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Case Study: Science and Innovation Diplomacy Agencies at the nexus of research, economics, and politics

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Case Study

Science and Innovation Diplomacy Agencies at the nexus of research, economics, and politics

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List of abbreviations

BEIS	UK Department for Business, Energy and Industrial Strategy
DWIH	Deutsches Wissenschafts- und Innovationshaus (German Houses of Research and Innovation)
FCO	UK Foreign and Commonwealth Office
FDFA	Swiss Federal Department of Foreign Affairs
ICD	Innovation Centre Denmark
SERI	Swiss State Secretariat for Education, Research and Innovation
SIN	UK Science and Innovation Network
S&ID	Science and Innovation Diplomacy
S&T	Science and Technology
UFM	Uddannelses- og Forskningsministeriet (Danish Ministry of Higher Education and Science)
UM	Udenrigsministeriet (Danish Ministry for Foreign Affairs)

Summary

- The last decade has seen the emergence of several organisations dedicated to pursue national science diplomacy agendas. Among others, countries like the UK, Switzerland, Germany, the Netherlands, and Denmark established **science and innovation diplomacy agencies**.
- We comparatively examine three cases: The UK's **Science and Innovation Network**, the Swiss **SWISSNEX**, and the Danish **Innovation Centre Denmark**. We look for similarities and dissimilarities in terms of organisational setup, locations, governance and funding, topics and objectives, and tasks.
- We put forward **three analytical dimensions** that shape the organisations' activities. Tensions between **headquarters** and **periphery** determine the range of possible activities on the ground. Agencies have to deal with challenges arising from the **different mind-sets of diplomats and scientists**. Last, but not least, the organisations have to decide whether to primarily engage either in the **promotion of (basic) science** or in the **commercial application of research**.
- The three cases each feature distinct characteristics. While SWISSNEX and Innovation Centre Denmark have a strong take on the **promotion of domestic research, innovation, and products**, UK's network engages in a broader spectrum of activities and topics at the **nexus of science, economics, and foreign policy objectives**.
- Despite differences in their objectives and organisational setup, **all agencies have established offices at hotbeds of science and innovation—particularly in the BRICS—**, carry out similar tasks on the ground, and focus on comparable topics. A **lack of reliable performance indicators** hampers the assessment of individual agencies and outposts, thus making it difficult to judge the success of the respective agencies.
- While the agencies have developed an integrative narrative of innovation as encompassing all activities from basic research to commercial application, officers on the ground predominantly pursue their goals against the backdrop of a linear model of innovation, **focusing either on fundamental research or on applying scientific insights into business opportunities**.
- It is unlikely that many new offices will be established in the near future. **Most likely, additional growth will be triggered when emerging economies like Brazil, India, or China** start to establish their own science diplomacy agencies.

1. Introduction

The emergence of science and innovation diplomacy (S&ID) is often seen in conjunction with the rise of new organisations dedicated to facilitating international scientific collaboration, tapping into new innovative markets, and promoting commercial applications abroad (Flink & Schreiterer, 2010). Of course, states have embraced certain instruments of science diplomacy long before (e.g. science attachés at their embassies), but it seems that we recently witness a new development in the field that is qualitatively different from older approaches. Several countries have established networks, centres, or hubs for science diplomacy during the first decade of the new millennium. In some states, these S&ID agencies have become the backbone of government efforts to push global science and internationalise formerly nationally oriented innovation systems (Carlsson, 2006).

Early examples of such activities can be found in Switzerland and the United Kingdom. In the year 2000, the British Foreign and Commonwealth Office (FCO) established a **Science and Innovation Network** (SIN) to *'take forward the UK's science interests overseas'* (FCO, 2005). From the beginning, this network was meant to cover countries across the globe, establishing distinct contact points for scientists and businesses both at home and abroad interested in collaboration and access. Parallel to the founding of SIN, and with similar intentions, Switzerland established an organisation for promoting Swiss science, innovations and products overseas. In the short period between 2006 and 2009, this development picked up speed. While both the British and the Swiss network developed incrementally, several other players entered the stage. Both Denmark (2006) and Finland (2007) established outposts in Silicon Valley. China became another hotbed for activities. Denmark, Finland, and Switzerland set up offices of their respective networks in the period between 2005 and 2008. Germany was a latecomer, joining the movement only after 2009 but then opening offices (**DWIH, German Houses of Research and Innovation**) in New York, Tokyo, Moscow, Delhi, and São Paulo at high speed. There are more examples of similar activities, for instance the Dutch **Holland Innovation Network**, which operates in similar areas and deals with comparable topics.

The specific approaches differ significantly, yet this short overview already illustrates the trend towards concentrating activities, personnel, and financial resources in specific organisational units. But how exactly do the different networks and organisations operate? What structures of governance are put in place to manage science diplomacy activities across the globe? What objectives determine the organisations' strategies, agendas, and tasks? And to what extent do they impact the actions of officers on the ground? Can we identify common problems emerging in the field of science diplomacy? Are we witnessing isomorphic tendencies and a one-size-fits-all approach to science and innovation diplomacy?

To shed some light on these questions, we analyse the activities of three prominent cases: SIN, SWISSNEX, and Innovation Centre Denmark (ICD). These organisations are fascinating because they are prototypes for integrative setups that try to merge science diplomacy with innovation diplomacy; they are meant to glue together different objectives, missions, and instruments at the nexus of science, business, and foreign policy. We wanted to investigate modes of science diplomacy across a variety of different cases. While the three countries all have strong science systems and are home to world-leading universities and companies, they significantly differ in other respects. In terms of population size, the UK is the largest (65 million residents), followed by Switzerland (~8.5 million) and Denmark (~5.7 million). In terms of political configuration, the United Kingdom (at least for the time being) and Denmark are part of the European Union, representing a big and a smaller member state. Switzerland and the UK were among the first states to establish S&ID agencies, while Denmark did so only after 2006. Hence, by focusing on the three mentioned organisations, we cover a broad scope of S&ID agencies in different settings.

