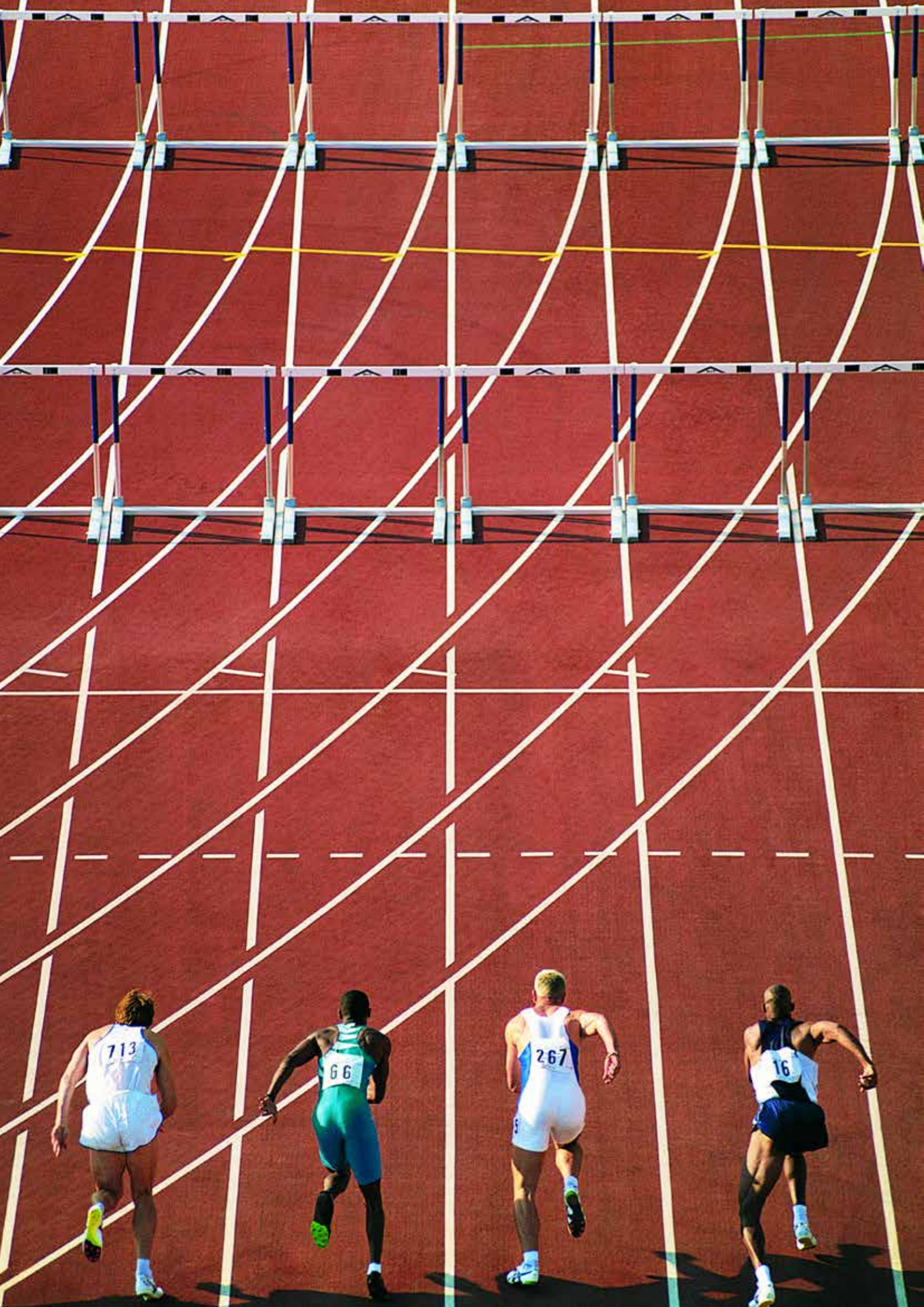
Airbnb operates a model similar to Uber, allowing private citizens to offer rooms or houses as accommodation, offering cheaper rates than hotels but also bypassing regulation; this type of disruption is growing in popularity globally and demands careful attention from the relevant tourism authorities. Expedia, a travel booking company originally started within Microsoft and now one of the largest travel companies in the world, has launched initiatives such as 'VisitBritain' in partnership with national tourism authorities to offer a tailored, integrated tourism experience for visitors.



Impact of Digitization on
Key Sectors in Saudi Arabia

DIGITIZING SPORTS
IN SAUDI ARABIA

07



DIGITIZING SPORTS IN SAUDI ARABIA

Health and wellbeing are strongly correlated with sports activities, and Saudi Arabia's National Transformation Plan (NTP) includes a number of objectives for the Kingdom's Sports Authority to increase the percentage of Saudis taking part in regular exercise, as well as increasing the country's performance in international sports events.

Modern sports analytics collect millions of rows of data from every sports event; at the higher level of semi-professional and professional sports, digitization is helping athletes and teams become more effective in many sports, and opening new opportunities for engaging with fans. Sensor suites embed Internet-of-things (IoT) sensors in clothing and footwear to monitor the performance of an athlete in real time, allowing coaches to track them accurately and identify areas of improvement. Because such systems are networked, visualizations of the data can be presented to fans through dedicated apps or through public broadcasting, bringing them closer to the action.

The benefits of digitization in sports are not limited to professional athletes. Consumer versions of the same technologies can be effective in encouraging participation more broadly, particularly when coupled with the modern popularity of gamification, which offers users an activity or reward feedback loop of continuous small rewards for their ongoing participation.

One of South Africa's leading healthcare insurers, Discovery Health, gamifies its products by providing small incentives to its customers in the form of Vitality Points to reward them for healthy activities. In addition to conducting routine health checkups, the system rewards participants for going to the gym and taking part in sports activities, with various discounts and benefits awarded for achieving specific point thresholds. Discovery Health has recently embraced wearable computing, using sensors to track its members' activity to reward their behavior more accurately.

Discovery Health also integrates with community events such as Parkrun, a growing global initiative that offers free weekly running events managed by volunteers. Runners have their times calculated by a barcode scanned at the finish line. Parkrun is a successful initiative in its own right, with a large community across 14 countries; Discovery Health realized it could piggyback on that initiative. The insurer picks up data from Parkruns (and other running events) and uses it to allocate reward points, which helps to promote fitness benefits and also drive positive brand association and marketing.

The Vitality Points program has proven very popular, as rewards-based gamification often is, but the financial upside for Discovery Health is also clear; healthier customers make fewer healthcare claims. By constantly encouraging people to become active, the community becomes healthier and happier, and the healthcare industry becomes more effective and profitable.

Another example of digital gamification translating into physical activity was the tremendous, if short-lived, global success of the Pokemon Go smartphone game, which encouraged users to walk around looking for virtual creatures. In the process, many users experienced far more physical exercise than they normally would, though this was not the explicit intention of the app.

"By constantly encouraging people to become active, the community becomes **healthier and happier**, and the healthcare industry becomes **more effective and profitable.**"



Impact of Digitization on
Key Sectors in Saudi Arabia

ENTERTAINMENT –
TECHNOLOGY UNIFIES
THE MODERN WITH THE
ANCIENT

08



ENTERTAINMENT – TECHNOLOGY UNIFIES THE MODERN WITH THE ANCIENT

The recently formed General Authority for Entertainment will have the task of creating policies and facilities to improve entertainment and tourism across Saudi Arabia. A key part of this mandate will be to effectively measure the success and impact of these initiatives, using digital platforms to gather and analyze data.

Safety and security will be a top priority, with Saudi Arabia drawing large numbers of foreign visitors, particularly during the Hajj and Umrah. Substantial investments are being made in technology, including security, crowd surveillance, emergency services, and social media analytics. Such platforms, used more generically to improve service delivery to other sites and occasions, will make a substantial contribution to the Entertainment Authority's ability to deliver on its milestones.

New York City has adopted a formal approach to social media, integrating over 200 platforms and reaching more than five million people every month. In addition to tourism marketing, the systems have been integrated with emergency services, enabling notifications for impending disasters (e.g., Hurricane Sandy in 2012) and providing real-time sentiment analytics to identify trouble brewing during mass events, thereby allowing emergency services to take proactive action.

Heritage sites around the world are embracing virtual reality (VR) and augmented reality (AR) to improve the visitor experience and to grow visitor numbers in a more efficient manner, particularly for sites that are at risk of damage as visitor numbers increase. AR technologies, in particular, are expected to play an increasingly important role in helping tourists find their way around sites and facilities. The emergence of cost-effective AR systems including Google Cardboard (a printable, folding headset run by Android phone apps) has made the technology broadly available, provided mobile connectivity is available.

Mobile connectivity, through 4G cellular networks or public wireless networks, is an essential ingredient in tourism. Ongoing expansion and upgrades of Saudi Arabia's mobile networks are, and will continue to be, inextricably linked to the growth of the entertainment and tourism industries.

Outside of tourism, domestic entertainment in Saudi Arabia will continue to grow, with technology playing a growing role particularly among youths. Community development is increasingly driven through online platforms, as well as exclusively online content services (e.g., streaming video, music, and gaming). The

role of the Entertainment Authority will not be merely to encourage the adoption of suitable services, but also to stimulate the creation of local content, and community engagement.

Internationally, social media has shown a steady evolution; celebrities were quick to adopt the technology to interact with their fans, but today, social networks are creating celebrities from within their ranks. Aligning with these trends will help the local entertainment industry to flourish, rather than seeing revenues flow out of Saudi Arabia.

"Mobile connectivity, through 4G cellular networks or public wireless networks, is an essential ingredient in tourism. Ongoing expansion and upgrades of Saudi Arabia's mobile networks are, and will continue to be, **inextricably linked to the growth of the entertainment and tourism industries.**"



**INTERVIEW WITH HEWLETT
PACKARD ENTERPRISE (HPE):**
COLLABORATION AND FOCUS
WILL BE THE HALLMARKS
OF SUCCESSFUL NTP
PARTNERSHIPS

09



INTERVIEW WITH HEWLETT PACKARD ENTERPRISE (HPE): COLLABORATION AND FOCUS WILL BE THE HALLMARKS OF SUCCESSFUL NTP PARTNERSHIPS

Khaled Al-Dhafer

Khaled Al-Dhafer has been the HPE's managing director in Saudi Arabia since 2013. He works closely with government officials and business leaders to provide ICT solutions. He has previously worked for Microsoft, Oracle, and AT&T, and has served on the board of directors for a large number public and private organizations. He is currently based in Riyadh.

How would you describe the value created by the National Transformation Plan (NTP) for Saudi Arabia?

Saudi Arabia's Vision 2030 initiative has several benefits and values – improved focus, collaboration, realignment, assets, and investment rationalization, among many others. The focus on a clearly articulated set of objectives and programs and defining the prime drivers are certainly a giant step forward.

By design, these programs will stimulate and foster collaboration among government organizations to ensure all objectives are executed in harmony to prevent duplication of effort and investment, and to help accumulate reusable in-country knowledge and practical experience.

Equally important is the alignment between the public and private sectors; unlocking the strength of the private sector will create the momentum needed inside the country to reach goals faster and create a healthy balance of citizen services and overall social responsibility between the public and private sectors.

