

# Supporting next generation innovation policy in the Pacific Alliance



A scoping project to understand the professional development needs of innovation policymakers in Chile, Colombia, Mexico and Peru.

How can the UK work with the region through the Newton fund to transform capacity to support innovation for economic growth and social impact?

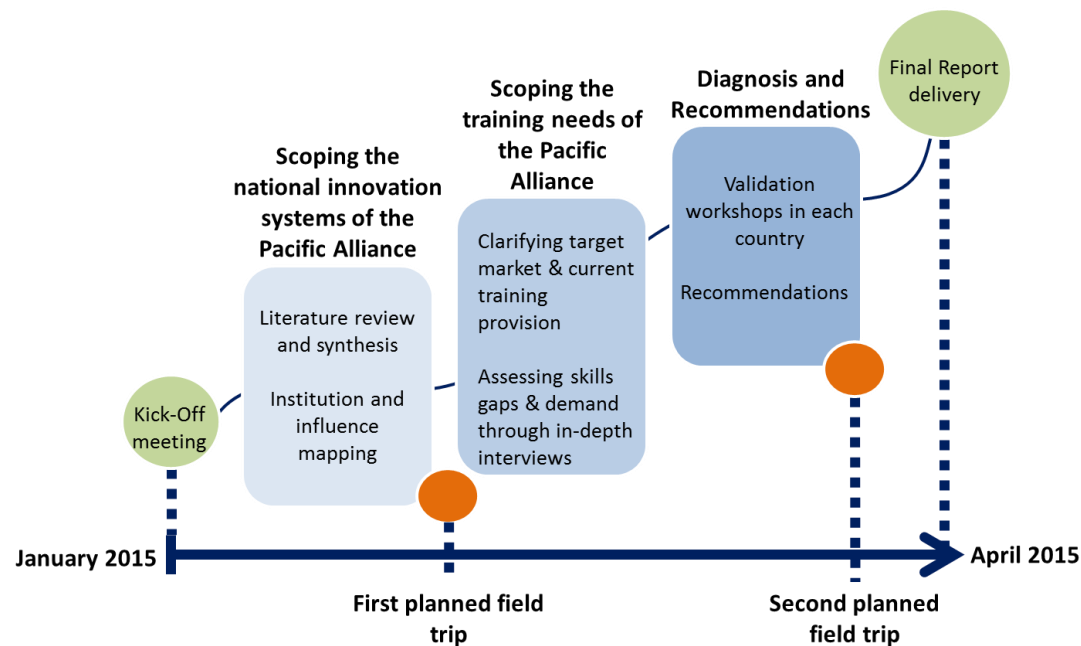
0.0	<b>Introduction and aims of the scoping project</b>
1.0	<b>The innovation systems of the Pacific Alliance countries</b>
1.1	Chile
1.2	Colombia
1.3	Mexico
1.4	Peru
2.0	<b>Scoping innovation policymaker training and capacity building needs</b>
2.1	Mapping innovation policymakers
2.2	Key findings from expert interviews
2.3	Current innovation policy executive development provision across the Pacific Alliance
2.4	Example training persona
3.0	<b>Recommendations</b>
3.1	What we know about what works in professional development and training
3.2	Global best practice in capacity building for innovation policy
3.3	The UK offer in building capacity for effective innovation policy
3.4	Building outline proposals for testing
3.5	Validation workshops
3.6	Final recommendations and next steps
	<b>Appendix:</b>
	<ul style="list-style-type: none"><li>• Project team</li><li>• Project team organisations overview</li><li>• Interviewee list</li><li>• Bibliography</li></ul>

# Introduction and aims of the scoping project

## This scoping study set out to:

- Diagnose the training needs of innovation policymakers in Pacific Alliance countries of Mexico, Chile, Colombia and Peru.
- Recommend a high impact and cost-effective approach to capacity building for innovation policymakers in the Pacific Alliance that could be administered by Innovate UK.
- Inform the development of a large collaborative programme on capacity building for innovation policy for the UK in the Latin American region, and potentially across the global Newton partnership.

The study was led by Nesta in partnership with leading Latin American think tanks Fundación Idea, C230 Consultores and Fundación Chile, with the support of in-country SIN and Newton teams. Our timeline and methodology was as follows:

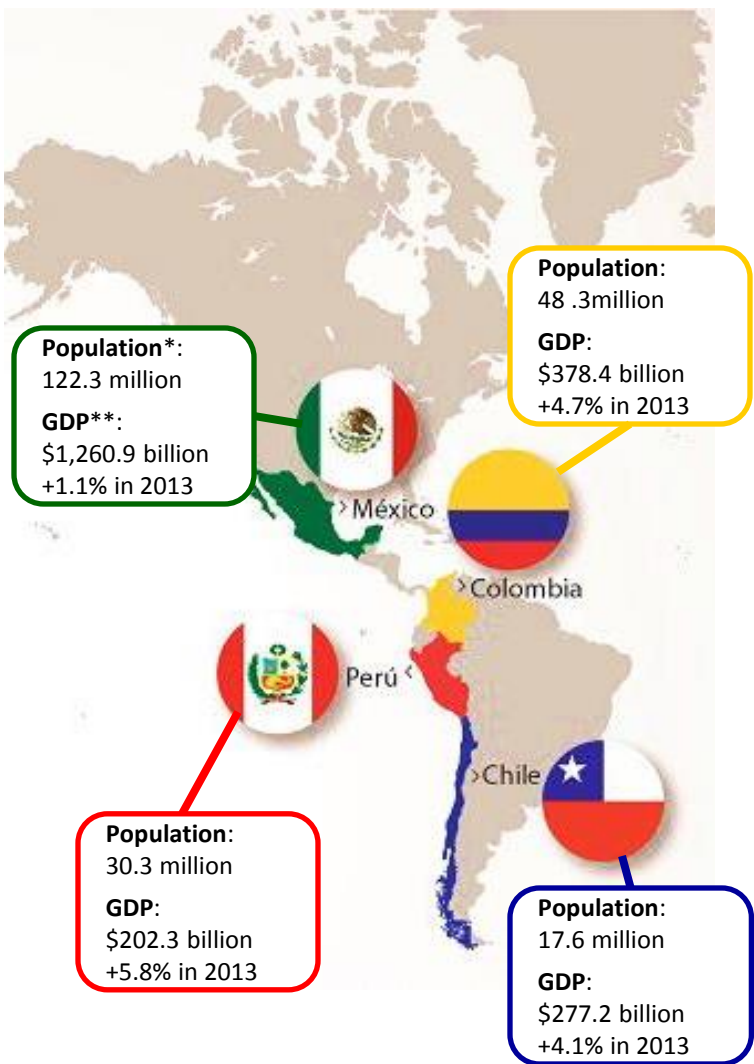


**Acknowledgments:** We'd like to thank all those experts across Pacific Alliance governments who kindly gave up their valuable time to participate in the interviews for the report, and to provide peer review and comment. Thanks also to the Newton and Innovate UK teams, and to the SIN and Newton advisors in Chile, Mexico, Colombia and Peru for the valuable support they provided throughout the process.

**Disclaimer:** Please note that opinions and analysis represented in this report are those of Nesta and our project partners, drawn from both published analysis and primary interviews and validated with expert workshops. They do not necessarily reflect the positions of Pacific Alliance governments or of Innovate UK. Errors and omissions remain our own.

**One:** The innovation systems of the Pacific Alliance countries

# 1. The innovation systems of the Pacific Alliance countries



Innovation indicators in the Pacific Alliance countries

Indicator	Chile	Colombia	Mexico	Peru	UK
Global Innovation Index Rank (2014)	46/143	68/143	66/143	73/143	2/143
Global Competitiveness Index (2014-2015)	33/144	66/144	61/144	65/144	9/144
R&D gross domestic expenditure as % of GDP (latest available)	0.39	0.18	0.46	0.15	1.77
High-Tech exports, in % of manufactures exports (2012)	5	5	16	3	22
Patents per million people (2010-2013)	2.1	0.2	1	0.1	77.2
Percent growth in total patent applications between 2003-2013	42	72	31	37	5
Time in hours required to start a business (2014)	6	11	6	26	6
% of the 18-64 population who believe they have the right skills/knowledge to start a business	60	58	59	62	44

\* and \*\* Population and GDP figures for 2013

# 1. The innovation systems of the Pacific Alliance countries

The Pacific Alliance is a regional integration initiative by the governments of Chile, Mexico, Colombia and Peru to stimulate shared economic development and competitiveness. The Centre for Global Development described it as one of the ‘few bright spots’ in Latin American economic integration, and diplomats have been superlative about the potential of the agreement.

A nascent partnership, it was only formalised in 2012. While the focus to date has been on trade liberalisation agreements, innovation has been mandated as one of the priorities for collaboration. With no permanent secretariat, policy developments take place in presidential summits, international working groups and conferences such as the 2013 Lab4+ entrepreneurship and innovation conference.

The Pacific Alliance covers a large geographical area (it takes over eight hours to fly direct from Mexico City to Santiago), and a diverse set of economies at varying stages of development of their innovation ecosystems.

Many challenges are shared – for instance the transition to knowledge-based industries from natural resource intensive economies<sup>1</sup>, low investment in innovation by

the private sector, and problems connecting and co-ordinating innovation institutions.<sup>2</sup> A wide range of new national institutions and initiatives have been set up to address these issues.<sup>3</sup>

An intensive IADB study of the Pacific Alliance innovation systems is currently underway, but our scoping study draws out some of the key characteristics and highlights.

In this section of the report, for each of the Pacific Alliance countries we:

- Give an overview of recent trends and innovation policy highlights.
- Map the formal institutional structures of the innovation system.
- Test a new method of mapping the informal patterns of influence on the innovation policy system along three dimensions: a) relative influence on core of the innovation system; b) the institutions’ relative role in design vs implementation of innovation policy and c) science and technology vs innovation.
- Summarise the strengths and weaknesses of each innovation system in six key categories.

## 1.1 Chile's Innovation System





# 1.1 Chile: Summary of innovation

For over a decade, innovation has been an important pillar of Chile's economic development policy. The innovation budget grew from US\$ 300 million in 2005 to over US\$ 1 billion in 2013. Alongside greater spending, institutions have been strengthened. There is a growing emphasis on high-level policy coordination at the centre of government, and an expanding role for innovation support agencies such as CORFO, the Chilean Production Development Corporation. Innovation support programmes have proliferated and matured. Startup Chile, launched in 2010, has become world-renowned for its innovative high-volume approach to attracting technology start-ups. With interesting short-term results, the programme has already been emulated in several countries even though the long-term economic impact of the programme is still unproven.

Although ranked the most competitive country in Latin America, Chile's economic growth remains dependent on natural resources like copper. Chile spends proportionally far less (0.39 percent of GDP) on innovation than peers at similar stages of development. With a low contribution from the private sector, challenges of improving R&D intensity of firms lie ahead alongside economic rebalancing, and continuing to grow human capital. Dependence on mining is being reframed as an opportunity to build local capabilities to develop knowledge and technology-intensive solutions relevant for many other technology-based industries, locally and globally. Regional and global integration of innovation activities will be crucial, as will ensuring that growth in spending on innovation support fosters the desired results for economy and society.

With this in mind, innovation is increasingly recognised as a cross-government activity. A new Laboratorio de Gobierno is launching this year with a high level mandate to support innovation in public service delivery and in the relationship between the public and private sectors on innovation.

## Statistical highlights

- In 2013, the expenditure in R&D was only 0.39 percent of GDP according to the Ministry of Economy, the lowest among OECD countries (the average is 2.4 percent). The public sector contributes 38 percent of total expenditure, and the private sector only contributes 34 percent). Universities held the largest share of R&D activities: 39 percent of the total, with public funding and companies each contributing 36 percent.<sup>1</sup>
- During the period 2011-2012, Chile had an relatively high innovation rate in firms: the percentage of firms that innovated in that period reached 26.9 percent – similar to the average reported by countries of the European Union (26.8 percent). However, only 7.3 percent of innovative firms indicated they undertook their innovation in collaboration with others.<sup>2</sup>
- Chile tripled its scientific production in 13 years. In 1997, the rate of production was 117 articles per million inhabitants, while in 2010, this rate was 380 articles per million<sup>3</sup>. However, the ratio of researchers per million head of population has risen only from 317 to 336 between 2010 and 2012: not a significant difference.<sup>4</sup> These numbers suggest that even though Chile has grown significantly in scientific production during the past decade, more recently that trend has levelled off.
- Chile has a low level of exports of high-technology goods; they represent only 4.74 percent of the country's manufacturing exports.<sup>5</sup>



## 1.1 Chile: Highlights of key innovation programmes

**World Class Suppliers Programme:** An open innovation programme driven by mining companies BHP Billiton and Codelco, in conjunction with Fundación Chile. The programme provides an open innovation space in which mining companies and local suppliers develop technological solutions that have the potential to be exported to other countries and industries. To date, the programme has worked with a total of 93 companies.

<http://desarrolloproveedores.cl>

**Start-up Chile:** In 2010, the Government of Chile, through CORFO, created the Start-Up Chile Programme, which aims to attract entrepreneurs from around the world to build their businesses in the country and to contribute to a cultural change around entrepreneurship. Since its inception, Start-up Chile has supported about 400 entrepreneurs from 37 countries.

<http://www.startupchile.org>

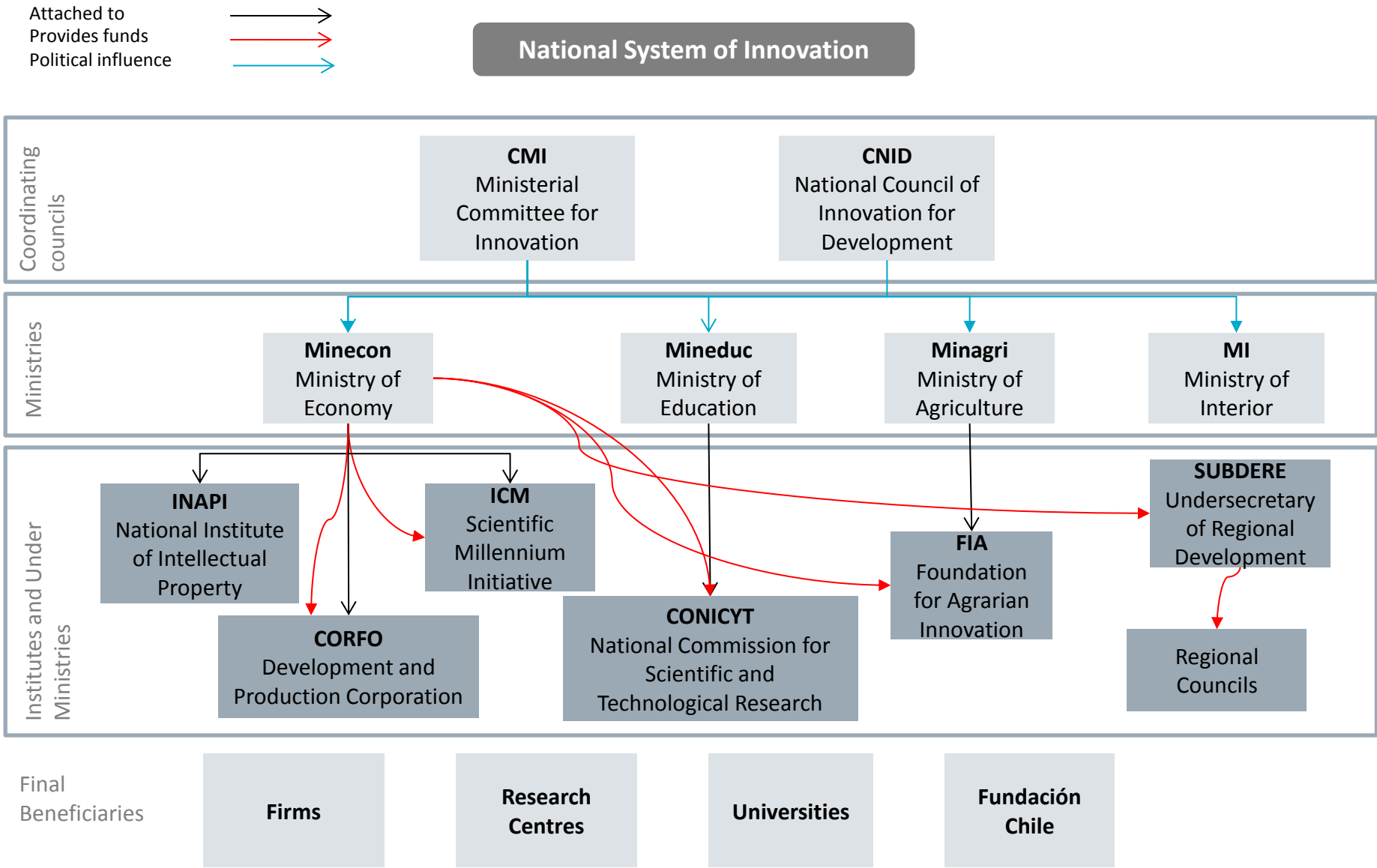
**CREO Antofagasta Programme:** The Antofagasta region is home to a large portion of the national mining industry and, as a result, the city has experienced exponential growth. This programme was created to stimulate the city's growth, with an emphasis on the quality of life of its residents, to transform Antofagasta into a model city, nationally and internationally.