We base our case study on several expert interviews with representatives from the respective organisations, ministries, and competitors. In addition, we analysed all kinds of publicly available documents like annual reports, evaluations, policy papers, and material from the web. Furthermore, we refer to secondary literature and older studies dealing with S&ID agencies.

First, we summarise central features of each of these S&ID agencies. After that, we develop a typology consisting of three dimensions for comparing the characteristics of every organisation. Finally, we discuss our findings and provide ideas for future research.

2. The cases

In the following, we provide a brief overview of each of the three organisations on a case by case basis, highlighting central features and characteristics. We pay attention to this development over time, the structures of governance, the modes of funding, staff composition, and to objectives, topics, and tasks.

2.1 UK Science and Innovation Network

Development and locations

SIN is probably one of the oldest S&ID agencies. It was established in 2000 on the initiative of the FCO. Since then, it has not seen much development in terms of offices and staff. At least since 2004, the number of employees has ranged from 90 to about 100 officers.¹ As illustrated in Figure 1, the UK has maintained a widespread web of offices since the inception of SIN, covering about 30 countries. Outside of the SIN, the UK has only few fully-fledged S&T counsellors. The network represents, as it were, almost all British S&T representatives abroad.

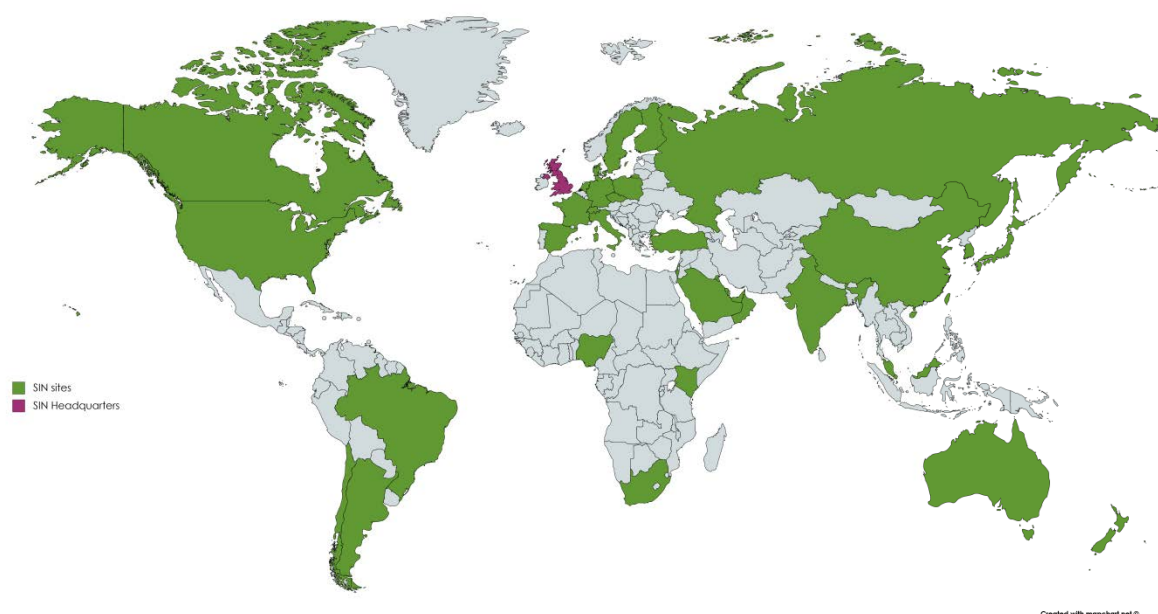


Figure 1: Countries hosting at least one SIN-office. Created with mapchart.net.

The organisation has grown only incrementally with few new sites, for instance, in Nigeria or Turkey. This does not necessarily mean that every country of interest has a separate office; it simply means that SIN has extended its scope and that there are officers responsible for these states. For instance, SIN is present in the Gulf region, covering Saudi Arabia, Kuwait, Bahrain, etc., yet the office is in Doha, Qatar. In contrast, the network maintains several branches within a single country, for instance, in the US or Canada. Offices are located at embassies, consulates general, or at British High Commissions in member states of the Commonwealth.

¹ Members of the network sometimes refer to each other as 'SINNers'.

Governance, modes of funding, and staff

Since 2004, SIN has been organised as a joint operation by the FCO and the Department for Business, Energy and Industrial Strategy (BEIS), which has authority over the British universities and large parts of the UK research sector. They have set up a joint governance board that defines the network's objectives and strategy. Representatives from both ministries communicate and coordinate activities on a day-to-day basis. In addition, the individual offices are grouped into regional clusters: Americas, Asia-Pacific, Europe, and finally India, Middle East, Africa. In every region, one office is responsible for having an overview of all activities going on in that part of the world.

There are performance indicators at place to evaluate whether a SIN office has operated successfully. The ministries collect data on a more general level (e.g. the research output of collaborations between scientists of two countries) and monitor the activities of individual branches by, for instance, counting how many contacts with partners they had engaged with within a year. However, these metrics are somewhat arbitrary and do not constitute the sole basis for assessment.

SIN is funded almost exclusively with public money from the FCO and BEIS. One cannot underestimate the FCO's importance for the network. The ministry's Chief Scientific Adviser² acts as the head of SIN, and the foreign office is responsible for the general management of SIN, such as, recruiting the officers for the various sites. Nevertheless, reports and communication are forwarded to the BEIS section for **Global Science and Innovation** as well.