Healthcare and education are great examples of how the private sector can participate to share responsibility, extend reach to remote areas, accelerate innovation, and create new jobs. In short, the possibilities are endless and the journey towards a bright and prosperous future for Saudi Arabia has begun.

Based on your interactions with customers, what are some of the biggest challenges IT leaders in Saudi Arabia currently face? And how can IT services providers like yourself help enterprises and public sector entities overcome these IT challenges?

Hewlett Packard Enterprise has worked with private businesses and government organizations in Saudi Arabia for more than 30 years. During this time, we have acquired a deep understanding of the local market. One of the challenges relates to the acquisition of proprietary technologies versus the adoption of open standards, as well as the emphasis on acquisition value rather than total cost of ownership, ease of management, and support capabilities, etc.

Another challenge IT leaders are facing is managing fragmented, distributed IT environments that are difficult to operate, expensive to maintain, and mostly underutilized. These challenges are usually due to the difficulty in defining strategies for changing business requirements given the rapid transformation and evolution of IT models.

At HPE, we develop fruitful partnerships while implementing total solutions and delivering quality life-cycle services. We work with public and private sector organizations to develop unified IT strategies and ensure proper training and knowledge transfer for their teams, enabling their IT solutions to provide the desired business objectives both efficiently and securely.

The NTP will necessitate Saudi organizations to embark on transformation in challenging times. How do you see your firm enabling or complementing the digitization efforts of Saudi organizations over the coming years?

HPE continues to bring a wealth of global experience to the Saudi Arabian market. We deliver that through leading open-standard products, innovative solutions, superior professional services, and uncompromising support services.

We aim to build on these assets and our commitment to the Saudi Arabian market to construct successful and sustainable partnerships, through which the Kingdom's initiatives and goals are met. We will be able to cover a wide spectrum of initiatives with special attention to ICT human capital development. Discussions on similar programs have already started with various ministries, including the Ministry of Communications and Information Technology (MCIT).

As the NTP gathers momentum and initiatives take shape, what technologies do you see having the maximum impact in Saudi Arabia over the coming 2–3 years?

Vision 2030 presents many forward-thinking objectives for Saudi Arabia and these objectives will require significant development of IT infrastructures. With the increased usage of apps and generation of data, there will be a need for faster, more agile systems and better practices to be put in place to utilize this

data. By transforming to hybrid infrastructures (i.e., mixes of private cloud, public cloud, and traditional IT), public and private sector organizations will be able to converge their current hardware, improve storage capabilities, and operate more efficiently.

With the availability of large volumes of data, both structured and unstructured (social media, machine-generated, and IoT), the challenge will be in creating and empowering data-driven organizations to make more informed decisions that provide a solid competitive advantage.

Additionally, in a world that is growing ever more mobile, the ability to provide access to the right information in a secure manner becomes essential.

How prepared is the Kingdom when it comes to adapting these technologies?

With great ambitions come great challenges. In Saudi Arabia, mobile penetration is high, with increased expectations for better connectivity and services. There are challenges related to connectivity bandwidth, cost reduction, and public IT literacy.

The goals outlined in Vision 2030 will require advanced IT solutions and well-maintained infrastructures in both the private and public sectors. This will inevitably require a sizable local talent pool. As a result, focused human capital development programs are needed to generate the required resources for this ambitious goal.

What could the relevant governmental authorities do to enable the market growth during the lifecycle of the National Transformation Program?

The Saudi Arabian government has already launched initiatives to address the aforementioned challenges. HPE is currently working with various government organizations and service providers to enable increased bandwidth requirements and build private and locally hosted government cloud.

Numerous programs to encourage development of IT skills within Saudi Arabia have also begun and others are in development. One such program sends government buses (caravans) around the country to provide more exposure to the general public around the latest ICT technologies. Other programs focus on engaging the younger generations—developing IT and ICT learning in schools through courses and competitions. In addition, HPE is collaborating with government ministries to implement certification programs in areas like IT security and new technology in order to help staff improve their skills and keep pace with the latest advancements.



Impact of Digitization on
Key Sectors in Saudi Arabia

**SUPPLY CHAIN AND
LOGISTICS: TAKING
SINGAPORE'S LEAD IN
BEST PRACTICES**

10



SUPPLY CHAIN AND LOGISTICS: TAKING SINGAPORE'S LEAD IN BEST PRACTICES

Trade and logistics form an integral part of the nation's economy, and in most cases is considered fundamental to attracting new business players and revenue streams. As is the case in most sectors, technology plays a crucial role in ensuring that key stakeholders realize benefits through improved planning and traceability.

Existing Challenges in the Logistics and Transportation Sector

The logistics and supply-chain sector is mired in issues related to policies, regulations, and changing customer preferences. Most nations are intent on conserving their respective regional advantages, and tend to formulate policies to provide them with the required leverage to gain an advantage over competing nations. Additionally, across-the-border policies could vary somewhat, depending on the nature of the goods and the associated sectoral focus.

Infrastructure, as an enabler, forms an integral part of the overall supply chain and trade ecosystem, and is rightly touted as an aspect that can delay digital transformation efforts. Information and communication technology investments, technology diffusion and general adoption, physical infrastructure in the form of roadways, and associated connectivity are all part of the core infrastructural needs that would go on to strengthen the overall supply chain.

The modern-day customer expects end-to-end visibility, from the initial shipment to the last-mile delivery. To achieve the required customer satisfaction level, there needs to be highly coordinated, integrated technologies and services that lead to a highly efficient supply-chain orchestration. The challenges related to orchestrating the complete logistics chain would involve the creation of a single platform that aids in the provision of relevant information to stakeholders, easier decision making, and faster execution of processes.

The Concept of Digital Logistics and Digital Supply Chains

The more popular technologies that enable the digitization of the logistics sector are the Internet of things (IoT), machine-to-machine (M2M) solutions, robotics, and analytics. The role of technology primarily revolves around integrating and providing a single platform for all the relevant stakeholders that enables 360-degree visibility of the ecosystem. The other prominent advantages of embedding technology are to:

- Increase productivity through automation.

- Reduce associated operational costs through increase overall equipment efficiency.
- Bring about competitive differentiation through value-added services and products.

Singapore: A Leader in Logistics Services and Supply Chain

Singapore has long been considered as a leader in digital logistics and supply chain management, driven primarily by trade-friendly regulations, supporting infrastructure, and locational advantages. Most of the key logistics companies have a strong presence in Singapore to take advantage of revenue emanating from trade and logistics.

Added to that, the Singapore government has 18 regional and bilateral agreements covering 24 trading partners across the Asia-Pacific region.

Some of key aspects that make Singapore a strong logistics hub are as follows:

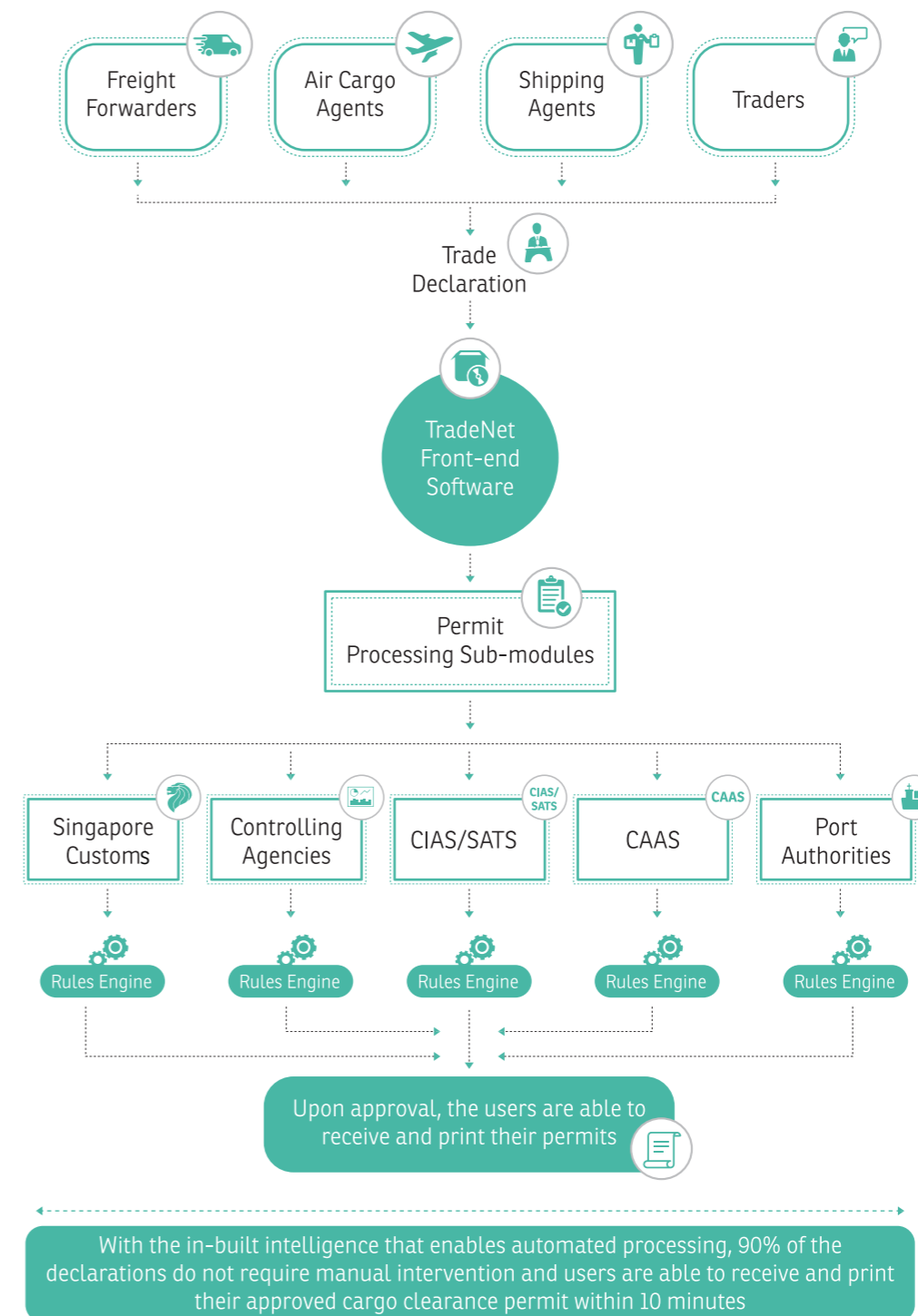
- Singapore has been a strong supporter of multilateral trade and trade liberalization, which is evidenced by six new FTAs that includes four ASEAN multilateral and two bilateral agreements since 2008.
- Singapore has good collaboration with IT partners and associated ecosystem partners, and provides a single trade platform that integrates traders, third-party logistics (3PL) providers, and freight insurance providers.
- Singapore is a signatory to the General Agreement on Trade in Services (GATS) protocols on telecommunications (Fourth Protocol) and financial services (Fifth Protocol).
- Singapore's economic and political stability provides the required confidence for traders to further invest in logistics-related infrastructure and services.
- The country's qualified, skilled labor force and business-friendly environment makes Singapore an attractive location for 3PL providers.
- With a view to helping the trade association and chambers (TACs) strengthen their presence, the Singapore government is in the process of introducing a new local enterprise and association development plus (LEAD-Plus) program. The core objective of the LEAD-Plus program aims to provide further funding support to TACs in order to develop new capabilities, strengthen existing processes, and attract new talent.
- The Singapore government has collaborated with IT providers to develop a single platform (TradeNet system) that integrates relevant stakeholders in the logistics value chain, enabling faster permit and freight insurance issuances.
- From the supply side, logistics providers consider Singapore as an important base for operations due to extremely robust physical infrastructure (e.g., highways, waterways, multi-modal terminals), strong local demand, geographic advantages, and, finally, support from the government and industry.

