THEME [INCO.2013-1.1] – Arab Gulf countries

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D4.3 - INCONET-GCC2 Continuity Plan

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History

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1. Summary of Project outcomes

This report is the Continuity Plan for INCONET-GCC2, the second stage of an EU-funded project which has linked partners in the EU and in the GCC[1] in joint research and innovation activities over the past years. The purpose of the report is to look ahead, to set out directions and options for what to achieve in the future, in follow-up to the present project through continued collaboration between these two regions. As starting point naturally serves what has already been accomplished in the past project, which is summed up in this initial section.

The INCONET-GCC2 activities undertaken in 2014-2016 have revolved around the following objectives:

- Identification of common research priorities and fostering of R&I cooperation opportunities between EU and GCC countries;
- Dissemination and awareness raising among the research and business communities of H2020 and the opportunities it presents;
- Capacity building in the GCC region;
- Provision of support to the bi-regional R&I policy dialogue;
- Roadmapping of future actions in order to increase R&I cooperation between the target regions.

In order to achieve the aforementioned objectives, concrete activities have been implemented over the past 3 years including:

- Organisation of 2 International Conferences in Oman and Brussels with the participation of approximately 250 key stakeholders from both EU and GCC countries
- Organisation of 2 Summer Schools in Greece and Qatar with the participation of 50 young researchers as well as more experienced academics from both target regions
- Implementation of a series of 5 Thematic workshops on the fields of Health/Diabetes, Smart Cities, ICT Innovation, and Renewable Energy Sources in Kuwait, Abu Dhabi, Bahrain, Oman, and Qatar with the participation of more than 350 researchers from both regions
- A series of H2020 Information Days in the Arab Gulf Countries. More specifically 7 Infodays were organized in Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, UAE, and Yemen
- Training of the H2020 National Contact Points of the GCC countries and Yemen. One training activity took place in Brussels, and one in Qatar
- Development of a comprehensive White Paper analysing the EU-GCC R&I cooperation landscape and providing a detailed SWOT analysis and of a Roadmap for enhancing R&I cooperation between the two regions in the next 5-10 years.

The partners and countries engaged in the project report various benefits from these activities. At the same time, their perceptions of different strands of work vary considerably. This is as expected, given the spectrum of economic structure, institutional fabric and policy priorities that characterise the

[1] The GCC stands for the Cooperation Council for the Arab States of the Gulf, also known as Gulf Cooperation Council, whose member countries include Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates (UAE). In the present report, the GCC is used to refer to these countries collectively, and not necessarily to the Council itself.

organisations and countries that form part of the project. Adding to that, a systematic difference between the EU and the GCC partners is that the former already operate within a well-developed regional research and innovation programme, while the latter usually act in isolation from each other, including when forging links to partners outside their region, whether in the EU or elsewhere.

Despite such differences, there are similarities as well, enabling us to distil a "hard core" of joint interests that are deemed important for laying the basis for follow-up work. In characterising results perceived by partners as useful to build on for the future, one may differentiate between (i) *direct* impacts, which were the immediate result of their involvement in the project, and (ii) *indirect* impacts, which had to do with more wide-ranging impacts resulting from the project activities:

i) *Direct impacts* (Table 1; 1st column) include, for instance, acquaintance with and access to new forms of training, sharing of data, the opportunity for researchers to connect with counterparts in other countries, in the GCC as well as in the EU, for institutions and policy-makers to exchange experience, and a strengthening of champions and contact points for research and innovation policy.

ii) *Indirect impacts* (Table 1; 2nd column) include the establishment of new platforms for idea-generation, the accumulation of experience on how to coordinate future collaboration, impetus to developing new databases for researchers and specialized experts in scientific research, enhanced shared understanding between key actors in the research and innovation system, increased interest in research and innovation in the private sector, and new policy mandates and greater leverage to implement policies

Both the direct and the indirect benefits relate more or less well to outstanding *needs* regarding training, formation of partnerships, capacity to plug into the EU activities and to manage policy coordination with respect to R&D and innovation more generally (see Table 1). To comment briefly on the fundamentals of that link, an important aspect has to do with the unique character of INCONET-GCC2. Reflecting the fragmented nature of GCC strategies and actions in research and innovation, each of the GCC countries have access to bilateral partners outside the region, but essentially lack an organised platform for joint exchanges and collaborative activities with multiple parties, within their own region, as well as externally. This, in turn, is associated with a marked fragmentation in their policy approach to innovation. In this respect, the INCONET-GCC2 has contributed to filling an important gap. No other activity has brought together a similar set of actors as partners, or featured similar dialogues and initiatives, encompassing the different GCC countries. Particularly INCONET-GCC2, with its action-oriented and consistent exposure and examination of research and innovation opportunities in a select set of prioritised areas, generated a range of exchanges of high relevance to these countries, as shown in Table 1.

As part of this picture, especially when partners in the GCC countries hosted H2020 Information Days, thematic workshops and conferences as part of INCONET-GCC2, the events were used as one tool among others to bring together a range of actors, spanning the public as well as the private sector, whose increased engagement in research and innovation is of great importance. In some instances, the project played a role in framing stronger national and regional policy mandates for partners participating in the project, in effect helping them to devise strategies or implement activities of high importance to their respective countries. Some of these resulted in new or strengthened policy mandates. Looking beyond the time frame of the project, the establishment of new partnerships and tracks for policy consultation may lead to various such yet unknown results.

Table 1: Results of INCONET-GCC2

Activities	Direct benefits	Indirect benefits	Outstanding needs
Hosting of conferences and thematic workshops	- New contacts, data sharing and impetus on key substantive issues - Enhanced networks for researchers and other actors engaged in research and innovation	- New experience of how to organise bi-regional dialogue - Better shared understanding between key stakeholders, nationally, regionally and bi-regionally	- Access to productive partnerships in research and innovation, within the GCC region, and also externally, along with broadened stakeholder engagement
H2020 Info days and Awareness sessions	- Improved understanding of Horizon 2020 - Facilitation of GCC researchers' participation in EU-projects	- Increased interest and engagement by private sector and other stakeholders in research and innovation collaboration - Implicit benchmarking with corresponding activities within the GCC and versus the EU	- A better, stronger and more motivated organisation ready for taking new initiatives or mobilising partners to take part in the initiatives of others
Summer Schools	- Acquaintance with new models for training - New meeting places and contacts - Access to expert information and facilitation of knowledge transfer	- New platforms for idea-generation and inspiration how to pursue training - Access to new training schemes, notably in the EU	- Experience of wider training and competence development schemes - Facilitation of GCC researchers' mobility
The project itself	- Strengthened contact point for policy coordination nationally, regionally and bi-regionally	- Impetus for developing new databases for researchers and experts in specialised areas of research, nationally, regionally and bi-regionally - New policy mandates and a deepened commitment by key policy bodies in the STI agenda	- Strengthening of national contact points - Improved policy coordination - Leverage of policy mandates and policy implementation

It should be stressed though, that the listing of results in Table 1 does not convey an assessment of the pervasiveness and reach of the noted impacts. As for the strengthening of policy mandates, it appears that the greatest boost to the R&D and innovation agenda occurred in Yemen, whose institutional policy framework for STI is less developed than those of the GCC countries, while also subjected to greater strains at the present time. The GCC also provides examples of cases where the project provided impetus by usefully leveraging the room for policy initiatives and implementation, for the partners participating in the project or for agendas they were connected to.

An impressive breadth of stakeholder engagement was recorded in several countries, including Bahrain, Qatar and the UAE. For Kuwait, the focus has been on engaging societal actors directly involved with diabetes and related health innovation. In Oman, the Research Council hosted a broad-based policy event which attracted wide participation. Meanwhile, the Public Establishment for Industrial Estates (PEIE) built on the project agenda to consider plans for new cluster development, notably in functional food. They further built on the results of INCONET-GCC2 to incorporate requirements for smart city elements in all master plans for industrial park development in Oman, and are also working on new initiatives that can feed into follow-up work.

For more elaboration on the activities and what was achieved notably in INCONET-GCC2, see the discussion on the main directions and conclusions presented in the Whitepaper and Roadmap on the EU-GCC Research Collaboration (Deliverables 4.1 and 4.2 of the project).

It should be underlined at this point that R&D and innovation policies and institutions in the GCC are still at a formative stage. Again, INCONET-GCC2 has constituted a very unusual, if not outright unique, platform for identifying and implementing joint research and innovation activities among the GCC, and in collaboration with an external set of players, the EU. With the two stages of the project running over a 6-year period, since the start of the first phase in 2010, more time will be required for measuring whatever lasting impacts will emanate in the end.