The SIN-staff consists of officers with a variety of professional backgrounds. Around 20% of them are members of the diplomatic corps detached as part of their regular postings abroad. For them, a job at SIN is only a temporary duty, after which they will return to the FCO or take a posting with a different portfolio. While there are a handful of SINners seconded by other governmental departments, we were unable to obtain their precise numbers. The remaining staff consists of locally employed officers who often have a background in science or industry. There is no general rule regarding the terms of their employment except for the general FCO-conventions; contracts are negotiated on an individual basis. In particular, locally employed SINners do not have to be citizens of the UK. Some of them can be part of SIN for 2 years, while others may continue their work for a much longer time depending on the individual situation, interests, and performance.

Objectives and topics

SIN has issued a comprehensive strategic framework for all its offices abroad, concentrating on four priorities (Prosperity, Security, Influence, and Development) and 11 thematic programmes with the additional, cross-sectional topic of big data.³ The four objectives bear a strong resemblance to the dimensions of science diplomacy put forward by the Royal Society and the American Association for the Advancement of Science in 2010, referring to **science for diplomacy** and **diplomacy for science**. This is not very surprising, given the regular interaction with internationally engaged stakeholders in the British science system like the academies or research councils⁴. Still, the four priorities are very broad in scope and aim at strengthening the UK's science and economy, teaming up with partners to tackle global challenges, and contributing to the development of partner countries.

The list of thematic priorities (see Table 1) includes a wide array of different topics, mostly from the natural sciences and engineering, sometimes with a regional emphasis, for example, on the polar regions.

² Currently, this office is held by Robin Grimes, a professor for material physics at Imperial College.

³ See

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/604011/SIN_Strategy_Mar_2017.docx, last accessed 31.01.2018

⁴ The research councils will be replaced by the newly created **UK Research and Innovation** (UKRI) from April 2018 onwards.

Table 1: Topics and Organisations (data obtained from interviews and desktop research).

<i>Organisation</i>	<i>Topics</i>
ICD	Agriculture, Arctic, Big Data, Biotech, Drones, Educational Technologies, Entrepreneurship, Financial Technologies, Health & Life Sciences, ICT, Smart Cities, Space Research, Water Technology, Maritime Engineering
SIN	Big Data (cross-cutting), Clean Energy, Digital Economy, Food And Agriculture, Future Cities, Future Manufacturing, Oceans, Polar, Quantum Tech, Resources, Space, Health & Life Sciences
SWISSNEX	Agriculture, Artificial Intelligence, Drones, Entrepreneurship, Health & Life Science, ICT, Neuroscience, Space Research, Vocational Education, Robotics

SIN outposts are allowed to freely focus on a range of topics from this framework, thereby adjusting the agenda to fit the situation on the ground. Almost every office has adopted issues of health and life sciences as a relevant priority, followed by clean energy and future manufacturing. According to the SIN-homepage, the offices responsible for Africa, China, India, Japan, South Korea, and the US cover the widest range of topics.

Tasks

The day-to-day activities are less well-defined than official announcements suggest. While the strategic framework provides a guideline for operations on the ground, it is the individual officer who determines the rough course of action. The basic tasks of SINners include creating a network of contacts, monitoring new international science policy initiatives, promoting British funding schemes, where applicable, and organising small to mid-scale collaborative projects. As one would expect, this translates into attending conferences and workshops, reviewing official announcements, and engaging in bilateral communication with potential partners. These activities are meant to both find partners for collaborations and to promote UK science abroad on the level of individually matching interests. SIN's concept of *innovation* is rather blurry and associated with scientific excellence, global challenges, and—to a lesser extent—industrial leadership. SIN officers focus primarily on science-to-science relations and do not pay that much attention to industry-related affairs; promoting innovative British products is definitely not the top priority. SINners act as brokers and facilitators to connect scientists from the UK with researchers from abroad. Hence, they maintain links to other British research and funding agencies, such as the Royal Society, which dispatch their own officers overseas.

2.2 SWISSNEX

Development and locations

Parallel to the inception of SIN, Switzerland established a S&T outpost in Boston, US, in the year 2000 as a kind of ad-hoc pilot project. Two additional sites followed in 2004, one in San Francisco, one in Singapore. In the beginning, the three offices were not considered or promoted to be a unified brand, and it was not until 2007 that the name SWISSNEX was coined to refer to all three sites. Since then, the Swiss government has established three new branches in Shanghai, Bangalore, and Rio de Janeiro (see Table 2). In addition to these centres, three so-called 'SWISSNEX outposts' were founded in New York, São Paulo, and in Guangzhou, China. It is worth noticing that—while generally expanding SWISSNEX—the Swiss government decided to close the Singapore office in 2015. Thus, SWISSNEX currently consists of five sites with three additional outposts in four countries. At first sight, SWISSNEX seems much smaller than the SIN. Unlike the UK, Switzerland features a dual, hybrid structure of S&T representations overseas.

