



# innovation**ENABLED**

shaping the Saudi Arabia innovation ecosystem

April 2016



## Preface

In concert with the signing of the Saudi Arabia Advanced Research Alliance (SAARA) and launch of Research Product Development Company (hereafter RPD Innovations), Saudi Aramco and the SAARA Steering Committee asked RPD Innovations to turn attention to the innovation system of the Kingdom of Saudi Arabia. They suggested a workshop to build on Saudi Aramco's prior commissioning of two panel sessions and a report on the "Polder Model" of collaboration for innovation in the Netherlands (spring 2014). With support from its implementation partner, RTI International, RPD Innovations organized and facilitated two workshops in December 2014 and January 2015. These "Innovation Enabled" workshops allowed stakeholders to consider how to shape the Saudi Arabia innovation ecosystem. This report provides a summary of the key findings, characterization of enablers, and recommendations to continue to advance the Kingdom's innovation ecosystem, leveraging the investments and efforts by stakeholders to date.



## Acknowledgments

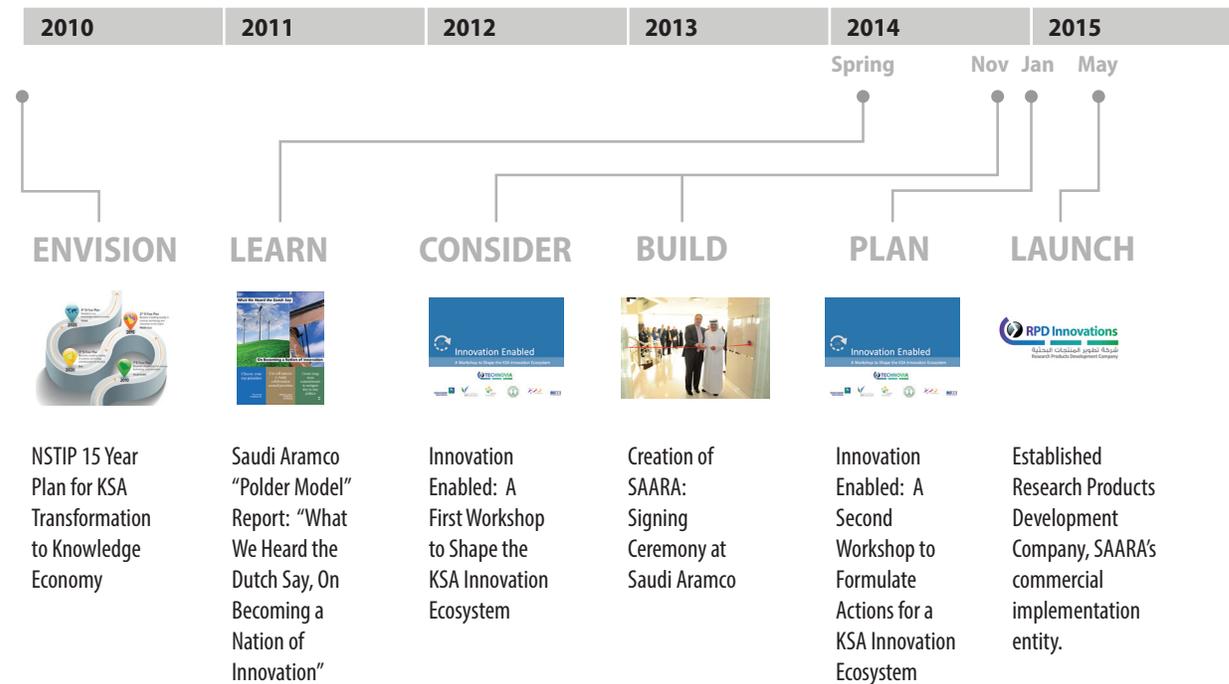
The authors wish to acknowledge the support of the Saudi Arabia Advanced Research Alliance members: King Abdulaziz City for Science and Technology, Saudi Aramco, King Fahd University of Petroleum and Minerals, King Abdullah University of Science and Technology, TAQNIA, and RTI International. We especially appreciate the leadership and guidance of HRH Dr. Turki bin Saud bin Mohammed Al-Saud, President of King Abdulaziz City for Science and Technology (KACST), and Mr. Ahmad O. Al-Khowaiter, Chief Technology Officer of Saudi Aramco and Chair of the SAARA Steering Committee. Finally, the findings and recommendations within this report build upon the critical observations of the many participants of the Innovation Enabled workshops; their insights are invaluable, and we are grateful for their active collaboration.

# Executive Summary

In establishing the Saudi Arabia Advanced Research Alliance, the alliance members asked RPD Innovations and RTI to conduct workshops to identify key enablers to strengthen the innovation ecosystem of the Kingdom. This report presents information gleaned from these workshops, organized to ensure that SAARA and RPD Innovations are well-positioned to advance the goals and objectives of the National Science, Technology and Innovation Plan (NSTIP).

Reflecting on current initiatives in Saudi Arabia and the learnings from successful models (see Sections 1.0 and 2.0) helps leadership find the right balance for a unique and successful model for the Kingdom. We expect that a successful model for Saudi Arabia will require a combination of top-down and bottom-up elements. Actions need to support the vision and build on efforts to date (Figure 1), yet aim to accelerate forward progress.

**FIGURE 1** Future success must build from the investment in planning to date, and drive toward action and learning.

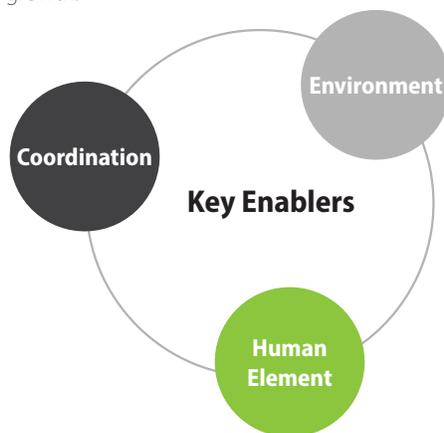


Independent of the overarching policy, programmatic, or organizational approaches that Saudi Arabia selects, there are common themes and principles that offer starting points for building success. These include:

- government leadership and support
- engagement, trust and connections across public and private sectors
- investment in people so that learning and improvement develop with experience.

