

## The Atlas of Islamic-World Science & Innovation

### Project summary – February 2012

This landmark study is exploring the changing landscape of science and innovation across a diverse selection of Organisation of Islamic Cooperation (OIC) member states in the Middle East, Africa and Asia, including in-depth case studies of Egypt, Jordan, Qatar, Pakistan, Malaysia, Indonesia, Senegal, Nigeria and Kazakhstan. Working closely with partners in each of these countries, the project will chart the delicate interplay between science, innovation, culture and politics, and explore new opportunities for partnership and exchange with the wider world.

### A renaissance in Islamic world science?

The names of Nasir al-Din al-Tusi and Ibn al-Nafis may be less familiar to many people than those of Isaac Newton or Albert Einstein. But these and other Islamic scholars of the 12th and 13th centuries belong in the pantheon of thinkers whose work has shaped the direction of modern science.

The history of Islamic world science and innovation is one of a period of great flourishing followed by a steep and protracted decline. Today, research and development spending across the 57 member states of the Organisation of the Islamic Conference (OIC) averages just 0.38 per cent of gross domestic product. This is not simply a sign of relative poverty: oil-producing states such as Saudi Arabia and Kuwait are among the lowest investors in research as a percentage of GDP. In 2005, the 17 countries of the Arab world together produced 13,444 scientific publications, fewer than the 15,455 achieved by Harvard University alone.

But now there are signs of renewed ambition and investment in education, science and innovation, with strong support from national governments, businesses, philanthropists and bodies like the OIC. This project coincides with a number of eye-catching developments that reinforce the potential for a wider shift in the science and innovation capabilities of the Islamic world. To give just a few examples:

- In September 2009, the **King Abdullah University of Science and Technology** opened in Saudi Arabia with an endowment of between US\$10 and \$20 billion, and is attracting leading academics and students from across the world;
- In May 2007, **Mohammed bin Rashid Al-Maktoum**, Prime Minister of the United Arab Emirates and Ruler of Dubai announced the creation of a US\$ 10 billion foundation to establish research centres in Arab universities and offer research grants to Arab scientists;
- In 2006, the government of **Nigeria** created a National Council for Research and Development and poured US\$ 5 billion into its Petroleum Technology Development Fund to support research and education;

- In **Qatar**, a 2,500 acre Education City has been built outside Doha, hosting international campuses of several of the world's top universities. The government has also set a target of 2.8 per cent of GDP to be spent on R&D by 2015;
- **Turkey** has doubled its research spending in the past five years. Since 1997, it has risen from 27<sup>th</sup> to 19<sup>th</sup> in the world rankings for rates of scientific publication;
- In January 2008, the United Arab Emirates announced the **Masdar Initiative**: a flagship sustainable city and S&I hub, which will become home for 50,000 people and 1500 businesses focused on renewable energy and sustainable technologies.

How far and fast these countries move up the innovation league tables remains to be seen. But just as small nations such as Finland and Singapore have proved some of the surprising success stories of global innovation in the past decade, individual countries within the Islamic world have the potential to make breakthroughs. At the same time, the path to a more innovative Islamic world is not without obstacles. Salaries, infrastructure and research grants remain low, and there is still a substantial brain drain, with many talented scientists and engineers opting to pursue their careers in the US and Europe. A more fundamental question is the extent to which societies where open debate is not always the norm can become centres of creativity and invention.

## Project aims

The Atlas of Islamic-World Science and Innovation is a three-year project, which runs to the end of 2012. It has six aims:

1. To map key trends in science and technology-based innovation across the 57 OIC Member Countries, and combine quantitative data with qualitative analysis gathered through interviews, workshops and other in-country fieldwork;
2. To look in greater detail at a geographically and economically diverse sample of up to nine OIC countries, and offer an independent and authoritative assessment of how their innovation capabilities are changing, and the opportunities and barriers to further progress;
3. To explore how relationships between science, technology, innovation, culture and politics are unfolding within the case study countries, and across the wider Islamic world;
4. To identify new opportunities for collaboration between scientists, policymakers, the private sector and non-government sector in the Islamic world and elsewhere, particularly directed towards shared global challenges of climate change, poverty reduction and sustainability;
5. To make developments in science, technology and innovation more visible across the OIC and to the wider world, and to design a series of agenda-setting articles, publications and events which spark policy, media and scientific discussion in the Islamic world and beyond;
6. To build the skills and capacity of science and innovation analysts and decision-makers across the Islamic world, and create new networks for the exchange of ideas, policies and good practice both within the Islamic world, and between the Islamic world and other countries.

## Project partners

The Atlas is a unique partnership between organisations from across the Islamic world, Europe and internationally. Members of the project consortium include:

**The Royal Society** is the independent scientific academy of the United Kingdom dedicated to promoting excellence in science. Its mission is to expand the frontiers of knowledge through the development and use of science, engineering, medicine and mathematics for the benefit of humanity. It is the oldest science academy in continuous existence and is made up of 1,400 elected Fellows and Foreign Members, who are among the world's pre-eminent scientists, including 74 Nobel Laureates. As part of the Society's 350<sup>th</sup> anniversary in 2010, it has launched the Science Policy Centre, to map, analyse and debate the latest developments in science policy around the world. The Royal Society will act as the European Project Manager for *The Atlas of Islamic-World Science and Innovation*.