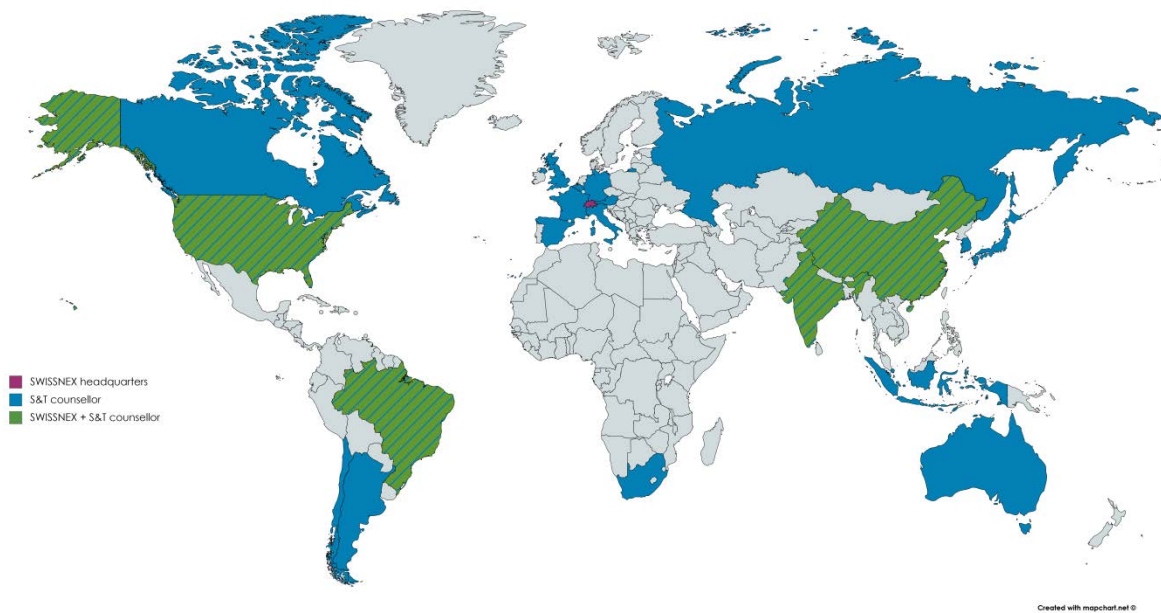


Figure 2: Countries hosting a SWISSNEX (green) and/or a Swiss S&T counsellor (blue). Created with mapchart.net.

While there are but five SWISSNEX-centres, the Swiss government dispatched S&T counsellors to 21 countries, where they are stationed at the embassies (see Figure 2). As a result, the overall network of Swiss S&T representations covers a wide range of countries, although it is still smaller than the British SIN. There are about 70 people working for SWISSNEX, however not all of them full-time.

SWISSNEX-offices are generally not located at the embassies but at consulates general at the respective 'world-leading technology & innovation hubs' of the hosting country.⁵

Table 2: Overview of new offices opened by SWISSNEX and ICD between 2000 and 2016.

<i>Year</i>	<i>SWISSNEX</i>	<i>ICD</i>
2000	Boston	
...		
2004	San Francisco Singapore*	
...		
2006		Silicon Valley
2007		Shanghai
2008	Shanghai	Munich
...		
2010	Bangalore	
...		
2013		New Delhi São Paulo Seoul

⁵ Quote from the SWISSNEX-homepage, see <https://www.swissnex.org/locations/>, last accessed 01.02.2018.

2014	Rio de Janeiro	
...		
2016		Tel Aviv

*closed in 2015

Governance, modes of funding, and staff

SWISSNEX is managed jointly by the Swiss Federal Department of Foreign Affairs (FDFA) and the State Secretariat for Education, Research and Innovation (SERI), as part of the Federal Department of Economic Affairs, Education and Research. The FDFA is in charge of Swiss representations abroad and organises the network of S&T counsellors at the embassies. SWISSNEX, in contrast, was a project first initiated by SERI that is still in charge of the day-to-day management of these outposts. Nevertheless, both departments coordinate their activities on a general level.

The Swiss model is based on public-private partnerships. The government provides a budget for basic operations only and salaries of a core team. Any activity beyond that has to be funded by third parties. Hence, SWISSNEX offices must collaborate with external partners (or customers) to develop their portfolio. This includes the cooperation with Swiss enterprises, but also with public universities, the latter creating a kind of public-public partnership.

Currently, only one of the five CEOs is a career diplomat, while the other four have different backgrounds. There is no mandatory rotation for this staff, yet postings are reviewed every four years. The CEO in San Francisco even held his office for almost 17 years before taking over the lead at SWISSNEX Boston. In order to keep up a coherent image and comparable procedures across the different SWISSNEX offices, all CEOs travel to Switzerland once a year for *swissnexDay*, which includes a public event but also briefings with central management. Apart from the leading officers, SWISSNEX staff consists of a combination of different officers who often are locally employed non-Swiss citizens. The individual outposts routinely host interns from Swiss organisations (e.g. universities) for shorter periods of time.

Objectives and topics

There are several levels of strategy development at SWISSNEX. In general, the network is meant to build networks, scout for innovative developments in S&T abroad, and to internationally promote Swiss products, technologies and research capacities (see also Schlegel, 2014). The general framework for activities is determined by SERI's policy programme (called *BFI-Botschaft*) that is renewed every four years and authorised by the Swiss parliament. This document provides guidelines for SWISSNEX on a very abstract level.

In addition, every SWISSNEX CEO has a set of objectives negotiated with SERI on a yearly basis. The performance of individual offices is assessed in light of these agreements. However, our interview partners were eager to point out that SWISSNEX's strategy mostly follows bottom-up principles. Local CEOs have a lot of freedom to pick topics and areas of activities they take to be interesting. They assess the local situation and carry out projects accordingly. A general precondition for such enterprises, funding by external partners needs to be available.

Thus, it is little surprising that SWISSNEX pursues a broad portfolio of topics. Most of the offices feature subject matters such as information and communication technologies (e.g. artificial intelligence, robotics), energy, or health and life sciences (see Table 1).

Tasks

SWISSNEX-offices engage in a wide range of different projects. Each centre has to take the local setting into account, i.e. it must consider cultural differences as well as local customs and conventions. In addition, actions partially depend on the type and number of partners that are willing to (co-)fund SWISSNEX.

In general, all sites are eager to cultivate an entrepreneurial spirit of their activities. They stress the innovation-related, creative aspect of their work. The objective of promoting Switzerland abroad is their main concern. Despite the image of being a hub for creativity and out-of-the-box thinking, the Swiss outposts engage in quite mundane activities such as hosting workshops, lectures and conferences, disseminate information on open calls and funding opportunities, and represent Switzerland at fairs and exhibitions. Of course, the funding model forces CEOs to constantly look for new opportunities to finance their operations. In consequence, the thematic scope of endeavours covers not only (applied) science, but also business innovation and sometimes cultural topics, depending on involved partners. In general, SWISSNEX is much more concerned with promoting Swiss capacities in research and innovation than gaining access to research capacities or resources of partnering countries overseas.