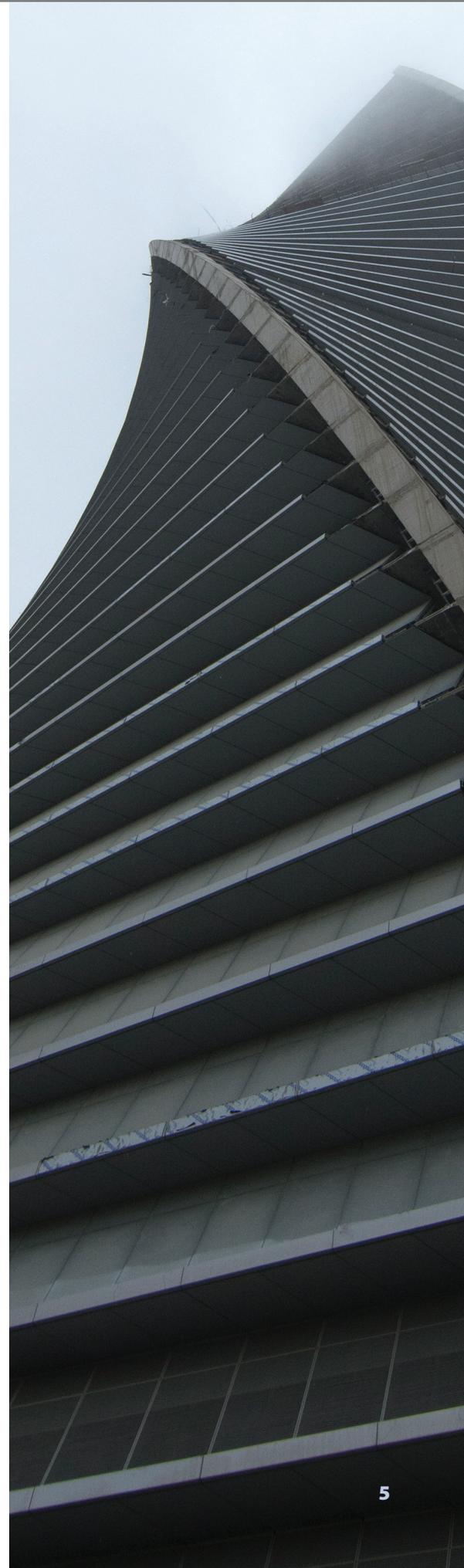
Key enablers needed as a foundation for the future were described by the workshop across three dimensions— Coordination, Environment, and the Human Element (see Section 3.0). Within each of these areas, potential programs, proposals, and actions were considered and aligned to the programmatic areas of the NSTIP (Section 4.0). These workshop-generated proposals are summarized briefly in Section 5.0.

**FIGURE 2** Stakeholders in the Saudi ecosystem identified key enablers needed for continued growth.



SAARA and RPD Innovations represent exciting next-generation ideas and fresh approaches to developing a uniquely Saudi ecosystem that can support development of a national knowledge economy by catalyzing ideas, helping to focus public and private resources and building interest among young people to prepare for careers in science, engineering and technology management.

This report from the Innovation Enabled workshops demonstrates RPD Innovations' emerging capability to take a national leadership role in developing new ideas around R&D and innovation. Based on global best practices adapted by Saudi Arabia's key stakeholders, the ideas presented herein will help position Saudi Arabia to compete. SAARA and RPD Innovations encourage others to join us to address future challenges and drive growth.



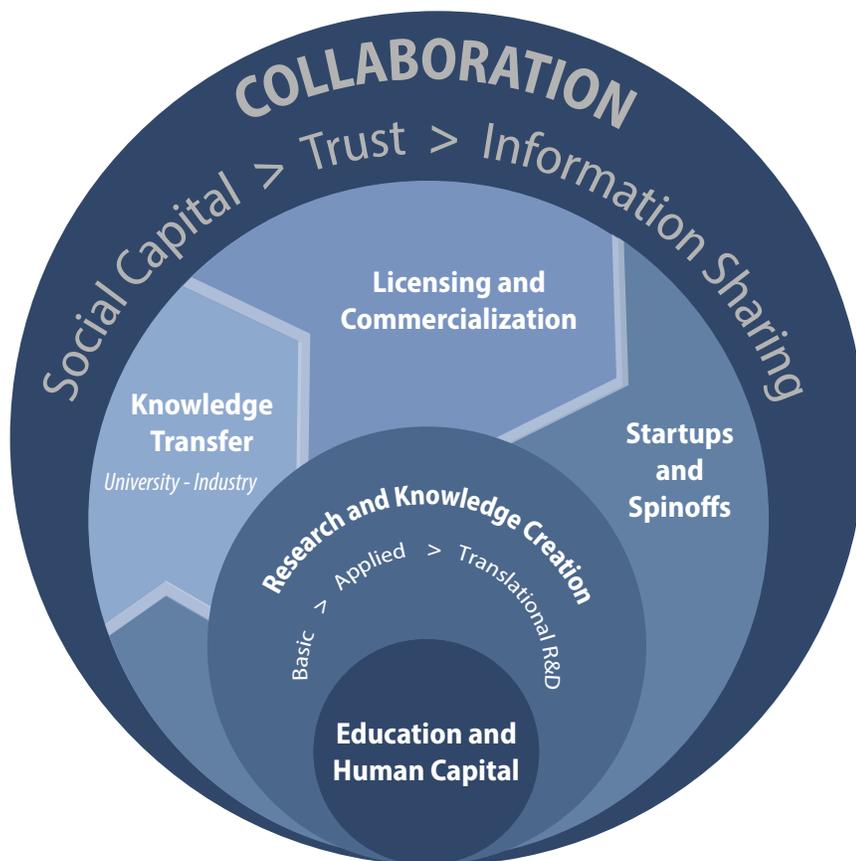
## 1.0 | Introduction

Natural ecosystems are defined as communities of living organisms interacting with their environment through unique networks and interdependencies as part of a system. Just as nature's interactions can be defined as an ecosystem, so too can regional and national economies. Much like natural ecosystems, "innovation ecosystems" are:

- living, changing, evolving
- connected and interdependent
- shaped by (and shape) their environment.

The term "innovation ecosystem" is used to describe the actors, elements, and enablers that both directly and peripherally impact the economy. These stakeholders include companies, universities, governmental agencies, small and medium enterprises, entrepreneurs, and others that interact and rely on each other to drive economic growth of a region, state, and nation. As illustrated in Figure 3, growth of the innovation ecosystem requires two distinct but interdependent systems—the knowledge economy (driven by research) and the commercial economy (driven by the marketplace).

**FIGURE 3** An innovation ecosystem describes the dynamics of the complex relationships enabling technology innovation and economic growth.



Saudi Arabia is roughly 10 years into a national drive to build a knowledge economy. A healthy innovation ecosystem is critical to achieve the sustained growth and economic diversification needed to provide opportunity for hundreds of thousands of young, well-educated Saudis. Much progress has been made, but much remains to be considered and addressed.

The Saudi Arabia Advanced Research Alliance (SAARA) and launch of RPD Innovations mark a giant step in strengthening the Kingdom's innovation ecosystem by not only providing critical technology commercialization capabilities but by its very charter to strengthen linkages and connections through multi-organization collaborations. RPD Innovations will provide applied R&D, technology assessment, and commercial development services in custom arrangements to meet the needs of companies, supply chains, networks, universities and government.

Yet RPD Innovations itself is but one important element. Robust innovation ecosystems are multifaceted and complex and in many cases can be elusive. Consequently, RPD Innovations will also seek to provide capacity building services to help organizations throughout the Kingdom to improve their innovation management capabilities. It will also act as a convener across the ecosystem to share best practices and strengthen networks.

Within Saudi Arabia, more needs to be done to ensure long-term health and viability of the innovation ecosystem. The "Innovation Enabled" workshops sought to elucidate a number of key enablers—some that may be missing, and many others that are present but require strengthening or better connections. The future health of the Kingdom's innovation ecosystem depends upon private and public sector leadership to work together to identify, assess, and build on the strengths and remediate the gaps. By sharing the insights gained with a larger audience through this report, we hope to foster collaborative thinking and idea sharing among critical stakeholders and develop a shared sense of priorities and next steps as guideposts for initiatives that support near-term actions toward longer-term economic strength and diversity.

## **SAARA and RPD Innovations**

RPD Innovations is the national center for translational R&D in Saudi Arabia. Aligned with the Kingdom's sweeping national initiatives to build a knowledge-based economy, RPD Innovations will focus on building technology innovation and commercialization capacity, bridging the gap between research outcomes and successful industries.

RPD Innovations was established as an effective technology development and commercialization company by the Saudi Arabia Advanced Research Alliance (SAARA). SAARA is a first-of-its-kind alliance between premier organizations from both the public and private sectors.