The question now is, what comes next, which is the focus of this (Continuity) report. In other words, what is the most productive way forward in terms of follow-up to INCONET-GCC2, for the project itself and its consortium, for the Commission and other regional actors, for groups or communities of other stakeholders that are central to the future bi-regional collaboration between the EU and the GCC? We distinguish this agenda from that of bilateral collaboration between individual countries or actors in the two regions, which is not addressed here.

The report is organised as follows. The next section elaborates on the sectors that may be in focus for future collaboration, taking stock both of the areas that have been at the core of INCONET-GCC2 and other areas. Section 3 examines implications of Innovation Ecosystems for approaches to collaboration. Prospects for a continuation, entailing recommendations for a structured approach along with a number of individual initiatives and activities, are presented in Section 4. The last section concludes.

2. Sectors for collaboration

The scope of research and innovation policy is massive, as it relates to virtually any sector of the economy, any policy field or sphere of social life. Moreover, science and technology has gradually become inherently networked, with productive impulses and learning processes transcending conventional borders between nation states, disciplines and sectors. In this vast realm of activities, multiple objective presents themselves; building capacity; enabling scientific excellence; framing a stronger and more dynamic platform for education; attracting and/or maintaining leading talent; spurring industrial capacity; fuelling the establishment of knowledge-based start-ups with the capacity to grow, diversifying the economy; generating new jobs, and so on. Having said that, not all aspects can be pursued with equal veracity, or in ways that are equally relevant to all sectors. A certain focus is required as a means to underpin efficiency in delivery and real results. The concept of "critical mass" conceptualises that initiatives will not be successful if operating on a "stand-alone-basis"; research and innovation need to draw on coinciding strengths and positive synergy emanating from the advance of *clusters* of actors and efforts.

On this basis, it is clear that actual policy choices have to balance between breadth and depth, or between "casting the net wide" vs. "targeting narrowly with precision". The first phase of INCONET-GCC, from 2010 to 2012, explored what objectives, activities and sectors were most relevant and of common interest for the various partners across the GCC as well as the EU. The final report of that phase (INCONET-GCC, 2013) consequently presented a broad map and a rich menu characterising the presence of diverse needs and possibilities.

For INCONET-GCC2, it was important from the start to select a proper and effective focus as a basis for taking the agenda forward, enabling concrete collaboration and more palpable results. This implied operating with precision to realize results that were sufficiently significant to make a difference. On this basis, two main areas, or sectors, were selected as the focus of INCONET-GCC2:

1) *Non-communicable disease, and health innovation more broadly*
2) *Smart cities*

The rationale behind their selection emanated from a combination of shared priorities in the EU and the GCC, for the underlying issues, as well as a common view on the relevance of research and innovation in these areas, along with the potential of both sides to benefit from bi-regional collaboration.

The spectrum of activities undertaken in the two areas, as indicated by Table 1, featured training activities, meetings, and various events. The agenda entailed putting in motion an orderly process leading to visible outcomes. It aimed both to highlight and raise interest in research and innovation as such, and to show-case their relevance to resolving outstanding issues that are very real and relevant to a broad range of constituents.

All partners clearly viewed at least one of these sectors/tracks of activities as highly motivating, and many viewed both in that light. Having said that, again, it must be stressed that partners came from different positions, with regard to needs as well as capabilities in research and innovation, concerning their view on the role of research and innovation, and with respect to existing international linkages. While bearing such caveats in mind, the project nevertheless set out to devise and schedule a set of

specific activities to take the agenda forward within these two realms, making the most of the selected sectors for the purpose of crafting a framework suitable for a bi-regional collaborative agenda.

Within the first area, the main thrust has been on addressing Non-Communicable Disease (NCDs), especially diabetes, which has emerged as a major health challenge to the GCC countries, while also a problem of high relevance to Europe and other parts of the world. A major platform for advancing collaboration in this area was the info-event and workshop hosted by the Dasman Institute in Kuwait on June 10-11, 2014. Diabetes rates are reaching levels within the GCC which exceed those observed basically anywhere else in the world, with up to 25 per cent of the adult population directly affected in Qatar and Saudi Arabia, and only slightly lower levels of incidence in the other GCC countries. At the same time, work in this area ventured more broadly as well, to incorporate various aspects of "health innovation". The deliberations and discussions addressed, e.g., the organisation of healthcare, competence development, the rise of personalized care, prevention, life-style issues, e-health and the Internet of (medical) Things - IoT.

Some of these aspects linked effectively to the second theme, on smart cities. In the latter, the emphasis was on information and communication technology (ICT) applications, interactive exchanges, big data, and the use of smart metering and advanced information management as means to incentivize communities and individuals to address key outstanding challenges in their local environment. In this, the project highlighted and provided a platform for exchanging experience between new initiatives in smart city development within both the EU and the GCC. Applications in the domains of energy efficiency, water conservation and the Environment were top priority, with smart city infrastructure and related applications for public health (and, hence, the link to the first area) awarded some attention. Other application areas, such as food or water security, transport and mobility, security, and so forth, were touched upon but not covered in detail.

Examples of what can be achieved featured strongly at the Abu Dhabi Conference hosted by Masdar on October 14-15, 2014, which reviewed and compared the experience of various countries in spurring smart city initiatives. In Manama, on March 17, 2015, exposure was awarded to best practices in e-Government services. Meanwhile, the INCONET-GCC2 International Conference held in Muscat, on December 7-8, 2015, ventured into the role of, and interactions between, different actors and competencies in propelling research and innovation. Professional skills, mindsets and culture were highlighted as determinant elements of the innovation system as a whole. At this event, Qatar Foundation challenged the EU to engage with the GCC through novel and targeted instruments.

Venturing into opportunities offering by specific technologies, the Doha event February 29th-March 1st, 2016 (co-organised by Qatar National Research Fund, the European Commission, and INCONET-GCC2) spun around the in-depth consideration of two specific key sustainable energy technologies - carbon dioxide capture, sequestration and reuse, and Concentrated Solar Power (CSP) to produce electricity or hydrogen. Such advanced technologies aim to massively reduce carbon dioxide emissions by either converting them into chemical products or storage in depleted oil and gas reservoirs or saline aquifers, potentially with huge implications throughout the GCC as well as in Europe. The scope for impacts coupled with the limited presence of offerings to learn from such activities generated wide-ranging interest.

For the future, work on NCDs and related e-health and smart cities innovations clearly carries the potential for a lot more progress - EU-GCC collaboration being a catalyst for advancing research and innovation on common challenges. The contact points, partners and wider networks engaged and leveraged through the project have gained a heightened momentum, mandate and capacity to work

together in next stage activities, building on what has been achieved thus far. The dynamics that have been created were vividly communicated at the final policy event, which addressed the way forward for EU-GCC Research & Innovation cooperation, in Brussels on November 29, 2016, in Brussels.

At least for the near future, it is recommended that the two areas referred to retain priority in the framework of the bi-regional collaboration, and that the progress achieved thus far can be maintained and further leveraged in the next stage. Gradually there may be changes, however, and not all countries may view these areas as continued priority for collaboration. In addition, what has been achieved to date can help pave the way for future initiatives in areas as well, beyond the two fields addressed to date.

As already noted, the smart city agenda itself opens for a range of activities beyond what has been covered thus far. Novel digital applications are set to make a major difference within the near future, combating health problems (including NCDs) as well as in the development and adoption of new solutions with regard to energy, environment, transport, water, food, and so forth. Beyond smart "cities", this goes into ICT applications in regard to "smart" buildings, cars, stations, rural areas, fishing villages, people, and so forth. Related connotations include "environmentally friendly", "socially acceptable", "sustainable" or "efficient".

Changing economic fortunes and business cycles play their role in defining priorities. For several decades, the GCC countries benefitted from secularly rising commodity prices, notably in oil and gas. As of just a few years ago, this granted them a position of formidable macro-economic strength, translated also into much enhanced infrastructure, a rich supply of high value real estate and advances in physical equipment as well as in health and education. While the accumulated strengths of high oil prices over so many years partly remain intact to this day, the dramatic turnaround that has taken place in commodity prices since 2014 put the GCC countries under serious financial pressure. Already before then, they met with severe challenges to diversify their economies and generate productive jobs for their overly young populations. Their stride in that respect became a major factor not least in the advent of the "Arab spring". Today, the GCC countries experience an even more urgent need to diversify their economies by developing new knowledge and technology-based companies that can create a large number of new jobs.