Operationalization, Execution, and Streamlining of Trade Processes Through TradeNet

In order to streamline existing permit issuance processes, the government of Singapore launched a national single portal for trade declaration, TradeNet, in 1989. The application allows the various parties in the ecosystem to exchange informa-

tion electronically. TradeNet aids in integrating the import, export, and trans-shipment documentation processing, while the Singapore Customs and relevant authorities can monitor the goods movement and enforce operational, health, and regulatory compliance. The other major advantage of TradeNet is the reduction in the cost and time to prepare and submit relevant documentation for trade permits.

TradeNet Operating Model



In order to obtain a permit,

1. The traders send out a trade declaration to TradeNet front-end (FE) software.
2. The FE system then sends those declarations for automated processing to various authorities, while the permit processing sub-module automatically determines and assigns the required workflow depending on the nature of the permit.
3. Driven by a set of in-built rules, the TradeNet internal engine executes the processing procedures for the controlling agencies.
4. The rule-based algorithms driven by built-in intelligence ensures that 90% of the declarations are completely automated and do not require any manual interventions. The whole process, in the majority of cases, take less than 10 minutes to be processed and approved.

The user-friendly web portal allows traders to track the permit processing workflows and raise any enquiries to the pertinent authorities. The advent of TradeNet has resulted in easier permit processing, a reduction in the number of trips to controlling agents, and a reduction in processing cost.

As well as TradeNet, the government of Singapore launched another application called TradeXchange, a multi-agency initiative led by Singapore Customs, the Infocomm Development Authority of Singapore, the Economic Development Board, and the Standards, Productivity, and Innovation Board (SPRING) in 2007. The application provides the trade and logistics community with a secure and neutral IT platform that, essentially, aids collation of real-time and comprehensive information, enabling logistics providers to take faster decisions.

The Singapore government announced in its 2016 budget that it will invest in the development of a National Trade Platform as the next-generation, one-stop trade information management system for supporting firms in the logistics and trade finance sectors. The new platform will eventually replace the existing TradeNet/TradeXchange systems.

Case Studies

The following case studies showcase some of the typical initiatives that the Singapore government and the associated departments have taken to demonstrate their focus on developing trade and logistics sector in Singapore.

Maritime and Ports Authority of Singapore (MPA)

Singapore has one of the busiest operating ports in the world, experiencing traffic of about 130,000 vessels annually. To address such strong demand, there has been an increasing push for the adoption of new technologies and analytics that can aid in the management of vessel traffic. The applications for data analytics in port management and logistics can range from analyzing port traffic trends to predicting the vessel arrivals and proactively address any clogging issues.

One other popular use case is the monitoring of suspicious vessel activities and detection of any associated anomalies. Operators and port technicians can use analytics to improve cargo planning and deployment of port resources. In order to operationalize these efforts, the MPA launched 4G@Sea, an initiative that provides low-cost, high bandwidth over a secure WiFi network at the Port of Singapore, which covers up to 15km of port waters from the shore. In order to develop mobile applications and data-driven services, MPA is exploring TV white-space technology in order to increase data carriage capacities.

Mass flow meters (MFMs) are also mandated by the MPA for measuring bunker fuel quantity. Singapore is the first port in the world that has set benchmarks for bunkering, a practice that will increase transparency and improve operational efficiency. The outcome of these standardized processes has resulted in savings up to three hours per bunker delivery.

The MPA has been testing the use of automated guided vehicles (AGVs), integrated with IoT and cloud technologies, to replace prime movers for increasing productivity, reducing operating costs, and enhancing safety. MPA has also collaborated with a local company in developing an unmanned aerial vehicle (UAV) for detecting oil spillages, thereby reducing environmental liabilities.

'Mobileye' Initiative and 'Software-as-a-System Total Logistics Information System'

The logistics and transportation sector plays a key role in Singapore's economy, contributing about 7% of GDP and employing around 227,000 workers. Singapore is also the world's largest container shipment hub, handling more than 32 million containers in 2013. Strong developments in other countries in Asia and the rise of ecommerce have led to double-digit growth in Singapore's logistics sector. In 2014 alone, the revenue driven by ecommerce B2C transactions was estimated to be SG\$525 billion.

To cater to this increasing demand and logistics requirements, the Economic Development Board (EDB) and SPRING have realized the importance of the required technology interventions in the existing supply-chain sector. One of the initiatives that was born out of the aforementioned need is Mobileye from the Singapore Transport Association (STA).

Mobileye is an advanced driver-awareness system that, through the use of sensors and cameras, monitor road conditions continuously, warns drivers of any impending collisions, and provides precautionary safety measures related to the existing speed limits, lane departure warnings due to driver fatigue, driving patterns, and so on. Besides the safety aspects, the system can also document and provide information on the reduced incidence of accidents which could potentially lead to reduced insurance premiums. The use of Mobileye has increased trucking companies' productivity by around 20% while at the same time reducing the number of accidents.

Mobileye is an initiative in which the industry has taken the lead and sought government support to implement and operationalize it. SPRING is also working providing a Logistics Productivity Toolkit, a self-help assessment application for companies and continues to work closely with other logistics industry and container depot associations in Singapore to increase the overall industry productivity.

Saudi Arabia and its Similarity to Singapore

Saudi Arabia is similar to Singapore in many ways, and will benefit significantly from some of the best practices that are listed above. Like Singapore, Saudi Arabia has geographic advantages, in essence serving as a bridge between the African, European, and Asian continents. Saudi Arabia is also supported by shared membership of the G20, and has strong commercial ties with Australia and with other members of the Gulf Cooperation Council (which is headquartered in Riyadh). The boost in non-oil trade and increased political collaboration with neighboring middle-eastern countries has made the situation ideal for Saudi Arabia to embark on becoming a global trading hub.

In line with Saudi Arabia’s National Transformation Plan (NTP), the Ministry of Transportation has outlined its strategic objectives as the following:

- Safety Related: Minimize the incidence of transportation-related accidents.
- Open Economy: Remove trade restrictions on air and truck transportation.
- Infrastructure: Upgrade railway networks.
- Ease of Business: Increase private sector participation.
- Governance: Introduce administrative reforms for Saudi Ports system.
- Productivity: Increase of railway cargo capacity.

From a regulatory and policy standpoint, Saudi Arabia has introduced a unified guide for customs procedures, anti-dumping, and countervailing and safeguarding measures. Similar to Singapore, the government of Saudi Arabia has taken several steps to simplify customs compliance through the Electronic Data Interchange (EDI) system that allows electronic submission and processing of import declarations, direct clearances systems, and the development of single portal for customs procedures.

With a view to boosting investments, the government of Saudi Arabia has introduced several measures such as a reduction in the regulatory burden for foreign investments, greater private sector funding, improved institutional settings, enhanced technical trainings, boosting female labor force participation, improving port capacity, and implementing trade facilitation agreements.

Recommendations

Driven by the aforementioned factors, Saudi Arabia is most suited to leverage the advantages emanating from the growth of trade and logistics sector, and would greatly benefit through the implementation of the following initiatives:

- Unified Portal for Trade: Saudi Arabia’s Ministry of Trade has already intro-

duced a single window for customs procedures and verification on a pilot basis. A single platform that can integrate the complete eco-system would be highly beneficial to the trade and logistics industry through reduced processing time and cost.

- Technology Adoption: The use of technology to both address efficiency and productivity challenges would enable logistics players to set up operational bases in Saudi Arabia. Enablement of automation and remote monitoring technologies can reduce the associated labor dependencies, and allow small and medium-sized enterprises to invest further in innovative solutions.
- Infrastructure Investment: The development of physical connectivity options that includes railways, roadways, and waterways would go a long way in attracting new logistics players.
- Treaties and Agreements: Saudi Arabia has bilateral investment treaties with 23 countries, with 17 of them in effect. Bilateral and multilateral agreements increase business confidence in the global trade setup, and will be seen as a positive step toward achieving the goal of making Saudi Arabia a gateway for trade for east European, African and, west Asian countries.
- Ease of Doing Business: According to the World Bank, Saudi Arabia places 82nd in the global ease-of-doing-business ranking. Policies targeted at reducing bureaucracy would aid in attracting new business partners to the country.

Summary

In summary, the Kingdom of Saudi Arabia has identified the need to move from an oil-based to a non-oil-based economy. The NTP defines the direction by identifying the focus sectors and investments required for making Vision 2030 a reality. And from a logistics and trade point of view, Saudi Arabia has all the ingredients to become one of the major trade and logistics hubs for the Middle East and Africa region. A collaborative, friendly, and open business environment will further aid in attracting global players to invest in and set up operational bases in Saudi Arabia.



Impact of Digitization on
Key Sectors in Saudi Arabia

**DIGITIZATION
OPPORTUNITIES FOR
SMALL AND MEDIUM-
SIZED ENTERPRISES IN THE
NATIONAL TRANSFORMATION
PROGRAM**

11



DIGITIZATION OPPORTUNITIES FOR SMALL AND MEDIUM-SIZED ENTERPRISES IN THE NATIONAL TRANSFORMATION PROGRAM

A core focus in Saudi Vision 2030, and the more immediate National Transformation Program (NTP), is to encourage the growth of small and medium-sized enterprises (SMEs). In many developed nations, SMEs are the engine of the economy, forming up to 99% of all companies, contributing up to 70% of GDP, and providing widespread employment and economic stability, as well as innovation and entrepreneurship, particularly in fast-moving fields, including ICT. In the Organization for Economic Cooperation and Development, around 95% of companies are SMEs, and account for nearly 60% of private sector employment.

The visit to Silicon Valley by Deputy Crown Prince Mohamed bin Salman in 2016 highlighted the role that startups can play in a growing economy, and the growth potential represented by suitably nurtured small businesses. Uber, one of the modern champions of digital transformation, which grew from a small startup into a major international player, receives funding from the KSA Public Investment Fund.

At present, SME contribution in Saudi Arabia lags behind other countries in the region, contributing only 20% of the country's GDP. Vision 2030 calls for this to increase to 35%, with the associated growth of scope, employment, and business opportunity. This will also be a major contributor to the goal of reducing Saudi unemployment from 11.6% to 7% by 2030, and increasing women's participation in the workforce from 22% to 30%. These transformations will require sweeping changes in the private and public sectors. The newly formed SME Authority will be responsible for implementing suitable strategies and monitoring the success of initiatives across the NTP in supporting SME development.

Today, for example, the processes required to start a small business and obtain funding are complex and slow by international standards, taking an average of 20.5 business days and 9 separate processes (World Economic Forum

Global Competitiveness ranking). Among its interim goals, the NTP sets out specific bureaucratic improvements in this area. The adoption of digital platforms to improve process efficiency in starting and managing small businesses should be a top priority for the Ministry of Finance and related bodies.