The founding strategic partners are:

**Saudi Aramco** – The Kingdom's fully integrated global energy and chemicals enterprise, and the world's largest energy producer.

**KACST** – Saudi Arabia's premier national science agency and its national R&D labs.

**KFUPM** – An institution known for its globally competitive graduates and leadership in science and engineering.

**KAUST** – A world-class, graduate-level science and technology university inspiring a new age of scientific achievement.

**TAQIA** – The technology arm of the Saudi Public Investment Fund, and a knowledge-based industries accelerator.

**RTI International** – One of the world's leading research institutes, dedicated to turning knowledge into practice.

## 2.0 | Models for Inspiration

The need to drive innovation for economic growth is now widely accepted. In fact, in the last 5 years, more than 40 countries have developed national innovation strategies, although many are now faced with challenges in implementing these strategies. Most of these efforts, for both developed and emerging economies, seek to develop what for them is the “right” model for an innovation system. A fundamental premise is that each country must resist the urge to copy what has worked elsewhere. Successful innovation systems must incorporate many local factors, both macro and micro-levels, to develop systems that will work in the local environment. However, there are many “good” practices to consider in forming the “best” practices. The innovation ecosystem for the Kingdom should be developed by Saudi Arabia with best practices and local realities in mind.

In considering best practices, two economically successful regions, The Netherlands and Silicon Valley in the United States, offer two models for inspiration that offer contrasts as well as common themes:

- The Polder Model from the Netherlands highlights the relationship between government, institutions and industry via the Dutch social history of cooperation and collaboration for success.
- As a counterpoint, *The Rainforest: The Secret to Building the Next Silicon Valley* (Hwang and Horowitz, 2012) characterizes the success of the Silicon Valley as based on a bottom-up and highly networked innovation model which is best summarized as “creative reassembly.”





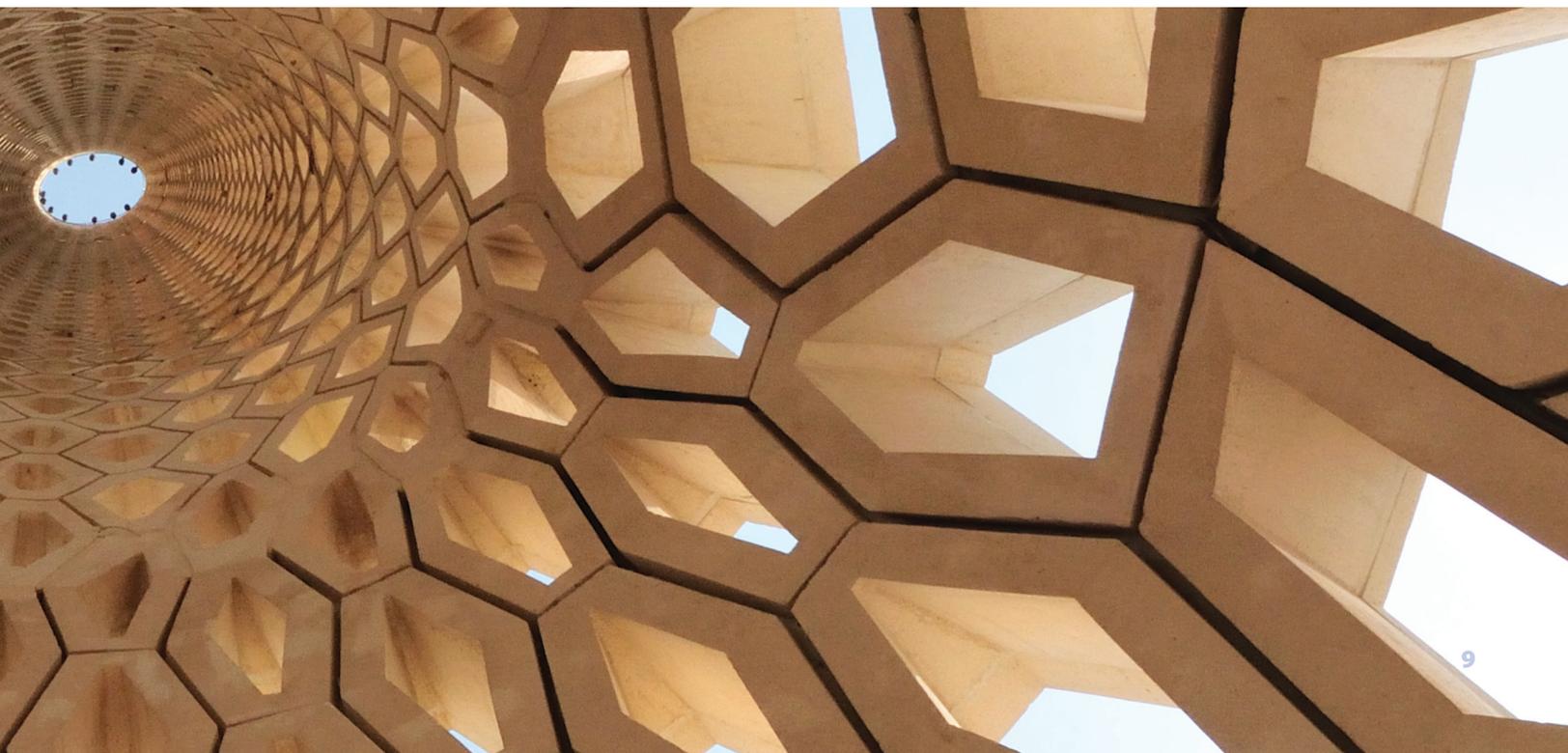
“Innovation is about wanting to be the best and then being the best, and with that mindset, there is no time for weakness or lack of ambition.”

“Shaping the Polder Model of Collaboration for Innovation”  
Saudi Aramco, 2014



“The health of the ecosystem is determined not by looking at individual elements or some comprehensive view of them, but rather by measuring the velocity of the flow of ideas, capital and talent.”

*The Rainforest: The Secret to Building the Next Silicon Valley,*  
Huang and Horowitz, 2012



## 2.1 | The Netherlands

The Polder Model centers on sustained, strategic relationships between government, institutions, and industry. Innovation has earned the Netherlands top spots in most economic and trade rankings. While ranked only 65th in the world in population, it is the 16th largest economy in the world, eighth in the global competitiveness index, tenth in productivity per hour, and the fifth largest exporter in the world. None of this has happened overnight. The government of the Netherlands has invested in research and innovation for over 30 years, and invests approximately 1.8% of GDP on research annually. The country's small size plays into this model, as well. The Netherlands is large enough to succeed in bilateral relationships with other countries, yet condensed enough to excel in one-to-one and public-private partnerships. The open and collaborative atmosphere resulting from this level of cooperation and collaboration fosters an environment in which innovation is not only possible, but inevitable.

**Clear roles and trust are crucial in the success of the Polder Model. Government must set a clear policy and direction. Industry and universities must trust that the government will not totally change policy. Government must trust industry and universities to support the goal and direction which has been set.**

Foundationally for the Netherlands, the government's innovation platform defined the areas in which the Netherlands was strongest, for example water management and chemicals, and focused their innovation efforts on those areas, recognizing that they can't be the best at everything at the same time. Within these areas, living labs put research into practice in a way that is aligned with national priorities to bring research to market in more fluent, and thus faster, way.