The EU, on its part, is struggling as well with economic stagnation, high unemployment in many regions, and social cohesion. The migrant crisis of recent years has magnified some of these issues, and with Brexit having opened for the first case of a member country leaving the European Union causing associated uncertainty what conditions will apply for investors, companies and ordinary citizens? In contrast to the GCC countries, with their relatively young population, the EU must pay disproportionate attention to managing ageing societies. On the other hand, both regions meet with common challenges to upgrade the quality of education, develop new jobs, protect social cohesion, and generally making their economies more dynamic. Joint research and innovation projects can importantly enable sharing of experience, perspectives and new ways to progress on the underlying substantive issues. In INCONET-GCC2, such opportunities raised interest among multiple players within the GCC as well as among EU representatives taking part in the different activities.

Reflecting these various needs, building on what has been achieved may lead into joint work in a range of other areas, which present potentially viable themes for collaboration in future activities. The following may be pointed at:

- Renewable and Alternative Energy resources

- Long term Environmental changes & Sustainability
- Food and Water Security
- Marine science
- Water Resources, Management and Technology, including Desalination projects
- Environmental Pollution
- Transportation problems and solutions
- ICT & Security
- Life-sciences and Biotechnology
- Nanotechnology
- Cognitive sciences
- Culture, design and experienced-based industries
- Social innovation

The degree to which these areas are relevant to all, or even most, partners obviously varies. Topics like "Renewable and Alternative Energy" or "Long-term Environmental changes & Sustainability" are high on the agenda of most partners, as is too s "Food and Water Security nowadays". Others, such as "Marine science" or "Nanotechnology" may attract only a few. Depending on the nature of follow-up activities, however, these various fields could show up as highly viable subjects for greatly successful cooperation.

This list of potential areas of collaboration can be made much longer. Also, there are innumerable common points, overlaps and synergies between the different areas, opening up for yet unexplored combinations of specialisation. Which actors, or partners, engage, for what purpose, taking the lead in which way, will influence what can be achieved in the specific case. In order to build further understanding how to help underpin a strategy for follow-up, the next section considers the features of innovation systems, and their implications for approaches, methods and processes for collaboration.

3. Implications of different innovation eco-systems for collaborative approaches, methods and processes

Staking out a successful way forward in collaboration between the EU and the GCC on research and innovation, hinges on the ability to identify joint interest and realise activities that generate real results and win-win for all partners. This, in turn, requires taking into account diverse objectives and capabilities.

Hence, areas of suitable cooperation cannot merely be selected based on the presence of ongoing research activities, or similarities in outputs such as publications or patents. A key aspect has to do with the *relevance* of collaboration, which will depend both on conditions with a direct bearing on research and innovation, as well as on the wider institutional landscape that influence the role of and scope for research and innovation in society. The benefits of collaboration will come in different shapes, again varying across countries, as a range of direct as well as indirect effects are at play.

Each party naturally needs to consider strengths/openings as well as weaknesses/hindrances, as reviewed for the GCC countries in the combined Whitepaper and Roadmap on INCONET-GCC2 (D4.1-4.2). For a thorough review of each country's research institutions and performances, see UNESCO (2015). In this section, we briefly reflect on the varying features of the innovation systems of the GCC countries, while also noting the universal importance of stakeholder engagement in framing support for research and innovation broadly, and for EU – GCC collaboration specifically.

In considering the characteristics of an innovation system, perceptions have changed over time. Table 2 illustrates how the focus originally was on *inputs* (such as R&D), then *outputs* (e.g. scientific publications, patents), *processes* (through a richer set of innovation indicators, innovation surveys, etc.) and, today, *systems* (the less tangible dynamics of a knowledge-based economy). In this context, we may conceptualise stages, or *generations* of metrics, broadly associated with different time periods (Milbergs and Vonortas, 2004) of relevance to the measurement of innovation. While there has been a gradual movement away from a perception of a linear one-sided relationship between science input and innovation output, however, in no way has the interest in the "older" aspects vanished.

On individual country profiles, the Global Innovation Index (GII)[2] ranks innovative capacity as well as actual performance. The *enabling environment* is measured by sub-indices and components such as: (1) Institutions, (2) Human Capital & Research, (3) Infrastructures, (4) Market sophistication and (5) Business sophistication. The *capturing* of innovation (fruits of innovation) is reflected in the innovation output sub-index, consisting of elements such as (6) knowledge and technology and (7) creative outputs. The approach provides an opportunity to gain a deeper understanding of countries combined *capacity* (input sub-pillar) and *capability* (the ability to exploit knowledge = output pillar) in the context of innovation.

Table 3 illustrates the trend for four of the GCC countries in the recent evolution of GII, and notably their recent innovation rankings[3] regarding input and output, as well as the overall innovation index ranking for each country. As can be seen, the GCC countries consistently score higher regarding input

[2] https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2014-v5.pdf

[3] The GII is an iterative process and yearly improves its ways of measuring and capturing innovation, therefore, the numbers of countries investigated as well as the number of indicators chosen does vary. A direct comparison from one year to the next is not advisable, however the observation of a trend is recommended.

compared to output, demonstrating the presence of investment/effort along with difficulties to attain results. Although the gap between the two diminished from 2014 to 2016 for three of the GCC countries, it increased for the UAE which has the strongest overall ranking among these countries. This does not necessarily imply an increasing difficulty for the UAE to convert input to innovative output, but it points to the importance of having in place "enabling" conditions, the absence of which may otherwise hamper the successful transformation of effort into real results.

Table 2: Evolution of innovation metrics

First Generation Input Indicators (1950s–60s)	Second Generation Output Indicators (1970s–80s)	Third Generation Innovation Indicators (1990s)	Fourth Generation Process Indicators (2000s plus emerging focus)
• R&D expenditures • S&T personnel • Capital • Tech intensity	• Patents • Publications • Products • Quality change	• Innovation surveys • Indexing • Benchmarking innovation capacity	• Knowledge • Intangibles • Networks • Demand • Clusters • Management techniques • Risk/return • System dynamics

Source: Milbergs and Vonortas (2004)

Table 3: Ranking of GCC countries' innovation systems, according to GII, 2014-2016

	Rank 2014	Input 2014	Output 2014	Rank 2016	Input 2016	Output 2016
Bahrain	62	48	80	57	51	67
Oman	75	59	96	73	63	86
Qatar	47	34	69	50	41	58
UAE	36	25	68	41	25	75

Source: INSEAD (2014*a*)

Table 4 shows where each country stands on sub-pillars. The UAE takes the lead in the input sub-pillars of Institutions, Human Capital & Research, Market and Business Sophistication. In the output pillars, Bahrain leads on Knowledge & Technology and Qatar on Creative Outputs. As for other key benchmarking studies, the Global Competitiveness Report (World Economic Forum, 2016/17) ranks the UAE in 16th place and Qatar in 18th, out of 139 countries ranked worldwide, while the other GCC countries appear in between places 29 and 66. Here, the UAE is the only GCC country to strengthen its

ranking in 2016 compared to the previous year, as the others lost between two and four positions overall. In the sub-domain of innovation, on the other hand, Bahrain and Oman recorded a strengthening, while Qatar and Saudi Arabia lost ground and the UAE held steady. See Table 5 for the mosaic of related rankings of each country, providing examples of significant strengths, such as government procurement as well as foreign investment as drivers of technological advance for the UAE and Qatar, to weaknesses such as Oman and Kuwait on the quality of scientific institutions.