The NTP also calls for increased funding from financial institutions, from 5% at present to 20% of the overall funding by 2030. The Public Investment Fund, augmented by the public offering of Saudi Aramco, will be a major contributor. Again, online access to processes to apply for funding and process documentation will be a key enabler for SMEs.

SME Challenges

Small businesses face significant challenges, and many do not survive. In developed markets, 5%–20% of SMEs are replaced by other SMEs every year. This churn, while comprising many failed businesses, is also a sign of hybrid vigor; the constant introduction of new businesses motivates others to succeed and become larger concerns. The constant replenishment of serial entrepreneurs is a sign of a healthy SME market, but it does highlight the inherent risk in supporting small businesses. Consequently, one of the key challenges for SMEs is access to funding, an area where development funds, and programs which encourage international support and investment, are crucial.

The financial risks of running a small business inevitably affect larger business partners, which disincentivizes larger companies from including SMEs in their supply chains, unless business and regulatory support structures are in place and trusted by the market. The necessary support is not just financial; SMEs often struggle to grow after a period of initial success, as they lack (among other things) advanced business skills, marketing capabilities, and ecommerce channels. Business incubators and accelerators can provide this support to ensure that SMEs achieve growth and stability.

Saudi Arabia is already adopting ICT more aggressively in the public sector, building platforms for service delivery and omnichannel citizen engagement. This – backed by the roadmaps of the NTP – has the potential to greatly assist SMEs in accessing public services, reducing their overheads and improving efficiency.

IDC recommends taking a modular approach to building this capacity, providing small, focused solutions that are designed to interoperate seamlessly via clearly documented business and technical interfaces. This will enable an agile approach to deploying solutions where they will have maximum impact, with the lowest cost and risk of failure. The resulting platform will be a significant business enabler in both the public and private sectors, and to SMEs in particular, since they are most impacted by inefficiencies and delays.

Some of this integration may happen in specific vertical markets. Healthcare is an excellent example, where patient records, service delivery, and performance

targets stand to benefit from integrated, efficient digital platforms. In the European Union (EU), it is estimated that a 1% reduction in face-to-face healthcare visits (using ehealth platforms instead) would save over EUR 200 million. This digital transformation is clearly not just a technical shift; it can only be achieved with regulatory reform as well as the acceptance of professionals and the public. Similar disruptive processes have been observed in many areas of ecommerce and online service delivery.

The Role of Digitization

The Strategic Policy Forum (SPF) of the European Commission estimates that organizations making use of modern technologies perform 10 times better than their peers. The SPF estimates that digital transformation in the EU will create millions of jobs, reduce administrative costs by up to 20%, and boost GDP up to 6% by 2030. Manufacturing, in particular, could grow up to 20% through digital transformation, much of that growth coming from small businesses, which are typically more agile and able to adopt new techniques and technologies faster than larger, more established incumbents.

Therefore, digitization should be a key instrument in achieving the goals of the NTP, particularly in relation to SMEs. However, it cannot be achieved in isolation; digital transformation requires broad support from all the parties involved, including the workforce, the customers, the businesses themselves, the legal/regulatory bodies, and the government ministries.

eCommerce: Potential for Sharp Growth

eCommerce is hugely empowering for SMEs, enabling them to compete with much larger rivals through digital channels for customer engagement and fulfillment. It also helps them to improve the management of their own supply chains. Furthermore, community ecommerce platforms create online marketplaces with vertical integration. Indeed, Chinese ecommerce giant Alibaba arose from such a community platform.

To realize the potential of ecommerce, attention must be paid to the regulatory frameworks governing electronic trade, including tax, foreign exchange, data privacy, consumer protection, intellectual property, and contract law. Regulations that are too restrictive or too complex for SMEs to effectively navigate may inhibit commerce to the detriment of the SME segment and GDP.

In India, ecommerce has boomed, with ecommerce marketplaces helping to accelerate the adoption of emerging technologies among SMEs. The Indian ecommerce market is forecast to expand at a compound annual growth rate of around 31% through 2020, when it is expected to reach a market value for the year of \$81 billion.

Smart Cities to Support Smart SMEs

A key promise of Smart City projects is to provide supporting infrastructure and shared services to SMEs, creating an ecosystem that greatly facilitates SME growth through access to next-generation communications, transport and logistics, human capital, governance, financial services, and more. In South Africa, for example, two metropolises – Tshwane and Cape Town – offer open wireless Internet services to residents and SMEs, providing free bandwidth in an attempt to overcome the cost and complexity associated with managing connectivity, a key obstacle for small enterprises. In terms of business, the fundamental aim of a Smart City should not be to provide free infrastructure; it should be to remove factors that inhibit business and undermine SMEs' potential to contribute to the economy; simply put, a Smart City should provide an environment in which SMEs can thrive.

Community feedback is therefore essential, as it enables the exchange of ideas and the identification of problem areas for improvement. The establishment of digital communication channels enables such feedback to be provided and plays a key role in facilitating service delivery and community engagement.

The Sharing Economy

The rise of the Internet has engendered the notion of a sharing economy. In the consumer context, this includes ride-sharing services like the one provided by Uber, and accommodation-sharing services such as Airbnb. Similar benefits exist in commercial niches, providing business communities with access to shared services, such as human resources, financial management, procurement, and logistics.

This sharing economy brings the benefits of business process outsourcing, typically the purview of large enterprises, to far smaller organizations. In theory, such developments can be achieved organically by businesses within a common marketplace; in practice, however, government coordination and resources are often required. As an example, in Singapore, SPRING (a subsidiary of the Department of Trade and Industry) set up a pool of human resource service providers to offer support to SMEs, enabling participating businesses to outsource HR functions such as payroll and advisory services, with up to 70% of the cost being government subsidized. This helps save enterprises money and ensures best practices and compliance with employment regulations, which in turn directly benefits the workforce and thus the local economy. Services are delivered via a digital platform to maximize efficiency.

"The rise of the Internet has engendered the notion of a sharing economy. In the consumer context, this includes ride-sharing services like the one provided by Uber, and accommodation-sharing services such as Airbnb."



شركة
الموبايلي
Mobily

**INTERVIEW WITH
MOBILY:** SAUDI ARABIA'S
TECH-SAVVY YOUTH IS POISED
TO ENABLE RAPID
TRANSFORMATION

12



INTERVIEW WITH MOBILY: SAUDI ARABIA'S TECH-SAVVY YOUTH IS POISED TO ENABLE RAPID TRANSFORMATION

Ismail ALGhamdi

Ismail ALGhamdi, a Harvard Business School alumni, is the Chief Business Officer of Mobily, a position he has held since May 2014. He is also Chairman of the Board for Mobily subsidiaries Sehati and National Company for Business Solutions (NCBS). He is tasked with managing the Mobily's performance, solutions, growth, and revenue across all enterprise aspects. With almost 20 years of experience, Ismail has held various positions with major blue-chip multinationals such as Microsoft and Cisco Systems. He also has extensive knowledge of Saudi Arabia's IT marketplace, and is equally effective in both the public and private sectors and across a diverse range of industries.

How would you describe the value created by National Transformation Program (NTP) for Saudi Arabia?

The NTP falls under the broader Vision 2030 initiative, which is an immensely ambitious plan to end the Kingdom's dependency on oil and build a more diversified, modernized, and sustainable economy that will help ensure future growth, employment, and prosperity. If implemented successfully, the NTP will have a huge impact on the economy, moving Saudi Arabia up into the top world economies (currently 19th). It will also greatly benefit the Kingdom's citizens by creating more jobs and improved citizen-centric services, which in turn will create a more vibrant and prosperous society.

Based on your interactions with your customers, what are some of the biggest challenges that ICT leaders in Saudi Arabia currently face? How can ICT services providers like yourself help enterprises and public sector entities overcome these challenges?

Digital transformation is no longer just an option for organizations, it is an imperative. This has made CIOs' jobs much more difficult as they need to invest in new technology in order to become more agile and efficient in the way they compete and deliver their services. The main challenge relates to the high costs of upgrading and optimizing legacy systems in addition, as well the scarcity of

the required skill sets. Moreover, moving toward cyber-physical systems poses security concerns as well. At Mobily, we anticipated the need to overcome these critical challenges in advance and have invested substantially in building our datacenters and cloud computing solutions.

We have also partnered with leading international ICT providers like Virtustream, Jasper, IBM, Cisco Systems, Dell EMC, and other global partners to complement our core offerings and ensure that state-of-the-art services and products are being delivered. At the same time, we have made sure that our capabilities are rated by independent third-party agencies that are trusted worldwide to ensure neutral assessment and credible judgment. We have been awarded numerous global shields and attestations so our customers can rest assured that we use cutting-edge technology while applying best practices, proper processes, and strict governance at optimum efficiency, productivity, and cost.

The NTP will necessitate Saudi organizations to embark on transformation in challenging times. How do you see your firm enabling or complementing the digitization efforts of Saudi organizations over the coming years?

Vision 2030 pays special attention to ICT and the role it can play in creating a knowledge-based economy and facilitating the economic added values of efficiency and productivity. There are 29 ICT-related initiatives included within Vision 2030, and we understand that these initiatives will transform the way people communicate and work as the Kingdom evolves into an information society. But this transformation will require a bridging of the digital gap and will depend mainly on innovation and massive ICT infrastructure enablement and deployment.

At Mobily, we have invested enormously in building the required fiber-optic infrastructure domestically and established international submarine cables. In addition, at 25,000 km in length, we have one of the longest terrestrial fiber networks in the world, which crosses and connects a couple of continents. We have invested in building state-of-the-art datacenters with cutting-edge cloud computing technology and security solutions. This means our customers can leave the task overcoming capacity bandwidth burdens, scarce resources, and high transformation costs to us, and instead focus solely on their core operations. We firmly believe that ICT will enhance efficiency and productivity, and consequently boost economic growth.

As the NTP gathers momentum and initiatives take shape, what technologies do you see having the maximum impact in Saudi Arabia over the coming 2–3 years?

Digital transformation will play a vital role in achieving the best results for the NTP. With a great focus on high productivity and cost optimization, investing in core ICT enablers – especially broadband, cloud services, and IT security – helps to lay a muscular infrastructure and serves as a strong base for fulfilling the targets of Vision 2030.

How prepared is the Kingdom when it comes to adopting these technologies?

During recent years, the Saudi government has made ICT investment a top priority. This has led to the country being rated eighth worldwide in terms of the importance of ICT to the government's vision. Saudi Arabia also ranks among the top developing countries and one of only three Middle Eastern countries classified as an "adopter" of the digital economy (GCI2016). Data consumption in Saudi Arabia is considered to be one of the largest in the world (more than 200 TB per day) and more than 50% of the population fall into the "youth, tech-savvy" demographic, which means the country is well positioned to adopt new technologies quickly. The government is rapidly transforming towards e-government, and our latest datacenter technologies will enhance the next phase of m-government development. M2M is already regulated and ready for the adoption of IoT, which will further drive new business models.

What could the relevant government authorities do to enable the market growth during the lifecycle of the NTP?