The end result of the long-term commitments to innovation inherent in this model mitigates the volatility of day-to-day politics. Like many other countries, the Netherlands has faced a shortage of people wanting to go into science; however, in the last five years, the inflow into university science departments has doubled. This is a result of a collaborative effort between universities and government to advertise and promote physical sciences for future career prospects. For example, industry executives have gone into the classroom to demonstrate the value of science and the country's need for bright new scientists.

Three clear principles emerge from the Polder Model:

1

Establish trust among stakeholders through clear policies and directions that don't shift with political agendas.

2

Establish clear priorities and use self-interest to build collaboration and focus around them.

3

Maintain long-term commitments to mitigate day-to-day politics.

## 2.2 | Silicon Valley

The book *The Rainforest: The Secret to Building the Next Silicon Valley* promotes the belief that successful innovative communities can emerge from an environment that displays elements similar to those that make up the rainforest. The book offers a fresh look at innovation as chaotic, serendipitous, and uncontrollable and highlights that processes that are linear and controlled are rarely self-sustaining.

Resources for innovation are most effectively brought together by an ecosystem that promotes the open mindfulness of the innovation despite the fact that this innovation may challenge the status quo of the current environment or community. The authors have observed in Silicon Valley that these resources require an input of energy that is often overcome by a keystone figure in the environment.

The basic ingredients of economic production come through interrelations among people combining and sharing ideas, talent and capital. **This animated process of innovation ecosystems begets “creative reassembly,” the ability of humans to combine and recombine in ever-increasing patterns of efficiency and productivity.** Innovation ecosystem “assets” (people, research, infrastructure, policy) are necessary but not sufficient for innovation to thrive. A rainforest must have a code that can be related to by all groups. Rainforests are known for and thrive because of their diversity. Diversity enhances the creation of ideas, talent and capital. The book describes diversity as a fragile element within the growth of a rainforest. Diversity is considered fragile because social barriers cause issues or difficulties within ideas, talent and capital. Silicon Valley incorporates such a code into its rainforest by attempting to stop or thwart the breaking of rules and dreams of the diverse members in the rainforest, by listening to the diverse members of the community, and by generating equal amounts of trust amongst diverse groups. The diverse groups in a rainforest will follow this code by proposing solutions to problems in the community together, agreeing to succeed and fail together as well as taking on a pay-it-forward persona together.

To build “rainforests,” we must transform culture by recognizing that:

1

People do not connect easily—social barriers create transaction costs that make it difficult for people to find each other and work together.

The ecosystem can overcome barriers—when people are motivated and when transaction costs are lowered by shifting social norms.

2

Cultural behavior is learned through real-world practice: hands-on education, role modeling, peer-to-peer interaction, and networks of trust.

Certain individuals and organizations have the special ability to integrate disparate people—by influencing them to act in ways that impact the entire system.

3

The goal is to create environments that foster self-generating economic transactions—as many as possible.

### 3.0 | Key Enablers for Saudi Arabia

The previous contrast of two different yet successful innovation ecosystems illustrates that there is no single model or best practice. In fact, it is likely that all nations, including Saudi Arabia, should incorporate elements of both top-down/orchestrated and bottom-up/creative reassembly. Nevertheless, regardless of the overarching policy approach, there are common themes and principles, summarized in Figure 4, that offer starting points for building success. These include government leadership and support; engagement, trust and connections across public and private sectors; and investment in the people so that learning and improvement can come with real-world effects.

**FIGURE 4** Successful innovation ecosystems, whether orchestrated to organic, share common elements for success.



To drive to local reality, key Saudi Arabia stakeholders from academia, industry and government were brought together in two workshops to collectively consider areas of strength and weakness. The group considered the core elements that are in place and debated gaps that remain to be addressed, the potential need for new policies and/or new programs, as well as less tactile elements like professional and organizational cultures that may need to be addressed organically through strengthened collaboration and networks.

### Collectively the stakeholders considered:

What can we do to advance science and technology from ideas to commercialization?

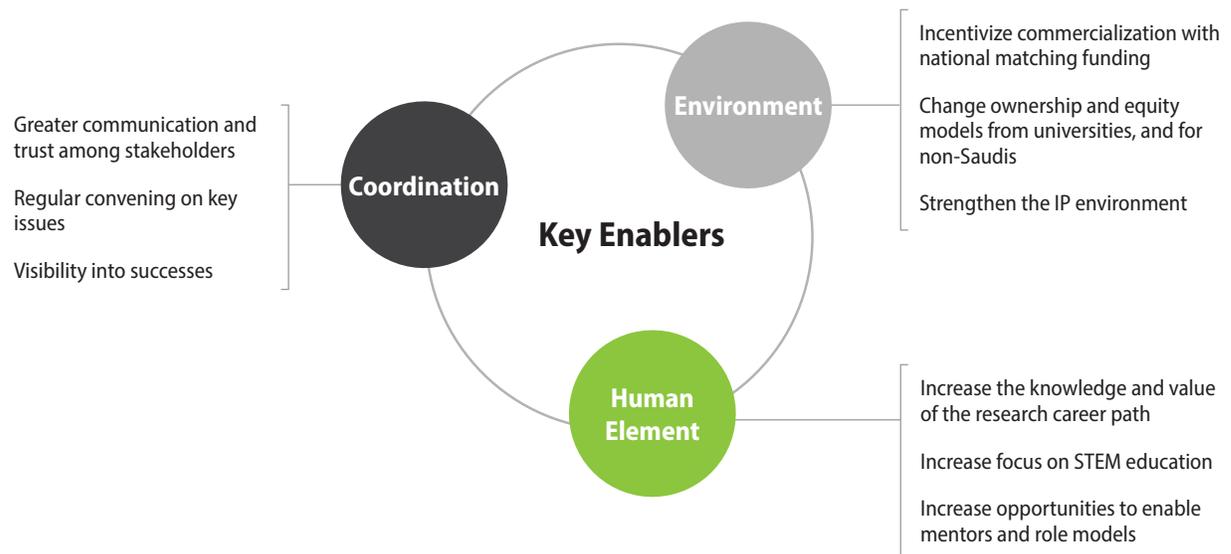
What are the enablers of this translation?

How can we create an ecosystem to effectively do this more efficiently and with higher frequency?

What do we need to do to make that ecosystem successful?

Though a process of facilitated discussions, workshop participants defined three categories of key enablers for the Kingdom’s innovation ecosystem, ultimately bringing the local reality into the equation. As illustrated in Figure 5, the key enablers of coordination, environment, and the human element were found to be a needed foundation for the future.

**FIGURE 5** Stakeholders in the Saudi ecosystem identified key enablers needed for continued growth.



### 3.1 | Coordination

- Saudi Arabia has many of the necessary elements for a strong innovation ecosystem; the parts just need to align or be encouraged to serve as champions. Greater and more coordinated opportunities for innovation networking and collaboration need to be provided (spaces, events, forums, awards). Trust is universally identified as a key enabler of innovation ecosystems.
- **Implementation steps require collaboration—the SAARA alliance, by its very nature, can forge the way.** Through regular convening around key issues in order to address challenges and solve problems as they arise, RPD Innovations will provide that dedicated focus on strengthening collaboration.
- Success breeds success, and visibility into such successes can provide role models for individuals to follow.