Table 4: Ranking of sub-pillars, GCC countries' innovation systems

	Institutions	HC&R	Infrastructure	Market sophisti-cation	Business sophisti-cation	Knowledge & technology outputs	Creative outputs
Bahrain	55	68	29	91	59	61	74
Oman	41	52	51	90	124	95	79
Qatar	34	59	16	68	78	88	49
UAE	22	41	23	42	24	86	70

Source: World Economic Forum (2016/17)

Table 5: Ranking of GCC countries' innovation systems, 2014-2016

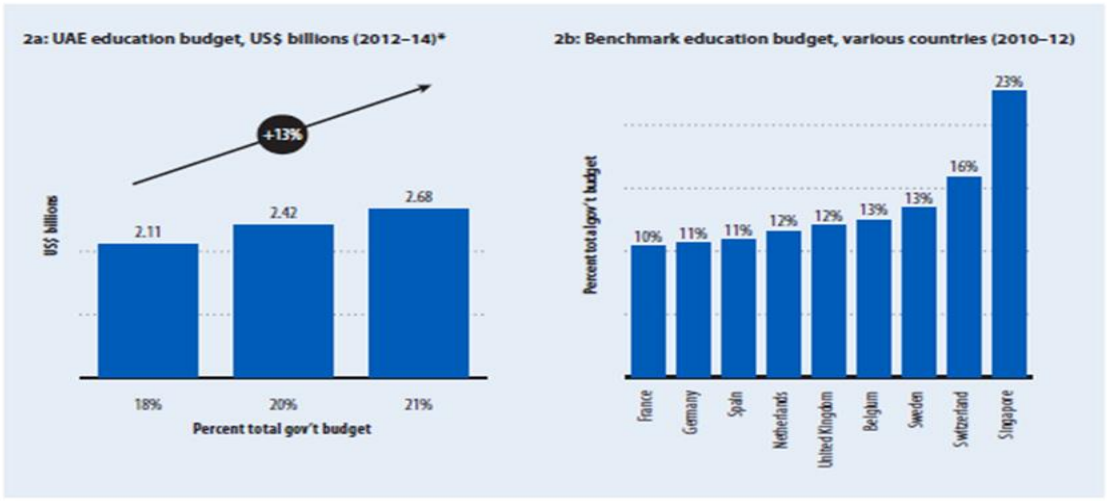
Index rank	UAE	Qatar	Saudi Arabia	Kuwait	Bahrain	Oman
Availability of latest technologies	11	21	42	55	36	66
Firm-level technology absorption	7	11	44	82	36	57
FDI and technology transfer	3	7	36	116	33	85
Capacity for innovation	15	19	72	93	65	97
Quality of scientific research institutions	27	14	68	104	75	105
University-industry collaboration in R&D	25	10	56	125	44	53
Government procurement of advanced tech. products	1	2	13	75	18	35

***Source*:** World Economic Forum (2016/17)

While the GCC share common characteristics, each country is faced with its own specific issues, opportunities and policy dynamic as well. Consider the UAE. As seen from Figure 1, between 2012 and 2014, investment in Education increased from 18 to 21 percent of GDP. Figure 2 maps its approach to overcoming gaps in financing, including stifling start-ups and expansion. According to Ahmad Bin Byat

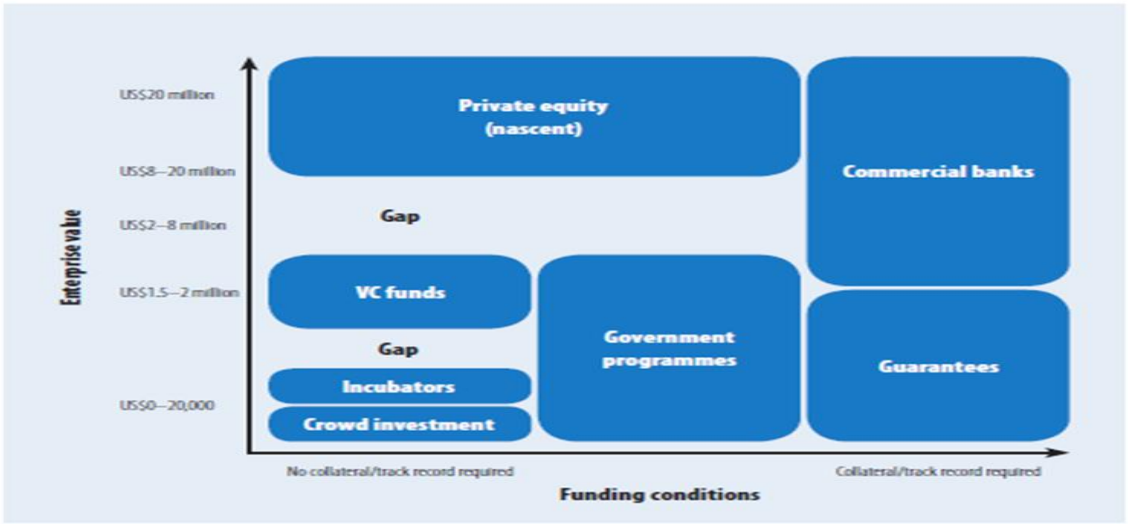
and Osman Sultan (2014)[4], the UAE is on the path of 'Fostering a unique innovation eco-system for a knowledge-based economy'. As illustrated in Figure 3, there is an ongoing effort to align instruments pertaining to the human, technological, and financial factors with a well-functioning innovation eco-system. However, despite this effort, as we have seen, challenges remain by way of actual results.

Figure 1: Allocations to Education as part of Government Budget, UAE



Source: INSEAD (2014*a*)

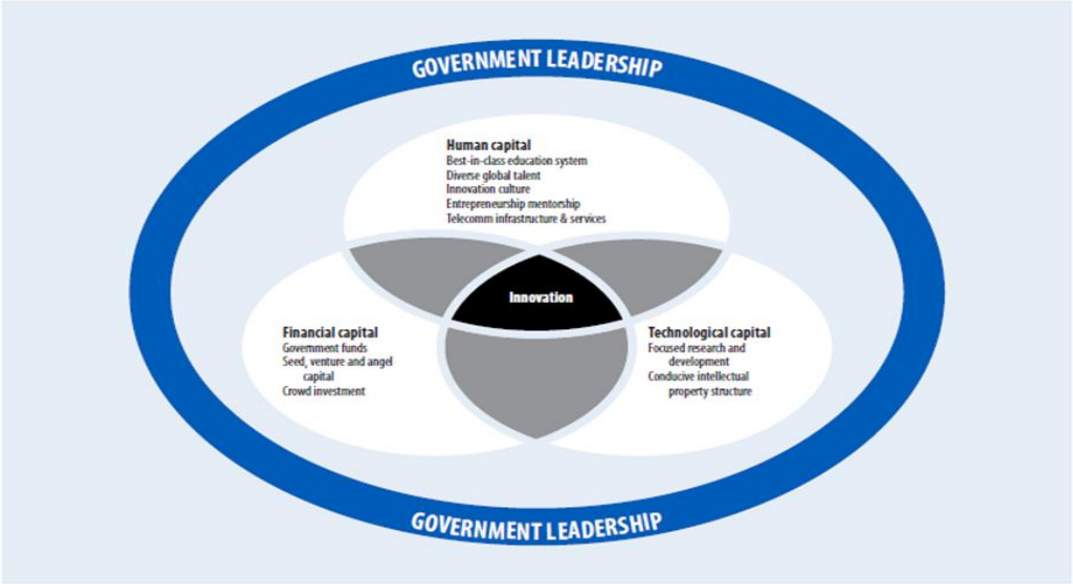
Figure 2: The Funding Gap, UAE innovation system



Source: INSEAD (2014*a*)

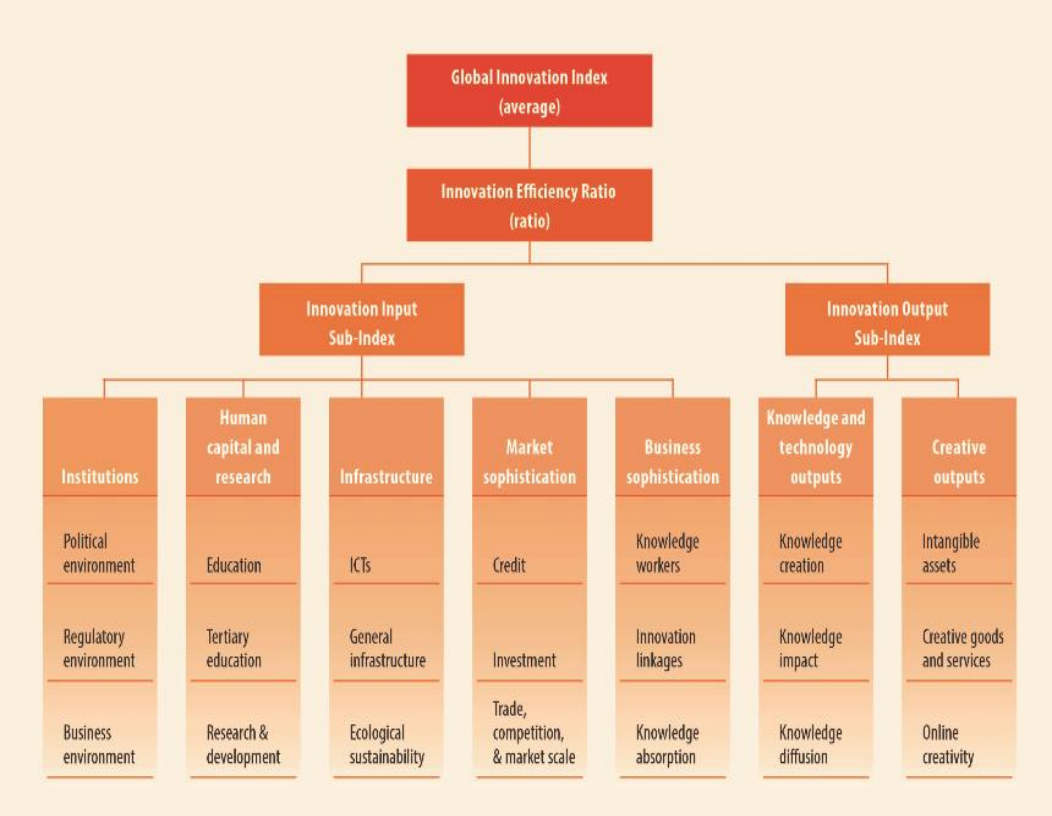
Figure 3: Pillars of innovation, UAE

[4] https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2014-v5.pdf page 101