The e-government initiatives already implemented have significantly enhanced and simplified previously complex processes, thereby improving the level of interaction between citizens, business, cities, and government entities (a UN e-Government Survey (EGDI) ranked KSA 36th out of 193 countries in this regard in 2014). We trust that new digital initiatives and organizations will be added to support NTP. New policies and regulations should also be created to drive investment opportunities and boost the role of the private sector. In addition, strong ICT-related policies and adoption are vital to achieving the NTP's targets.



**PUBLIC-PRIVATE
PARTNERSHIPS** AND
THEIR ROLE IN ENABLING
DIGITIZATION

13



PUBLIC-PRIVATE PARTNERSHIPS AND THEIR ROLE IN ENABLING DIGITIZATION

Public-private partnerships (PPPs) are a strategic approach to projects, in which the cost and risk are shared between public bodies and private sector organizations. Numerous models exist for such projects, with varying approaches to involvement and funding on both sides, but for Saudi Arabia, the key objectives are not merely to manage risk and cost, but to actively build up the private sector economy and capability beyond the immediate projects called for by the National Transformation Program (NTP). The public-private partnership model will provide essential mechanisms to set targets, manage stakeholders, and ensure positive outcomes. If successful, PPPs will play an important part in enabling the NTP's goals.

PPP initiatives between government investment institutions and the private sector are already well established in the Kingdom and across the region, with numerous joint ventures underway. For example, Taqnia Defense and Security Technologies (a subsidiary of the Saudi Development and Investment Company) has formed a joint venture with Turkish firm Aselsan to create a defense electronics business in Saudi Arabia. Taqnia has also formed a joint venture with United States-based satellite specialist Skyware to create new satellite technology, with King Abdulaziz City for Science and Technology (KACST) playing a central role as a technology partner for the project.

Digitization will play a key role in defining the objectives of these projects in Saudi Arabia and in measuring their success. Specifically, this synergy creates an opportunity for the entire community to embrace digitization, digital transformation, and modern technology platforms in pursuit of the NTP's ambitious objectives; partnerships involving leading local companies and reputable multinationals will likely open up economic opportunities and lead to the development of entirely new markets. As an example, Cognit is a joint venture between UAE-based Mubadala Development Company and IBM Watson to explore cognitive computing and machine-learning opportunities across the Middle East and North Africa.

The Case for PPPs

In many countries, PPP projects, particularly in specialized technical fields such as IT and telecommunications are set up to reduce risk and manage costs for

both public and private sector participants. The advantages are significant for all concerned; the public sector organizations, their private sector partners, and the market as a whole.

Public-private partnerships allow public sector organizations to focus on their core service delivery business. Private organizations can use PPP arrangements to grow their business, expanding their available skills and providing greater employment within the community, at lower risk to themselves. The community benefits in every respect; greater employment, stronger domestic industry and service providers, and improved public services.

The structure of PPP agreements varies from country to country, even in countries with a wide range of projects. In Saudi Arabia, a uniquely Saudi approach is expected, with partnerships tailored to maximize the uplift of the private sector while focusing on the specific milestones of the NTP and the broader goals of Vision 2030.

In fact, an elegant synergy exists from the outset, since the NTP's specific goals include the mandate to create 450,000 jobs and to kick-start digital transformation in key sectors. Public-private partnerships will be a key strategy in achieving these objectives. While cost reduction is less of an up-front concern, since some projects will be funded through government initiatives, with seed funding available from the expanded Public Investment Fund, the goal of the NTP is to grow non-oil gross domestic product (GDP) contributions dramatically. This will not be achieved if PPP projects are reliant on public funding; the public sector will be stimulated as necessary, but should be expected to become self-sufficient quickly. This stimulation of the public sector will also contribute to a key NTP goal.

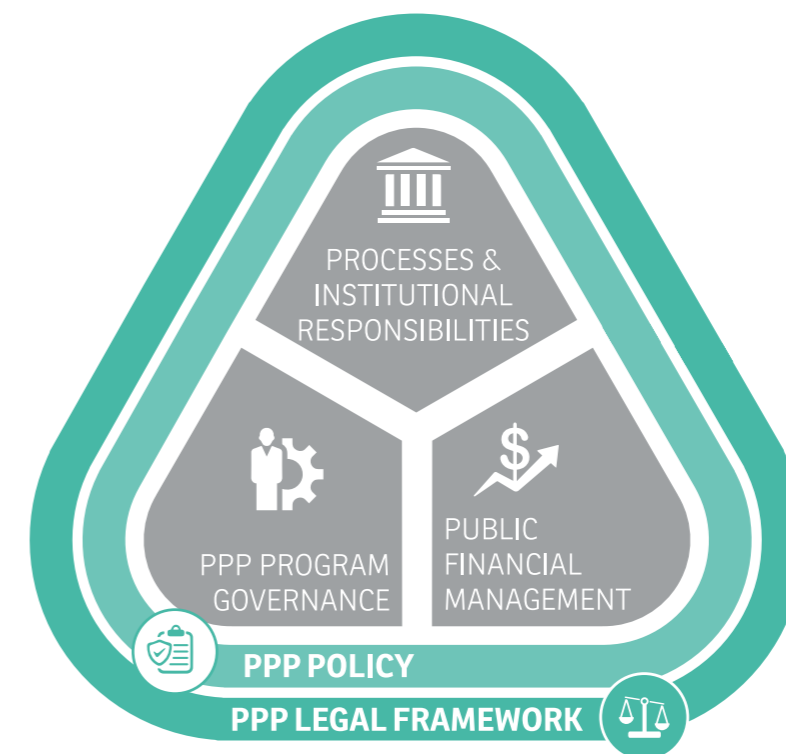
Smart Cities, by design, operate frameworks that encourage PPP initiatives; they provide an environment in which joint ventures serve to improve shared services and ensure sustainability through the innovative use of emerging technologies.

In India, Smart Cities will play a pivotal role in improving both the national economy and the quality of life for citizens. Projects will encompass breakthrough technologies in sectors such as communications, healthcare, transportation, utilities, and business services. The government has allocated a combined INR 980 billion (US\$15,329.26 million) to 100 Smart City projects and the Atal Mission for Rejuvenation and Urban Transformation, which is intended to improve 500 towns and cities over the next five years – a scheme that will fund smart solutions for the efficient use of available assets and provide new employment opportunities, thus boosting local economies and quality of life in general.

The foundations are already in place for similar projects in the Middle East, with initiatives such as King Abdulaziz University of Science and Technology in Saudi Arabia and Masdar City in Abu Dhabi establishing a precedent for successfully embracing emerging technologies.

Public-Private Partnership Models

PPPs rely on clear frameworks to ensure successful outcomes. Before any project is initiated, it is vital to put in place the framework (and the groundwork implied therein) to ensure successful delivery. This requires legal and regulatory frameworks within which suppliers are selected, performance managed, and spending controlled. Failure to set out clear policy frameworks can result in expensive delays with contractual or legal wrangling over tender assignment or cost overruns when projects do not meet their objectives.



PPP FRAMEWORK

Source: The World Bank Group, PPP knowledge Lab Library

In the NTP, each department has a roadmap with clear milestones and objectives set out; these will logically map to PPP frameworks and provide the basis for unequivocal service-level agreements (SLAs) with expectations for all involved, and suitable penalties for non-performance, including financial penalties and even complete termination of contracts.

Similarly, PPPs can and do run their course. When key objectives are met, possibly ahead of schedule, it may be appropriate to transition to a different engagement model which fundamentally changes the nature of the relationship. This can benefit both parties, so suitable exit strategies should be considered from the outset, particularly when the project is cast against known objectives and milestones, as in the case of the NTP. Where joint-venture entities have been established, they may pivot into effective private sector organizations; in the U.S., Silicon Valley has seen a number of entities formed this way in the technology sector, and Saudi Arabia should itself embrace such opportunities as they arise.

Better Business

One of the common components of PPP engagements is that of skills development and employment; contractors are able to use PPPs to establish and grow their business along a predictable, low-risk roadmap, expanding their human capital strategically. In Saudi Arabia, this will be a substantial benefit of such a partnership. Even where international suppliers are engaged to supply services, ongoing Saudization efforts to increase employment and skills transfer to local organizations will maintain the focus on strengthening domestic capacity as a key outcome of every project.

Beyond the specific needs of each project, this is also an opportunity to strengthen supply chains and business practices across industries. The NTP will rely heavily on digitization to achieve its goals; projects with similar goals and resources stand to benefit from mutual cooperation. This is itself a goal of the NTP, encouraging cooperative, efficient project management. PPPs will provide an opportunity to achieve this not only within the public sector, but across the private sector as a whole, not limited solely to those organizations engaged in PPP contracts. The specific needs of the NTP modify the standard drivers for PPP arrangements. Usually, the drivers for the public sector are one of the following:

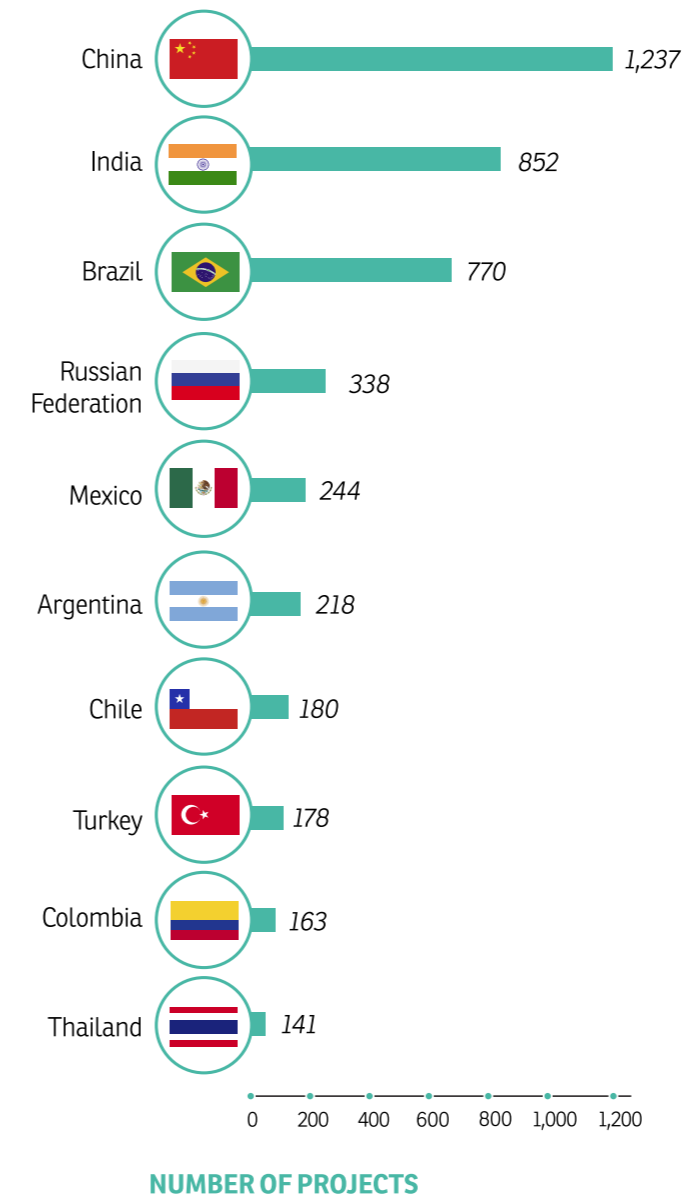
- The public entity lacks the skills for the project in question.
- The public entity lacks the funding to undertake the project.
- The public entity believes the private participation will improve the operation.