<http://creoantofagasta.cl>

**BecasChile Programme:** In 2008, the Ministry of Education launched this programme, whose goal was to foster the knowledge economy and society in Chile through scholarships for Chilean nationals to study at the top universities abroad. The scholarship programme funds postgraduate training as well as top-level technical training and teacher training. By December 2013, the BecasChile Programme had provided scholarships to more than 8,500 students, of which over 70 percent were at masters, doctoral or postdoctoral level.

<http://www.becaschile.cl>

# 1.1 Chile: Institutional map of the innovation system



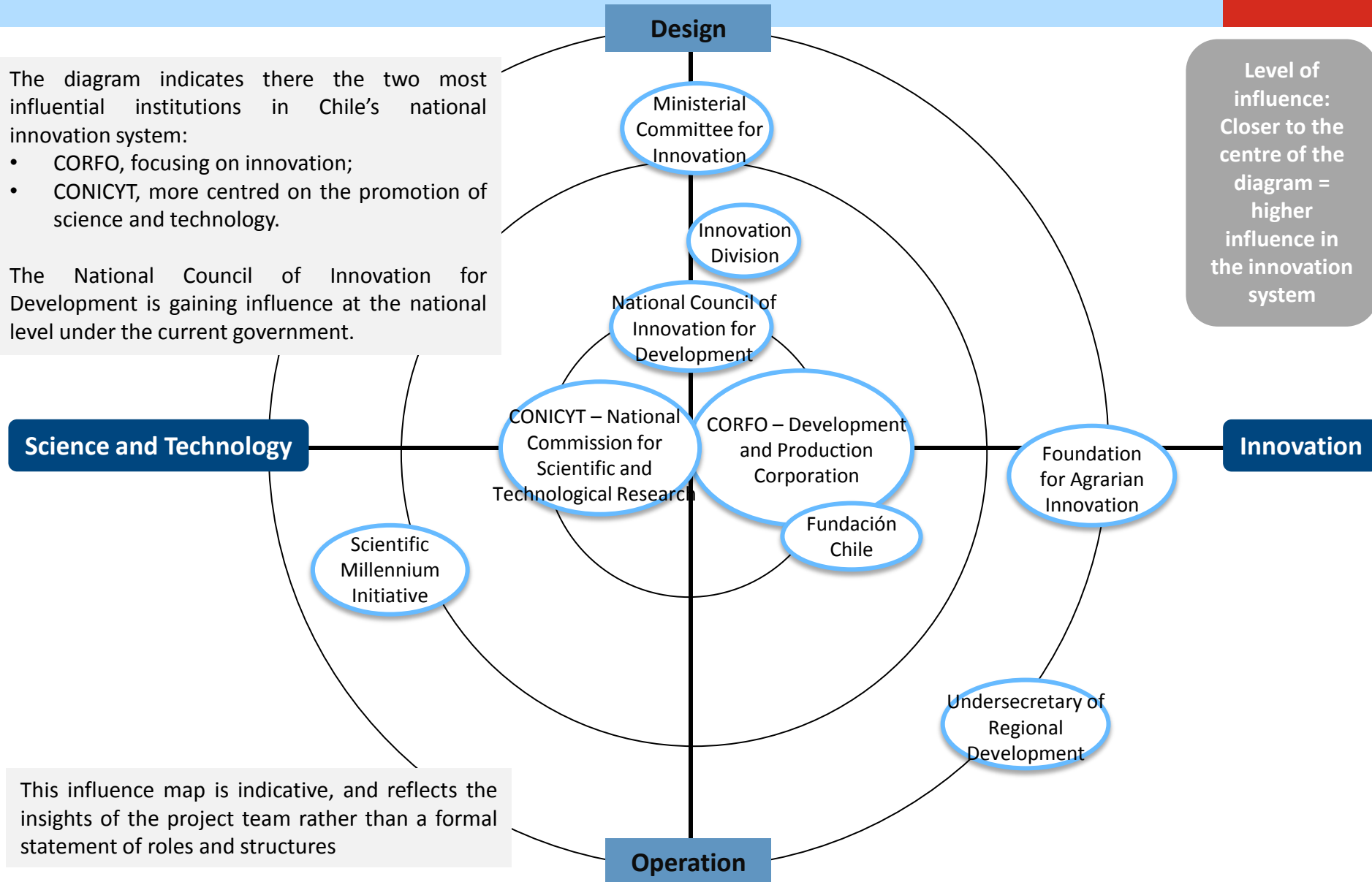
# 1.1 Chile: Role and influence diagram of key ministries and agencies

Level of influence:  
Closer to the centre of the diagram = higher influence in the innovation system

The diagram indicates there the two most influential institutions in Chile's national innovation system:

- CORFO, focusing on innovation;
- CONICYT, more centred on the promotion of science and technology.

The National Council of Innovation for Development is gaining influence at the national level under the current government.



This influence map is indicative, and reflects the insights of the project team rather than a formal statement of roles and structures



## 1.1 Chile: Glossary of institutional abbreviations and acronyms

CMI	Ministerial Committee for Innovation
CNID	National Council of Innovation for Development
CORFO	Development and Production Corporation
CONICYT	National Commission for Scientific and Technological Research
FCH	Fundación Chile
FIA	Foundation for Agrarian Innovation
FIC	Innovation Fund for Competitiveness
FIC Regional	Innovation Fund for Competitiveness for Regions
ICM	Scientific Millennium Initiative
INAPI	National Institute of Intellectual Property
Innovation Division	Ministry of Economy
SUBDERE	Undersecretary of Regional Development



# 1.1 Chile: Strengths and weaknesses of the system – institutional framework and funding

	Strengths	Weaknesses
Institutional framework	<p><u>Chile’s national innovation system is one the most robust in Latin America, with strong government institutions for innovation:</u></p> <ul style="list-style-type: none"><li>• Great efforts have been made to strengthen the institutionalisation of national R&amp;D and innovation mechanisms.</li><li>• Chile has seen steady increases in public financing for innovation in recent years. For example key agency CORFO’s seed funding programme grew from US\$ 1.6 million in 2000 to US\$ 6.2 million in 2012.</li><li>• Nationally consistent consolidated indicators for innovation have allowed for improved evaluation of system performance and easier benchmarking against international standards.<sup>1</sup></li></ul>	<p><u>There remain some concerns regarding the political dependencies of key innovation institutions, and the degree of coordination between them:</u></p> <ul style="list-style-type: none"><li>• CNID and CMI – in charge of innovation strategy design – are limited in their actions because they depend on the political priorities of the government in charge.</li><li>• CONICYT and CORFO answer to the Ministry of Education and the Ministry of Economy respectively. The ministries’ differences in approach and processes around common themes leads to tensions, role overlaps and a general lack of coordination at the agency level.<sup>2</sup></li></ul>
Funding	<p><u>Public funding for innovation in Chile has been increasing, allied to a growing private venture capital (VC) industry:</u></p> <ul style="list-style-type: none"><li>• FIC was created in 2006 using mining industry royalties. Since 2008, 25 percent of these resources have been distributed to the regions. This fund has been constantly increasing. In 2015, USD\$ 195 million were allocated to programmes and instruments, about 20 percent more than in 2014 (Ministry of Economy, 2014a).</li><li>• Newer programmes such as Start-up Chile, Seed Capital and the Incubators programme have sat alongside a fourfold increase in applications to state-backed VC programmes, and an increase of public-backed VC funding from US\$ 8.6 million in 2005 to US\$83.3m in 2012.<sup>3</sup> VC investment has been increasing, currently standing at 0.15 percent of GDP.<sup>4</sup></li></ul>	<p><u>Despite increasing public sector funds for innovation, this has not resulted in proportionately increased private sector investment in innovation:</u></p> <ul style="list-style-type: none"><li>• Overall R&amp;D expenditure is low in comparison to the OECD average. In 2013, it only represented 0.39 percent of GDP.</li><li>• The private sector is less likely to invest in innovation than the public sector. Private sector investments in R&amp;D only account for 29 percent of total expenditure (versus 59.9 percent in average in OECD countries).<sup>5</sup></li></ul>

# 1.1 Chile: Strengths and weaknesses of the system – Human capital and knowledge assets

	Strengths	Weaknesses
Human capital	<p><u>The percentage of the population with professional and technical qualifications has increased substantially in the last decade:</u></p> <ul style="list-style-type: none"> <li>First year enrolment in professional and technical education has increased by 67 percent in the past ten years.<sup>1</sup></li> <li>Public funding for science has increased threefold since 2009 (OECD 2013) – including the widely-praised dedicated science training programme <i>BecasChile</i>.</li> </ul>	<p><u>There are several problems with the quality of education – including for researchers :</u></p> <ul style="list-style-type: none"> <li>Even relatively recently – 2009 – PhDs per million population were lower than other strongly emerging economies like Slovenia and Turkey (OECD 2013).</li> <li>The 2012 PISA international skills study rated the basic skills of more than 80 percent of the Chilean population in the bottom two levels for science, maths and reading.<sup>2</sup></li> <li>Forty-four percent of the adult Chilean population is ‘functionally illiterate’ (insufficient reading and writing skills to manage daily living and employment tasks requiring reading skills beyond a basic level).<sup>3</sup></li> </ul>
Knowledge assets	<p><u>Chile has public programmes to promote international collaboration and increase knowledge production in the country:</u></p> <ul style="list-style-type: none"> <li>Since 2009, CORFO has been developing eight Centres of Excellence in specific science and research topics (biotech, solar etc.). These are led by leading global institutions like the Fraunhofer Institutes, and US universities. Each centre received €25 million over eight years and is designed to boost R&amp;D, increase technology transfer, and build more industry-science links.</li> <li>The first four centres of excellence established in Chile are now moving into their second (operational) phase. They are augmented by 12 major international centres in the country.<sup>3</sup></li> </ul>	<p><u>Capacities to generate new knowledge and capture it are still low:</u></p> <ul style="list-style-type: none"> <li>Although Chile has the region’s highest number of scientific publications, overall scientific productivity only reaches 25 percent of the OECD average.</li> <li>Chile is still generating a low number of patents: according to an OECD study comparing the number of patents simultaneously filed in office in Europe, USA and Japan, Chile ranks 36 out of 42 developed and emerging countries.<sup>4</sup></li> </ul>



# 1.1 Chile: Strengths and weaknesses of the system – the broader environment, and ecosystem connections

	Strengths	Weaknesses
The broader environment	<p><u>Chile has a solid macroeconomic context and good external conditions, allowing more resources to be directed to the promotion of STI:</u></p> <ul style="list-style-type: none"><li>• Between 2003 and 2012, the Chilean economy grew by 4.4 percent annually (versus 1.5 percent average in OECD and 3.9 percent average in Latin America and the Caribbean).<sup>1</sup></li><li>• The current government’s strategy is to select strategic sectors to optimise the deployment of those increasing resources.</li><li>• Chile is the largest copper producer in the world, accounting for about 32 percent of the world’s production. Over the past ten years, mining has contributed to 14.8 percent of Chile’s GDP, and represented about 60 percent of all exports.<sup>2</sup></li></ul>	<p><u>Low economic diversification and low productivity is a threat to the country’s long-term growth:</u></p> <ul style="list-style-type: none"><li>• The main Chilean production and export industries are concentrated in primary industry, focused on the exploitation of natural resources.</li><li>• The degree of diversity and spread across sectors of Chilean exports is inferior to other countries in the region, as well as to other natural resources-rich OECD countries.<sup>3</sup></li></ul>
Ecosystem connections	<p><u>The current government has refocused sectoral innovation policy</u></p> <ul style="list-style-type: none"><li>• Since the IADB found in 2010 that ‘the instruments for making strategic bets on new sectors are particularly weak’ in Chile, a number of options for industrial and sectoral policy have been experimented with, including cluster policies (primarily around food, aquaculture, mining, tourism and offshore global services). The current government has moved away from clusters (Erawatch 2014).</li></ul>	<p><u>Cooperation between different actors of the national innovation system is insufficient:</u></p> <ul style="list-style-type: none"><li>• Technological cooperation in the system is weak: knowledge transfer is limited by low levels of association between knowledge creators and industry.<sup>4</sup></li><li>• The rate of cooperation between firms and others actors to develop innovation is very low (13 percent, according to the 8<sup>th</sup> Innovation Survey), and the lack of available partners to cooperate was considered the most important obstacle to innovation.<sup>5</sup></li><li>• Despite new programmes to promote university-industry interactions, fewer than 1 percent of companies have applied and received support from these programmes (OECD 2013).</li></ul>

## 1.2 Colombia's Innovation System







## 1.2 Colombia overview: Innovation in the Pacific Alliance

With a recent history of insecurity and conflict, and challenges of social inequality, innovation has officially been on the public policy agenda in Colombia since 2009, and innovation policy is now recognised as an inter-sectoral issue with a high priority in the most recent 'National Development Plan'.

One agency, Colciencias, has primary responsibility for the design of the innovation policy across the system and combines roles as ministry, research council and innovation agency. In practice its attention is weighted towards research funding: 47.9 percent of its 2012 budget went towards scholarship loans for postgraduate programmes, or was used to fund education programmes.

A frequent criticism of the public innovation system is that it operates with two overlapping systems: the 'science and innovation system', largely focused on research, science and scientist funding, and the 'competitiveness and innovation system', focused on supporting the private sector. Many agencies operate separate programmes in the two spaces.

The 2010 National Plan created the iNNpulsa agency to support high-impact entrepreneurs and innovation; its success has been rewarded by re-absorption into parent development bank, Bancoldex, in 2015 with a significantly increase budget and remit. Bancoldex

recently announced plans to create a new line of credit for innovative firms with the equivalent of US\$ 12.3 billion in capital. Colombia ranks third of the Pacific Alliance countries in terms of relative R&D spend at 0.22 percent of GDP, with broader Science, Technology and Innovation (STI) spending higher at 0.5 percent of GDP in 2013. Private sector contribution to spend however, remains low at under a third.

Public funding for innovation is rising, albeit in a somewhat distributed way. Laws require ministries to invest 1 percent of their budgets in R&D (with limited impact where capabilities to exploit it are missing), while the requirement across regions to allocate 10 percent of mining royalties to innovation has led to significant new funding opportunities. While some regions lack the absorptive capacity to exploit these, others have capitalised. For example, Medellin is widely seen as a national innovation hub, with its highly-effective 'Ruta N' agency. Other agencies outside the core innovation system also have considerable budgets. Educational development agency, SENA, for example has a budget of around US\$ 1.3 billion, 20 percent of which is designated for innovation and competitiveness.