Source: INSEAD (2014*a*)

Figure 4: Global Innovation Index Framework



Source: INSEAD (2014*b*)

The challenge of the GCC countries, as for many others around the world, has to do with fragmentation and managing linkages within the innovation system, e.g., between education and research, or between universities and corporations. A "granular" approach, spanning all 82 indicators provided by

the Global Innovation Index[5], may be applied for a step-by-step examination of the innovation eco-system. Figure 4 demonstrates how different inputs and outputs combine in the assessment. Meanwhile, a "pipeline" approach may be applied in examining sub-pillars, breaking down the innovation eco-system into more manageable segments. Either method may help cast light on ways to guide countries frame policies at different levels. They may also help provide clues to countries interest in and ability to 'take turns in leading' from various angles.[6]

At any given point in time, a country's standing regarding, e.g., capacity building, knowledge transfer and implementation is naturally reflected in its policy priorities and preferred partnerships. While each country may thus naturally prefer to "go it alone" in building some external partnerships, in addition to various kinds of bilateral collaboration, however, the bi-regional framework offers a much greater scope for benefits while countering the common tendency towards unwanted "herd behaviours", i.e. that all countries run for promoting the same assets and industries. There is the opening to exchange experiences and learn from multiple directions, and to benefit from exposure to unexpected complementarity and synergies arising from unique capabilities, by way of a diversity of local conditions and assets. In the GCC countries, examples of specialisation in research include health (diabetes) for Kuwait, various aspects of energy for Saudi Arabia, Qatar, and the UAE, financial services for Bahrain, and water for Oman. Beyond that, special niches prevail in medicine, natural sciences, social sciences, environmental studies, food, cultural amenities, and so forth. Yet, few research institutions and innovation agendas display effective examples of research specialisation.

Table 6: Institutional pillars

		Average value by income group				
	Indicator	High income	Upper-middle income	Lower-middle income	Low income	Mean
1	**Institutions**					
1.1	*Political environment*					
1.1.1	Political stability*	0.70	−0.23	−0.57	−0.83	−0.08
1.1.2	Government effectiveness*	1.18	−0.10	−0.48	−0.84	0.14
1.2	*Regulatory environment*					
1.2.1	Regulatory quality*[a]	1.12	−0.07	−0.42	−0.70	0.16
1.2.2	Rule of law*[a]	1.13	−0.30	−0.59	−0.81	0.04
1.2.3	Cost of redundancy dismissal, salary weeks[b]	14.55	18.98	25.63	20.05	19.23
1.3	*Business environment*					
1.3.1	Ease of starting a business*	89.53	82.42	82.20	68.95	82.78
1.3.2	Ease of resolving insolvency*	68.18	49.08	36.67	36.62	50.73
1.3.3	Ease of paying taxes*	83.06	69.42	61.05	62.94	71.08

Note: (*) index, (†) survey question, (a) half weight, (b) higher values indicate worse outcomes.

***Source**:* INSEAD (2014*b*)

Meanwhile, the analysis of data on joint scientific publications, by both INCONET-GCC and UNESCO, highlights a weak research collaboration between the GCC countries, while GCC based researchers collaborate with counterparts in the US, the EU, and increasingly China (D4.1-4.2).

[5] The information is available in user-friendly format under: https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2015-v5.pdf.
[6] https://www.globalinnovationindex.org/about-gii

Again, the discrepancy between effort and output in the GCC is indicative of the challenge related to fragmentation. A critical question is to what extent collaboration can be devised to entice stronger engagement by multiple actors in crafting a viable research and innovation system, e.g., by overcoming resistance to reforms that are critical for progress in research and innovation, by providing new means to achieve results, as well as to make use of research and innovation to address important societal issues. Striving for relevance requires an understanding of the interests and needs of different relevant spheres, which in fact varies naturally in a fairly uniform manner across countries. Table 6 provides a stylized estimate of the degree to which different kinds of reforms benefit different income groups.

Meanwhile, Table 7 illustrates the varying nature of benefits from research across stakeholder groups, with a greater number of stars in a particular cell, indicating greater interest. *Scientific* results matter for the research community itself, for research councils and other bodies funding science. *Technological* impacts along with impetus for innovation matter for industry, the business community, and for policy makers. *Economic* impacts, by way of growth and jobs, matter politically, as well as for the general public. Impacts by way of *Social* gains, through greater awareness of and interest in research, including a spurt to creativity, are important for a science and research process seen as contributing to enhanced quality of life. Beneficial impacts on *Governance* may occur through the provision of better information to underpin decisions and greater capacity by decision makers to make use of such information. Finally, *Environmental* gains can occur through improved resource use, more efficient production and reduced consumption of energy, waste management, usage of water and food resources, reduced CO_2 footprint, other impacts on the physical environment etc., emanating from advances in science as well as improvements in governance.

Table 7: Interested parties and their focus by way of impacts

Interest from	Scientific impact	Techno-logical impact	Economic impact	Social impact	Political impact	Environ-mental impact
Research community	★★★	★★	★	★	★	★
Research Councils	★★★	★★★	★	★	★	★
Policy makers	★★	★★	★★★	★★★	★★★	★★★
Business community		★★★	★★★			★
General public	★★	★★★	★★★	★★★	★★★	★★★

Source: Adapted from EU (2008)

Table 8: Evaluation procedures: inputs required and outputs generated

	Outputs generated

		Contribution to S&T	Strengthening the Research Area	Sustainable development
Inputs required	**Scientific excellence**	Frontier research	Science and Technology challenges	Contribution to understanding the Grand challenges
	Capacity of management	Efficient research services	Transparent and effective Governance	Long term balanced budget
	Capabilities to generate impacts	Knowledge to inform policy	Excellence in Science and Technology	Understanding the mechanisms of implementation

Source: Adapted from EU (2008)

Such variation in interests indicates the need of diverse tools for analysing, measuring and communicating the presence of impacts. Table 8 indicates how evaluation procedures need to be framed with a view to meeting with the objectives of relating inputs to outputs mirroring a range of different objectives. Meanwhile, Table 9 maps the kind of data sources along with research methodologies and information requirements that may have to be applied for measuring the different kinds of impacts displayed in Table 7.

For any country acting alone, it is hard to handle the totality of these relations and tasks. For countries with limited experience and lack of broad-based appreciation of scientific research and innovation from the start, it is particularly challenging. Bi-regional collaboration can be greatly helpful, as it expands access to diverse pools of competencies and achieves greater economies of scale and scope in the sharing of diverse experiences, as well as in measurement and analytics, in effect laying the basis for richer collaborative practice as well as for evaluation and learning.

Therefore, when considering how to build on INCONET-GCC2 for future activities, it is important to take advantage of the inherent needs of and opportunities for both the EU and the GCC regions, along with the advantages of bi-regional collaboration spanning diverse sets of countries and actors. The effort should be made to organise the next step to realize positive synergies while promoting and taking advantage of diversity and complementarity. This could in part be done by creating a larger number of winners - promoting awareness and achieving active buy-in and participation by an expanded range of actors.

Table 9: Measurement, impact and methods of analysis

Type of impact:	Measurement of:	Methods of analysis:
Scientific impact	Scientific outputs, publications, conferences, training and capacity building.	Peer review; bibliometrics; statistics, administrative records, surveys of users.
Technological impact	Actual and potential spin-off products and services; links to private sector.	Survey of spin-off companies and activities; in-depth interviews with scientists, innovation surveys; factor productivity analysis.
Economic impact	Contribution to GDP, jobs, distribution of income, regionally and/or nationally,	National and regional accounting input output models; autoregressive variance analysis models; analysis of administrative data held by RIs.
Social impact	Contribution to family and community wellbeing; amenity value of the facility	Synthetic reviews of evidence from science based on use of RIs; local population surveys.
Political impact	Contribution to political stability, cohesion	Interviews with key informants. Analysis of Media publications.
Environmental impact	Impact on air, water quality; energy balances; CO_2 footprint	Synthetic reviews, analysis of energy use; analysis of environmental measures.