In the case of domestic industrial stimulus, a fourth case is manifest: the public entity is capable of investing in, and thus empowering the private sector, thereby increasing employment, skills, and the GDP contribution of local industry.

This model is not unique; Asian economies including India, China, and Indonesia have successfully used investment models to stimulate industrial development. In Saudi Arabia the opportunity exists for a hybrid approach, balancing stimulus

with genuine operational benefit to the government departments and their NTP sub-projects, achieving NTP milestones toward the Vision 2030 goals while encouraging private sector development.

TOP 10 COUNTRIES BY PROJECTS, 1990-H1 2015



TOP 10 COUNTRIES BY INVESTMENT, 1990-H1 2015 (US\$ MILLION)



TOP 10 COUNTRIES BY PROJECTS AND INVESTMENTS, 1990-H1 2015

Operational Models

Typical PPP agreements can be categorized as one of a handful of operational models. Saudi government departments will need to select suitable models carefully, according to the risk and strategic importance of each project concerned.

- **Financial Only:** In these partnerships, a private organization funds a public initiative. It is, in effect, a form of government borrowing directly targeted at infrastructure or service delivery. This is a popular model for less economically successful nations, but less relevant for Saudi Arabia.
- **Operations and Maintenance Contracts:** These models sometimes include the initial design and building, but always end with ongoing operation and management. Funding and ownership rest fully with the public body.
- **Joint Venture:** The risk and costs, and, sometimes, infrastructure ownership, are shared. A jointly owned entity is created to manage the project, with the public entity usually retaining the rights to buy out and replace the private partner if service levels fall below an agreed threshold.
- **Design, Build, Own, and Operate (DBOO):** Similar to a joint venture, but with the private party retaining ownership and control. Startup funding is usually provided by the public partner; in cases where a private entity funds a project, ongoing concessions (tolls, tariffs, or tax breaks) are typically negotiated to make the project profitable over a long period.
- **Concession:** Once completed, the ownership of the newly constructed infrastructure reverts to the public entity, and management fees are offered for ongoing operation.

The DBOO and concession models are often suitable for large-scale, long-term fixed infrastructure projects, and require effective regulatory oversight.

Strong Frameworks Reduce Risk of Failure

While PPP contracts are typically a lower risk to either party than a fully public or private initiative, the risk of failure exists. This risk can be mitigated, and turned into opportunity, through careful project management and the adoption of digitization.

Misalignment of project goals can cause PPP agreements to falter. The private entity is typically focused on profit and growth, while the public entity is usually focused on service delivery. These need not be competing goals; key performance indicators (KPIs) should align sustainable business performance with service outcomes, with the service levels clearly understood by both sides. Infrastructure projects, in particular, may not be able to avoid this friction, so agreements should be structured to balance the cost and risk of, for example, providing expensive services to low-usage areas which will not offer sustainable revenue on their own.

In these scenarios, it is valuable to set objectives in relative rather than absolute terms; in telecommunications, for example, acceptable broadband speeds

today may be hopelessly inadequate as we come closer to the year 2030; the NTP is thoughtfully constructed along such lines, allowing for ongoing review of acceptable standards and setting goals for improvement. This ongoing review will likely be a key characteristic of NTP-related public-private partnerships and their regulatory overview.

IDC suggests reviewing outcomes against both specific benchmark targets, and against desired outcomes (which may change during review). For example, “provide high-speed broadband access” allows for ongoing review of what constitutes “high-speed”, while “provide sufficient bandwidth for telemedicine and distance learning” ties infrastructure capacity to specific social objectives; these may be harder to measure, but are more clearly aligned with the broader and more ambitious national goals of Vision 2030.

Measuring Performance

Public-private partnerships require crystal-clear frameworks for contractual agreements, particularly when project goals are subject to review on an ongoing basis. Private organizations need the surety of contract protection to manage their risk and financial exposure in joint ventures, while public organizations need to avoid being shackled to partners failing to deliver acceptable services.

Several key offices in the Saudi government are being created to ensure that NTP goals are met, including the National Center for Performance Measurement, the Delivery Unit, and the Project Management Office of the Council of Economic and Development Affairs.

These offices will extend facilities to PPP projects to measure performance and ensure delivery against targets. Technology platforms will form a vital part of this process, including telemetry; enterprise resource planning (ERP) and reporting systems; mobility, cloud services, and sharing data; and the Internet of things. These platforms will, in turn, provide business opportunities to Saudi businesses, feeding back into the ongoing success of the NTP’s development objectives.

Examples of Successful Public-Private Partnerships

Numerous examples exist of successful PPP projects, which will provide useful templates for Saudi initiatives.

The Smart Village in Cairo, Egypt, was established to form a technology cluster and business park that would attract technology companies by removing local and regional obstacles to investment and stimulating local organizations. The Smart Village hosts ICT companies, financial institutions, and a number of government agencies. It currently employs over 45,000 people and has successfully attracted a growing number of IT companies, including multinationals, local and regional enterprises, startups, training centers, the International Telecommunications Union (ITU) Arab regional office, and Egypt’s Ministry of Information and Communication Technology (MICT). The project is a PPP between the MICT

and a private consortium; the MICT provided 300 acres of land, valued at 20% of the project, together with the business/regulatory framework necessary to encourage adoption, while the consortium funded the remaining 80%. The success prompted plans for two similar initiatives in Damietta and Alexandria.

The Multimedia Super Corridor (MSC) in Malaysia was developed in 1996 to establish a global and regional hub for technology innovation, with development in three phases through 2020. The government’s electronic governance policy, which sought to transform the relationship between the government and its citizens according to new, indigenous (non-Western) models of development, supported the mega-project. The project is now known as MSC Malaysia.

As with its past infrastructure megaprojects, the Malaysian government relied heavily on partnerships with the private sector to develop and invest in the new MSC and to provide the infrastructure and operate the applications and services of the new e-government program.

New cyberlaws, tax incentives, and government policies were enacted to support investment. High-capacity telecommunications and transport infrastructure facilitates services including elearning, telehealth, ebusiness, and government services; the project will continue to expand across the country and extend to other nations. The MSC currently hosts more than 900 high-tech companies.

MSC Malaysia encompasses an area 50 km long by 15 km wide. It stretches from the Kuala Lumpur City Center’s Petronas Towers in the north to the Kuala Lumpur International Airport in the south, and includes two new greenfield cities: Putrajaya, the national government’s new administrative capital; and Cyberjaya, a new city created specifically to attract private international multimedia, communications, technology, and knowledge-based companies. It was expanded to include the entire Klang Valley in December 2006. MSC Malaysia has grown into an ICT hub, hosting more than 900 multinationals, as well as foreign-owned and homegrown Malaysian companies focused on multimedia and communications products, solutions, services, and research and development.

The Multimedia Development Corporation (MDeC) oversees the project; it started as a government agency, then was later incorporated as a private entity. The MDeC actively markets the MSC globally and facilitates applications by multinational and local companies to relocate to MSC Malaysia. Further MSC projects were planned from the establishment of the organization to form a network of 12 cybercities linked to a single national network, hosting global services including an international court of justice.

e-Mitra in India is a successful initiative to provide unified delivery of services including government services, utilities, and more in both rural and urban areas. About 6,500 centers are operational, providing a platform which enables faster and more efficient interaction between government officials and citizens. The services provided are not limited to government services; the platform also

facilitates private sector services (e.g., electricity and water supply, and telecommunications services).

The project was initiated in 2005 by the government of the state of Rajasthan, with the goal of unifying two previous e-government platforms – LokMitra (in urban areas) and JanMitra (in rural areas) – to give citizens access to a multi-service, single-window platform. e-Mitra kiosks provide a one-stop facility for paying utility bills, as well as dues to the municipal corporation, Jaipur Development Authority, and the Rajasthan Housing Board, among others.

The kiosks also serve as processing centers for applications for the revaluation of grades for board exams, and applications for ration cards and birth and death certificates. They further act as public grievance centers and databanks with easy access to government information and a counter for buying stamps, rail tickets, or writing deeds. The platform allows the services provided at each kiosk to vary according to the needs and demands of the particular area. The front- and back-office projects are managed under separate PPP engagements. Hundreds of thousands of customers are served each month, and the model is spreading to other countries in the region.



**DEVELOPING ICT
SKILLS** FOR A
DIGITAL ECONOMY

14



DEVELOPING ICT SKILLS FOR A DIGITAL ECONOMY

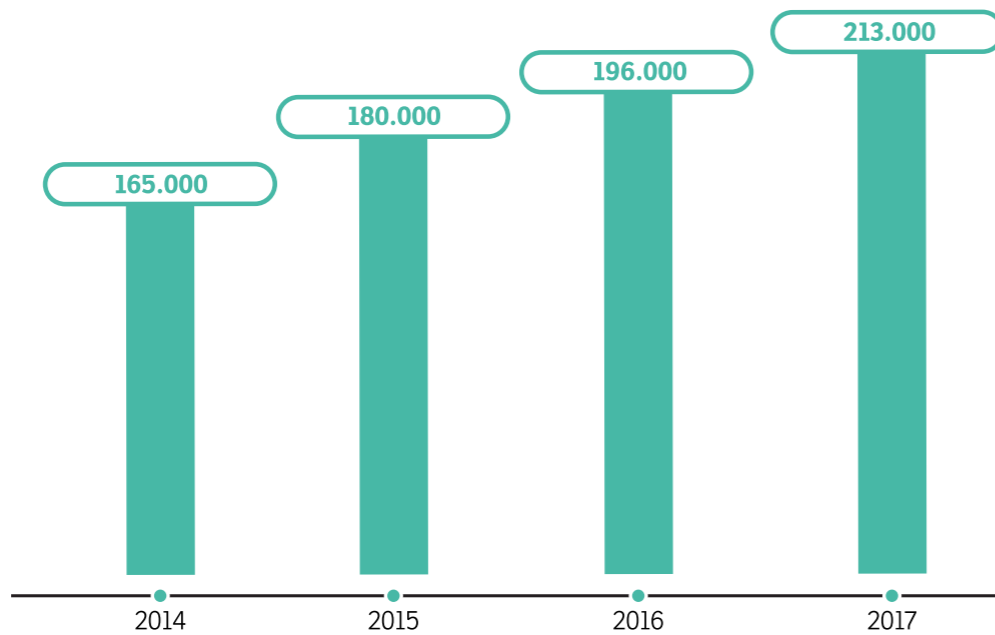
The capability of the Saudi Arabian economy to compete in the global marketplace is increasingly reliant on the innovative and effective use of technology. In order for the population to be able to actively participate in the digital economy, more people are now required to be ICT literate and have basic ICT skills. In addition, in order to innovate effectively and fully leverage technological advancements for economic growth, it is important to nurture a pool of ICT specialists who can design, build, deploy, and maintain ICT systems. This pool, if sufficiently developed, will also provide a much needed source of gainful employment.