### 3.2 | Human Element

- Creating ecosystems takes time, and ultimately hinges on human talent. Saudi Arabia must promote research and research management as viable careers, create role models, and celebrate successes in research and innovation. Success will be characterized by unleashing the passion of students to follow their dream.
- Early stage talent development can nurture the natural curiosity for learning and education. Conscious efforts are required to ensure that later education systems do not discourage such creativity, but rather encourage critical thinking and guide the innate talent. Stakeholders across government, education, and industry need to be aligned with and coordinated towards this common objective, creating a line of sight between the vision for the country and the elements of education.
- Mentorship is central to building a large Saudi talent base in translational R&D and commercialization. **Technology commercialization is difficult and a learned skill. To build these skills, people need the opportunity to experience it, to learn by doing, and to inculcate this into repeatable processes.**
- Organizations need to provide programs that encourage this type of mentoring, and individuals should actively seek out opportunities to mentor these skills among young Saudis. There is merit to assembling a forum with stakeholders to drive discussion with industry about careers in research and innovation.

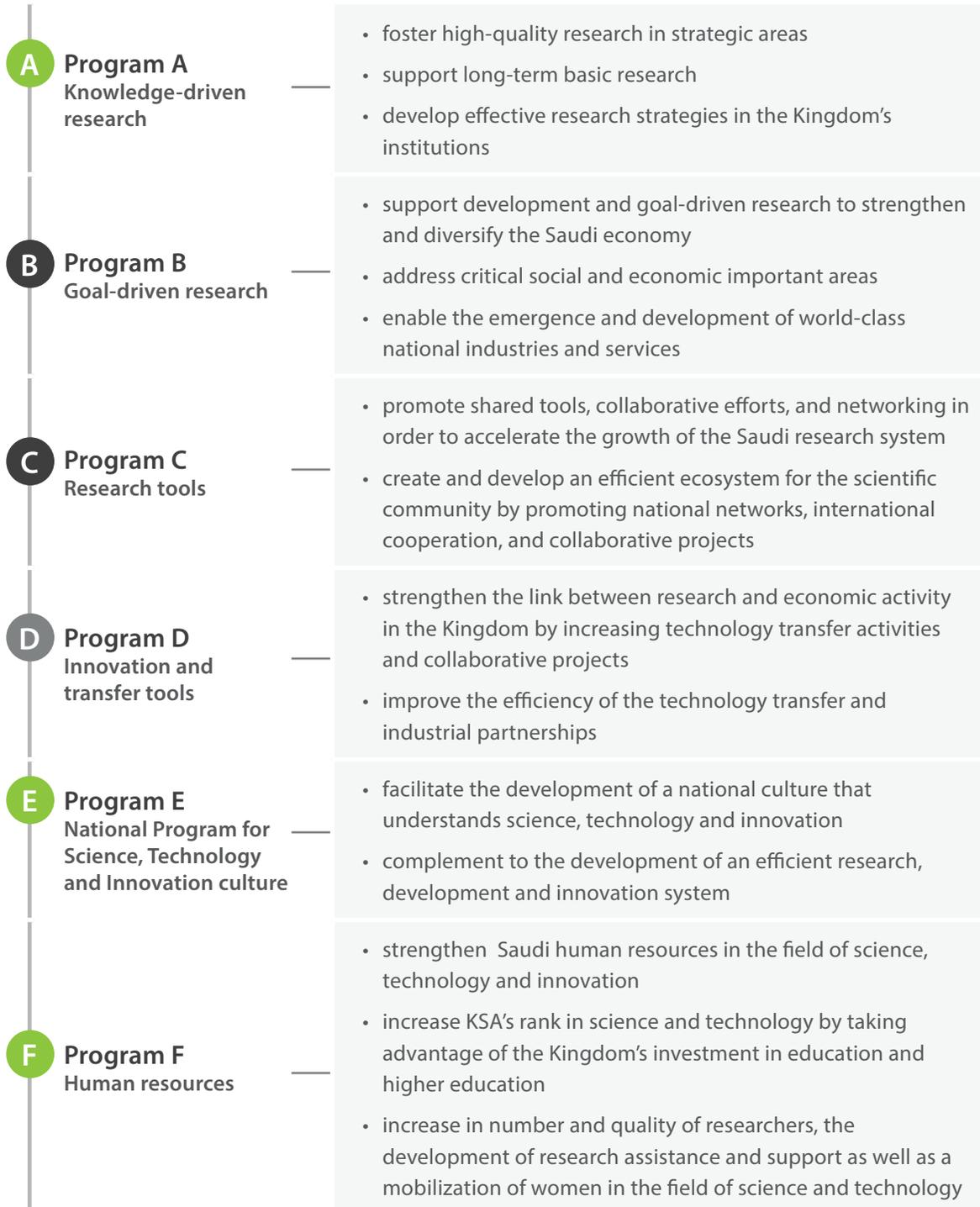
### 3.3 | Environment

- Participants advocated a national framework for funding commercialization. How can we reduce technology risk to make R&D and technology commercialization attractive to Saudi companies?
- Matching funds must only be applied to real investment in Saudi Arabia (not sunk costs from previous R&D). It was suggested that these matching programs would be most effective in specific areas for building long-term competitive advantage for the Kingdom.
- Changes to laws should enable ownership in new ventures by non-Saudis. Changes in the ownership requirements associated with infusion of capital need to be finalized and broadly communicated.
- Setting up companies in Saudi Arabia remains more complicated than it is in many more advanced innovation economies. To facilitate more innovation-based startups, the Kingdom must enable researchers to have equity position in university startups. For the inventors to be able to benefit from the startup and commercialization, ownership needs to be an option.
- There remains a need to strengthen the IP environment in Saudi Arabia as IP is a critical link between research/discovery and commercial exploitation. While IP laws exist, there remains much concern about security to discuss ideas when legal implications around enforcement of IP remain uncertain.



## 4.0 | Aligning Key Enablers to NSTIP Programs

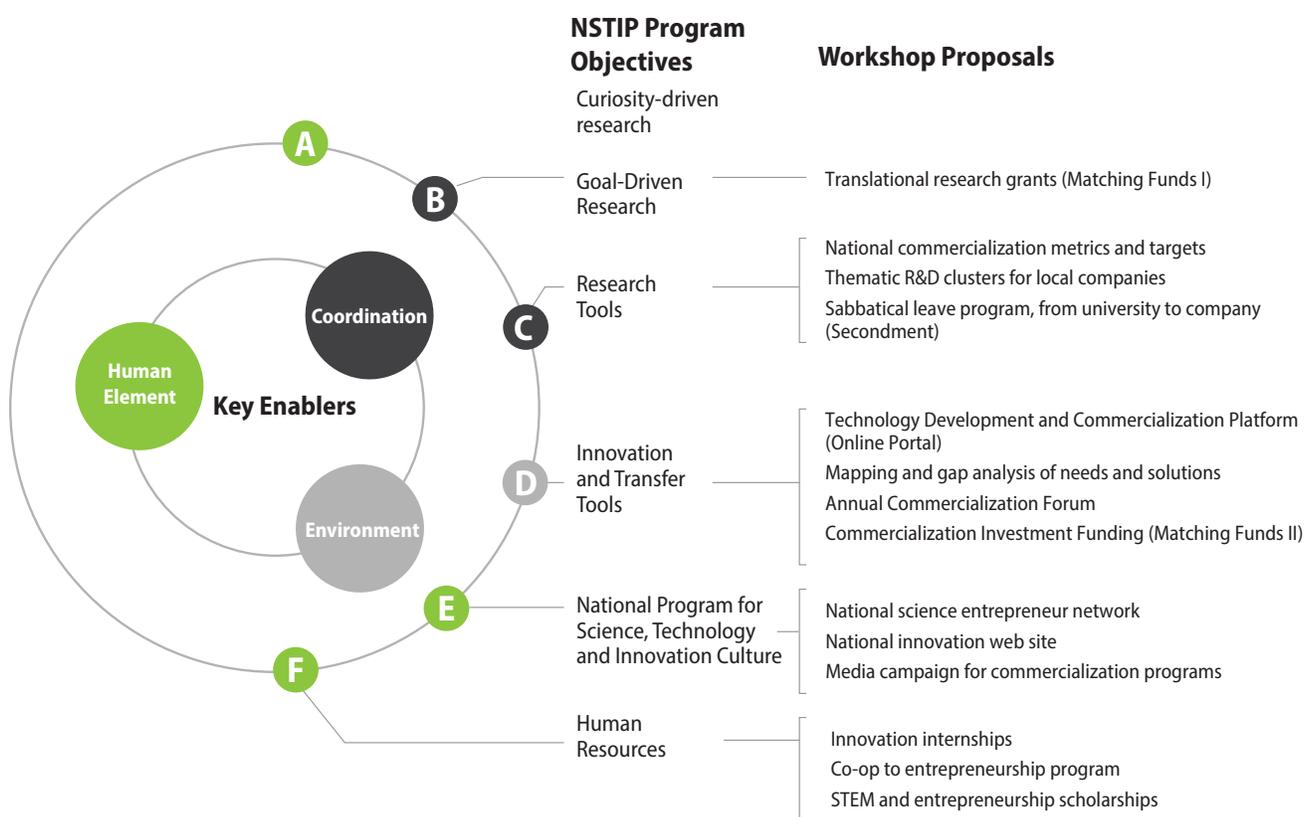
The Science and Technology for National Policy defined 15 programs for localization and development of strategic technologies that are essential for the future development of the Kingdom of Saudi Arabia. The National Science, Technology and Innovation Plan (NSTIP) has provided a unifying framework by which Saudi Arabia may address the key enablers identified by stakeholders. Under NSTIP, the MAARIFAH 2 plan is composed of six programs with these objectives:



## 5.0 | Workshop Proposals to Stimulate the Innovation Ecosystem

The two Innovation Enabled workshops led to a series of conceptual proposals to fund new projects that can enhance and empower the innovation ecosystem of Saudi Arabia. These proposals were aligned to elements of the NSTIP (Figure 6), and proponents were identified for each proposal. Brief summaries of these workshop proposals are provided in the following sections, in order of their alignment to the major NSTIP program objectives.

**FIGURE 6** Proposed investments in Saudi Arabia’s innovation ecosystem align with the NSTIP program objectives.



## 5.1 | Goal-Driven Research **B**

- **Translational research grants (Matching Funds I)**

The Matching Funding Program for Collaborative Innovation Projects is intended to stimulate establishment of collaboration/partnerships between the Saudi universities and the companies/ organizations that have established R&D centers in the techno-valleys located at the Saudi universities. The mutually beneficial collaborations are expected to result in industrial and/or economic benefits to KSA. Proposals for matching funds would be submitted and co-funded through NSTIP.

The program will be piloted first through Dhahran Techno-Valley (DTV) with the goal of having 3-4 well-defined collaborative commercialization projects that create locally developed technologies that are produced by local subsidiaries of the DTV companies. RPD Innovations may also help accelerate commercialization efforts by providing translational R&D capabilities for select programs. Based on the success of the program outcomes, the program could be extended to other university techno-valleys in KSA. Note that the concept of requiring client MNEs (multi-national entities) to set up local subsidiaries is a valuable idea for further consideration.

“Programs to incentivize industry-academic collaborations, commercial R&D clusters, and industrial training and sabbaticals would stimulate *translational* or product-driven R&D.”



## 5.2 | Research Tools

- **National commercialization metrics and targets**

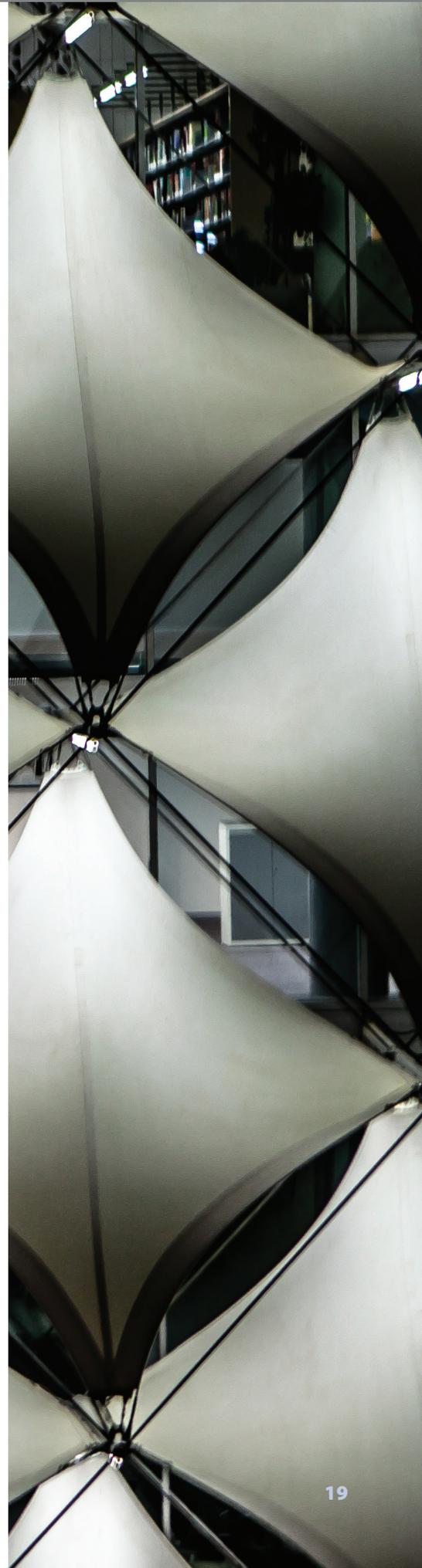
The establishment of consensus on a set of national level commercialization targets by which progress could be evaluated can help consider progress in a defined way. National metrics could be translated to programmatic and institutional metrics as well. The project would engage a set of experts and stakeholders to define high-level commercialization objectives, identify quantifiable metrics, set targets and timelines, and communicate these targets widely. Metrics are only useful if programs are also established to track and report these metrics in a transparent manner.

- **Thematic R&D clusters for local companies**

Under this concept, the NSTIP would develop a proposal framework calling for proposals aligned with opportunities to build key thematic R&D clusters engaged with local companies. The NSTIP solicits proposals from universities wherein the universities would connect with local industry partners to provide cost-sharing arrangements. Through targeted cost-shared R&D programs, innovation clusters of local companies would evolve around universities that provide infrastructure, specialized capabilities, and graduating talent.

- **Sabbatical leave program, university to company (Secondment)**

University faculty and researchers currently have little opportunity to experience directly the development challenges of the private sector. This program would solicit proposals from university faculty to take a leave of absence to spend time working within a Saudi company. The proposals would require clearly stated learning objectives and how these new insights would strengthen the university research programs in ways to increase the volume of university-industry collaborative research and technology transfer.



## 5.3 | Innovation and Transfer Tools D

- **Technology Development and Commercialization Platform (Online Portal)**

This proposal has strong potential to facilitate development of an R&D ecosystem by providing a community platform from which to build vertical and horizontal networks. The critical roles played by networks in knowledge economies—and their absence in the Kingdom—have long been noted in the literature. The portal would be in effect a network of networks, providing an online home for collaboration and for the launch of individual R&D networks focused on key scientific fields. The project would design and specify requirements, survey existing models, design and build the online platform, populate it with data, test, rollout, and create awareness and publicity. Potential challenges include building acceptance by the potential audience; adapting known techniques to the legal, business and cultural environment of the Kingdom; and maintaining fresh bilingual content. This proposal fits within the near-term capabilities of RPD Innovations, and, indeed, it may be the essential first step to development of an ecosystem framework.