Source: Adapted from EU (2008)

4. Prospective collaboration and activities

With the INCONET-GCC2 project coming to a close, and following extensive consultations with the project members, this section presents the resulting recommendations structured under six headings. These are the proposed *objectives*, *instruments*, and *activities*, along with modes of action for promoting *linking*, allocating *resources* and stimulating *governance* as a basis for fruitful follow-up collaboration in research and innovation between the EU and the GCC.

The following should be noted regarding the nature of these recommendations:

- It is not a given who is the representative partner in the respective regions initiating or coordinating bi-regional collaboration. In some instances, initiatives may be taken by coordinating bodies such as the Commission and the Gulf Cooperation Council. In other cases, individual institutions may take the lead and invite partners to build a consortium, e.g. to bid in response to a particular call or respond to another opportunity or need for joint action. This document is not meant to be prescriptive with respect to which actor goes first". The existing fragmentation of regional and even national efforts is the reality and diverse institutionalised responses are thus encouraged for the next phase.
- They are relevant to technology and innovation collaboration between the two regions under consideration, not to bilateral collaboration between individual countries nor to bi-regional collaboration in a general sense.
- They mostly do not elaborate any details of approaches to specific sectors, research fields, or knowledge areas, which were considered in Section 2, but rather address the broader nature of measures and principles for collaboration to be employed;
- They incorporate a continuation that features a range of activities of relevance to diverse societal spheres and a range of stakeholders. Having said that, they do not imply that all the suggested activities have to be carried out. It will be necessary to prioritize and make choices, for instance, where to allocate (most) resources, which objectives to address in the short versus long term, whether to engage large groups of countries versus smaller teams to focus on certain issues, etc.;
- It will be important to distinguish between objectives and activities that are of high relevance in the short term vs. those that are of long term nature. While acting at the stage of university collaboration is natural for projects "on the roll", for the long term it may be more important to develop programs that involve young people and start-ups, allowing them to benefit from broader cross-border collaboration between the GCC and the EU;
- In devising the continuation, it is important to match considerations of potential benefits from collaboration with judgement what is "realistic" and "doable", and incorporate actions that are helpful for realizing "implementation";
- The overall approach should combine and connect schemes strengthening research and innovation capacity with consideration of economic and societal benefits, including with a view to supporting economic diversification in the GCC as well as SME development and new jobs, especially for the young, in both regions.

In the following, we present our recommendations under six headings; i) objectives; ii) instruments; iii) activities; iv) linking; v) resources, and; v) governance.

i) Objectives

Objectives have to be examined in the light of overriding aspects to aim for in going forward. The following were proposed by partners in the preparations of this report:

1. Foster collaboration between researchers and develop research networks;
2. Optimally utilize resources, infrastructure and expertise to the joint advantage of the two regions at hands;
3. Build trust, develop relationships across institutions, learn from each other's experiences;
4. Provide a vibrant cross-pollination research platform capable of connecting students as well as researchers across the region by creating exchange opportunities;
5. Involve a broadened set of actors in research and innovation, in part to diffuse awareness and ability to make use of tools for cooperation, spread the results of initiatives undertaken and help strengthen the reach and linkages of the innovation system.

These objectives broadly mirror the spectrum of impacts from the work undertaken thus far, ranging from strengthening of direct impacts to, further down, the aim of fuelling broader, more indirect ones.

ii) Instruments

Where traditional instruments for fostering collaboration are useful and sufficient, there is no reason to "re-invent the wheel". Having said that, new instruments, or combinations of new and old, may be fitting to address new situations. Online platforms, directed mission research support, incentives for multi-stakeholder initiatives, stimulating the rise of diverse, yet interlinked knowledge pools as well as communities of practice, or providing innovation support possibly coupled with public procurement.

The wider bi-regional collaboration framework can be used to advance a portfolio of policy actions as well as expert networks to help realize them in practice, which is likely to be particularly valuable for countries with limited experience and thin actor networks in research and innovation. New forms of executive/professional training for decision makers could be offered, tailored to overcoming limitations or building linkages in a particular innovation system.

Instruments for devising common projects may include building resource pools, a scheme for issuing calls, and a framework for actors in the two regions to work out common portfolios of projects and developing joint schemes for funding of innovative projects. Ways and means should be introduced to strengthening the industrial perspective from both EU and GCC side as a basis for implementing "real world" solutions. A key aspect is the development of a co-funding mechanism that draws upon, and in itself encourages, enhanced policy dialogue.

Complementary ways of promoting research collaboration can be made use of, developed by groups. or "teams" of actors, across several EU and GCC countries, working towards putting in place "smart" means of stimulating collaboration, in the sense that they are interactive and respond to the way needs and opportunities evolve over time. An example is the PEIE initiative to reach out to the INCONET-GCC network for taking part in feeding ideas into the formation of living labs around the development of new industrial parks in Oma. Other kinds of instruments have to do with stimulating competition, development and applications of new technology in collaboration with Industry as well as governments through the adoption of joint programs that should be inclusive and simple to join.

Finally, in order to provide guidance, remove hurdles and gather support, including for strengthening the availability of resources to a joint programme, there is a case for putting in place some sort of joint

expert group, or action board. This should consist of individuals, from both sides, in possession of varied relevant experience, expertise and access to networks, as required for fruitfully catalysing and/or leveraging initiatives which could foster great value at the level of bi-regional collaboration.

iii) Activities

Related to the above, we propose adoption of activities along the following lines:

- Facilitating common advocacy for research and innovation as a key enabling factor for economic diversification, higher productivity, sustainable development, and long term prosperity. This advocacy role is needed to underpin better stewardship and mechanisms in the innovation system including better combinations of capacities in basic and applied research, better linkages between education and the work place, and the private sector playing a more important role in both research and innovation;
- Engaging children and young adults in contests, "Olympiads" or development agendas running in parallel in the two regions, stimulating "grassroots" collaboration on long term issues along with interest in research, innovation and entrepreneurship;
- Activities that serve to build platforms for establishing partnerships spanning different social spheres, including research, education, industry and financing, to develop innovative projects, by developing new local partnerships, exchange researchers, service designers back and forth;
- Special activities helping to stimulate the development of the next generation and start-up in producing together from both EU and GCC partners new & improved products, devices, processes, systems & services;
- Building common expert groups, with representatives of the various key actors (policymakers, universities, researchers, businesses, financiers, research councils, entrepreneurs) mandated to realize improved collaboration across sectors and countries, enable common learning processes and improve cross-border synergies;
- Undertaking joint training activities and stakeholder events to build capacity and mobilise research and innovation as tools to address prioritized development agendas.

Generally, activities should be organised so as to create minimum constraints and leave it to those partners that take the largest interest in them to get engaged.

iv) Linking

The agenda ahead should refrain from applying arbitrarily limiting criteria for initiatives to be taken, such as operating within any particular sectoral boundaries. Many of the critical issues of our time require cross-disciplinary effort and the ability to achieve synergies between traditionally separated complementary kinds of competencies. New opportunities may spring from the unchartered territory between disparate knowledge-areas, where unexpected synergy may give rise to unprecedented benefits for partners that offer different but complementary competencies.

Against this backdrop, we propose pursuing a track of joint effort devoted to stimulating linking, not only for actors to go "in-between" the two regions, but to reach out and engage a broader set of actors at the level of bi-regional collaboration. Initiatives should for this purpose be adopted to:

- Increase the number and quality of partnerships among GCC and EU universities, while linking to other related stakeholders in the two regions, e.g. to enhance the employability of students, the mobility of researchers, and stimulating the interface between university and industry/society;
- Creating joint, or at least mutually compatible, curricula among EU and GCC education and training institutions;

- Promoting a spectrum of individual research exchanges;
- Work towards enhancing flexibility in exchanges.

Other action-oriented ways of building cross-broader collaboration in research, innovation, and entrepreneurship should be welcomed.

v) Resources

The earmarked resources available through INCONET-GCC for supporting EU – GCC collaboration are expected to be over with from the end of the project. Any new resources would probably have to come from new sources, or link to other existing or new agendas.

The following key avenues for raising more support may be identified:

1) Tapping into existing programmes and initiatives;
2) Develop new specific initiatives with resources earmarked for providing new support;
3) Catalysing/building agendas that can attract resources from various players across the two regions.