# 1.2 Colombia: Innovation at a glance



## Innovation System Timeline

2006

The national government creates the **National Administrative System of Competitiveness** to co-ordinate the private and public activities for the development of the country's competitiveness.<sup>1</sup>

2009

Innovation was included in the National System of Science and Technology. Colciencias becomes an **Administrative Department** and is designated as head of the sector, with responsibility for STI policy in the country. The National Council of S&T disappears and the **Advisory Council of STI** is created as the main co-ordinating body.<sup>2</sup>

2009

The STI Law creates the Francisco José de Caldas Fund (which was the original name of Colciencias, which began as a fund for S&T) to give financial support to STI programmes/projects, and the National Tax Benefit Council, co-ordinated by Colciencias.<sup>3</sup>

2011

The Colombian Government creates **iNNpulsa** through the National Development Plan. It is the agency in charge of the promotion of innovation in 'HyperGrowth' enterprises, contributing to the development of competitiveness and the increasing of productivity in the country.<sup>4</sup>

2011

The National Tax Benefits Council changes its composition and includes the Ministry of Finance and Public Credit, the Ministry of Commerce, Industry and Tourism, the National Planning Department, and two experts in STI issues.<sup>5</sup>

2012

Innovation is included in the National Administrative System of Competitiveness. The reform aimed to improve the co-ordination among the Regional Commissions of Competitiveness to ensure the development of private-public actions and innovation in the sub-national level. The **Joint Technical Committee** is created as supporting branch of the Executive Committee.<sup>6</sup>

1 Decree 2828 of 2006.  
2 Law 1286 of 2009.  
3 Ibidem.

4 Law 1450 of 2011.  
5 Decree 1500 of 2012.  
6 Cornell University et al., 2014.

## 1.2 Colombia: Innovation in the Pacific Alliance



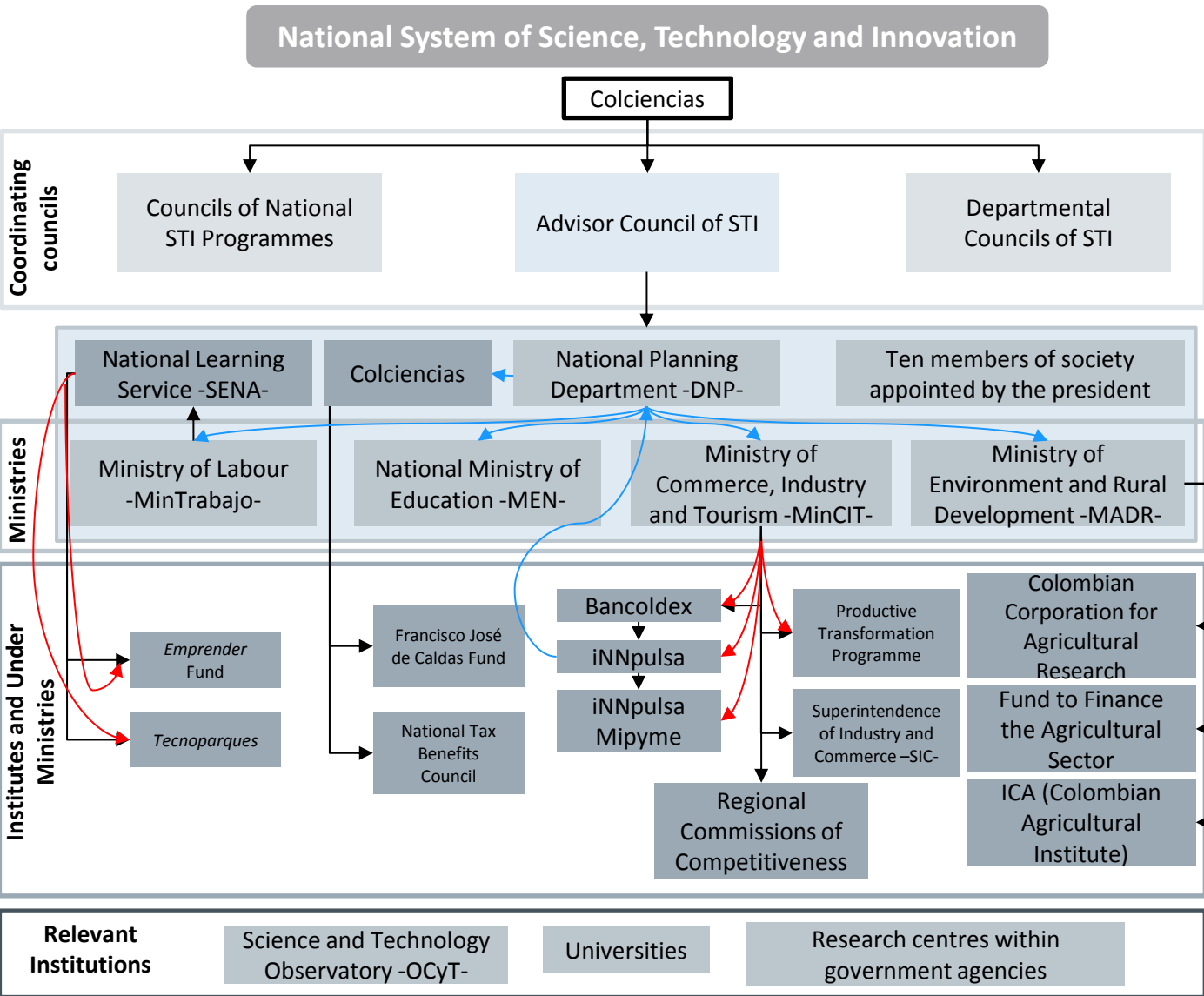
### Key statistics

- In 2013, the expenditure in Research and Development was 0.224 percent of GDP, and in STI activities was 0.5 percent of GDP.<sup>1</sup>
- In 2013, the expenditure in STI activities was mostly performed by companies (29.9 percent), following by higher education institutions (26.5 percent), and government organisations (25.3 percent). These relative proportions of innovation expenditure has been mostly stable over the last decade.<sup>3</sup>
- The number of researchers per million of population has increased during the last decade. While in 2002 this ratio was 168, in 2011 it was 343.<sup>4</sup> At the same time, the number of publications in index journals by million of habitants increased from 18.2 in 2002 to 64.6 in 2011.<sup>5</sup>

### Innovation policy highlights

- **iNNpulsa:** created through the 2010 National Development Plan as an experimental agency in charge of supporting high-impact entrepreneurs and innovation. iNNpulsa is currently designing a National Observatory of Entrepreneurs.  
<http://www.innpulsacolombia.com/>
- **TechnoParques:** a local network of free innovation labs created by SENA to support the creation of technology-based prototypes. Last year, SENA invested US\$ 270 million in programmes aimed at the promotion of innovation.  
<http://www.sena.edu.co/Paginas/Inicio.aspx>
- **Ruta N:** A regional example of how the public and private sectors can improve the environment for innovation, as well as create strong relationships to tackle innovation policy as a co-responsibility.  
<http://rutanmedellin.org/es>
- **National Development Plan 2014-2018:** currently being studied in Congress, it aims to bring together and streamline the National System of Science, Technology and Innovation, and the National System of Competitiveness and Innovation.  
<https://colaboracion.dnp.gov.co/CDT/Prensa/Bases%20Plan%20Nacional%20de%20Desarrollo%202014-2018.pdf>

# 1.2 Colombia: Institutional map of the innovation system (1)



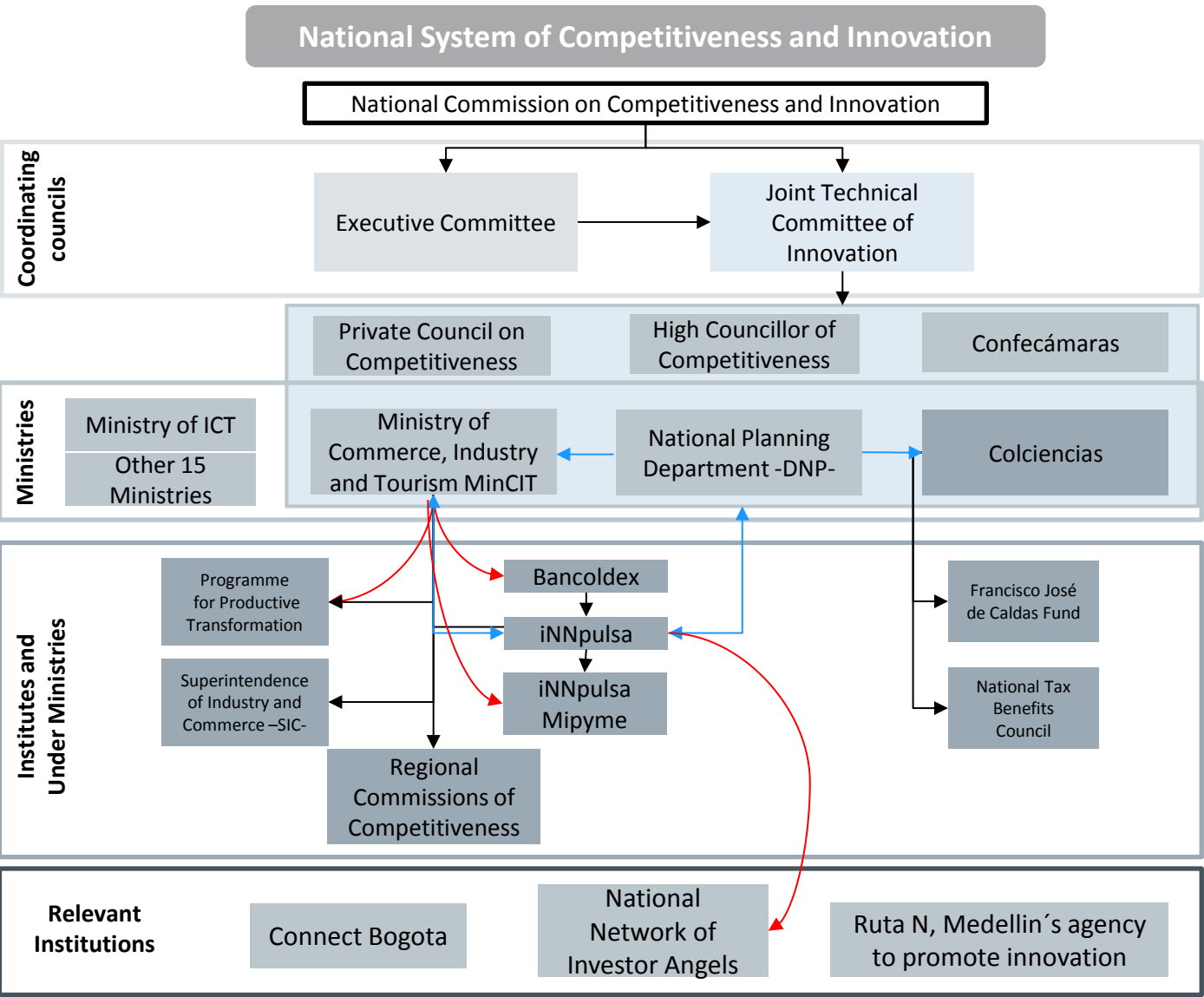
- There are two national systems playing a role in innovation policy: the National System of Science, Technology and Innovation, and the National System of Competitiveness and Innovation (see next slide for more detail). These systems are made up of the same public organisations. The Competitiveness and Innovation system, however, also integrates the private sector.
- The Advisor Council for STI has lost decision-making influence since Colciencias was appointed Administrative Department.
- Although the DNP stands at the same level as Ministries, it lacks legislative initiative and its role is limited to technical advisor for the Ministries.
- SENA engages in STI activities even though it is not part of its remit, but usually remaining distant from discussions with other Ministries.

→ Attached to

→ Provides funds

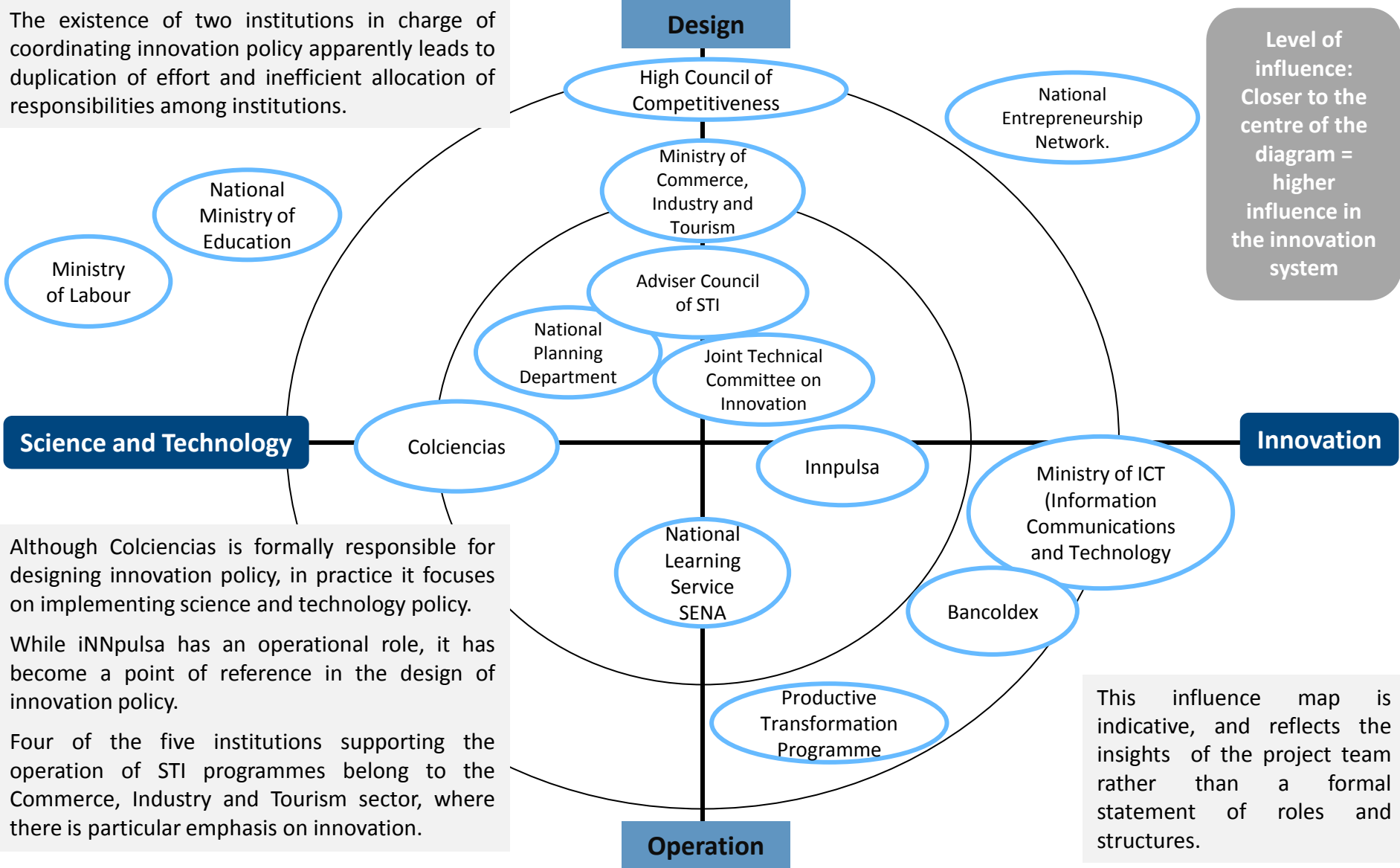
→ Political influence

# 1.2 Colombia: Institutional map of the innovation system (2)



- The National Commission on Competitiveness and Innovation advises the government on topics related to competitiveness and productivity at national and regional levels.
- MinCIT, in partnership with Confecámaras, is the body responsible for co-ordinating and monitoring the performance of the Regional Commissions of Competitiveness.
- Although iNNpulsa stands at a lower government level, it forms part of the Joint Technical Committee for Innovation. This is due to its important role in developing innovation programmes and good links with the private sector.

# 1.2 Colombia: Role and influence diagram of key ministries and agencies



# 1.2 Colombia: Glossary of institutional abbreviations and acronyms (1)



CNBT	National Council of Tax Benefits
Colciencias	Administrative Department of Science Technology and Innovation
Confecámaras	Commerce Chambers Network
CONPES	National Council for Economic and Social Policy
CORPOICA	Agriculture and Livestock Research Colombian Corporation
CPC	Private Council on Competitiveness
DANE	National Administrative Department of Statistics
DNP	National Planning Department
FFJC	Francisco José de Caldas Fund
FINAGRO	Agriculture and Livestock Fund
GDP	Gross Domestic Product
SGP	General Participation System
SGR	General Royalties System
ICETEX	Colombian Institute for Educative Credit and External Studies
INS	National Health Institute
INM	National Metrology Institute

## 1.2 Colombia: Glossary of institutional abbreviations and acronyms (2)



ICA	Colombian Institute of Agriculture and Livestock
ICT	Information and Communications Technology
Invima	National Institute of Food and Medicaments Oversight
MADR	Ministry of Agriculture and Rural Development
MDN	National Ministry of Defence
MinCIT	Ministry of Commerce, Industry and Tourism
MinTIC	Ministry of Information and Communications Technology
MinTrabajo	Ministry of Labour
MEN	National Ministry of Education
SENA	National Learning Service
OCyT	Colombian Science and Technology Observatory
PGN	National General Budget
PND	National Development Plan
R&D	Research and development
SIC	Superintendence of Industry and Commerce
STI	Science, Technology and Innovation



## 1.2 Colombia: Assessment of institutional co-ordination and influence in the Colombian System

### Main strengths

- Currently, the Joint Technical Committee co-ordinates innovation-related issues in both the National System of STI and the National Administrative System of Competitiveness and Innovation. The Committee has identified duplication in the system prior to putting forward plans to eliminate it, and has improved the targeting of programmes.
- iNNpulsa has a constantly-evolving portfolio of programmes to support innovation in high-potential companies. It has been responsible for improving links between the public and private sectors.
- Ruta N has developed a public-private collaboration in the region of Antioquia (capital Medellin) to successfully retain talent and create innovations in all sectors.
- The SENA (National Learning Agency) has a local level operational network that delivers high-quality training for anyone wishing to enter the labour market, or acquire technical knowledge.