Globally, developing ICT skills has become more challenging than in the past due to the fast pace of technological advancement and change. Over the past decade, the emergence of what IDC calls the 3rd Platform (cloud, mobile, big data analytics, and social) and, more recently, a slew of new technologies called innovation accelerators (3D printing, robotics, cognitive systems, augmented/virtual reality, etc.) are creating significant demand for new skills. This is driving some of the older skills to obsolescence and opening up supply and demand gaps in the skills landscape. Governments and private sector enterprises are realizing that it takes a considerable amount of time to develop both the basic skills and the specialist ICT skills required for the digital economy. We are currently experiencing a lag in skills availability globally because the digital economy requires people versed in science, technology, engineering, and math (STEM) skills, which are precisely the skills that are currently lacking.

Saudi Arabia's Vision 2030 has outlined a number of objectives that need the infusion of ICT to enable them. Key objectives of the Vision – such as improving the quality of e-Government, privatizing government services, boosting small and medium enterprises, building a developed digital infrastructure, digitizing healthcare, and building a regional logistics hub, among others – all require significant ICT enablement. This, in turn, will significantly increase the demand for ICT skills over the next few years.

Even disregarding Vision 2030 and the National Transformation Program, a significant ICT skills gap exists in the Kingdom. According to CITC's ICT Workforce Report 2015, there were a total of 180,000 ICT professionals in the Kingdom in 2015. Most of these were expatriates, with Saudi nationals contributing to just a very small portion of this workforce. The number of ICT jobs available is expected to grow to approximately 213,000 in 2017. However, the injection of Saudi ICT professionals from universities and colleges is not sufficient to fill the jobs that are expected to be created over the next few years. CITC estimates that the cumu-

relative gap between demand and supply will exceed 37,000 individuals between 2014 and 2017.



NUMBER OF ICT PROFESSIONALS IN SAUDI ARABIA (2014–2017)

Source: CITC ICT Workforce Report 2015

The NTP addresses this issue of ICT skills by laying down a strategic objective for the "rehabilitation of specialized Saudi human capital and employment of this capital to reduce the gap between supply and demand in the ICT sector," under the responsibility of the Ministry of Communications and Information Technology. The aim is to have 20,000 Saudi nationals employed (cumulative) in the ICT sector by 2020. The NTP also aims to create 7,600 jobs from start-up companies in incubators and universities. The target, if achieved, will lead to a much-improved local ICT talent pool, and provide a step to improving the Kingdom's ability to compete in the digital economy.

Within the context of these goals, the Kingdom needs to determinedly address various aspects that contribute to overall ICT skills development. Some of these are addressed partially or substantially in the NTP and other ongoing government initiatives. However, some areas need further analysis and attention in order to develop a more holistic approach to ICT skills development.

Developing Basic Skills

The development of modern basic skills such as math, science, critical thinking, and problem solving during the early stages of education is critical to ensuring that individuals are equipped to participate in the digital economy and have the pre-requisites for mastering more specialist ICT skills later. Saudi Arabia is

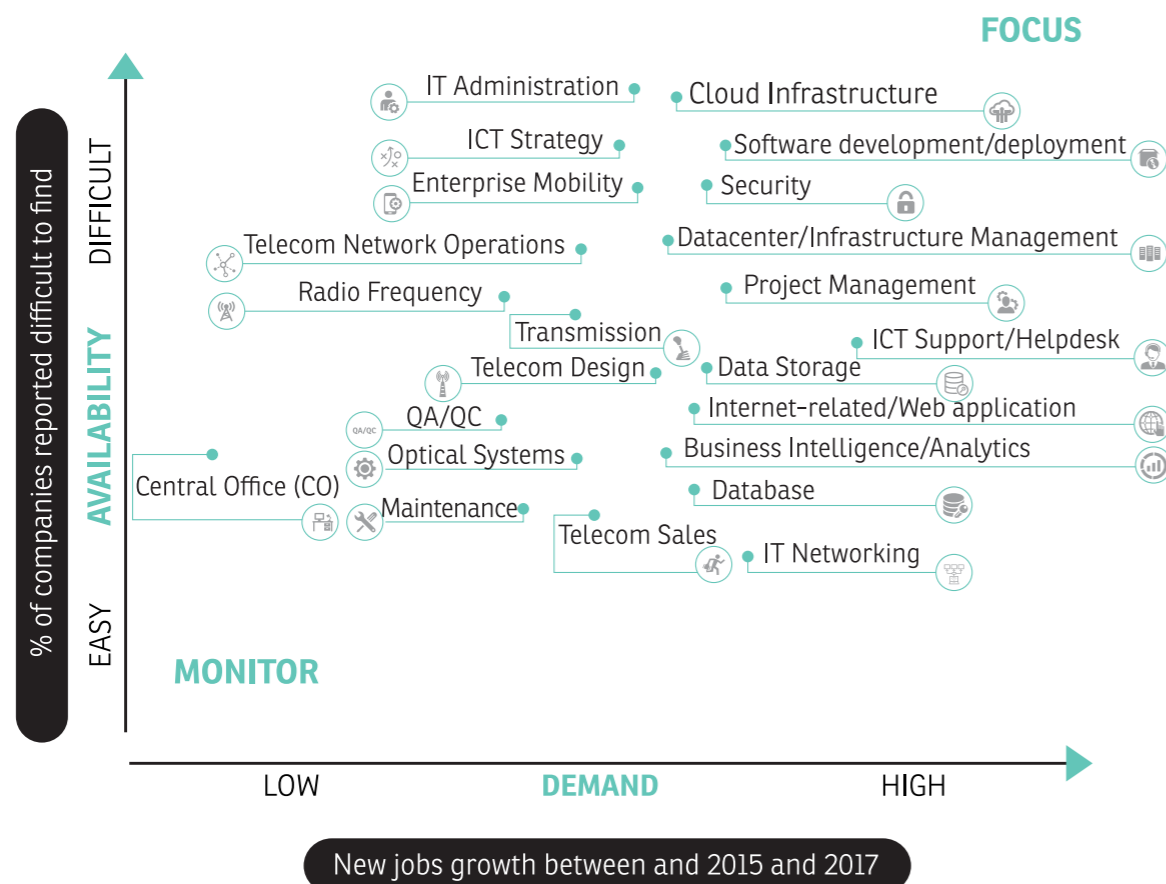
ranked 73rd out of 143 countries on the quality of math and science education, according to the World Economic Forum's Global Information Technology Report 2015. Currently, schools mostly stress on rote memorization with insufficient focus on analytical and critical thinking. The emphasis on STEM-related subjects needs to be strengthened in the school education system.

Many countries have experimented with different innovative practices in teaching and learning, where students are encouraged to take up tasks to develop social and critical thinking skills. As well as improving practices at school level, some countries have developed strategies for fostering the acquisition of basic skills in formal education at national level. For example, in 2009, Singapore identified the most relevant 21st century competencies as critical and inventive thinking; communication, collaboration, and information skills; and civic literacy, global awareness, and cross-cultural skills. It then developed a competencies framework that now guides the development of the national curriculum. Saudi Arabia needs to focus on curriculum development, particularly at school level. The NTP has laid out an initiative to develop a curriculum assessment system under the Ministry of Education that could address some of these issues.

Aligning ICT Education with Industry Needs

Vision 2030 aims to "provide citizens with knowledge and skills to meet the future needs of the labor market." The NTP envisages a critical role for the Technical and Vocational Training Corporation (TVTC), which oversees technical colleges and vocational training institutes, setting specific targets for Saudi student enrollment and the proportion of graduates joining the workforce. The enrolment target, in particular, is aggressive – to grow the number from about 104,000 currently to 950,000 by 2020. TVTC aims to leverage private sector support to achieve these goals and has already laid out goals to increase the number of strategic partnership institutions to 35 by 2020 (www.tvtc.gov.sa/English/MediaCenter/News/Pages/1212.aspx). Additionally, the NTP also lays out an initiative to establish King Salman University for Technical and Vocational Education. Clearly, the plan is to build much greater capacity for technical and vocational education by 2020. This will be of immense benefit for the development of ICT skills.

In parallel to building capacity, higher education and training institutions in Saudi Arabia urgently need to adapt their ICT courses to align with the demands of the industry. As highlighted by CITC's ICT Workforce Report 2015, the current skills mix within the workforce does not align well with the emerging needs of the digital economy. The report states that skills related to emerging technologies such as cloud, mobility, security, ICT strategy development, and so on are currently in high demand from employers but are very difficult to find.



CURRENT ICT EMPLOYMENT AND FUTURE DEMAND BY SKILL

Source: CITC ICT Workforce Report 2015

In order to align with industry needs, it is important to start by defining the ICT skills domains and tasks for each new technology mega trend, specifying relevant competencies and skills. However, to succeed in this exercise, it is important to have a common framework on the industry side that these skills can be mapped to. For example, the European Union (EU) has developed a reference framework of digital competencies, the European e-Competence Framework (e-CF) (www.ecompetences.eu), for the ICT sector that can be used and understood by ICT users and suppliers, ICT practitioners, managers and HR personnel, the public sector, and educational and social partners. A similar type of framework could help better align with industry and the move towards a competence-based approach to higher ICT education in the Kingdom. Higher and executive education institutions would then be able to use the approach to map their own courses onto these, to identify whether there is alignment with the descriptions and required skills, and thereby fit with the newly emerging skill requirements resulting from the ICT megatrends.

Training the Current Workforce

Workplace-based training (or on-the-job training) has been shown to positively impact wages, job security, and productivity at organizations. In addition, such training is best suited to coping with the rapid pace of technological change. Especially with older workers, training helps to address employability and skills depreciation. The challenge of skills depreciation due to technological change is exacerbated in the ICT sector, where change is fast paced.

The NTP has outlined several initiatives to expand the capacity available for ICT training. It has outlined an initiative to launch ICT training centers in partnership with major ICT companies and another for promoting career training program for graduates and job seekers within ICT companies. The Technical and Vocational Training Corporation (TVTC) has started evening training programs at technical colleges on various disciplines to provide citizens and residents an opportunity to upskill. Countries like the Netherlands have tried to address the need for ICT training through nationwide policies such as the Technology Pact 2020 (investinholland.com/nfia_media/2015/05/Summary-Dutch-Technology-Pact-2020.pdf) that aims to retain technology workers in the ICT sector, by re-skilling them and upgrading knowledge, reducing wastage of young workers, and providing them mobility within the sector. A similar policy that could provide the necessary framework for activating the current workforce and skilling them on ICT could be considered for the Kingdom.

Self-Learning

In addition to classroom-based learning, self-directed learning and continuous professional development can be extremely beneficial for the development of ICT skills, particularly for emerging digital technologies. The NTP outlines a target to increase the number of Saudis who have completed online training, hybrid, and on-the-job training from 36,000 currently to 1,000,000 by 2020 across all disciplines, as well as an initiative for flexible training under the Ministry of Labor.