Among these options, the first is essentially about making use of "mainstream" resources and instruments, already at hand. This will be most useful in areas where the basis for joint networks and interests have already been established. Smart cities and diabetes, identified in INCONET-GCC2 as fields of common research interest and thus already subject to numerous exchanges over the past year, are the best placed to keep evolving within this mode. The most potent tools of this sort appear to be Horizon 2020 on the EU side, and perhaps the GCC on the part of the GCC countries, although the latter do not at present devote much collective attention to this area. For the field to be promoted this way, it is important to ensure a significant pool of relevant research and development investment is at hand from both EU and GCC sources. In the case of EU-funding, there is a need of simplifying calls and application procedures for accessibility to non-EU countries. Funding from GCC sources should naturally similarly seek to implement user-friendly administrative procedures.

To build on the momentum that has been created, however, and especially if there is to be a broadening of the scope of collaboration, most of the project partners in the GCC appear to be of the view that the above can be applied, but that the region is not yet ready for effective usage of the mainstream channels for bi-regional cooperation. In effect, if the next stage is left to that, there will most likely be a severe cut-back in the networking that has started to evolve. To some extent, research councils, foundations, universities and other research organisations in individual countries may step in to fill parts of the gap, but the result will be a sharp contraction of the bi-regional dimension. Those countries that have the most active networks and funding bodies, such as the UK in Europe and Qatar or the UAE in the GCC, will then most likely acquire a greater dominance within a landscape that will become more fragmented and shredded. While individual countries can normally be expected to favour agendas that support their national interests, clearly-defined bi-regional frameworks improve opportunities for pluralism and wider sharing of benefits.

While partners realize there may currently be limited appetite to allocate large resources through the second option, they are of the view some resources should be allocated that way. For this to materialise, there is a case for instituting an applicable governance mechanism, as is further discussed below. Such a mechanism should work towards ensuring, as one element of its mission, that appropriate resources are raised from both sides and earmarked for effective usage in common activities. Having said that, the effort should be made to have such new funds interlinked with the third

level. Presently, hardly any examples can be found of collaboration agreements between funding bodies operating in the EU – GCC sphere, of the kind that has been signed based on joint interest and/or calls, providing a platform for working out shared objectives and prospective synergies from research collaboration. The point is that bi-regional initiatives are needed in part to grow regional linkages between, and leverage, the much larger offerings that are anyway made available from national sources.

Specific recommendations for strategic funding streams include:

- Coordinated efforts to stimulate research funding bodies issuing joint calls, possibly in conjunction with public authorities undertaking public procurement, inviting open-ended research projects, development work, or provision of new solutions by GCC-EU cross-border consortia of actors;
- Organizing more awareness sessions for researchers in order to assist them identify joint research and funding opportunities in the two regions;
- Other collaboration mechanisms should be put in place between sources of research funding in the two regions. The EU should be open to consider flexible models. A partnership between Qatar and H2020 could be envisaged, on a similar basis as the one between EU and third countries. QNRF could be the funder to support Qatari teams involved in the partnership, while funding bodies in other GCC countries could adopt parallel mechanisms to be linked up in joint agendas;
- Enabling participation by GCC stakeholders in Horizon 2020 by establishing special expert groups or events that can feed into regular calls, enlarging prospects for researcher mobility;
- Specific joint funds for scholarships & PhD exchange schemes;
- Joint funds for the development, partnerships and/or competence development schemes tailored to the needs of SMEs;
- Small-scale (around 200,000Eur) multi-year calls for competitive research jointly conducted by EU-GCC institutions but administered by the EU counterparts for an initial period of around five years in order to strengthen the collaboration on applied research, possibly modelled on the example of the British Council Institutional Links programme *(https://www.britishcouncil.org/education/science/institutional-links)*.

vi) Governance

As a final consideration, future research and innovation collaboration will be most effective it if succeeds in maintaining and furthering its relevance to strengthened mechanisms for governing research and innovation systems. This is not a matter of imposing any particular model. but about mutual learning and reflection while building capacity. There is, for instance, a case for collaborating in the development and implementation of new kinds of training of the next generation of Science investigators. Strengthening innovation systems through such strategic collaborative initiatives should aim at addressing those factors that matter most and could make the biggest difference. In addition, offerings of collaboration should usefully entail mechanisms that, in effect, broaden the set of actors who pay attention to research and innovation.

Box 1 illustrates a special case in this regard, while not from the GCC but Yemen, which has been associated with INCONET-GCC through its entire project span. In this case, a planned agenda for

strengthening the EU contact point has been complemented by a “task force” development, which has further course to run in Yemen.

Box 1: Opportunities for task force in Yemen

The ways and means for activities to support governance take various shapes. In the case of Yemen, which has been associated with INCONET-GCC, the result incorporated an expanded and reorganised role of the local partner in science and research. Further action is envisaged to strengthen the National Contact Point (NCP) for EU-collaboration, including the arrangement of a constructive, bonding conference, promoting the importance of scientific research once the war has ended. There is great need of international partnerships around training, so as to build capacity to communicate, connect will the private sector, civil society, universities and research centres (Governmental and non-governmental) from Sana'a as well other main governorates of Yemen.

In addition, promotion of the NCP is envisaged to take place through other means, such as printed brochures, media flashes etc., for the purpose of reaching a broader spectrum of actors. There is also the task to help underpin a better combination of capacities in basic and applied research, with the private sector playing a major role the latter.

Common task forces, again with representatives of the various key actors (policymakers, universities, researchers, research councils, businesses, financiers, entrepreneurs), are set to be formed to realize improved collaboration across sectors and with external countries. The local partner brings on board its INCONET-GCC experience to promote common advocacy for research and innovation. This carries the potential to add to the National Dialogue Process pertaining to the inclusion of economic and business people in the transitional process of re-building the country. Continued bi-regional collaboration accounts for a unique instrument for furthering learning processes and cross-border synergies around research and innovation, entailing the various GCC-countries as well as the EU.

Beyond such implicit but significant influences, as already noted, a joint Expert, or Advisory, body is called for by some partners, made up by representatives from both the EU and the GCC, and with some members from INCONET-GCC2 included to ensure continuity. Going beyond the project activities thus far, it is envisaged that such a body could be well connected with the main regional authorities and also with national bodies in both regions. It should be sufficiently flexible to receive mandates on demand, creating a new kind of well-informed, responsive quality momentum for collaboration ahead.

Meanwhile, the momentum in place following INCONET-GCC2 may keep building with add-on activities introduced by various actors that step forward and invite others to join. PEIE, for instance, will hence require the incorporation of smart metering and interactive services along with other smart city elements as a standard component of its forthcoming master plans for industrial park development in the Sultanate of Oman. In this context, it is open to the idea of using and extending from the INCONET-GCC network as a cradle for spurring broad-based engagement in innovative pilot projects, in effect creating a series of *living labs* conducive to collaborative experimentation open to GCC and EU parties. Another example is the intentions expressed by the Bahrain E-Government Authority to make use of wider bi-regional networks to leverage support services and enhance access to new markets in support of entrepreneurship and high-growth start-up activity.

Based on the potential for benefits/needs of continued orderly sharing of experience, training, seminars, such a body could further be tasked to identify where regional level funds could catalyse and

connect with national initiatives to discuss a way forward for a collaborative set-up in this respect (target groups policymakers, planners, mixed groups of relevance to KBE or selected priority areas).

5. Conclusions

Summing up, many elements are at play and should be considered in implementing the Continuity plan for INCONET-GCC2. Apart from what is discussed in this report, the Roadmap and Whitepaper of INCONET-GCC2 should be accessed for more background on underlying issues and opportunities.

There is great variation in the degree to which partners already have well-established research and innovation agendas, applying in a general sense as well as regarding specific fields and aspects. In a similar vein, the different countries and parties are at different stages regarding the status of their international collaborative schemes and partnerships. The engagement of different societal players in their research and innovation agenda, and what role different players assume, varies as well.

On this basis, countries are in varying positions when it comes to determining their greatest needs, desired means to overcome outstanding issues, and to the extent research and innovation is a priority in that context. Further, countries will have different motives for collaboration, ranging from expecting to benefit by taking part based on strength, or due to the desire for catch-up, e.g., from technology transfers. Such aspects influence countries' view whether research and innovation matter only in limited respects, and cannot attain priority in the immediate future, or whose capacity-building and strategically important role in response to critical societal issues wait. For each of the GCC countries, however, a range of bilateral relations are nevertheless already developed with external partners, often emanating from individual universities and research organisations. Such relations are the most developed with the United States, followed by the United Kingdom, while relations with China have grown rapidly in recent years. Relations with the EU are still patchy, with most links basically of a bilateral nature.