- **Mapping and gap analysis of needs and solutions**

This proposal is in the form of a research study to conduct a national survey of industry needs, collect data, survey and map solutions, and perform a gap analysis. This ambitious set of projects is long overdue and could be an important precursor to developing broad industry connections to networks and ecosystems. The project would survey industry needs, survey emerging technology solutions, map needs versus solutions, and conduct a gap analysis to define strategic actions. This project, if successful, could bring data that would be very helpful to development of an R&D ecosystem. The result would be a hybrid of an industry roadmap and could help set priorities for a new cost-share funding program to help drive specific technology development activities. Ideally such a project would follow the emergence of industry networks, not precede them.



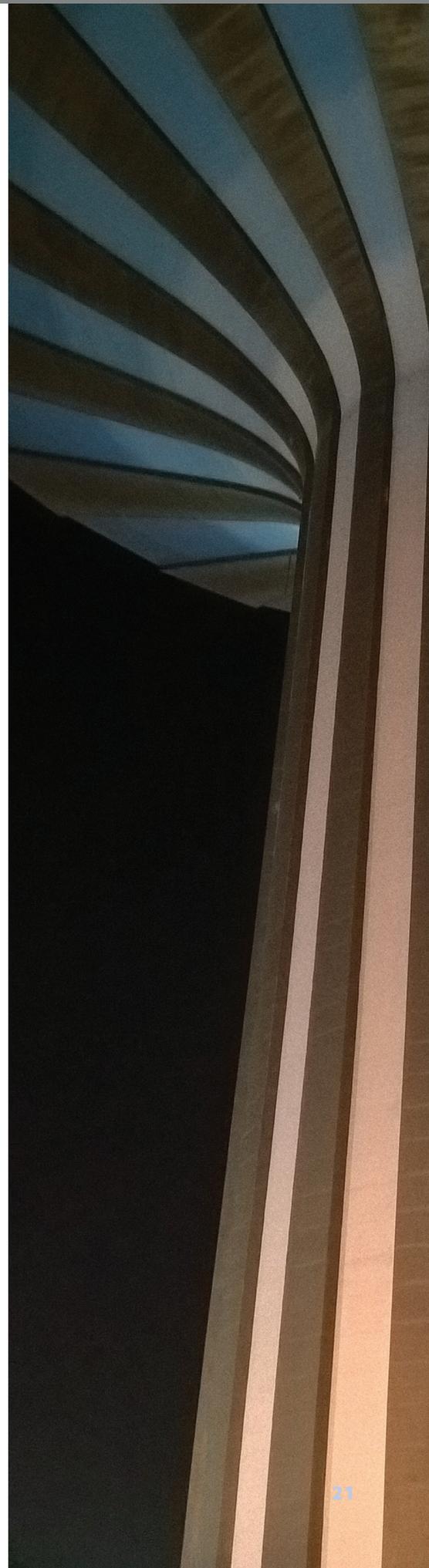
- **Annual Commercialization Forum (organized by RPD Innovations)**

This proposal calls for RPD Innovations to conduct an annual commercialization conference designed to share best practices and program experiences as well as celebrate successes. It would be a key element in strengthening networks by providing opportunities for shared learning and reinforcement to sustain programs to reach success. The project would design programs and objectives, set dates, location, and frequency, establish organizing committees, and hold annual events. An event with this type of new content is well within the capabilities of RPD Innovations and its operating partners and essential to achievement of SAARA objectives. It could have many benefits:

- Disseminate information on SAARA progress
- Attract new stakeholders to RPD Innovations networks
- Spread industry awareness of the value of a national scale R&D center
- Provide professional training opportunities at a level not seen in the Kingdom

- **Commercialization Investment Funding (Matching Funds II)**

The purpose of this program is to provide seed or investment funding for early stage commercialization opportunities. The goal is to establish an investment consortium as a review or steering committee, or more broadly later as an established regional association. Technology-based commercialization opportunities would be sought to provide proposals for commercialization funding through NSTIP. Companies or entrepreneurs would provide proposals for review and selection by the steering committee or association. Program outcomes would include seed-funding programs for technology-based startups, spinoffs or joint ventures.



## 5.4 | National Program for Science, Technology and Innovation Culture **E**

- **National science entrepreneur network**

One of the previous recommendations in this report, the Technology Development and Commercialization Platform (Innovation and Transfer Tools, p. 20), proposed an online portal that could become a national R&D network. Alongside the professional domains, such as R&D management, represented in this web site and shared on the network, there would be a linked web site aimed at young entrepreneurs and business people where ideas could be shared using video and social media tools (see [wamda.com](http://wamda.com) and [ar.wamda.com](http://ar.wamda.com) for a successful version in the region) and where new government programs and jobs and educational opportunities could be introduced.

The National Science Entrepreneur Network can support the growing innovation culture in Saudi Arabia by providing a “community” platform where like-minded people can learn and share their experiences about new technology, innovation and startup ideas.

Successful implementation of the National Science Entrepreneur Network will not only help achieve KACST and NSTIP objectives in an exciting public manner, but also substantially strengthen RPD Innovations’ capability to achieve its long-term SAARA mission.

- **National innovation web site**

A useful tool for the promotion of science, technology and innovation culture is a national web site focused on promoting innovation building and training opportunities. The web site could be hosted by KACST as the Kingdom’s national agency for the promotion of science and technology. This would require coordination of a national database including companies, academic institutions, calendars of events, collaborations and training programs that could be summarized and advertised along with sponsors and contact information. This would allow students and professionals who are looking for opportunities for furthering their career or professional network to find potential links and contacts. Such a collection of information would help to define current activities in the innovation ecosystem and help individuals identify opportunities to participate.

“Networking events to connect research with industry needs, promotion of entrepreneurship, and investment incentives for early-stage commercialization facilitate the growth of an innovation ecosystem.”

- **Media campaign for commercialization programs**

Once a database is built through the innovation web site, a media campaign could be launched including posting advertisements for events, programs and training opportunities, for example, at academic institutions, in trade journals, or at exhibition booths at technical conferences. The goal would be a unified campaign to promote the national innovation web site as the “place to go” to find out what is happening in the innovation ecosystem and how participants can engage.

Other activities that could be sponsored by NSTIP and coordinated with science and technology-based academic institutions include:

- **Competitions**

Institutions with entrepreneurship and/or R&D-based startup seed funding programs could host NSTIP-sponsored competitions such as “best new startup” or “top 5 technologies of the year.” These could carry the tag “sponsored by NSTIP” in exchange for funding provided to the institutions to help pay for the event and attract attendees.

- **Integrate innovation into curriculum**

Programs and workshops sponsored by NSTIP could be held between external experts and local academic administrators targeting academic programs that can be implemented from the primary to secondary to higher education levels to promote science and innovation to breed the next generation of entrepreneurs.

- **Entrepreneurship courses**

Saudi students have historically sought entrepreneurship training at institutions outside the Kingdom. However, many local universities now promote entrepreneurship training within Saudi Arabia. These programs should be promoted by web site and media efforts mentioned above to spur organic growth in the entrepreneurship workforce.