**The Organisation of the Islamic Cooperation**, with 57 member states, is the world's largest inter-governmental organization outside of the United Nations. This project has been designed with the backing and direct involvement of the OIC secretariat, based in Saudi Arabia. It will contribute to the OIC's 10-year Programme of Action, launched in 2005, which has science, innovation and sustainability as three of its core priorities. Significantly, a Resolution in support of this project was adopted by the OIC Kings and Heads of State at the Eleventh Session of the Islamic Summit Conference in Dakar, Senegal on 13-14 March 2008. H.E. Professor Ekmeleddin Ihsanoglu, Secretary-General of the OIC, is Chair of the project's Joint Management Team.

**Nature** is the world's foremost weekly scientific journal and *Nature.com* is one of the most popular scholarly websites on the internet, serving 12 million visitors a month. In November 2006, *Nature* published a special issue on 'Islam and Science'. The journal's involvement in this project will build on that special issue, and help to ensure that the index and country-papers will be of an unmatched quality.

**SESRIC** (The Statistical, Economic & Social Research & Training Centre for Islamic Countries) was founded in 1978 as a subsidiary organ of the OIC, and is the lead agency for statistical data and other socio-economic information on and for the OIC member countries. SESRIC's new online searchable data system provides up-to-date statistical data on almost 200 indicators from the 57 member countries. In addition, SESRIC conducts research aimed at evaluating the economic and social developments of member countries to help generate proposals that will initiate and enhance co-operation among them. SESRIC is the OIC Project Manager. Its unrivalled access to data from across the OIC means it is also well placed to coordinate the quantitative elements of project research.

**The British Council** is the UK's international organisation for educational opportunities and cultural relations. Its purpose is to build engagement and trust for the UK through the exchange of knowledge and ideas between people worldwide. It operates in the UK and 110 other countries and territories worldwide, and in the past year its programmes have reached 128 million people, the highest number in its history. Its work draws on the artistic, scientific and educational components of cultural relations to construct long-term relationships that not only flourish in favourable conditions but also endure in testing times. The British Council will play a key role in the project's in-country fieldwork, networking and capacity-building, and in ensuring its longer-term legacy.

**The International Development Research Centre (IDRC)** is a Crown corporation created by the Parliament of Canada in 1970 to help developing countries use science and technology to find practical, long-term solutions to the social, economic, and environmental problems they face. The IDRC direct

support toward creating a local research community whose work will build healthier, more equitable, and more prosperous societies.

**The Qatar Foundation** is leading Qatar's drive to become an advanced knowledge-based society. Founded in 1995 by His Highness the Emir Sheikh Hamad bin Khalifa Al-Thani, the Foundation is an independent, non-profit organization committed to the development of Qatar and its people. Now chaired by Her Highness Sheikha Moza bint Nasser, the Foundation works in three distinct areas: Education (through Education City); Science and Research (through the Qatar Science and Technology Park, and the Qatar National Research Foundation); and Community Development. The Qatar Foundation has agreed to become a major partner as this project encapsulates many of the Foundation's own priorities in terms of enabling knowledge-transfer and capacity building across the Islamic world.

**The Islamic Development Bank** is an international financial institution established in 1973 by the first conference of the Finance Ministers of the OIC. Its purpose is to foster the economic development and social progress of member countries and Muslim communities individually as well as jointly. Currently it has six priority areas: human development; agricultural development and food security; infrastructure development; trade among member countries; private sector development; and research and development in Islamic economies and finance. This project speaks directly to the last of these priorities, and the IDB will be providing significant support.

**COMSTECH** is the OIC's Standing Committee on Scientific and Technological Cooperation, which exists to support the promotion and cooperation of science and technology activities among the OIC member states. COMSTECH is chaired by Pakistan's president Asif Ali Zardari and its Islamabad secretariat is headed by Professor Atta ur Rahman FRS. Its priorities are to assess the science and technology needs and requirements of OIC member states; build up their indigenous capability through cooperation and mutual assistance; and create effective institutional structures for planning, development and monitoring of science and technology activities.

**The Islamic Educational, Scientific and Cultural Organization (ISESCO)** is an international organization working within the framework of the Organization of the Islamic Conference. Its headquarters are in Rabat, Kingdom of Morocco, and its objectives are to strengthen, promote and consolidate cooperation among the Member States in the fields of education, science, culture and communication, as well as to develop and upgrade these fields. ISESCO actively supports this project, and Dr Faiq Bilal, Director of Science at ISESCO is a member of the project's Joint Management Team.

Importantly, the project will also identify **National Research Partners** to contribute to the preparation and delivery of each of the country case studies. Examples of national research partners would include the University of Malaya in Malaysia and the Biblioteca Alexandrina in Egypt.