2.3 Innovation Centre Denmark

Development and locations

Denmark, along with other states, was part of the second wave of science diplomacy initiatives and entered the stage in 2006 when it established an outpost in Silicon Valley. Additional offices opened in Shanghai in 2007 and in Munich in 2008. After a period of consolidation, Denmark decided to launch three additional centres in India, Brazil, and South Korea in 2013, followed by the most recent office in Tel Aviv, Israel, in 2016 (see Table 2).

ICDs are either located at embassies (when they are set up in the target country's capital, for instance, in Seoul or Tel Aviv) or at consulates general (e.g. in Munich). The first office in Palo Alto was established on its own premises, yet nowadays it offers consular services as well.

Governance, modes of funding, and staff

The ICDs are managed in a partnership by the Danish Ministry for Foreign Affairs (UM) and the Ministry of Higher Education and Science (UFM).

The UFM provides the bulk of public funding for the centres, yet these funds are channelled through the UM which is responsible for the day-to-day management (paying salaries, providing office space and other infrastructure, etc.). Aside from public funding, ICDs offer consultancy services for Danish companies as an inherent part of their business model, imposing different fees for the services provided, yet there is a minimum charge. Public institutions (i.e., universities) generally do not have to pay for any services.

The centres are subject to periodic evaluations. In 2015, Oxford Research conducted the first comprehensive evaluation of all six centres existing at that time (see Oxford Research, 2015). The performance is not assessed by standardised metrics, but individual officers have to follow annual targets in their activities, in particular, revenue targets based on the number of consultancy services offered.

The staff consists of a mixture of civil servants, who dispatched from the involved ministries, and locally employed officers. ICDs always have an executive director who is nominated and hired by the UM **and** an innovation attaché paid by and dispatched from the UFM (see Figure 3). While the foreign office also takes care of the local staff, the attachés' employer, and principal, remains their ministry at home. Still, the attachés are part of the embassy/consulate general and subject to directives given by the ambassador. We discuss the potential advantages and disadvantages of such split authority relations below.

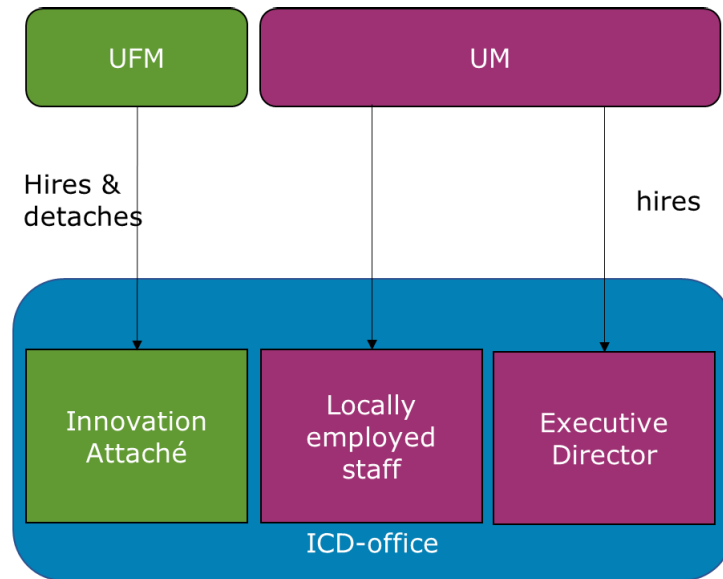


Figure 3: The **Danish model** of staff composition at ICD.

Objectives and topics

ICD's main objective is—at least according to official statements—to support Danish stakeholders who want to tap into new international markets. Stakeholders are broadly defined and include companies as well as public institutions like universities or research organisations. ICD may be interpreted as the prime instrument for supporting of an export- and growth-oriented S&T policy. The centres are meant to be facilitators, assist clients in promoting Danish products and technologies, disseminate outcomes from applied research, and vet new business opportunities overseas.

This looks like a rather clear-cut, top-down based mission; however, which topics are dealt with depends largely on the type of clients seeking for ICD's help to advance their respective agenda. As a consequence, the range of topics is fairly broad. The centre in Silicon Valley shows a focus on entrepreneurship and rising start-ups while the branch in China deals, for example, with maritime engineering.⁶ All in all, the topics reflect areas where Danish companies or research institutes a) stand out and b) show an interest to promote their products or expertise abroad (see Table 1).

Tasks

Two factors shape the everyday practice of ICD-officers on the ground: **innovation projects** and Danish stakeholders seeking **services**. ICD-officers spend a considerable amount of their time on innovation projects meant to focus on topics and products that are innovation-driven. Thus, ICD has to do with products, applications, or services at a pre-competitive level that have not yet entered the market. In practice, however, this definition is difficult to retain since the boundaries between applied research and the promotion of new products are increasingly blurred.

In general, officers engage in a lot of consultancy tasks in order to meet their earning targets. Given ICD's objectives, this supporting function for clients can take a variety of forms, depending on the individual case and local settings. For example, it may consist of guided tours to business hubs, or involve connecting a Danish enterprise with potential partners in the region. Support and services depend on the market environment. For instance, as a market entry is quite difficult to handle in Brazil due to bureaucratic obstacles and language barriers, the ICD São Paulo is much more engaged in initiating contacts with local partners than, for example, ICD Silicon Valley in the US.

⁶ From time to time, topics are boosted by political circumstances. For instance, the casting of the first Danish astronaut propelled the interest in space research.

We clearly see an inherent tension between the innovation attachés' status as detached personnel from the UFM on the one hand, and their role as a member of the embassy on the other. They are under the respective consul's or ambassador's jurisdiction as long as they are stationed at an ICD. This means they have to follow diplomatic conventions and routines at the embassy and at the same time their ICD-related targets.