### Main challenges

- Since both systems (the Science, Technology and Innovation system, and the Competitiveness and Innovation system) have very similar goals in the development of innovation, there is no clear distinction between the role of each of them in the design of innovation policy. This situation has hindered co-ordination.
- One of the main problems is the absence of a legislative power to propose changes to the STI Law in Congress.
- Colciencias has not successfully restructured since the Law of STI. This has slowed down the allocation of organisational resources to lead and co-ordinate the National System of Science, Technology and Innovation, and the development of an STI policy.
- There is weak co-ordination between the national institutions and the sub-national agencies (Departmental Councils of STI and the Regional Commissions of Competitiveness) in both systems.
- There is a common perception between all actors: there are too many agencies developing innovation policy and not a clear lead for the sector.

# 1.2 Colombia: Strengths and weaknesses of the system – institutional framework



	Strengths	Weaknesses
Institutional framework	<p><u>There are new public agencies working in the operation and design of innovation policy. Colciencias has formal responsibility for co-ordinating the system.</u></p> <ul style="list-style-type: none"> <li>• Innovation was included in the public policy agenda in 2009. Innovation Policy is recognised as an inter-sectoral issue with national scope.</li> <li>• In 2011, Colombia created iNNpulsa as an agency to exclusively support companies with ‘hypergrowth’ potential, promoting and supporting innovation.</li> <li>• The <i>Tecnoparques</i> initiative (operated by SENA, the National Learning Agency) offers 16 free innovation labs to create technology-based prototypes in regions across the country.</li> <li>• In 2009, Medellín created the ‘Ruta N Corporation’ as a public-private centre for the development of STI policy. This initiative is recognised worldwide as best practice in regional innovation policy.</li> <li>• Colciencias is aware of the need to take responsibility for leading STI policy across the system, and has made an effort to become an entity able to design policy in addition to acting as a fund for STI activities.</li> <li>• The Joint Technical Committee of Innovation has been acting as the co-ordination space for all public stakeholders and has developed a web portal<sup>1</sup> to inform enterprises, researchers and entrepreneurs on the public offer of programmes for all stages of the innovation process.</li> </ul>	<p><u>In practice, Colciencias struggles to play a leadership role across the entirety of the system.</u></p> <ul style="list-style-type: none"> <li>• Colciencias, formal head of the system, has historically been focused on the development of science and technology and not in the promotion of innovation in the private sector. These new responsibilities are still a challenge for Colciencias.</li> <li>• Colciencias currently lacks some of the structure and capacity to lead the innovation policy.<sup>2</sup></li> <li>• Almost all of Colciencias’ programmes target R&amp;D-focused research centres, with little attention to broader innovation in the economy. Beneficiary organisations are strictly limited, meaning newer players with new areas of focus cannot easily access these funds.</li> <li>• The coexistence of two national systems (STI and Competitiveness) and the lack of clearly delineated responsibilities hinders coordination among institutions.</li> <li>• The institution in charge of property rights (Superintendence of Industry and Commerce – SIC) does not belong to either the STI System or the Competitiveness System.</li> <li>• There is no entity with legislative power in charge of the STI policy, and no commission in Congress related to STI issues.</li> <li>• In practice, while the national system of STI and the national system of Competitiveness are both very aware of the fundamental role of sub-national authorities in the development of innovation, there is no clear process for the strengthening of local authorities’ role.</li> </ul>



# 1.2 Colombia: Strengths and weaknesses of the system – Funding and Human Capital

	Strengths	Weaknesses
Funding	<p><u>There is growing public sector finance for early-stage companies.</u></p> <ul style="list-style-type: none"><li>• The city of Medellin has developed ‘Velum Ventures’: the first seed capital fund with public funds managed by the private sector.</li><li>• One of the main changes in the General Royalties System (Sistema General de Regalías) was the redirection of 10 percent of resources for STI projects at sub-national levels (2012, Law 1530).</li><li>• The National Council of Tax Benefits has the responsibility to grant tax benefits to companies developing STI activities.</li><li>• iNNpulsa has become one of the principal agencies providing funding for companies with innovative products. iNNpulsa also runs programmes to improve entrepreneurial capabilities.</li></ul>	<p><u>In spite of the improved availability of public funds, investments in innovation are still limited.</u></p> <ul style="list-style-type: none"><li>• Although it has been increasing since 2007, most of Colciencias’ budget is invested in scholarship loans for post-graduate support programmes and used to fund education programmes (47.9 percent in 2012). There is little promotion of programmes related to the building of private sector STI capabilities in the country (only 18.6 percent in 2012).<sup>1</sup></li><li>• There is a relatively low participation of private investment in STI activities (29.9 percent in 2013 – compared to 45 percent of GERD in Mexico).</li><li>• Only 32 percent of the Tax Benefits Fund’s available resources (managed by the National Council of Tax Benefits) was disbursed in 2012.<sup>2</sup></li></ul>
Knowledge assets	<p><u>Over the last ten years there has been a positive trend in the number of patents granted to Colombian nationals and in the number of high-quality publications.</u></p> <ul style="list-style-type: none"><li>• Patents granted to Colombian nationals has increased from 71 in 2004 to 195 in 2012.</li><li>• The number of patent applications per 100,000 inhabitants increased from 0.19 in 2003 to 0.46 in 2012.<sup>3</sup></li><li>• Colombia is a World Trade Organisation member and has approved legislation to comply with the Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS).<sup>4</sup></li><li>• The proportion of articles produced by recognised research groups in B, C and D categories has decreased, while those in the A category have increased, according to the Colombian categorisation of scientific journals, Publindex.<sup>5</sup></li></ul>	<p><u>There is a low proportion of patents of Colombian origin registered with the United States Patent and Trademark Office.</u></p> <ul style="list-style-type: none"><li>• In 2012, only 21 Colombian patents were awarded by the USPTO.</li><li>• The average time between applying for and being granted (or refused) a patent is 38 months. The slow process is a disincentive to STI activities in the private sector.<sup>6</sup></li></ul>

	Strengths	Weaknesses
Human capital	<p><u>The quality of education at primary, secondary and higher levels has improved markedly in recent years, and is reaching a higher percentage of the population:</u></p> <ul style="list-style-type: none"> <li>Colombia rose up the Human Capital and Research category of the Global Innovation Index from 87 in 2012 and 2013 to 65 in 2014.</li> <li>There are scholarships and loan programmes for post-graduate studies, doctoral studies and technical training. Between 2003 and 2013, the number of beneficiaries went from 348 to 3,826 for postgraduate and from 148 to 1,159 for doctoral-level studies.<sup>3</sup></li> <li>In 2015 the Ministry of Education launched an ‘Excellence Day’ aiming to give public and private schools’ directors some free time to evaluate their performances and to hold a national evaluation of the quality of education.</li> <li>61.8 percent of doctoral loans and scholarships are awarded for Colombians studying abroad.<sup>1</sup></li> <li>Colciencias has developed the ‘Ondas’<sup>2</sup> programme to promote an ‘STI culture’ among Colombian children in primary schools.</li> </ul>	<p><u>Colombia continues to lack sufficient numbers of researchers particularly in engineering, technology and the natural sciences.</u></p> <ul style="list-style-type: none"> <li>In 2013, the number of researchers per thousand head of population was 0.4, against 1 in Uruguay and 3 in Argentina.<sup>4</sup></li> <li>Even leaders of key state-funded research groups are not particularly highly-qualified, with only 38.1 percent holding a PhD or equivalent, compared to 44 percent with a master’s degree as highest qualification, and 17.4 percent for bachelor degree level.<sup>5</sup></li> <li>There is a lack of research and postgraduate students in natural sciences and engineering. Thirty-five percent of Colciencias’ research groups focus on social study, only 12 percent focus on natural sciences. The percentage of active researchers in natural sciences, engineering and technology was 29.3 percent in 2012, against 41.6 percent<sup>6</sup> for social sciences and humanities.</li> </ul>



# 1.2 Colombia: Strengths and weaknesses of the system – the broader macroeconomic environment

	Strengths	Weaknesses
The broader environment	<p><u>There is a stable macroeconomic environment and a growing community of entrepreneurs.</u></p> <ul style="list-style-type: none"><li>• The total rate of New Entrepreneurial Activity reached 23.7 percent in 2013, measuring the proportion 18 to 69 year-olds in the total population working for newly-formed businesses.<sup>1</sup></li><li>• In 2013, 11.6 percent of the just/new-born enterprises offered a product which was an innovation in its market. This shows the interest of new entrepreneurs for innovation.</li><li>• In 2013, 90.9 percent of the population considered entrepreneurship as a desirable career.</li><li>• 77.6 percent of new businesses are founded on a recognised market opportunity rather than individuals choosing to start a business because there was no alternative employment.</li><li>• Surveys show Colombians consider entrepreneurial activities as very important for economic development (76.6 percent), higher than the perception of the role of increased efficiency (65.4 percent) or innovation (58.8 percent).</li><li>• The cluster network developed by the Private Council on Competitiveness, in partnership with the Productive Transformation Programme, has more than 500 members in the country and has promoted more than 65 cluster programmes nationwide.</li><li>• The Ministry of ICT has developed the ‘Vive Digital’ strategy, improving ICT infrastructure in the country and promoting the inclusion of ICT tools in the operation of government institutions (both at national and sub-national levels).</li></ul>	<p><u>Currently, Colombia depends on the prices of commodities such as petroleum and coal, and there are low levels of development of companies based on innovation.</u></p> <ul style="list-style-type: none"><li>• 73 percent of manufacturing enterprises did not undertake innovation activities during 2011-2012. Only 0.2 percent undertook activities that generated an international disruptive innovation, and only 21.5 percent of those undertaking innovation activities created a nationally disruptive or incremental innovation.</li><li>• The number of new businesses that employ others and survive as employers for more than 42 months has decreased from 12 percent to 5.9 percent between 2010 and 2013.</li><li>• Few recently-created companies are devoted to innovation activities: 31.9 percent are located in commerce, 13.8 percent in manufacture, and 12.2 percent in retail.</li><li>• Although new enterprises show an increasing propensity to develop innovative products, most new and established enterprises offer very similar products.</li><li>• Due to an adverse economic environment, the perception of business opportunities and capabilities has decreased while the fear of failure has increased between 2010-2013.</li><li>• There has been an internationalisation process (through free trade treaties), but most Colombian companies do not seem to be aware of the need to include innovation in their day-to-day tasks to improve competitiveness.</li><li>• In 2013, the first top export products were all commodities, and represented 70 percent of total exports.</li></ul>

# 1.2 Colombia: Strengths and weaknesses of the system – ecosystem connections



	Strengths	Weaknesses
Ecosystem connections	<p><u>There are regional initiatives to empower innovation within society: Ruta N promotes and supports innovation at sub-national levels, and the academic-public-private committee in Cali has encouraged innovation development.</u></p> <ul style="list-style-type: none"><li>Enterprises accessing tax benefits have experienced an increase of their productivity ranging between 4 percent and 16 percent, an increase of 8 percent in employment-generation and of 5 percent in export activity.<sup>1</sup></li><li>A reasonable percentage of Colombian manufacturing businesses (14 percent in 2009-10<sup>2</sup>) see a relationship with one or more universities as core to their business. There is therefore considerable scope to build on successful university-industry partnerships for innovation.</li></ul>	<p><u>There is still a lack of connection and trust between the private and public sectors.</u></p> <ul style="list-style-type: none"><li>23.7 percent of manufacturing enterprises which fund STI activities with public resources think that the main obstacle to becoming beneficiaries of public support is the excessive transaction-time needed to claim support, and 21.1 percent think that meeting the requirements for being awarded funding are the main obstacle.<sup>3</sup></li><li>According to the Global Entrepreneurship Monitor report, structural conditions for business activity environment are rated lower than 3 (on a scale from 1 to 5) in funding, government policies, R&amp;D transfer, commercial infrastructure, internal market openness, business creation capabilities, and copyrights.<sup>4</sup></li><li>Most of the connections between National Government and companies in innovation-related issues are implemented by the Ministry of Commerce, Industry and Tourism. This has prevented the establishing of a common space for innovation across the three main sectors: private, public, and academia.</li></ul>

1 Consejo Privado de Competitividad, 2014.  
2 DANE, 2013.

3 Ibidem.  
4 GEM, 2014.

## 1.3 Mexico's Innovation System





# 1.3 Mexico: Summary of innovation

## Background information

**Mexico's GDP in 2013 was US\$ 1,258 billion and had a population of 120 million.**

**Mexico belongs to the upper-middle income group and has a GDP per capita of US\$ 15,562**

The innovation ecosystem in Mexico has quickly evolved since the Law of Science and Technology of 2002, which aimed to strengthen the development of science, research and innovation to boost the economy. Five stakeholders mainly shape the national institutional framework that designs and operates the public policy and infrastructure to promote innovation:

- The National Council of Science and Technology - CONACYT- (*Consejo Nacional de Ciencia y Tecnología*)
- The National Institute of the Entrepreneur -INADEM- (Instituto Nacional del Emprendedor)
- The Vice Ministry of Industry and Commerce -SIC- (*Subsecretaría de Industria y Comercio*)
- The Mexican Institute of Industrial Property -IMPI- (*Instituto Mexicano de Propiedad Industrial*)
- The Ministry of Education -SEP- (*Secretaría de Educación Pública*) as the main responsible for the national education policies.

Further reforms in 2009 strengthened regulatory frameworks, and today Mexico has many of the building blocks of an effective system – a growing scientific output, a well-regarded new system of technology transfer offices, strong commitment by government to support entrepreneurship, and efforts to rationalise and clarify the large number of innovation and entrepreneurship support programmes. The system is increasingly co-ordinated, yet under-connected.

Already by far the largest market of the Pacific Alliance, Mexico benefits from close geographical, commercial and scientific relationships with its US neighbour. For example Mexico's manufacturing exports are larger than the combined manufacturing exports of the rest of Latin America. These strengths have contributed to the growth of strong innovation clusters in the North and the capital region. These are set against a backdrop of a diverse country with considerable national social inequality and persistent challenges of corruption, violence and poverty.

While Mexico has invested heavily in improving its human capital to boost its economic development (90 percent of 6 – 15 year old Mexicans are now in education), it only invests US\$ 23,913 per child for education between 6 and 15 years old – which ranks it 33<sup>rd</sup> out of 34 on the PISA international rankings of developed countries. Mexico's educational system is unequal: a child with an index of one in his socioeconomic status obtained 78 points in qualifications more than a child with the lowest socioeconomic status.<sup>1</sup> On average, Mexican people are in education for 9.4 years, and only three million people finished higher education. The inequality of the education system and the brain drain – particularly to the US – hinder the conditions for the development of in-house innovation.



# 1.3 Mexico: Highlights of innovation system and recent steps forward



## Key statistics

- In 2012, the investment in Science and Technology was 0.43 percent of GDP.<sup>1</sup>
- The first serious and sizeable changes in the system of knowledge production and human resource training for innovation were made through the law of 2009, which strengthened the role of CONACYT. These changes were followed by economic support and other strategies designed to promote the development of new business.
- The current administration has committed to aiming to invest at least 1 percent of the GDP in this area by the end of its term.