Over the last few years, online education has grown substantially with the emergence of Massive Open Online Courses (MOOCs), which are full-fledged courses of lectures available online for a variety of purposes. ICT organizations around the world have started using MOOCs from academic platforms such as EdX and Coursera and from courseware providers like Udacity for training workers, often providing them with incentives for skills development. Few governments have utilized or stipulated a particular platform or provider or ventured to develop such a platform at the national level. The French Public Employment Service, Pôle Emploi, however, has launched a MOOCs platform that, for now, provides a few professional orientation courses to help job seekers build their value proposition to potential employers. Developing a national unified platform specifically for the Kingdom is perhaps not advisable as it may limit the choice of content and learning tools. However, raising awareness about such resources and tools can help increase instances of self-learning.

Raising Awareness

Significant gaps in awareness exist among nationals about the ICT jobs, career prospects, and education and training options that are available to people with ICT skills or those seeking ICT skills. The NTP outlines an initiative to implement a program to provide vocational guidance and awareness campaigns for graduates and job seekers in the ICT sector. Such initiatives could consider drawing learnings from the European Commission’s ‘eSkills for Jobs’ campaign (eskills-4jobs.ec.europa.eu) that was launched in response to the growing demand for ICT-skilled professionals in Europe and is now running in over 20 countries. Its main focus is to inform about the education, training, jobs, and other opportunities available to people with e-skills. It runs conferences on ICT skills, organizes competitions, provides profiles of various IT jobs, publishes individual success stories, and makes available resources such as online courses, webinars, and self-assessment tests.

Improving the Participation of Women in the Workforce

Raising the participation rate of women in the workforce in general is a key priority for the NTP. The program lays out a strategic goal to increase the proportion of the female labor force from 23% now to 28% by 2020. It goes on to outline initiatives to improve the employability of women and to support tele-working. Countries like Sweden have noticed a low rate of participation for women in the IT industry, which they realized was due to low enrolment rates in IT-related academic courses. They have since been placing greater emphasis on improving this metric. Saudi Arabia could focus on boosting interest among girls in STEM subjects at both school and university level, supporting awareness programs to remove any misconceptions among women about IT careers.

IT-enabled industries that do not require a great amount of travel or in-person interaction – such as business and knowledge process outsourcing – could offer Saudi women an opportunity to ease into the workforce. The Princess Nourah bint Abdulrahman University, which is a public university for women has set up the Kingdom’s first all-women business and technology park (WBP) in partnership with the IT major Wipro. Such initiatives, supported by the emphasis given to this matter in the NTP, could pave the way for women to play a bigger role in the Kingdom’s ICT transformation.

Multi-Stakeholder Partnerships

Governments, training providers, employers, and social organizations all need to play a role in ICT skills development. Multi-stakeholder partnerships are essential to not only build capacity but also to promote a more integrated, inclusive, and focused approach to ICT skills development. Such partnerships lead to education and training strategies that are more aligned to industry needs, help raise awareness of training programs among employers, and enable training providers to keep abreast of industry needs and emerging technology trends.

Skills councils that foster multi-stakeholder partnerships have been established in several countries. Countries like Canada have established a specific ICT sector skills council – the Information and Communications Technology Council (www.ictc-ctic.ca) – that includes a network of industry, educational institutions, and policymakers in the country, with a focus on providing research on ICT skills trends, offering policy advice, and developing talent strategies. Establishing such a council could help the Kingdom evolve a more systematic approach towards addressing the gaps in the supply and demand of ICT skills.

Conclusion

Vision 2030 and the NTP have set ambitious goals and laid out specific initiatives to bridge the burgeoning ICT skills gap in the Kingdom. While detailing these initiatives and fleshing out plans, the relevant ministries and NTP stakeholders should adopt a holistic approach, taking into consideration the aspects described above. Honing basic skills in STEM areas right from school level will help in the long-term development of more advanced skills. In addition to building capacity to produce more ICT professionals, it is equally important to align the curriculum with emerging technology trends and industry needs with the help of competence frameworks.

Training the existing workforce on ICT skills, through classroom training and self-learning, will help to re-skill them and improve their employability. Raising awareness of employment opportunities in the ICT sector and offering resources and information for capitalizing on them is critical to enabling the large-scale mobilization of students and professionals and the uptake of skills development programs. Finally, the government cannot do this alone; partnerships with multiple stakeholders is the way forward. If achieved, the alignment of skills needs and competence development strategies between government, ICT employers, and education and training providers will go a long way towards ensuring that the Kingdom’s ICT skills goals are met.

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15



INTERVIEW WITH Dell EMC: VISION 2030 WILL ESTABLISH THE KINGDOM AS AN ECONOMIC POWERHOUSE

Kamal Othman

Kamal Othman is the Regional Director - Public Sector, Saudi Arabia, Turkey, Egypt and Libya for Dell EMC. In his role, Kamal is tasked with supporting key organizations successfully transform their IT infrastructures to respond to changing business needs. In addition to extending the relevant portfolio of Dell EMC solutions and technologies to customers across Saudi Arabia, Turkey, Egypt and Libya, Kamal is also responsible for establishing key alliances with leading education institutions in the country to contribute to the development of the next generation of IT professionals in Saudi Arabia.

If you were to explain the value created by National Transformation Program for Saudi Arabia, how would you describe it in a few sentences?

The Strategic Vision 2030 not only outlines a thought out, step-by step approach to establish an "economic powerhouse" but also addresses key areas of improvement across various sectors to build a strong, sustainable foundation for the future.

Based on your interactions with your customers, what are some of the biggest challenges ICT leaders in Saudi Arabia currently face? How can ICT Service Providers like yourself help enterprises and public sector entities overcome these IT challenges?

Each of the objectives set out by the National Vision 2030 is centered on the understanding and intelligent application of technology. From helping lower costs by improving processes and reducing wastage to enabling the ability to introduce/launch new products and services; from building systems that allow faster monitoring and regulation of traffic systems to ease congestion to developing mobile applications for more proactive healthcare.

Today, the rapid adoption of mobile, social, cloud and big data technologies is changing customer behaviour and creating a new digital world, whereby organizations must adapt in order to stay competitive. The first step for any organization is to understand what role ICT can play in helping them achieve their own business objectives and sustain growth in the future.

As a core member of this community and a leader in IT Transformation, we at Dell EMC believe that we have a responsibility to support these objectives and assume the role of a trusted advisor as we work towards achieving the vision of a smart, innovation-backed nation that aims to offer its citizens and wider community a sustainable future and improved quality of life.

The National Transformation Program will necessitate Saudi organizations to embark on transformation in challenging times. How do you see your firm enabling / complimenting the digitization efforts of Saudi organizations over the coming years?

Dell Technologies – Dell, Dell EMC, VMware, Pivotal, RSA, SecureWorks and Virustream – is a unique family of businesses delivering the products and services needed for businesses to realize their digital future, transform IT and protect their most important asset, information. Dell Technologies is the world's largest privately-controlled tech company, which allows us to focus on our customers first and foremost and gives us the freedom both to invest in R&D for the long term.

Dell Technologies brings together strong capabilities in the fastest-growing areas of the industry including hybrid cloud, software-defined data center, converged infrastructure, platform-as-a-service, data analytics, mobility and cyber-security all of which remain central to business transformation to help achieve the national vision.

We have a proven track record of working with 98% of the world's Fortune 500 Companies; we believe that change brings rich opportunities. Alongside our partners, we are well positioned to enable customers to shift the status quo and embrace a digital future.

As the National Transformation Program gathers momentum and initiatives take shape, what technologies do you see having the maximum impact in Saudi Arabia over the next 2-3 years?

There are a number of technologies that are designed to empower transformation:

- Converged or hyper-converged infrastructure platform to deliver IT as a service and meet evolving customer demands for a connected experience
- Hybrid cloud to deliver the speed and agility the business needs to accommodate growth
- Flash technology to ensure cost effectiveness, reduce risk and complexity while helping improve efficiency of IT operations
- Solutions that would enable faster analysis of data from multiple sources can help the business drive decision making, predictively spot new opportunities, foresee emerging challenges and attain a significant competitive advantage to accelerate customer loyalty and revenue growth
- Build and maintain integrity of security architecture and applications throughout the entire lifecycle of application development and infrastructure enhancement.

- To do all this, transform IT roles and responsibilities to help deliver IT as a service and advance digital transformation

How prepared is the Kingdom when it comes to adapting these technologies?

As Saudi Arabia prepares to stand at the forefront of emerging markets by implementing its Vision 2030, there is a growing interest to facilitate innovation amidst the public sector. The ambitious plan envisages the provision of a sustainable service-based economy fueled by innovative technologies.

Organizations in Saudi Arabia are making a concerted effort towards changing the way IT is consumed and delivered by businesses through technologies like hybrid cloud, hyper converged infrastructure and software defined storage. They are poised to foster a cross-functional collaboration between innovation and IT to add more value to their conversations with customers.

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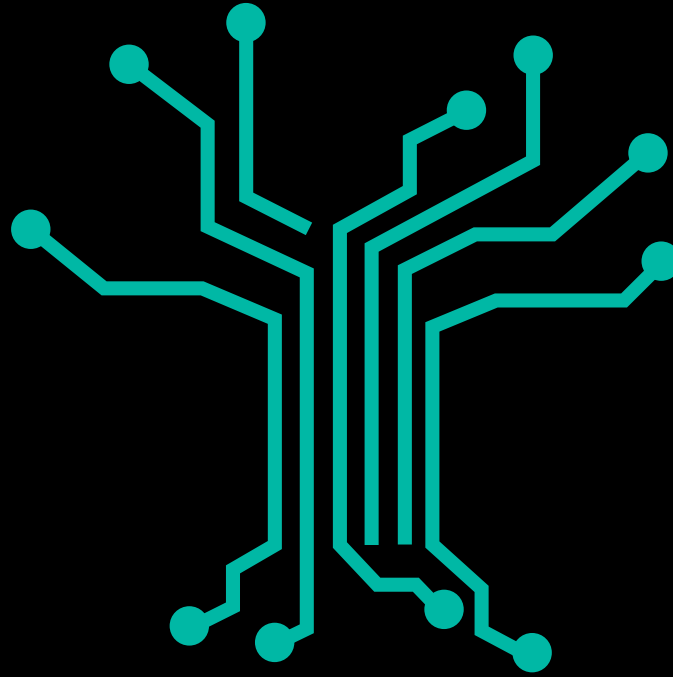


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Saudi Arabia announced its much anticipated Vision 2030 initiative, which is a long-term economic blueprint designed to curtail the country's dependence on oil. The vision, which is expected to be implemented over the next 15 years, outlines regulatory, budgetary, and policy changes that will impact all major aspects of the Saudi economy. Subsequently, the government released the National Transformation Plan (NTP), which outlines a number of initiatives to be undertaken by different ministries. Technology will be a key enabler and driver for many of the changes envisaged in the Vision.

This IDC report analyses the state of digitization in the Kingdom and the impact of technology on the new programs outlined by the NTP. It outlines the ways in which digitization can enable the NTP, juxtaposing the future possibilities with the current situation. It focuses on the vision, initiatives and programs listed in the Vision 2030 and the NTP for key sectors such as healthcare, tourism, SMEs, logistics, commenting on best practices from around the world, and outlining guidance for key stakeholders.

The Report also describes the viewpoints of senior ICT leaders from the local ICT industry on the programs and plans. It draws upon IDC's extensive research in the Kingdom and experience in assessing similar strategies in other countries.