## **Project methodology**

The project has **four phases**:

### **Phase 1: Scoping, initial workshops and pilot studies (July 2008 – March 2011)**

The project began with a Kick-Off Meeting which took place in Istanbul, Turkey in July 2008. This brought together senior representatives from partner organisations and eleven OIC countries, and enabled issues of project management and governance to be discussed. It was agreed that the project will be overseen by a Joint Management Team (JMT), which will comprise representatives of all project partners. It was also confirmed that day-to-day coordination and delivery of the project will be shared between SESRIC,

which will act as the OIC Project Manager; and the Royal Society, which will act as the EU Project Manager.

Phase 1 involved further scoping research, to ensure that we had a robust and comprehensive methodology in place to measure and benchmark science and innovation performance across the OIC. We also launched a **positioning paper** in June 2010 outlining in detail the themes and questions that will be pursued through the rest of the research. Five countries - Jordan, Malaysia, Pakistan, Qatar and Egypt – were selected as **pilot case studies**, and will be launched over the course of 2011 and 2012.

## Phase 2: In-country fieldwork and working papers (2011 – 2012)

Having incorporated improvements in light of the pilot studies, the remaining case studies will then be carried out. These will involve a mix of mapping, data gathering, bibliometric analysis, and in-country interviews with scientists, policymakers, thinkers, religious leaders, business leaders, political movements and civil society organizations. The project team will spend several weeks in each country, depending on the size and scale of the research task.

The country case studies have been selected to reflect the diversity of the OIC membership in regional, economic and scientific terms. Within each country, we will identify and work closely with a **national research partner**, and co-host seminars, networking and capacity-building events for national stakeholders. The main outputs of this phase will be a series of events, articles and country working papers. The fieldwork will address the following questions:

- What are the most eye-catching and distinctive features of this country's science and innovation system?
- What are the main structures for science and innovation (institutions, policies, decision-makers, funding etc.)?
- What is the history and how rapidly are things developing?
- What are the key indicators and metrics that reflect the health of this system?
- What are the strengths and weaknesses of the secondary and higher education system?
- Can we measure flows of scientific and research talent in and out of this system?
- What are the innovation sectors and domains of particular strength?
- What is the balance between public and private sector R&D?
- What is the contribution of development assistance and philanthropy to R&D?
- How much (if any) multinational R&D takes place in this country?
- How innovative is domestic enterprise? Is this changing?
- How does this country approach the governance and ethics of science?
- How do we understand the relationship between Islam, science and politics in this country? How is this changing?
- How well connected is it to research and innovation hubs in Europe, the US, Canada, Japan, China, India and elsewhere?
- How can international collaboration be strengthened? What are the barriers to this?
- How can R&D in higher education be enhanced?
- How best can scientists, inventors and innovators be rewarded?

## Phase 3: Production of final report (2012)

Based on the country working papers and additional survey/desk-based research across the rest of the OIC member states, we will produce **an agenda-setting overview report**, which highlights commonalities and differences between the countries, and draws wider conclusions about the prospects for science and innovation across the Islamic world, and closer collaboration with the rest of the world.

The format of the final report is being considered but will include recommendations for governments, industry and higher education. The final report will be translated into Arabic and French. All outputs, including country working papers and the overview report, will be peer reviewed, to ensure they are high quality, rigorous and independent.

#### Phase 4: Launch events and dissemination (2012 – 2013)

The overview report and final versions of the nine country papers will be launched at a **special event towards the end of 2012** or in early 2013, and a series of smaller **dissemination events** in other OIC countries. We are exploring with *Nature* the option of special coverage linked to the project. We will also link to key networks such as the World Economic Forum to disseminate the findings.

Particular emphasis will be placed on ensuring that the findings can be taken forward and used by the OIC member states to strengthen their innovation systems. By working closely with national governments and research partners throughout the process, the aim will be to build capacity and practical mechanisms for regular updating and refreshing of the analysis in the years ahead. A key priority will be to build up a cadre of trained research analysts in each of the countries being studied, who can then become the kernel of a wider network.

#### Project budget and funders

To undertake this programme of work will require a budget of **USD 4 million**, spread over three financial years. This budget is being secured from four main sources:

- OIC institutions and member states;
- EU member states, scientific and cultural organisations;
- International trusts and foundations;
- The business and philanthropic community.

Funders and partners have identified three main reasons to become involved:

- A desire to better understand how the knowledge, scientific and technological base of OIC member states is changing, and the opportunities and barriers to further progress;
- An interest in the implications this will have for the wider global networks of innovation, and a recognition that this agenda provides potential arenas for positive dialogue and cooperation between institutions, governments, businesses and scientists in the Islamic world and internationally at a time when such opportunities are urgently needed;
- A practical need to identify new collaborators and partners across the Islamic world, particularly in countries that are rapidly scaling up their investment in science, technology and innovation.

The project will be managed through several layers of governance including the Joint Management Team and the Advisory/Peer-Review Group. The Joint Management Team will be responsible for overseeing the project at every stage, and will include representatives of the OIC General Secretariat and key partner organisations (including IDB, SESRIC, COMSTECH, ISESCO, The Royal Society, *Nature* and British Council). It is chaired by Professor Ekmeleddin Ihsanoglu, Secretary-General of the OIC.

#### For more information:

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