## Innovation policy highlights in Mexico:

- **Nationwide network of Technology Transfer Offices:** The network was awarded the prize for best national knowledge transfer policy from Licensing Executives Society International (LESI).  
[www.lesi.org](http://www.lesi.org)
- **National Observatory of Entrepreneurs:** a privately managed, government-funded agency aiming to generate evidence on the state of entrepreneurship and SMEs in Mexico.  
<http://www.one.org.mx/>
- **Red mover a México:** A network of regional points of service where companies can get information on the services offered by both local and national government. The initiative shows the government's interest in centralising information in easily-accessible platforms designed to facilitate access to programmes for their target population.  
[https://www.redemprendedor.gob.mx/red\\_mover\\_a\\_mexico\\_y\\_puntos\\_para\\_mover\\_a\\_mexico.html](https://www.redemprendedor.gob.mx/red_mover_a_mexico_y_puntos_para_mover_a_mexico.html)
- **RENIECYT:** an initiative by CONACYT to easily classify and centralise its beneficiaries in a single registry.  
<http://www.conacyt.gob.mx/index.php/el-conacyt/registro-nacional-de-instituciones-y-empresas-cientificas-y-tecnologicas-reniecyt>
- **Sistema Emprendedor:** An initiative to centralise all programmes in one institution and standardise application and evaluation processes.  
<http://www.sistemaemprendedor.gob.mx/>

## 1.3 Mexico: Overview of key innovation policy institutions



The National Council of Science and Technology (CONACYT) is the head of the sector, and has formal responsibility to co-ordinate all efforts aimed at developing science, technology and innovation. However, it controls only 38 percent of the federal budget for STI.<sup>1</sup> The INADEM operates all government support for the development of entrepreneurship, and SMEs at national level.

The Vice Ministry of Industry and Commerce – SIC – co-ordinates public policy aimed at strengthening national industry, improving regulation and promoting innovation, while the Mexican Institute of Industrial Property – IMPI – is in charge of the regulation of patents.

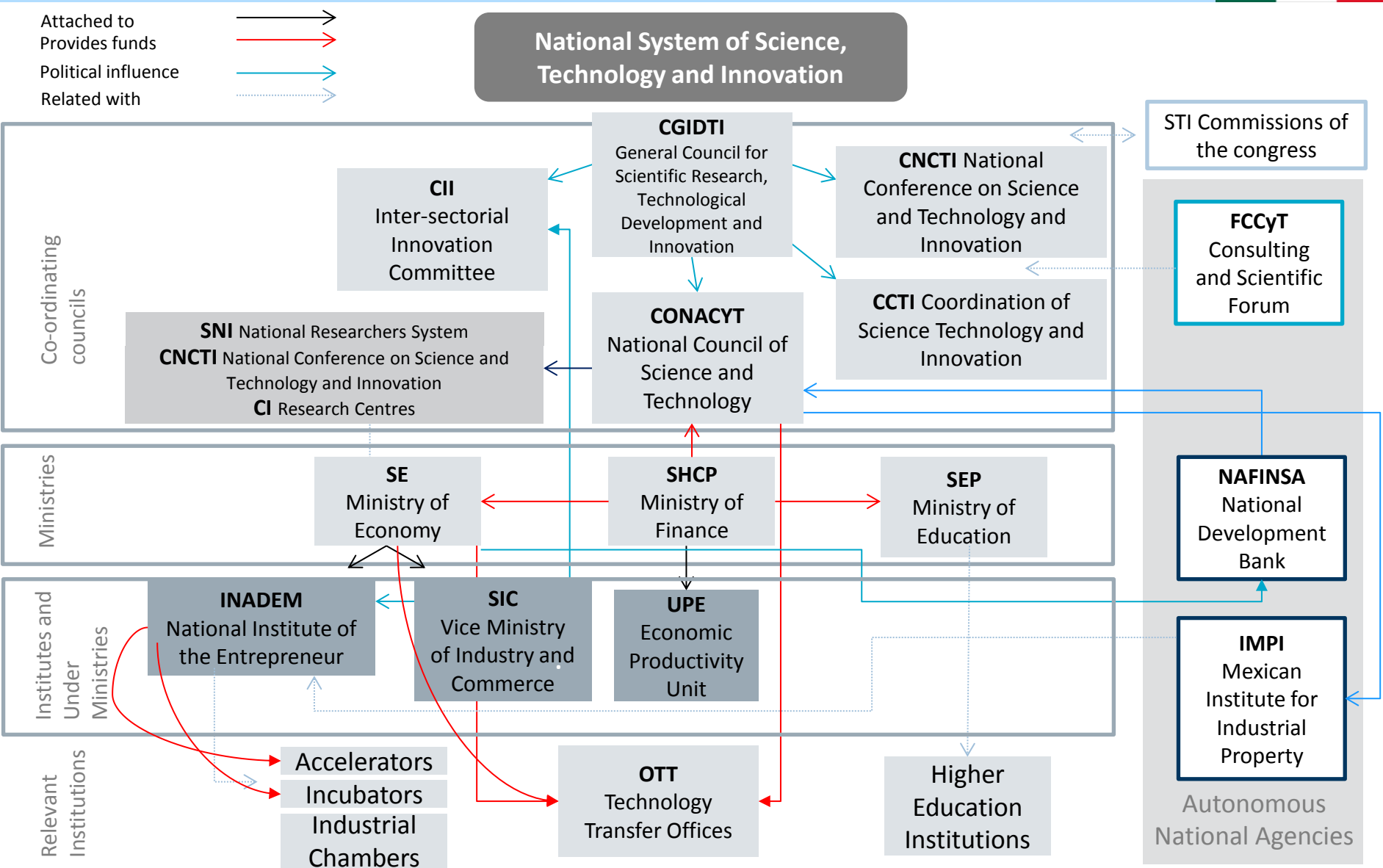
In addition to these institutions, there are councils and forums that inform the national innovation policy, the primary ones being:

- The Inter-sectorial Innovation Council – CII – (in charge of the Vice-ministry of Industry and Commerce),
- The General Council for Scientific Research and Technological Development (in charge of the CONACYT),
- The Scientific and Technological Consultative Forum (FCCyT); and

- The National Conference on Science and Technology (CNCTI).<sup>2</sup>

In 2012, the investment in science and technology was only 0.41 percent of the GDP; this is the lowest investment in STI of all OECD Countries. Today Mexico has 46,125 researchers (41 percent from the private sector), of which 17, 639 of these belong to the National System of Researchers (*Sistema Nacional de Investigadores*). Public Research Centres (*Centros Públicos de Investigación*) and the Institutions of Higher Education (*Instituciones de Educación Superior*) undertake most of the Research and Development in the country. According to the latest census, there are 3,366 enterprises investing in research and development<sup>3</sup>, and a rate of early-entrepreneur activity of 12.1 percent.<sup>4</sup>

# 1.3 Mexico: Institutional map of the innovation system



## 1.3 Mexico: Glossary of institutional abbreviations and acronyms (1)



ADIAT	Mexican Association of Directors of Applied Research and Technological Development
AMEXCID	Mexican Agency for International Development Cooperation
CANACINTRA	National Chamber for Transformation Industry
CCTI	Co-ordination of Science Technology and Innovation
CGIDTI	General Council for Scientific Research, Technological Development and Innovation
CGUTyP	General Co-ordination of Technological Universities and Polytechnics
CII	Inter-Sectorial Committee for Innovation
CNCTI	National Conference on Science and Technology and Innovation
CONACYT	National Council of Science and Technology
CONCAMIN	Confederation of Industrial Chambers
COPARMEX	National Employers' Confederation
ECLAC	UN Economic Commission for Latin America and the Caribbean
FCCyT	Consulting and Scientific Forum
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitor
ILPES	Latin American and Caribbean Institute for Economic and Social Planning



IMCO	Mexican Institute for Competitiveness
IMPI	Mexican Institute of Industrial Property
INADEM	National Institute of the Entrepreneur
INAP	National Institute of Public Administration
INASP	International Network for the Availability of Scientific Publications
NAFINSA	National Development Bank
OAS	Organisation of American States
OECD	Organisation for Economic Co-operation and Development
ONE	Entrepreneur National Observatory
OTT	Technology Transfer Offices
REDNACECyT	National Network of Councils and State Agency of Science and Technology
SE	Ministry of Economy
SEP	Ministry of Education
SHCP	Ministry of Finance
SIC	Vice ministry of Industry and Commerce
STI	Science, Technology and Innovation

## 1.3 Mexico: Role and influence diagram of key ministries and agencies



CONACYT has historically focused on the development of science and technology, while INADEM and the Vice Ministry of Industry and Commerce maintain closer relationships with the private sector and the operation of innovation programmes.

However, none of these institutions have taken a lead in linking and co-ordinating innovation policy with private sector interests.

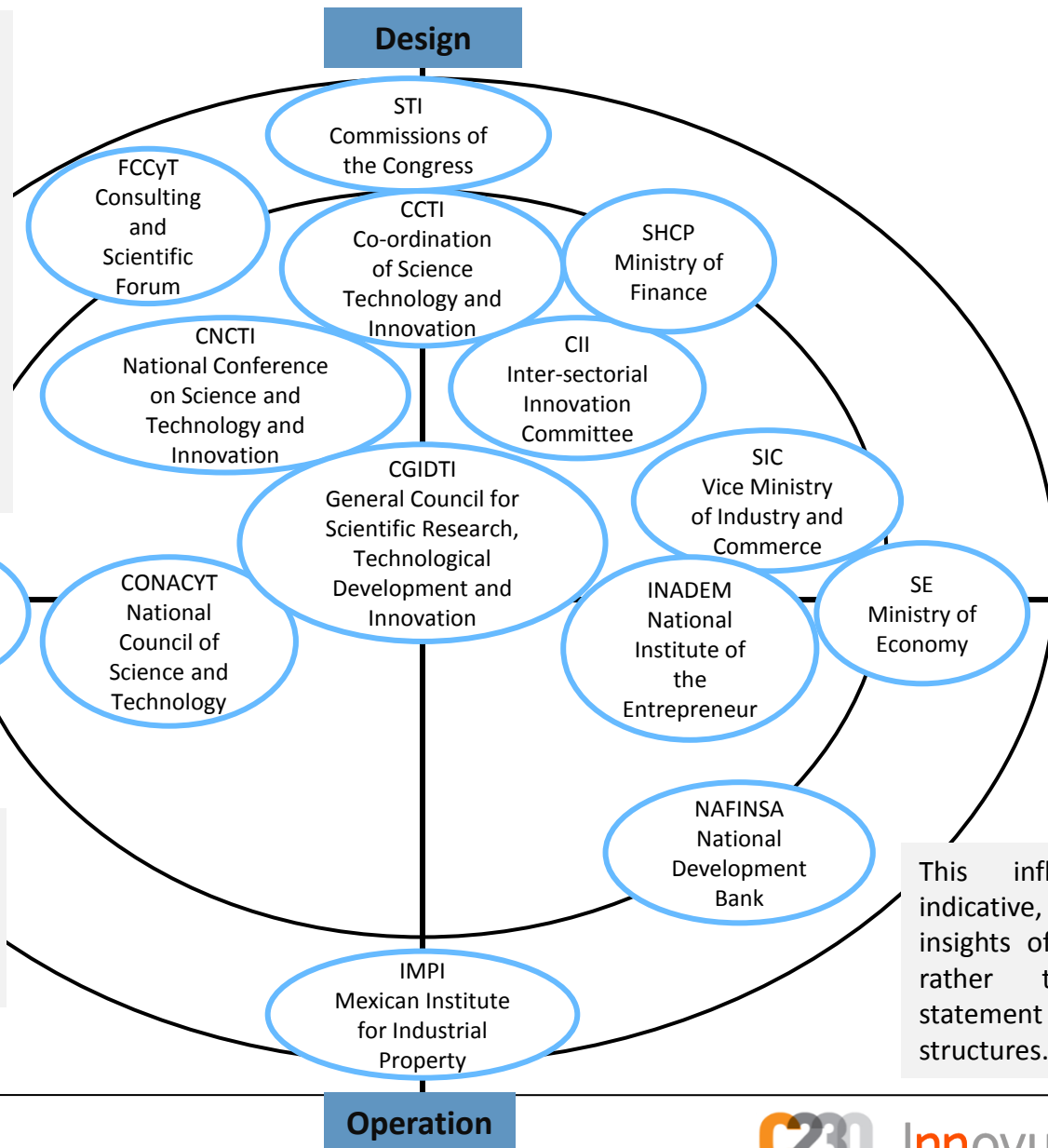
Level of influence:  
Closer to the centre of the diagram = higher influence in the innovation system

Science and Technology

Innovation

Co-ordinating bodies help share understanding of innovation needs and initiatives. However, the main operational institutions have less influence as a result.

This influence map is indicative, and reflects the insights of the project team rather than a formal statement of roles and structures.





### Main strengths

- The creation of the ONE (the National Observatory for Entrepreneurship) in 2014 represents a commitment by the government to create evidence on how its programmes are working, and open a space to generate win-win partnerships with the private sector.
- The Inter-sectorial Innovation Committee (CII) oversees and monitors the main public policies to create better conditions for innovation in Mexico. This committee has been monitoring and co-ordinating innovation policies within PEMEX (the Mexican state Oil Company), CONACYT, INADEM and the Ministry of Economy.

### Main challenges

- While policy design is centralised, STI main operating agencies (CONACYT and INADEM) are specialised in different things, the first one deals with human capital development and scientific research, and the second one aims to become the single key contact for innovation/entrepreneurship support for both large and small private firms.
- Three different agents are responsible for the co-ordination of the STI policy. It is not clear where the role of one starts and the role of the other finishes.
- Most relationships between agencies involved in the system are vertical; peer institutions do not always share experience.
- The main obstacles are due to duplication, lack of co-ordination and inefficient flows of information between stakeholders, and there are too many programmes operated (more than 206 at Federal level) with little co-ordination or evidence of their impact.
- The National System of Researchers promotes the publication of papers in peer-reviewed journals, but does not promote innovation, patenting or licensing.

# 1.3 Mexico: Strengths and weaknesses of the system - institutional framework



	Strengths	Weaknesses
Institutional framework	<p><u>Mexico has strong institutions and regulations for the promotion of innovation policy:</u></p> <ul style="list-style-type: none"><li>• The recently reformed legal framework (starting with the Law of Science and Technology of 2009) designates innovation a priority.</li><li>• There is a strong national institution devoted to the protection and promotion of property rights (IMPI – the Mexican Institute of Industrial Property).</li><li>• The legal framework for property rights meets all international standards, and administrative process in that area have increased in efficiency and effectiveness.</li><li>• New funds (FIT, FINNOVA) have long-term vision, encouraging companies to make a better use of resources.</li><li>• CONACYT’s main programme to stimulate private investment in innovation have been evaluated several times, and adopted some best practices from the Small Business Innovation Research (SBIR). Following these evaluations, internal procedures, for funding allocation have been improved to better suit timing and financial needs of beneficiaries.</li></ul>	<p><u>The competence and experience of institutions is not reflected in the co-ordination between them:</u></p> <ul style="list-style-type: none"><li>• CONACYT does not have the leverage of a Ministry, diminishing its influence in the agenda of the Ministry of Finance and Public Credit (<i>Secretaría de Hacienda y Crédito Público</i>) to negotiate its budget.<sup>1</sup></li><li>• Although a wide range of innovation support programmes are available, it is not clear if they meet all the stages of the innovation process. Some programmes such as <a href="#">Prosoft</a>, <a href="#">PROINNOVA</a> and <a href="#">NAFIN</a> do not specifically define the stages of company development which they support.</li><li>• The IMPI has no specific programmes providing funding or support to commercially exploit registered innovations through licensing, transfer or creation of a new company based on innovation.</li><li>• Protection and enforcement measures for intellectual property are limited and much slower than the registration process.</li><li>• Although CONACYT is mandated to support both human capital development and innovation, the first is still a clear institutional priority, in 2014 US\$ 660 million were invested in scholarship programmes and only US\$ 260 million in innovation/technology.</li><li>• The infrastructure to develop science and technology is limited and disjointed, mainly composed of Public Research Centres (PRC) and Institutes of Higher Education (IHE).</li></ul>