As shown by INCONET-GCC2, however, and looking to the opportunities ahead, the bi-regional context offers a much needed potential for broader scope entailing learning processes, diversity in linkages, experimentation and substantive collaboration. Rather than continuous lock-in with individual partners, the presence of manifold counterparts and potential partners lends support to processes of natural specialisation and capturing of synergies from work with multiple complementary partners.

The project that is now closing, INCONET-GCC2, has generated a range of direct and indirect benefits, commented on in this report and responding to a varying extent to outstanding needs. These have mostly centred on the two areas in focus through the past work - Health Innovation and Smart Cities The associated impetus has served to increase capacity, offer new kinds of training, broaden networks and strengthening contact points for research and innovation throughout the GCC, and in deepening and broadening linkages to the EU. Learning and discovery has, in some instances, been accompanied by overcoming resistance to new initiative, and by building support for implementation of needed reforms.

On the other hand, reflecting the still early stage of collaboration, and also the fact that some impacts will be long term and demonstrate their significance only in the long run, not much can be said about the eventual strength of many of these impacts. It is also clear that the extent to which there will be any lasting effect will much depend on what happens next.

We further reviewed the nature of the innovation system itself, taking note of the differences in features displayed notably within the GCC. Both regions stand to benefit from working out more constructive avenues to unleash benefits from research and innovation. The nature of benefits looks different for different actors and stakeholders and we have underlined the importance of strategies to communicate more broadly to among many of the actors that matter for innovation.

The GCC countries thus far have displayed limited interest in establishing cross-order collaboration in research and innovation, and there is great yet untapped scope for developing complementarities and synergies both within their region and in relation to the EU. In this, there is a strong case for moving beyond a patchy landscape dominated by bilateral activities of a few countries, to realize a vibrant bi-regional platform.

Finally, we advanced recommendations for the *objectives*, *instruments*, *activities*, and modes for promoting *linking*, allocating *resources* and stimulating *governance* that have been put forward by members of the project team. A conscientious effort is needed to ensure an agenda that is of great importance and relevance to both the EU and the GCC, with limited bureaucracy and high accessibility. A joint expert group may be developed, exercising effective linkages with the main regional authorities as well as with national bodies in both regions.

A special effort is merited to build on the momentum that has been created thus far, in the fields of Health Innovation and Smart Cities, while opening also for new promising avenues for collaboration through the ability to respond to evolving needs and opportunities conducive to mutual value-creation for the EU and the GCC.

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Appendix 1 - Executive Summary

Introduction to the projects

The Continuity Plan of INCONET-GCC2, the second stage of the EU-funded project linking partners in the EU and in the GCC[7], sets out directions and options for future collaboration in research and innovation. In doing so, it takes into account the presence of systemic differences between the EU and the GCC. The former already operates within well-developed regional research and innovation programmes, while the latter has less experience of such collaboration and each country engages in activities primarily on its own.

The INCONET-GCC2 project has thus represented a unique agenda, which brought together these various actors in a structured joint programme featuring international conferences, thematic workshops, H2020 Information Days, training activities, etc. Each of the GCC countries hosted specific activities, with some also taking place in the EU.

The results of INCONET-GCC2 include both *direct* results for those participating and more indirect and wide-ranging results, with both kinds largely corresponding to identified *needs* regarding training, formation of partnerships, capacity for GCC research and innovation to plug into EU activities, and to improve policy coordination. The question now is how to build on what has been established, which is the focus of the (Continuity) plan, summed up in this document.

Sectors

In the interest of effective organisation and making a difference, two priority areas were selected for INCONET-GCC2:

3) *Non-communicable diseases (NCDs), especially diabetes, and health innovation more broadly*. Sub-themes addressed in here included the organisation of healthcare, competence development, the rise of personalized care, prevention, life-style issues, e-health and the Internet of (medical) Things - IoT.
4) *Smart cities.* This featured usage of information and communication technology (ICT) applications, interactive exchanges, big data, smart metering and advanced forms of information management as means to address outstanding issues notably in energy efficiency, water conservation and the environment.

These areas were selected based on a shared appreciation among members for the underlying issues as well as on the relevance of research and innovation for addressing them. It was also viewed that these areas offered the potential for great mutual benefits from bi-regional collaboration.

[7] The GCC stands for the Cooperation Council for the Arab States of the Gulf, also known as Gulf Cooperation Council, whose member countries include Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates (UAE). In the present report, the GCC is used to refer to these countries collectively, and not necessarily to the Council itself.

Going forward, there is great scope for continued EU-GCC collaboration and further mutual benefits from working together in these areas, based on the momentum that has been created. The collaborative framework needs to be flexible, however, so that priority areas can be shifted when needed as well as new opportunities in other areas of shared interest be introduced. The list of candidate other areas includes: Renewable and Alternative Energy resources; Long term Environmental changes & Sustainability; Food and Water Security; Marine science; Water Resources, Management and Technology, including Desalination projects; Environmental Pollution; Transportation problems and solutions; ICT & Security; Life-sciences and Biotechnology; Nanotechnology; Cognitive sciences; Culture, design and experienced-based industries, and; Social innovation.

Implications of Innovation Ecosystems for approaches to collaboration.

When considering how to build on INCONET-GCC2 for future activities, it is important to take into account the inherent needs and opportunities that pertain to both regions and how they relate, including the anticipation of advantages from bi-regional collaboration spanning diverse sets of countries and actors.

Similar to many others around the world, the GCC countries experience fragmentation and weak innovation system linkages. While mainstream indices point to a strong position in many inputs, innovation outputs perform less well. A conscious effort should thus be made to reflect the features of countries' innovation system and the interests of different sets of key stakeholders, and to promote a widening circle of participants and actors engaged in research and innovation collaboration.

Prospects for continued collaboration and activities

As a basis for fruitful follow-up collaboration in research and innovation between the EU and the GCC, the recommendations for follow-up have been structured in terms of *objectives*, *instruments*, and *activities*, along with modes of action for promoting *linking*, allocating *resources* and stimulating *governance*. These may summed up as follows:

1) *Objectives;* foster collaboration between researches and research networks, build trust among diverse players, supporting mutual learning strengthening the innovation system.
2) *Instruments;* build a pool of established as well as new instruments, making use of combinations such as online platforms, incentives for multi-stakeholder initiatives, and executive/professional training for decision makers. A diversity of smart initiatives coming from different actors should further be welcomed.
3) *Activities;* facilitate common advocacy for research and innovation, including with a view to building competencies and stewardship, better combinations of basic and applied research, and boosting private sector engagement in research and innovation. Specific examples of recommended activities include: "Olympiads" or development agendas engaging children and young adults; stimulating "grassroots engagement in research on long-term issues; establishing "platforms" for new partnerships; fostering a new generation of start-ups and their growth, and; building joint expert groups and undertaking joint training activities.
4) *Linking;* Put a premium on cross-disciplinary effort and synergies between traditionally separated competencies, for instance by: creating mutually compatible curricula among EU

and GCC education and training institutions; Promote a spectrum of individual research exchanges, and; stimulate cross-sectoral mobility.

5) *Resources;* For the follow-up stage: tap into existing programmes and initiatives; develop new specific initiatives with resources earmarked for providing new support, and; catalyse agendas that can attract resources from various players across the two regions. Specific proposals for strategic funding streams include; Coordinated or joint calls by research funding bodies; awareness-building sessions to assist researchers from the two regions to team up in response to specific calls; various other kinds of institutional collaboration around funding.
6) *Governance;* Strengthen innovation systems through strategic collaborative initiatives and for a joint Expert Group, or Advisory body, promoting links to major regional authorities as well as national bodies, and other stakeholders, with the flexibility to receive mandates on demand as well as take new initiatives. Meanwhile various actors should be welcomed to build on the momentum of INCONET-GCC2 by introducing add-on activities and inviting others to join. Examples include PEIE interest in opening for bi-regional engagement to take part on innovative pilot projects, creating a living lab around smart solutions to be incorporated in industrial park development of Oman the Bahrain E-Government Authority's interest in bi-regional networks in support of entrepreneurship and high-growth start-up activity.

Concluding remarks

Countries are in varying positions when it comes to what needs are perceived as the greatest, to what extent research and innovation is a priority and in which way they benefit from collaboration. It is important to arrange the collaboration so that win-win is possible, and to make the most of the bi-regional context. This includes taking advantage of diversity in linkages, stakeholder engagement and capturing of synergies from work with multiple complementary partners.