3. A three-dimensional typology for S&ID agencies

We suggest a three-dimensional typology to characterise science and innovation agencies on the basis of the three cases. These dimensions encapsulate characteristic features that shape S&ID agencies in general and every office in particular. The heuristic categories need to be seen as continua in a multidimensional space (see Figure 4) that—at least to a certain degree—influences the scope of and restrictions for activities pursued. Of course, empirically the three dimensions are closely intertwined and appear in different configurations. Nevertheless, all science and innovation diplomacy agencies have to cope, and come to grips, with the tensions inherent to their objectives and setup. We find tensions within each of the dimensions but also examine the lines of conflict between the different categories.

The three dimensions are: headquarters vs. periphery, diplomacy vs. science, and basic vs. applied. All investigated cases face the challenge to balance different claims and interests in their chains of command, between centres and outposts, general strategic frameworks and specific settings in their activities.

3.1 Headquarters – Periphery

The first line of conflict between the centre and the periphery of a S&ID agency is reflected in tensions between top-down orders and bottom-up initiatives. This tension becomes apparent primarily intra-organisationally.

Top-down strategies clearly dictate the choice of locations for possible outposts. The three countries of our sample show very similar approaches in that respect. They primarily establish their offices in industrialised countries and BRICS. Furthermore, within these countries, S&ID agencies typically are located not in the capitals, but rather at business and innovation hubs such as Silicon Valley, Shanghai or São Paulo. The US—a hotbed of activities—is home to a number of offices. Brazil, China, and India are countries of shared interest as well. In three countries, only Denmark and the UK established outposts, in South Korea, Germany, and Israel.⁷ SIN also keeps an eye on developments in emerging markets in the Commonwealth of Nations (e.g. offices in Nigeria and Kenya). In these cases, political considerations go hand in hand with economic reasoning and cultural and historical ties.

When it comes to the day-to-day management, the central management at the capital must ensure a coherent image of the organisation in order to develop some kind of corporate brand. Yet the diversity of local environments constantly challenges such a coherent, clearly structured image. On the one hand, insisting on uniform strategies might strangle any efforts to tap into new markets, where flexibility is needed to create partnerships and new projects. Thus it is the local situation that shapes activities. On the other hand, headquarters and central management need to make sure that the organisations does not disintegrate into a number of independent, loosely-coupled sites. Widening gaps between individual outposts' interests and approaches to the topic threaten cohesion, thrust, and identity of the organisation and may even weaken its work's impact.

⁷ However, Switzerland has S&T counsellors stationed in these countries.

Interestingly enough, not one country relies exclusively or extensively on metrics to govern, control, and assess the performance of individual branches. Officers have reporting duties, yet these mostly rest on individual agreements and negotiations. Head offices are aware of the difficulties to apply standardised evaluation techniques to the diversity of tasks and objectives pursued by the individual S&T outposts. So far, there is no baseline, let alone a standard procedure, for measuring the success of S&ID agencies.

Empirically, we observe two approaches to cope with the tensions between central management's top-down instructions and locally emerging bottom-up activities. In smaller organisations, such as SWISSNEX and ICD, it is up to individual officers to adapt general rules and guidelines issued by the ministries to the local setting, be it Silicon Valley or Shanghai. The results may differ depending on the location and people involved. Obviously, this is also a matter of scale. Size matters: more outposts in more countries clearly increase the complexity of tasks and approaches followed and pose a challenge to any kind of centralised management. Due to the small number of their outposts, it seems much easier for the organisational headquarters of SWISSNEX and ICD to stay on top of things. Managing five or six centres and keeping contact with their officers is without question less demanding than keeping an eye on the activities of roughly 100 employees in 30 countries.

The second approach, pursued by SIN, relies on a coherent, yet flexible framework of objectives, topics, and activities. The British network covers a much wider range of countries than the other two organisations. Its fully-fledged strategic framework allows for promoting the organisation as well as different objective, and prominent topics. In comparison to ICD and SWISSNEX, SINners seem to have less leeway to encourage bottom-up initiatives but are bound by a fixed—yet supposedly flexible—framework.

In practice, both approaches to balance top-down/bottom-up conflicts seem to provide enough flexibility to successfully adapt to specific environments. In fact, we observe isomorphic tendencies that reflect local settings rather than general strategic guidelines. Our findings illustrate that there is no standard approach that works in *all* environments. It is primarily local conditions that mould topics, activities, and courses of action of effective agencies. Tapping into new markets might pose a big challenge in some regions. Every target country has its own pitfalls. While engaging with partners in the US may be fairly easy, our interview partners unanimously mentioned serious obstacles to do so in emerging markets like Brazil, China, and India. Among other difficulties, cultural differences and language barriers make it more difficult to enter these markets both for academics and businesses. In general, it looks like the periphery defines the specific setup of a given branch much more than the head office might desire. The same holds true for the selection of topics. For example, it seems logical for any organisation to address issues regarding entrepreneurship in Silicon Valley, and to focus on agriculture in Brazil.

3.2 Diplomacy – Science

The second tension inherent to all agencies refers to the interaction of diplomats and S&T staff. This dimension is complementary to the first in that conflicts are fought out both at headquarters and local sites. The interests and objectives of different government departments need to match in order to allow for effective S&ID agencies. Diverging views on how to utilise these organisations or quarrels about jurisdiction negatively impact the interaction between foreign ministries and science administrations. In particular, conflicts may arise from different understandings of the term science diplomacy. While foreign ministries tend to use the term primarily as *science for diplomacy*, departments responsible for science—and in the case of the UK, business—rather seek their objectives in terms of *diplomacy for science* (cf. Royal Society, 2010). In our research, we did not come across such evident lines of conflict, let alone intense battles between the different branches of government. Yet the division of labour, and the general understanding of science diplomacy, clearly influences and shapes all S&ID agencies. We can only speculate that Denmark, the UK, and Switzerland have developed a *modus operandi* for their networks over time that somehow or other matches the interests and organisational procedures of the departments involved.