# 1.3 Mexico: Strengths and weaknesses of the system – Human Capital, Knowledge Assets and Funding



	Strengths	Weaknesses
Human Capital/ Knowledge Assets	<p><u>The country has a favourable environment for scientific research, the largest system of support in this area reflects steady growth:</u></p> <ul style="list-style-type: none"> <li>• The National System of Researchers has over 17,000 researchers across all disciplines, and provides them with incentives to publish in academic journals.</li> <li>• The scholarships for researchers given by CONACYT have increased from 8,200 in 1995 to 39,511 in 2012.<sup>1</sup></li> <li>• The number of researchers, both public and private, has doubled from 1995 to 2011 (46,125 researchers), of which 41 percent work in the private sector.<sup>2</sup></li> <li>• Mexico has the advantage of a young population; a third of the population has between 12 and 29 years.<sup>3</sup></li> </ul>	<p><u>The incentives of the National System of Researchers are not related to the development and commercialisation of innovation:</u></p> <ul style="list-style-type: none"> <li>• The incentive system of the National System of Researchers favours the number of publications produced over quality, and it does not incentivise patents or licencing. Furthermore, the system is centralised as most researchers work from Mexico City.</li> <li>• The systems for matching the specific job skills demanded by strategic sectors to educational programmes is poorly developed.<sup>4</sup></li> <li>• Unequal educational system. There is a wide gap between public and private education institutions, and between rural and urban areas.</li> <li>• A risk adverse culture: the educational system does not promote or strongly encourage entrepreneurs.</li> </ul>
Funding	<p><u>The offer of financial support for entrepreneurship and innovation is increasing:</u></p> <ul style="list-style-type: none"> <li>• According to the Ministry of Economy, between 2006 and 2012 the level of available funds to support entrepreneurs grew significantly. Private capital funds for example went from US\$ 942 million) to US\$ 8,000 million.<sup>5</sup></li> <li>• New seed capital funds and networks of angel investors have grown, mainly in Nuevo Leon, Guadalajara and Mexico City.</li> </ul>	<p><u>The funds available for research generally have academic goals:</u></p> <ul style="list-style-type: none"> <li>• CONACYT resources focus primarily on academic research but do not consider marketing the results of such research.<sup>6</sup></li> <li>• Experts consider the overall growth of funding has not kept pace with the growth of demand – particularly from private investors.</li> <li>• The majority of innovation funding from CONACYT goes to smaller well-established firms rather than early-stage start-ups.</li> </ul>

# 1.3 Mexico: Strengths and weaknesses of the system – Ecosystem Environment



	Strengths	Weaknesses
Ecosystem Environment	<p><u>Levels of entrepreneurship are increasing, and the government is providing more support for new businesses:</u></p> <ul style="list-style-type: none"><li>• INADEM has taken a leading role in the promotion of entrepreneurship, raising expectations and supporting a less risk-adverse culture.</li><li>• According to a Global Entrepreneurship Monitor (GEM) survey, the entrepreneurship rate in Mexico (considering new and established businesses) has shown a positive trend in the last few years going from 10.8 percent in 2010 to 18.4 percent in 2013.<sup>1</sup></li><li>• The GEM survey also shows experts feel that supporting new businesses has become a government priority.<sup>2</sup></li><li>• Legal Reforms such as the new Competition Law (2014) are expected to have a positive impact in the business environment, curbing anticompetitive and monopolistic practices.</li></ul>	<p><u>The business environment is not particularly supportive for entrepreneurial firms: many new businesses have poor prospects and do not survive the first couple of years:</u></p> <ul style="list-style-type: none"><li>• Because of the historical division between knowledge generating institutions and those exploiting it, investment from the private sector is much lower than in other OECD countries – below 50 percent compared to above 50 percent for the OECD average.<sup>3</sup></li><li>• Entrepreneurs think the administrative costs of registering a patent are too high.<sup>4</sup></li><li>• A study conducted by the Global Entrepreneurship Monitor in 2011 showed that the percentage of people in Mexico that consider entrepreneurship as a desirable career (58 percent) is considerably lower than other countries in the region such as Brazil (81 percent) or Colombia (85 percent).<sup>5</sup></li><li>• Although the number of new businesses is growing, the number of companies closing in their first three years is also rising.<sup>6</sup></li><li>• Entrepreneurs appreciate the government sees new businesses as a policy priority, but find the currently-available support funds difficult to access and utilise.</li><li>• There is a danger that entrepreneurs lose trust in government funding of new businesses if they do not improve the transparency of their processes to ensure public perception of fairness.<sup>7</sup></li></ul>

1 GEM, 2013a.  
2 Ibidem.  
3 IMCO, 2014.  
4 GEM, 2013a.

5 Ibidem.  
6 Ibidem.  
7 IMCO, 2014.

# 1.3 Mexico: Strengths and weaknesses of the system – broader environment



	Strengths	Weaknesses
Broader Environment	<p><u>The public and private sectors and the international environment are increasingly conducive to the development of innovation:</u></p> <ul style="list-style-type: none"><li>• There are strong chambers of commerce and business associations in the country, with growing interest in promoting innovation and development.</li><li>• There are now 117 certified Technology Transfer Offices within the official network, which has improved their effectiveness at commercialising research and technology</li><li>• There are successful clusters where innovation thrives, such as Nuevo Leon, Jalisco and Mexico City.</li><li>• The creation of the Red Mover a México (Moving Mexico Network), formed by local Economic Ministries in co-ordination with INADEM, allows local authorities to take an active role in executing innovation and entrepreneurship policy.</li><li>• Proximity with the USA and links all across Latin America presents an opportunity to become an innovation hub in the region.</li><li>• The recent creation of the National Entrepreneur Observatory ‘ONE’, is an opportunity for all stakeholders involved in the sector to communicate and collaborate more effectively.</li></ul>	<p><u>There is no clear strategy to promote greater integration between businesses and universities, or to achieve the decentralisation of knowledge production:</u></p> <ul style="list-style-type: none"><li>• There are few mechanisms to create a mentorship culture in which successful entrepreneurs can advise those who are just starting.<sup>1</sup></li><li>• There is little direct involvement by the private sector in funding or collaborating for innovation through universities and public research centres.<sup>2</sup></li><li>• Research Centres are present in only fourteen of the thirty-two Mexican states, and they are highly geographically concentrated, with seventeen in central and central-western Mexico.</li><li>• Without strong enough business networks, new businesses face difficulties in finding good suppliers, subcontractors or consulting partners.</li></ul>

## 1.4 Peru's Innovation System



## 1.4 Peru: Overview of the innovation system (1)

A relative latecomer to innovation policy compared to its Pacific Alliance counterparts, nevertheless according to the OECD, by 2011 Peru had some 'well-designed and well-managed programmes' for STI support. This marks a sharp improvement on the scenario five years earlier, and one which continues to improve. There has been a recent surge in funding, with the main science and research funding agency CONCYTEC receiving close to a ten-fold increase in budget over the last year, from US\$ 5.1 million to US\$ 42 million and an increasingly important agenda setting and co-ordinating role.

However, overall public innovation investment significantly lags behind other Pacific Alliance countries even after these increases, and has failed to keep step with rapid economic growth in recent years (the most recent available statistics – from 2004 – show 0.15 percent investment in R&D as a proportion of GDP). National budgets are complemented by multilateral innovation funding mechanisms including US\$ 40 million World Bank funding for the National Agricultural Innovation Programme (PNIA).

Peru's private sector invests very little in R&D and innovation and there are significant regulatory challenges to using public funds for private R&D. Recognising the need to diversify away from resource-based industries, the Ministry of Production leads a number of programmes, including the innovation fund 'FINCYT' / Innovaté Peru, which from a very slow start in 2007 is now starting to tap latent demand for innovation funding.

Critics point out a lack of co-ordination and connectedness across the innovation system, and an absence of mission-driven approaches to innovation support. For instance, while awareness of the importance of innovation is rising among politicians, this is disconnected from the poverty reduction debate. Policymakers need to grow the efficiency and output of support programmes to ensure the funding surge is sustained, and grow the reach of a concentrated system through greater regional co-ordination.

## 1.4 Peru: Overview of the innovation system (2)

### Key statistics

- Science, Technology and Innovation statistics in Peru are often outdated and hard to come by. The latest official figures for R&D expenditure are of the year 2004, the result was only 0.15 percent of GDP, very low compared with others countries of the region. In relation to human capital devoted to science and technology, the available data for 2004 indicates that the country had 8,434 people engaged in science and technology, of which 4,965 were researchers and 3,469 were support staff. That same year, in contrast, Argentina had just over 36,000 researchers; Brazil 135,000; Chile 17,000; and Colombia 11,000.<sup>1</sup>
- In 2012, the National Innovation Survey for manufacturing firms was developed. This survey found that 65.5 percent of firms were engaged in, at least, one innovation activity. The national survey also revealed that expenditure in innovation activities was mainly concentrated in the purchasing of machinery and equipment (81 percent).<sup>2</sup>
- Following the development of a National System of Innovation, exports in the non-traditional agricultural sector have increased from US\$ 0.39 billion in 2000 to US\$ 1.9 billion in 2010. In part, this is due to programmes supporting innovation and technology transfer in this sector.<sup>3</sup>
- The country still has low levels of high technology goods production. Only 2.23 percent of Peru's exports in 2008 were high-tech goods compared to a Latin American average of 7.72 percent. Peru is known for being more aggressive in buying technology than in producing it.<sup>4</sup>

1 Díaz and Kuramoto, 2011.

2 Ministerio de la Producción, 2012.

3 OECD, 2011a.

4 Fundación Telefónica, 2011.



**Start-up Peru:** This programme of public support for start-ups emerged in 2012, based on the successful experiences of Start-up Chile and Start-up Brasil. The programme seeks to support high-impact entrepreneurs to venture and implement their innovative technological ideas. The first programme, in 2013, received 2,421 applications, and 23 entrepreneurs were chosen and funded with US\$ 45,000.

<http://www.start-up.pe>

**Programme “CienciaActiva”:** In 2014, the CONCYTEC created the public programme ‘CienciaActiva’. Its main purpose was to improve the national research and innovation capacity of the country. The programme is going to invest US\$ 71 million in five years. Two of the main initiatives are Cientificos, INC, which promotes research, and Fórmula C, Centros de Excelencia en I+D+I, which develops international research centres in the country.

<http://www.cienciactiva.gob.pe/que-es-cienciactiva.php>

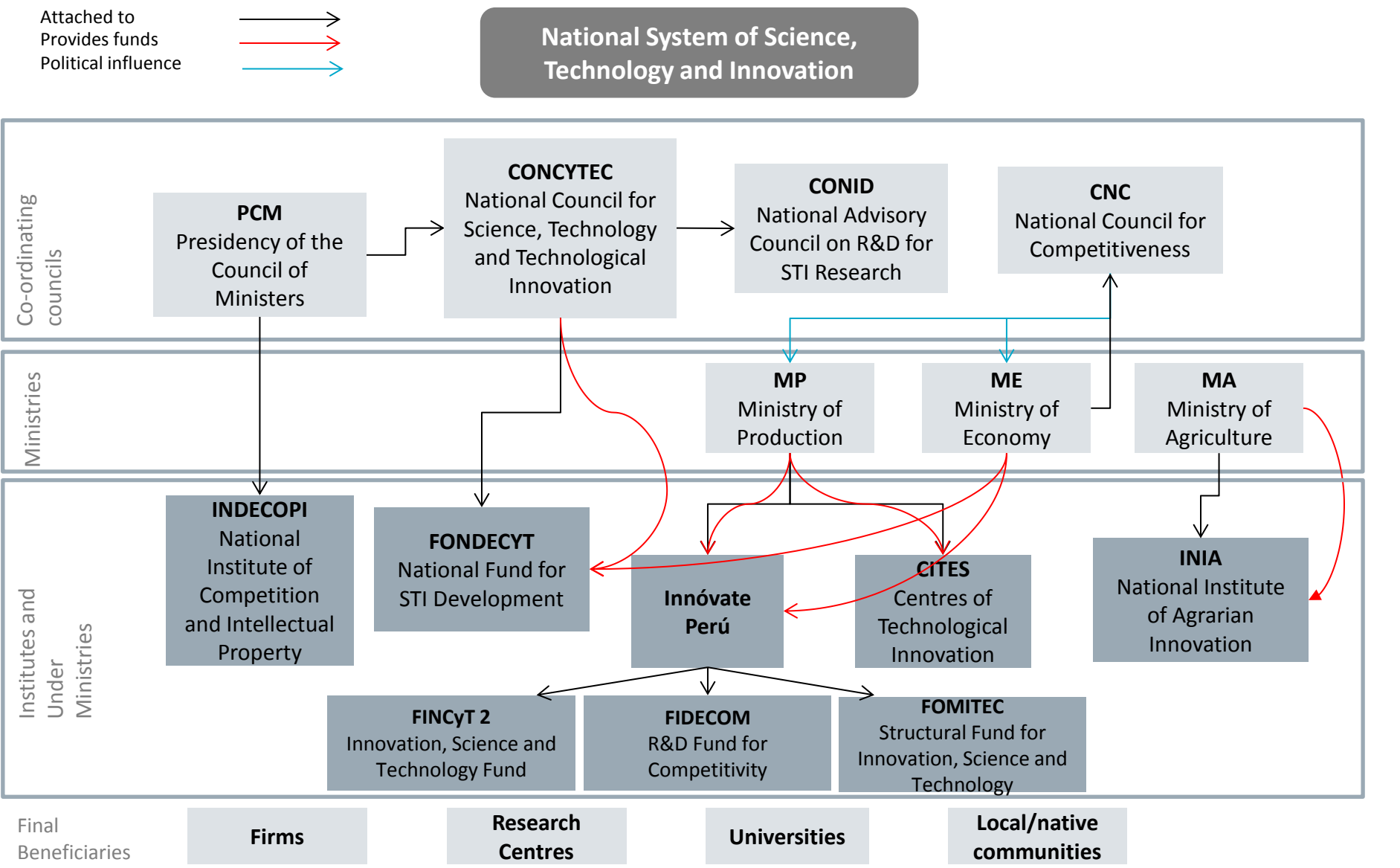
**Programme of Technological Diffusion:** Its main objective is to develop 47 Technology Innovation Centres (CITE) by 2016, as well as to increase technological diffusion in the agricultural sector. The first centre was opened in October 2014.

<http://www.crecemype.pe/portal/index.php/servicio--desarrollo-empresarial/red-cities>

**FINCYT has funded more than 1000 innovation projects:** This fund was created in 2007. During its first call, only ten institutions participated. Currently, 500 to 600 institutions are engaged. In the last year, FINCYT surpassed 1,000 funded projects; some of the best examples of financed projects are the introduction of grapes in the desert zone of Piura, and the use of artificial vision for the selection of chestnuts.