## 5.5 | Human Resources **F**

- **Innovation internships**

Industry partners, academic institutions and government organizations could all sponsor short-term (e.g. summer/winter break) internship programs sponsored with NSTIP funding. Industry participants could sponsor opportunities for university faculty to gain industrial laboratory work experience. Academic or government institutions with entrepreneurship or startup programs could offer internships for industry professionals to help get startups off the ground. Applicants would apply through NSTIP and be accepted on a merit basis.

- **Co-op to entrepreneurship program**

Linking training events throughout the year could provide a “for-credit” option under which companies could sponsor employees to complete a challenging curriculum over an extended period. For-credit participants could complete a capstone project developed with their employer and having relevance to the company’s needs. The curriculum would combine lectures and texts, but emphasize simulation-based learning using real case studies and small teams. The series would be staffed by volunteer guest speakers and industry-based staff and consultants.

- **STEM and entrepreneurship scholarships**

Scholarships sponsored by NSTIP could launch applicants into innovation-based curricula or internship programs. Academic institutions could apply to NSTIP for yearly scholarship allotments to bring new students into their programs. Industry participants may also sponsor scholarships and/or research at local institutions as a contribution to the R&D workforce to grow the innovation ecosystem.

“Saudi Arabia must promote research and research management as viable careers, create role models, and celebrate successes in research and innovation. Success will be characterized by unleashing the passion of students to follow their dream.”



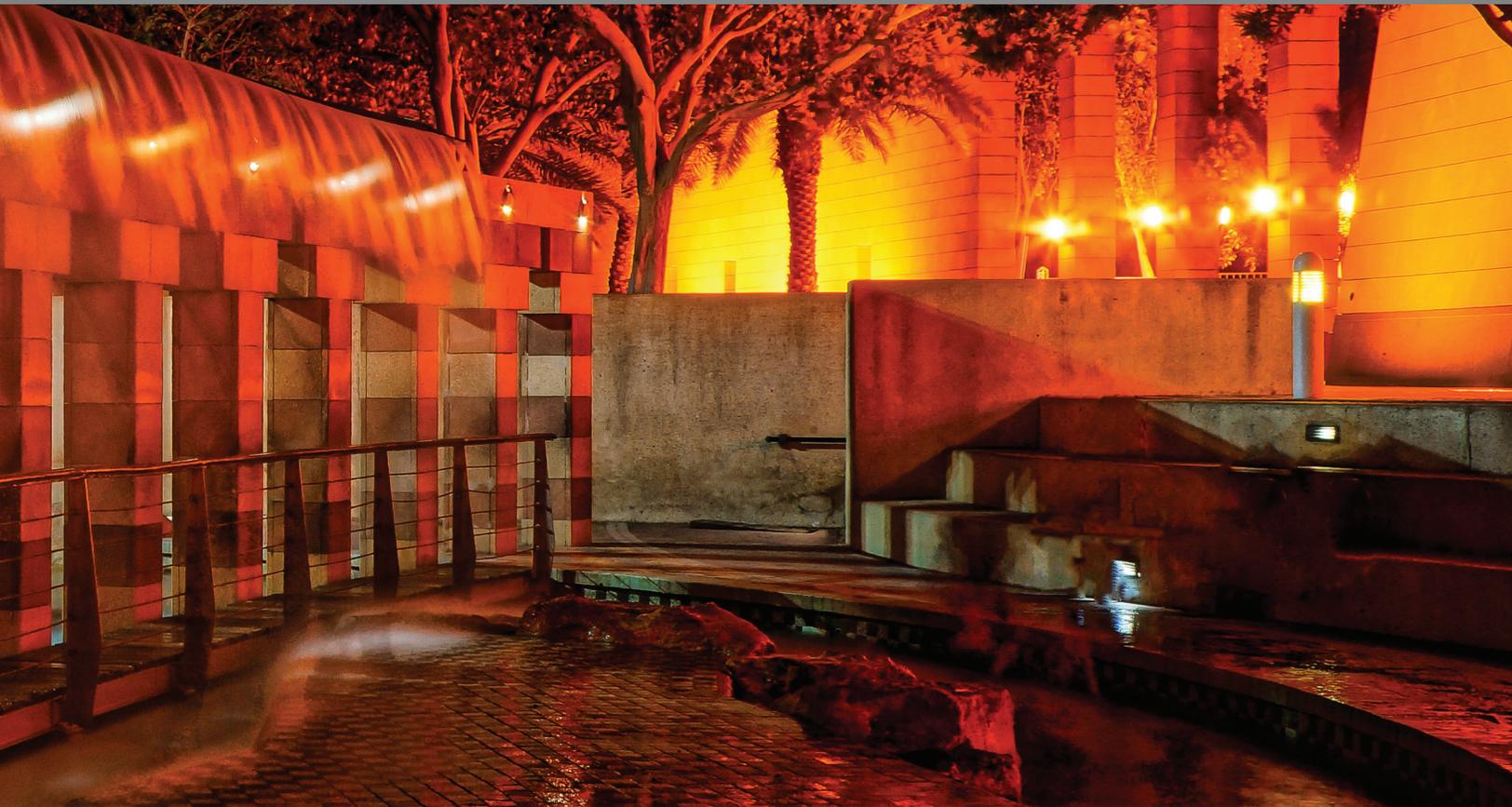


## 6.0 | A Call to Action

Participants of the Innovation Enabled workshops identified key unmet needs in the Saudi Arabia innovation ecosystem. In order for the ecosystem to thrive, Saudi stakeholders need to come together to strengthen efforts in networking, R&D collaboration, talent development and commercialization infrastructure.

As the first R&D network established in Saudi Arabia, SAARA is one model for enabling the innovation ecosystem. Through KACST and Saudi Aramco sponsorship, and RTI, TAQNIA, KFUPM and KAUST leadership, SAARA founded RPD Innovations as a private corporate R&D enterprise, one that SAARA sponsors have committed to funding and nurturing until it becomes self-supporting. SAARA and RPD Innovations represent exciting next generation ideas and fresh approaches to developing a uniquely Saudi ecosystem that will support development of a national knowledge economy by catalyzing ideas, helping to focus public and private financial resources and building interest among young people to prepare for careers in science, engineering and technology management. These steps could not have been possible ten years ago.

However, continued and additional investment and participation from the ecosystem's stakeholders is needed. MAARIFAH 2 provides a roadmap "to facilitate the expedient development of a viable and sustained ecosystem that fosters high quality research in KSA across all fields of science, in particular 'goal driven research' within the framework



of the nation's strategic technologies which are critical social and economic importance to the Kingdom of Saudi Arabia." MAARIFAH 2 also provides a framework for the development of new programs to fill gaps in the innovation ecosystem and enable greater coordination of its stakeholders toward the commercialization of research outcomes.

**RPD Innovations recommends that the following priority program concepts be proposed by RPD Innovations to KACST for funding consideration through MAARIFAH 2.** RPD Innovations welcomes the participation of other partners to collaborate with RPD Innovations and sponsor other program areas outlined by the workshops.

- Translational research grants (Matching Funds I)
- Commercialization Investment Funding (Matching Funds II)
- Sabbatical leave program - university to company (Secondment)
- Annual Commercialization Forum

This report from the Innovation Enabled workshops demonstrates RPD Innovations' emerging capability to take a national leadership role in developing new ideas around R&D and innovation. The ideas presented here are just the beginning, and the alliance calls upon all interested stakeholders in Saudi Arabia to help SAARA and RPD Innovations grow the Saudi R&D ecosystem to meet the challenges ahead in creating the Kingdom's knowledge economy.

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