With regard to the periphery, we see that most S&ID agencies are a part of embassies or consulates general. Science diplomacy officers are members of their respective agency and embassy. This model has two advantages: first, it facilitates communication and coordination between science diplomats and regular diplomatic staff. Second, it also carries a message for potential partners: S&T matter a lot and have a distinct role in foreign policy. That aspect could become important in target countries that pay a lot of attention to social status. The diplomatic status of S&ID agencies facilitates door opening to decision-makers and important partners in countries like Brazil or China.

However, this comes at a cost. Science diplomats depend on the regular embassy staff. In case that personal antipathy strains relations between, for instance, the ambassador and the science diplomacy team, the formal hierarchy at the embassy may turn out to be a burden for the S&T outpost's mission. The fact that S&T outposts are part of the embassy also creates rather mundane challenges, for instance, obstacles related to security issues. It goes without saying that it is quite annoying to host a conference on interesting topics if everyone has to undergo a tight security check first. These anecdotal incidents may not seem that important, but definitely create a lot of frustration for the S&T staff on the ground.

Finally, the different mind-sets of science-oriented officers and career diplomats, may lead to cultural misunderstandings and conflicts. As members of the regular diplomatic corps, posted to S&ID agencies as a stepping stone in their career, they might look after different, intramural foreign office-goals. Science diplomacy officers, who often are detached from other departments or are locally employed, have no other professional career plans. In this regard, the ICD is an interesting model that systematically brings together members of the department for foreign affairs and detached personnel from the science ministry, who are supported by local staff.

3.3 Basic – Applied

It is difficult to get a firm grasp on the approaches how S&ID agencies link science and innovation. We differentiate between a level of talk and a level of action. In terms of talk, we see a blurring of boundaries between science and innovation. The term *innovation* is used in a variety of ways both relating to scientific breakthroughs and entrepreneurial inventions in a commercial, often corporate, context. The distinction between basic science and application is replaced by an integrative narrative. S&ID, then, is meant to simultaneously contribute to economic growth, improved international relations, and the advancement of science.

However, this narrative's integrative role does not automatically translate into practice. When it comes to the activities pursued on the ground, the three S&ID agencies of our sample essentially perform their mission and purpose against the backdrop of a classic, linear model of innovation on a continuum of activities, from basic, fundamental research, to the application of new scientific insights to turn it into new business opportunities. Local officers continue to distinguish between more science-related undertakings, in particular facilitating collaborations, and innovation-related tasks that deal with the commercial application of research. The blurry narrative of S&ID facilitates to justify the engagement in a wide range of topics, tasks, and activities. As seen above, all examined S&ID agencies engage in quite mundane undertakings (e.g. hosting workshops) that were carried out even before the rise of the innovation narrative. Hence, while *innovation* starts to seize the role of a catch-all concept, this does not mean that established practices on the ground begin to change.

Still, the organisational setup influences the type of incentivised engagement. Modes of funding affect both the objectives and activities of each organisation. What we see empirically are three different revenue streams: SIN relies almost exclusively on public funding. Denmark's model combines public funding and service fees paid by private clients. SWISSNEX's model is based much more on private engagement; the Swiss government only provides a basic budget. SWISSNEX and ICD primarily deal with applied research and product promotion. In the light of a large share of

private funding, this is not surprising since private stakeholders are interested in promoting their products and gaining access to new markets rather than tapping into basic research. While private funding clearly shapes the operations of SWISSNEX and ICD, the British SIN carries out a more state-driven portfolio by focusing on topics and objectives that are part of the governmental agenda. Compared to the scope of the Danish and Swiss agencies, SIN's scope is more diverse. Officers may start projects in areas of basic research as long as they can justify, and sell, these initiatives as contributions to the UK's agenda of prosperity, security, influence, and development.

4. Conclusion

Our research shows that S&ID agencies share a number of characteristics and face similar challenges. They show isomorphic tendencies with regard to their location and general setup as organisations that are a) jointly managed by two governmental departments, b) employ a mix of professional diplomats, research administrators, and local staff with a great many of different backgrounds, and c) pursue a converging set of objectives and topics.

Nevertheless, we also see large differences in the scope of objectives, the flexibility of strategic frameworks, and modes of funding that heavily impact both their organisational features and practices (see Figure 4).

In terms of organisational setup, we see that there are several alternative ways to organise S&ID agencies. The UK decided to create a single brand for almost all S&T counsellors. This network, SIN, consists of both small outposts and large offices. Denmark, in contrast, maintains only few centres at selected hotbeds known for their innovative capacities. Switzerland prefers a hybrid structure of dedicated S&T branches combined with a traditional service of S&T counsellors at embassies. However, it is difficult to determine which model features which advantages or disadvantages.

Interestingly enough, we rarely come across evidence of any direct competition between the three organisations. The narrative of a global competition between states dominates on a general, strategic level. This narrative of rivalry notwithstanding—and in spite of similar missions, tasks, and topics—the interviewed experts were seldom aware of the activities of the other agencies. This finding implies that the blurry, very broad field of S&ID gives few opportunities for any direct confrontation between the different agencies.

ICD represents a type of S&ID organisation that above all is meant to promote Danish science and innovation. It concentrates on applied research and innovation projects, mostly based on bottom-up initiatives. SWISSNEX follows a similar approach, yet it is even more characterised by ad-hoc initiatives launched, and partly funded, by private partners. The UK's SIN—implementing an agenda put forward by its central management—addresses the central nexus of science, politics, basic research, and application.