<http://www.fincyt.gob.pe/site/index.php>

# 1.4 Peru: Institutional map of the innovation system

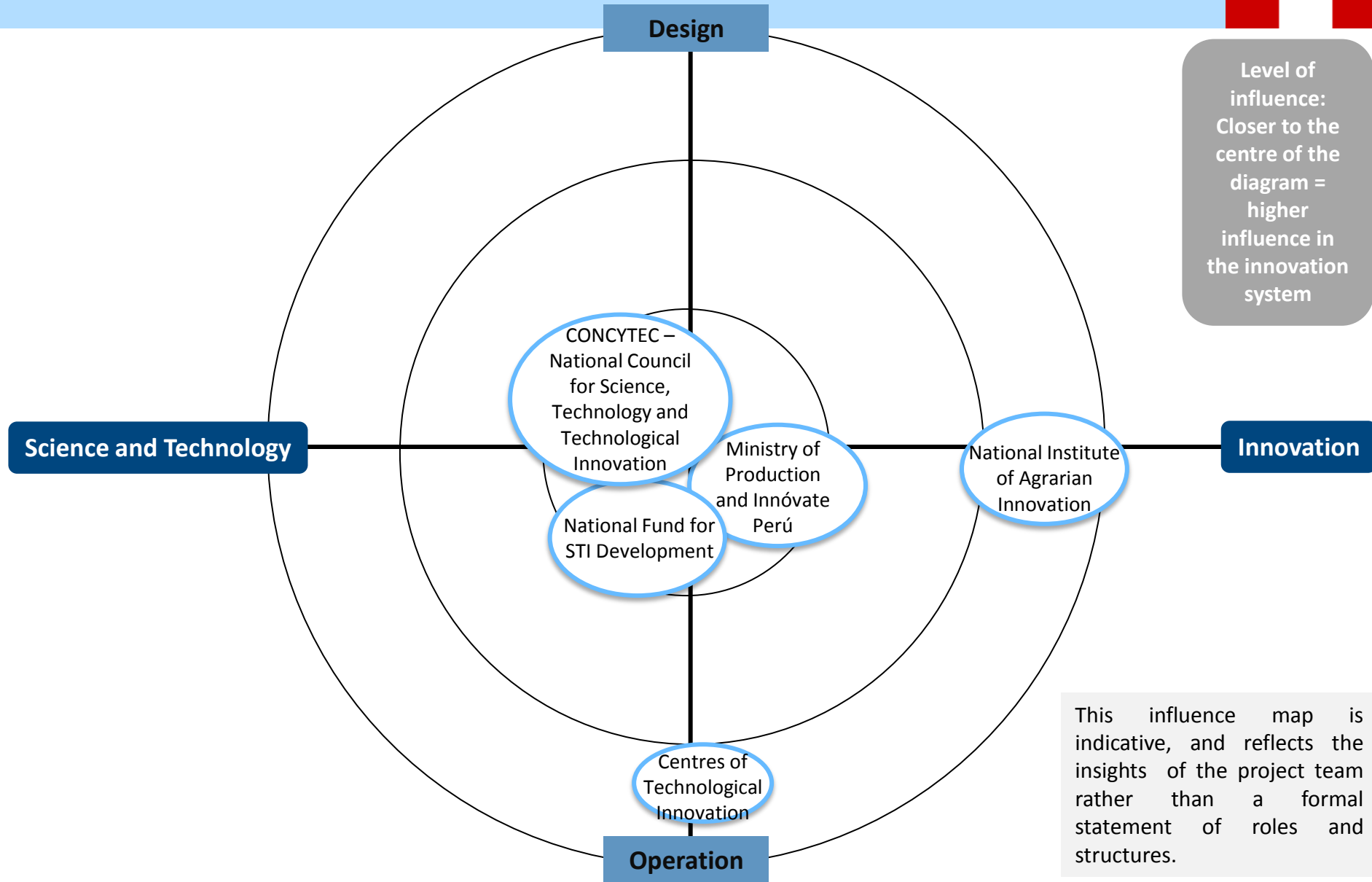






CNC	National Council for Competitiveness
CITES	Centres of Technological Innovation
CONCYTEC	National Council for Science, Technology and Technological Innovation
CONID	National Advisory Council on R&D for Science, Technology and Innovation Research
FIDECOM	Fund of Research and Development for Competitiveness
FOMITEC	Fund for Innovation, Science and Technology
FONDECYT	National Fund for Scientific, Technological and Innovation Development
INDECOPI	National Institute of Competition and Intellectual Property
INIA	National Institute of Agrarian Innovation
INNOVATE PERU	Replacing FINCYT (National Fund for Innovation, Science and Technology)
PCM	Presidency of the Council of Ministers

1.4 Peru: Role and influence diagram of key ministries and agencies



Level of influence: Closer to the centre of the diagram = higher influence in the innovation system

This influence map is indicative, and reflects the insights of the project team rather than a formal statement of roles and structures.

# 1.4 Peru: Strengths and weaknesses of the system – Institutional Framework, Funding and Human Capital



	Strengths	Weaknesses
Institutional framework	<p><u>Peru has improved STI government institutions and some well designed programmes:</u></p> <ul style="list-style-type: none"> <li>• In 2012, CONCYTEC shifted from reporting to the Ministry of Education to reporting to the Council of Ministers, in order to strengthen its capacity as lead agency of the national innovation system, and improve co-ordination with the various entities involved.</li> <li>• The OECD concluded as long ago as 2011 that Peru has some well-designed and well-managed individual programmes around STI. <sup>1</sup></li> <li>• The Ministry of Production is playing a growing role in the implementation of support for innovation in businesses.</li> </ul>	<p><u>Structural problems and a lack of co-ordination affect the performance of the national innovation system:</u></p> <ul style="list-style-type: none"> <li>• There are institutional conflicts within the system due to: a lack of effective governance mechanisms; high levels of bureaucracy; a lack of co-ordination between public institutions at the central and regional levels; a lack of information, monitoring and evaluation mechanisms, and poor regulation in encouraging public investment. <sup>2</sup></li> <li>• Co-ordination is weak among the stakeholders of the national innovation system and their different functions. <sup>3</sup></li> </ul>
Funding	<p><u>In the last few years, Peru has mobilised greater public funds for STI:</u></p> <ul style="list-style-type: none"> <li>• The general budget for STI grew from US\$ 5.1 million to US\$ 42 million in 2015. <sup>4</sup></li> <li>• Peru has had at least four public funds in charge of improving the country's performance in STI: FONDECYT (reporting to CONCYTEC), FINCYT (reporting to the Ministry of Production), FIDECOM (managed by FINCYT) and since 2013, FOMITEC (administered by CONCYTEC, the Ministry of Production and the Ministry of Economy).</li> </ul>	<p><u>Peru's spending and investment in R&amp;D remains comparatively very low:</u></p> <ul style="list-style-type: none"> <li>• Peru's R&amp;D expenditure in 2004 was 0.15 percent of GDP (latest available data). This percentage is comparable to Colombia (0.18 percent) but low in comparison to other countries of the Pacific Alliance – Mexico at 0.46 percent and Chile at 0.42 percent <sup>5</sup>.</li> <li>• Both public and private investment in R&amp;D, innovation and infrastructure are very low.</li> <li>• In 2011 the OECD also highlighted 'an absence of capital markets and scarcity of financial institutions responsive to the financial requirements for innovative ventures in SMEs and the development of technology-based firms'. <sup>6</sup></li> </ul>

# 1.4 Peru: Strengths and weaknesses of the system – Knowledge Capital and the broader environment



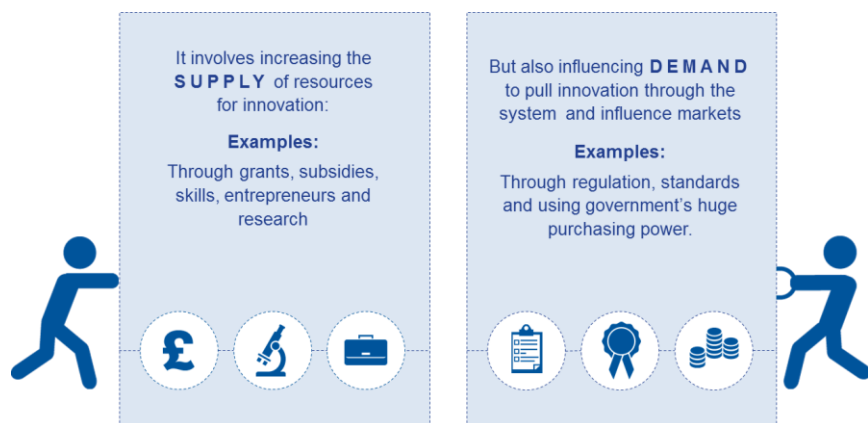
	Strengths	Weaknesses
Human Capital	<p>Peru has some (highly concentrated) excellence in <u>scientific research</u>:</p> <ul style="list-style-type: none"> <li>There are internationally recognised research centres, such as the Institute of Research of the Peruvian Amazonia, the Geophysical Institute of Peru and the University Cayetano Heredia.<sup>1</sup></li> </ul>	<p>The educational system has had several problems:</p> <ul style="list-style-type: none"> <li>Peru was placed bottom in a 34-country ranking of educational achievement in Maths, Reading and Science by the PISA study in 2012.</li> <li>There is a lack of highly-qualified people in the fields of science and technology.<sup>2</sup></li> </ul>
Knowledge assets	<p><u>There is a new public programme promoting international collaboration to increase knowledge production</u>:</p> <ul style="list-style-type: none"> <li>The first International Centre of Excellence was approved in January 2015. The programme seeks to promote the development of research impacting the competitiveness and productive diversification of the country.<sup>3</sup></li> </ul>	<p><u>Capacities to generate new knowledge and capture it are still low</u>:</p> <ul style="list-style-type: none"> <li>Peru produces a low number of high-quality science publications: 2.43 publications per 100,000 inhabitants in 2008<sup>4</sup>.</li> <li>The number of patents registered internationally is also low: only two applications from Peruvian nationals based in Peru were received by the European patent office in 2008. The average for Latin America was 44 applications per year.<sup>5</sup></li> </ul>
The broader environment	<p><u>Peru has a stable macroeconomic context, allowing more resources to be directed to the promotion of STI</u>:</p> <ul style="list-style-type: none"> <li>The country's macroeconomic environment is healthy and stable, with a mostly fast- growing economy (GDP per head increased from US\$ 4,177 in 2009 to US\$ 6,557 in 2013) – although there was a slowdown in growth through 2014.<sup>6</sup></li> </ul>	<p><u>Peru's low competitiveness is a threat to the country's future growth</u>:</p> <ul style="list-style-type: none"> <li>Peru ranks 67 out of 144 countries in the Global Competitiveness Index. In the sub-index on innovation, Peru is ranked 89<sup>th</sup> - much lower than neighbouring countries (Chile, Argentina and Uruguay)<sup>7</sup>.</li> </ul>

**Two:** Scoping innovation policymaker training and capacity building needs

## 2.1 Mapping innovation policymakers – definitions and descriptions

### What is innovation policy?

‘Innovation policy’ covers a wide range of public interventions that seek to support the generation and diffusion of innovation.



Government interventions in support of innovation can be at the level of activity, firm/organisation, sector or market, and the interactions between these levels. In addition to operating at many different levels, improving support for innovation typically cuts across different policy areas, meaning that it has a particular emphasis on improving ‘horizontal’ co-ordination and systemic interaction.

In recent years leading governments have tended towards integrating related areas of policy like R&D and commercialisation support, industrial policy and societal challenge areas like health and environment into a coherent or ‘broad-based’ innovation policy.

### And how do you make it work better?

Interventions are usually justified in response to **market failures** (e.g. lack of competition or funding, externalities where the benefits of innovation investments spill over beyond the firm and unequal access to information) and **system failures** (e.g. problems with capabilities, networks and institutions).

Increasingly **societal challenges** like environmental degradation, ageing societies, rapid urbanisation and globalisation are an important justification for innovation policy interventions.

Making government support for innovation more effective is not just a case of investing more and adopting ‘best practices’ from other countries where national contexts might be very different. It involves intense adaptation to local context and significant judgements about what firms want and what countries need for future development and competitiveness.

## 2.1 Mapping innovation policymakers – definitions and descriptions

### Who is an innovation policymaker?:

- A) A person responsible for or involved in formulating public policies which seek to support innovation – whether through seeking to improve supply, demand, connection or direction of policy.
- B) A person who leads or manages the deployment and implementation of major government programmes which are designed to foster innovation.

### Where are innovation policymakers based?

Overarching decision-making or advisory bodies like National Innovation Councils.

Core national government departments relating to innovation: e.g. Business, Economics, Science and Technology or Universities, Finance and their associated agencies.

Other national government departments with significant innovation roles and agencies: e.g. Defence, Health, Agriculture, Energy, Education.

Non-governmental bodies with a significant influence on innovation policy: eg development banks, think tanks, learned societies, industry bodies.

Regional and Municipal Governments.

In this scoping project, our quantitative mapping exercise focuses on mapping innovation policymakers in the ‘core’ innovation policy departments and agencies. Within each of these bodies we have set out to map both the overall numbers and levels of seniority of policymaker into a set of categories that help to articulate their potential demand for training and development opportunities.

Policymaker seniority	Characteristics
‘Level 1’ Junior politician or Director General	Likely to be political appointee – senior responsibility for policy-setting strategy, including budget allocation, possibly across multiple areas of the innovation system. Usually changes with new government.
‘Level 2’ Director	Likely to be a political appointee – has responsibility for programme design and executing the policy strategy developed by Level 1s. Broad responsibility for how innovation policy is implemented and innovation programmes deployed.
‘Level 3’ Programme Director	May be political appointee or civil servant. Responsibility for the implementation of fairly major innovation programmes (examples might include managing an R&D tax break programme, a major SME support programme etc.).
‘Level 4’ Programme manager	Likely to be a civil servant – responsibility for management and implementation innovation programmes and policy initiatives.

## 2.1 Mapping innovation policymakers: assessing the size of the core audience

In the table below we estimate the number of policymakers employed in key institutions in innovation policy roles at each of four key levels of seniority. The targeted institutions are highlighted in slides 58-61. The numbers below are drawn from publicly available data on government employment combined with insights from expert interviews. These numbers were presented for comment and discussion in our stakeholder validation workshops.

Core innovation policymakers per country					
Country	L1	L2	L3	L4	Total core innovation policymakers
Chile	4	29	38	80	151
Colombia	6	26	38	20+*	94+
Mexico	10	26	37	22+*	95+
Peru	2	8	45	28+	83+

These numbers should be regarded as estimates only. Comparability is limited by different definitions of seniority, variable data availability, and differing perceptions of what counts as an innovation policy role. The high numbers for Chile are largely a result of a mature dedicated innovation agency, CORFO. As the largest country, we would expect Mexico to have the largest number of policymakers overall, although not necessarily a larger number of core institutions. This analysis could suggest proportionately fewer dedicated innovation policy roles, or just a different approach to describing them, and merits further investigation.

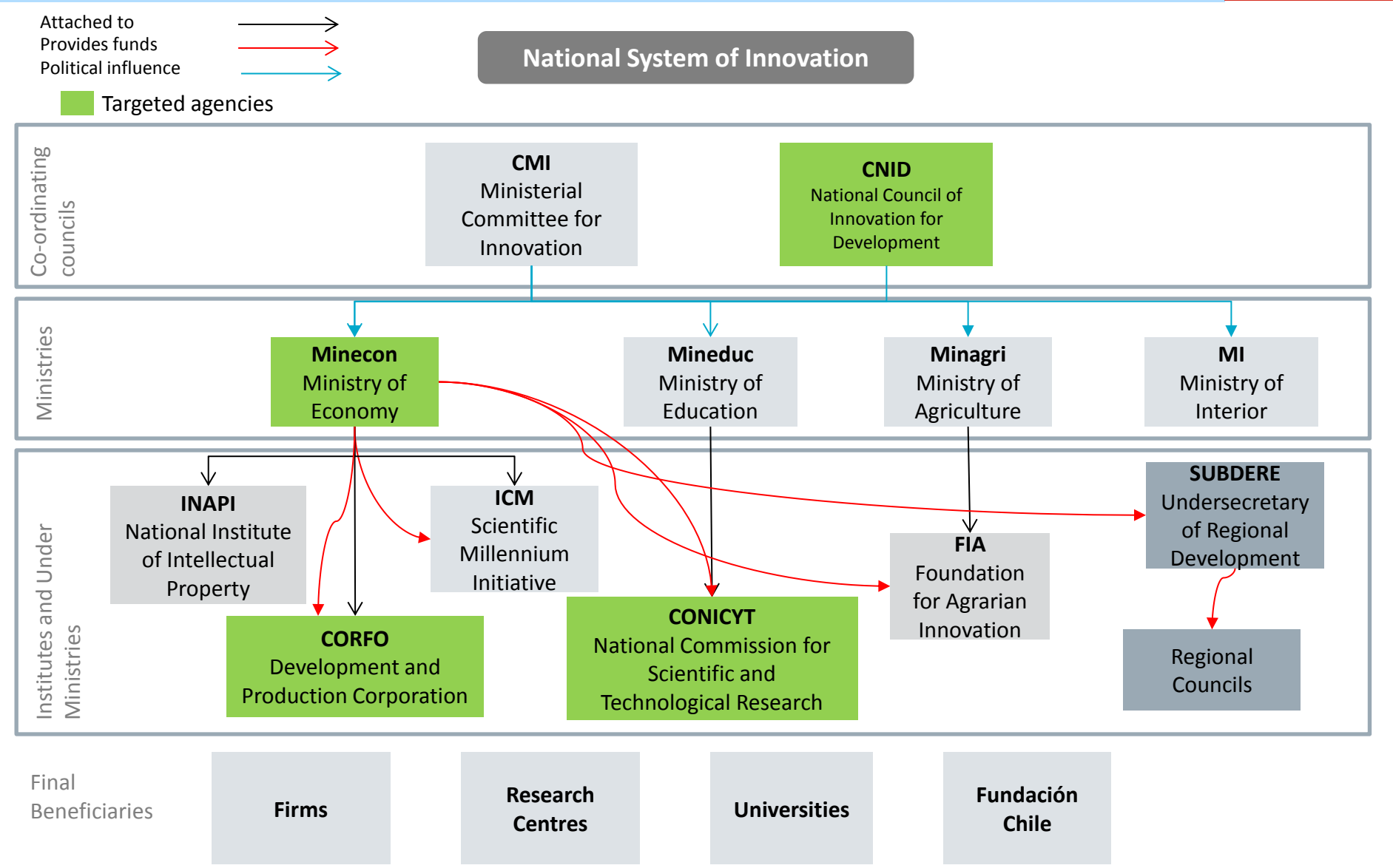
While not precise, this analysis gives us a helpful insight into the potential size of the recognised innovation policymaking community in each country. These indications are sufficient to inform the design of capacity building initiatives.