The bottom line is that making these organisations become effective and work successfully is a challenging endeavour. Inter-departmental conflicts may hamper activities, local conditions may be impossible to adjust to or cope with, and diplomatic conventions may aggravate the officer's daily work. A core element of state-driven science diplomacy is, without question, *nation branding*. Yet many projects on the ground develop in rather contingent ways; officers mostly pursue ad-hoc activities, improvised campaigns, and need a large amount of audacity. Hierarchy matters a lot in integrating a myriad of different activities into a single, coherent strategy. At the end of the day, it is a matter of flexible guidelines and strategic frameworks that officers on the ground can adapt to local conditions, while keeping the big picture in mind. Flourishing S&ID agencies are those that manage to successfully juggle a plurality of demands at the nexus of science, economy, and politics.

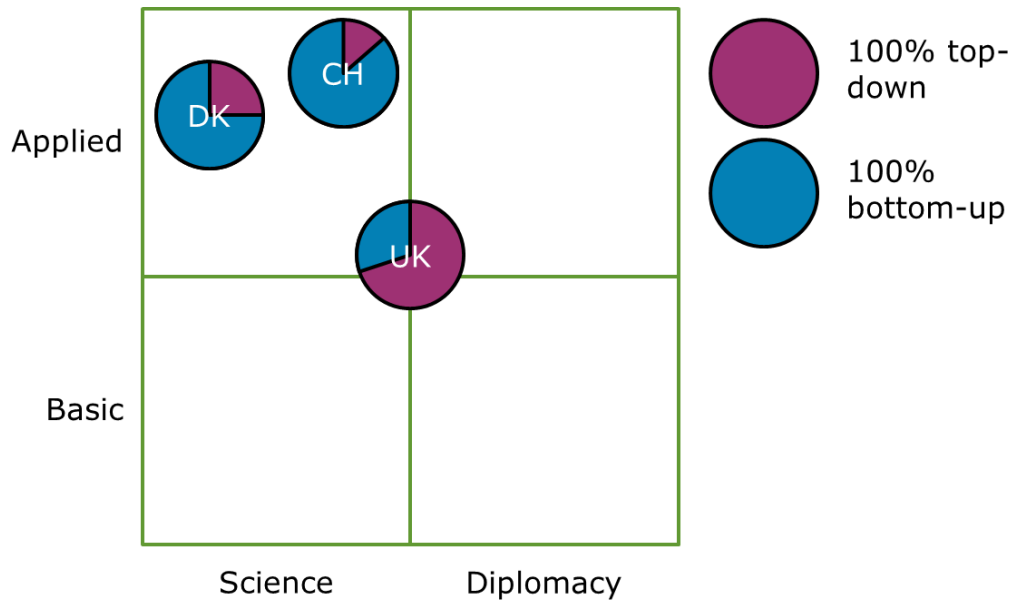


Figure 4: Position of the three S&ID agencies with regard to the three-dimensional typology. Blue indicates the degree of bottom-up strategy pursued by the periphery. Violet indicates the degree of top-down dictated strategy developed at headquarters.

This balancing takes a toll on the organisations. The times of an apparently unlimited expansion of science and innovation diplomacy agencies seem to be over by now. Across the board, our interview partners were quite clear: It is unlikely that we will see new sites opening soon. The closing down of SWISSNEX Singapore may indicate a certain level of saturation. Governments have to carefully consider where to invest in science diplomacy; maintaining outposts everywhere is expensive and not feasible. Spending on S&ID agencies may have hit a ceiling. Of course, one could argue that established sites are already covering most of the relevant (future) markets. The focus on the BRICS is obvious as all analysed agencies have offices in Brazil, India, and China. That the UK's SIN covers a much larger set of countries than Switzerland and Denmark do is not surprising. But even the UK is adding but few, if any, new sites to it. Mostly, these are small offices with only a handful of officers. If we were to take our network sample as a proxy for overall growth of science diplomacy related activities, we would have to conclude that the field has reached its climax and is about to stagnate. For further research, we should therefore look more closely into the connections, and the interplay between, S&ID agencies and other instruments from the toolbox of science diplomacy, such as science and technology agreements, joint funding schemes, or S&T advisers in ministries for foreign affairs (Rüffin, 2017; Van Langenhove, 2017). Further advancement of science diplomacy would benefit from a more efficient coordination of different tools much more than from an increase in the number of S&ID agencies.

Last, but not least, additional growth will most likely be triggered by emerging economics like China, Brazil, or India, that sooner rather than later will enter the field and start to set up their own S&ID agencies for promoting their respective agendas.

5. Bibliography

Berg, L.-P. (2010). Science Diplomacy Networks. *Politorbis* 49(2), 69–74.

Carlsson, B. (2006). Internationalization of innovation systems: A survey of the literature. *Research Policy* 35(1), 56–67.

Flink, T., & Schreiterer, U. (2010). Science diplomacy at the intersection of S&T policies and foreign affairs: towards a typology of national approaches. *Science and Public Policy* 37(9), 665–677.

FCO Foreign & Commonwealth Office (2005). *Science & Innovation Annual Report 2004-2005*. London: Foreign & Commonwealth Office.

Oxford Research (2015). *Evaluation of the Danish Innovation Centres*. Frederiksberg: Oxford Research.

Royal Society (2010). *New Frontiers in Science Diplomacy: Navigating the Changing Balance of Power*. London: Science Policy Centre, The Royal Society.

Rüffin, N. (2017). Science and Technology Agreements in the Toolbox of Science Diplomacy. Effective Instruments or Insignificant Add-ons? *EL-CSID Working Paper 6*. Brussels: Institute for European Studies at the Vrije Universiteit Brussel.

Ruffini, P.-B. (2017). *Science and Diplomacy. A New Dimension of International Relations*. Cham: Springer International Publishing.

Schlegel, F. (2014). Swiss Science Diplomacy: Harnessing the Inventiveness and Excellence of the private and Public Sectors. *Science & Diplomacy* 3(1), <http://www.sciencediplomacy.org/editorial/2014/educating-for-science-diplomacy>, last accessed 01.02.2018.

Van Langenhove, L. (2017). *Tools for an EU Science Diplomacy*. Luxembourg: Publications Office of the European Union.

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