\* L4 figures were difficult to access in a comparable way across countries. These figures indicate a group of policymakers at approximately L4 (senior manager level) who operate with an innovation remit within other government departments, rather than the direct reports of L3s in our targeted agencies. This group was identified as potentially important targets for capacity building in our workshops.

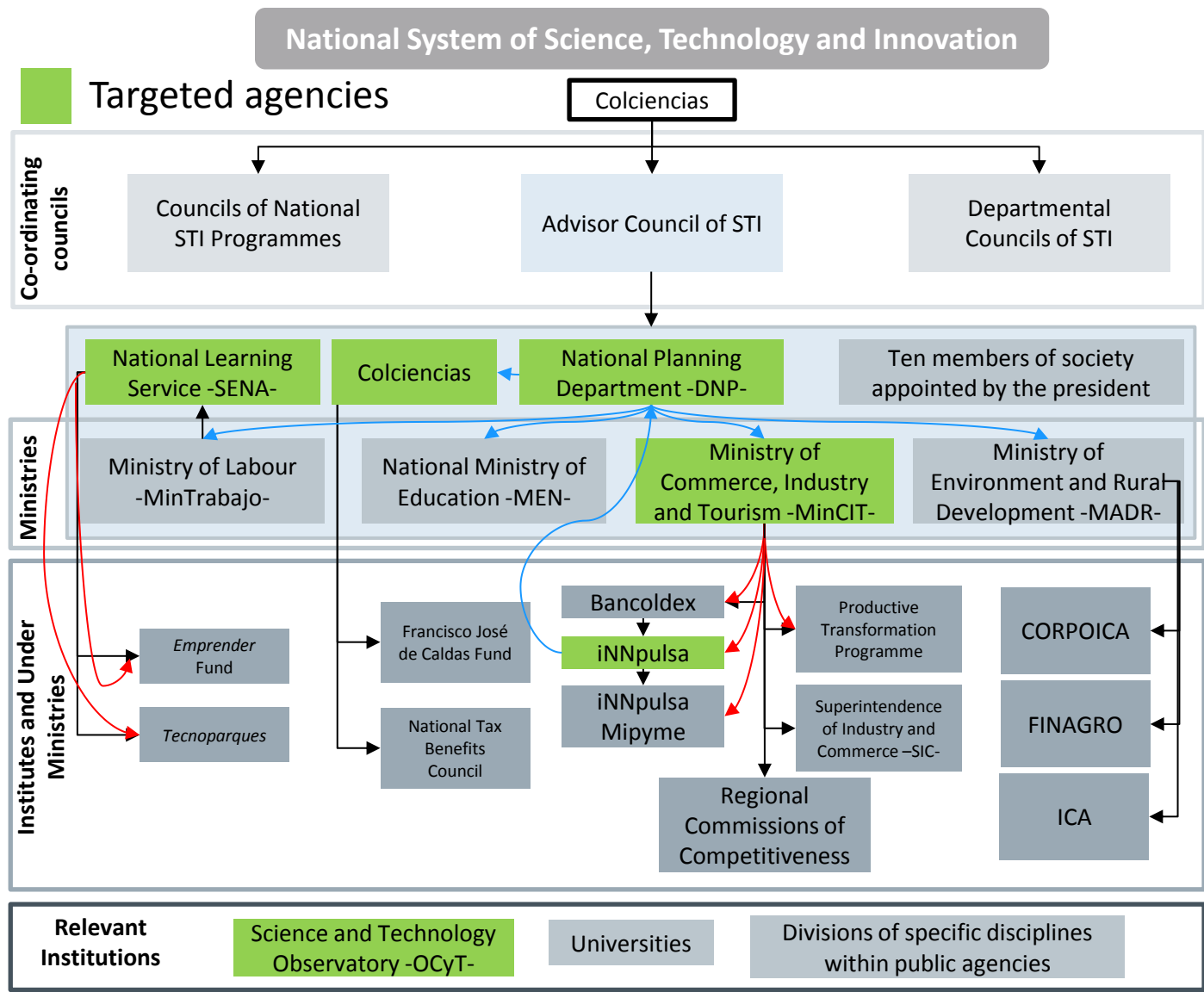




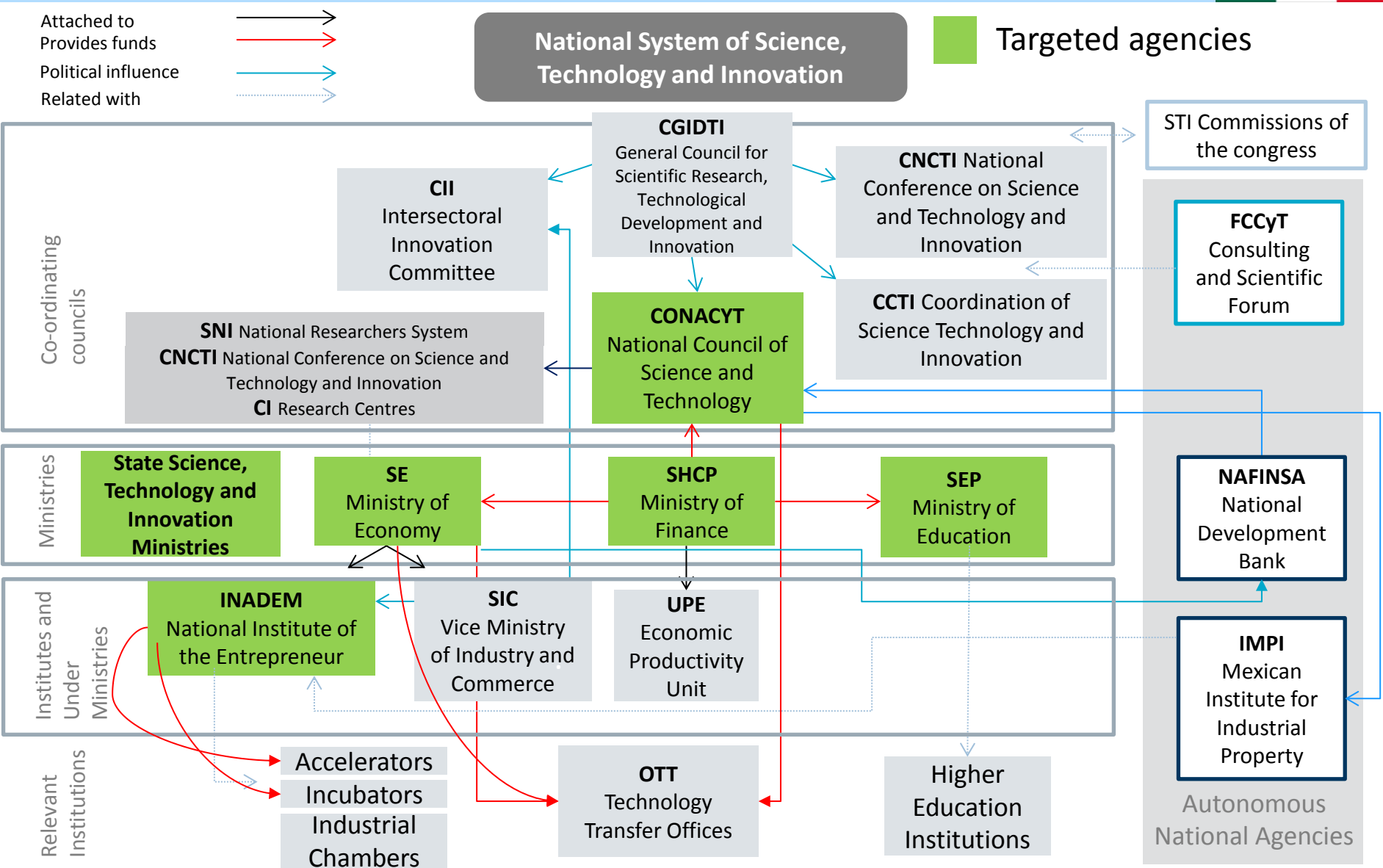
# 2.1 Institutions targeted for innovation policymaker mapping: Chile



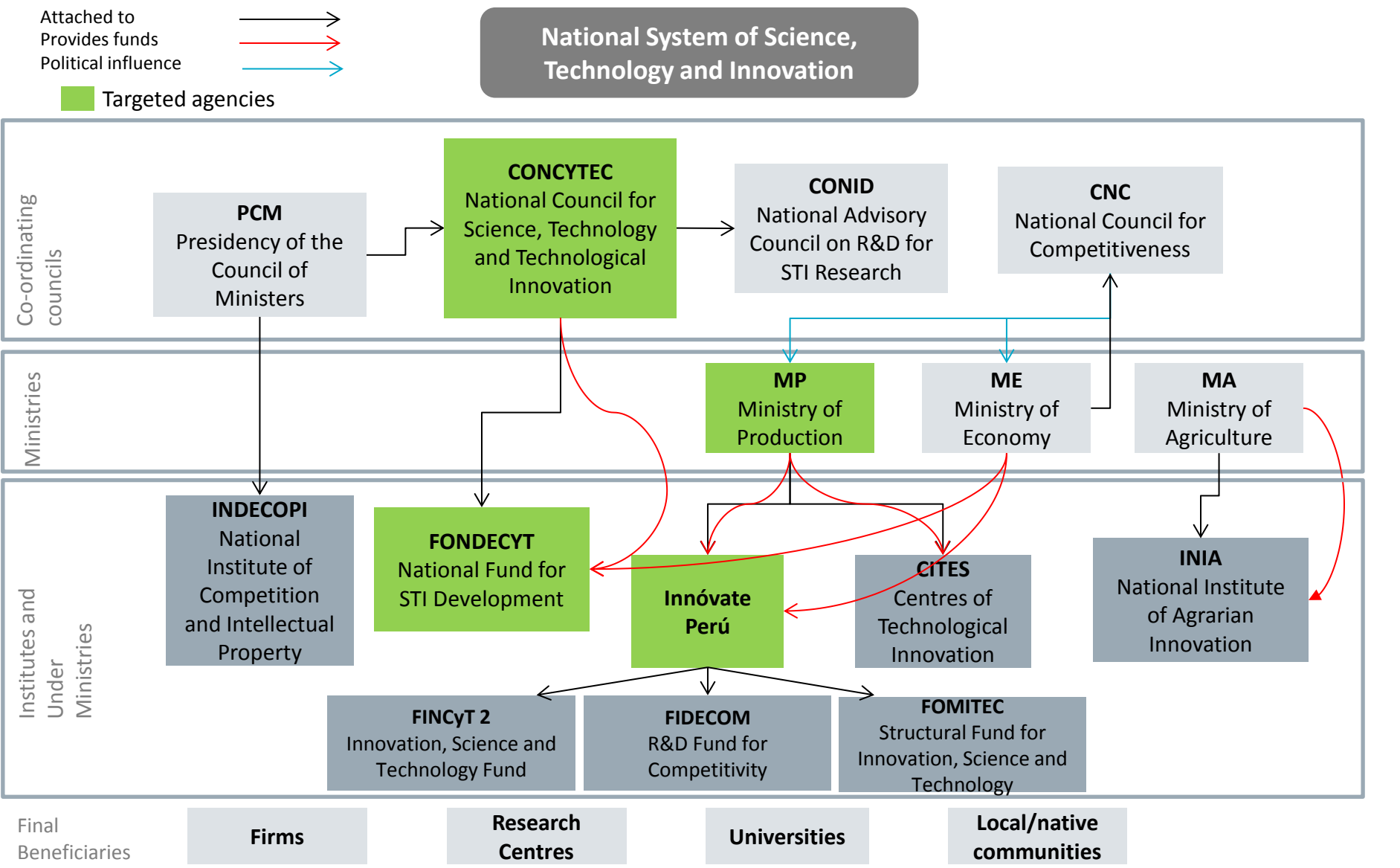
# 2.1 Institutions targeted for innovation policymaker mapping: Colombia



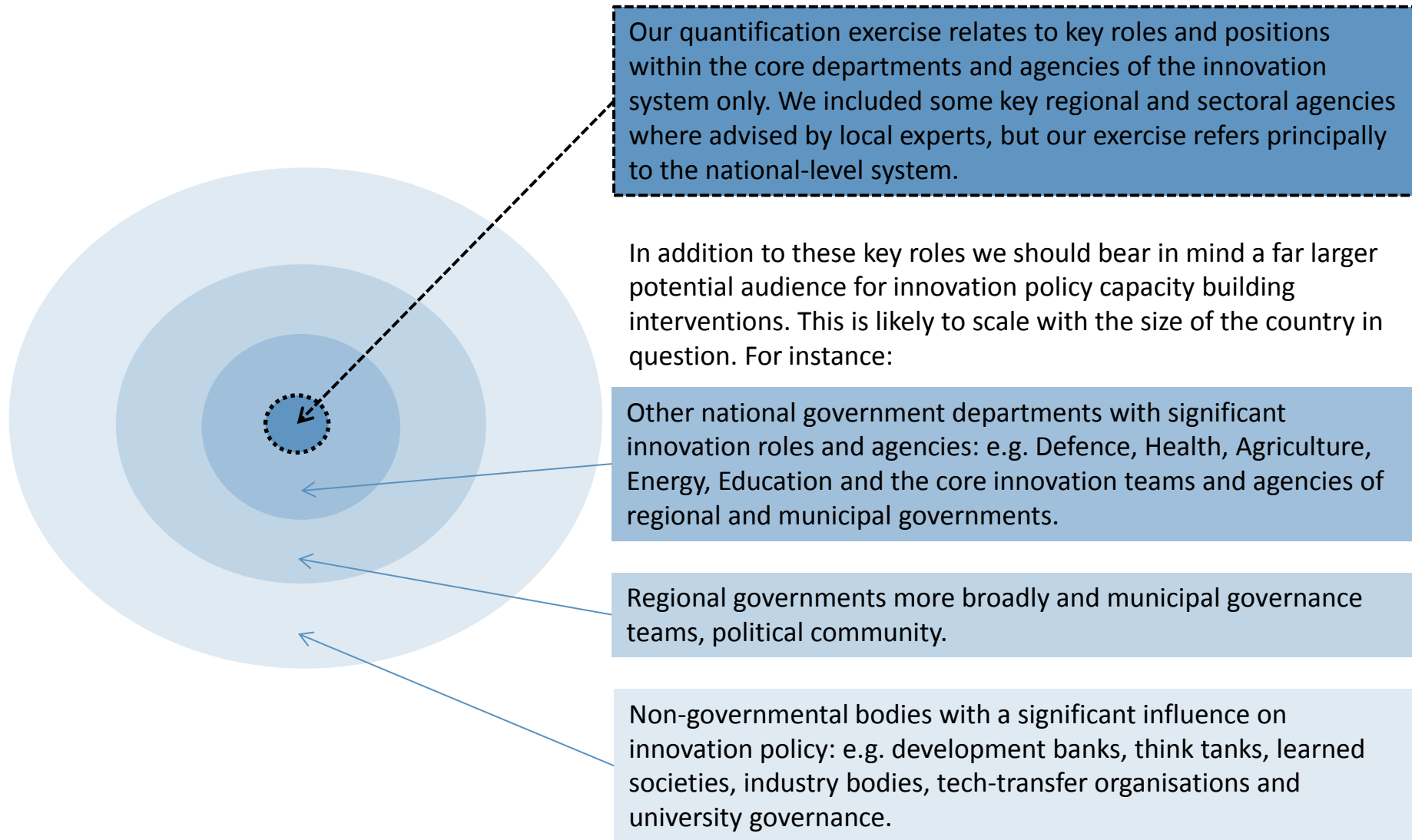
# 2.1 Institutions targeted for innovation policymaker mapping: Mexico



# 2.1 Institutions targeted for innovation policymaker mapping: Peru



## 2.1 Mapping innovation policymakers: assessing the size of the wider audience



## 2.2 Interviews with key senior innovation policymakers: mapping demand and understanding priority challenges and needs

Our training needs analysis was informed by over 30 in-depth interviews with key individuals across the Pacific Alliance.

### Who did we interview?

- In each Pacific Alliance country between 8 and 11 people were interviewed (total of 34 interviews).
- All were senior innovation policymakers in a Pacific Alliance public sector body.
- Details of those individuals interviewed for this study are available in the Appendix to this report.

### Why did we select them?

- Individuals were selected on the basis of their central role in setting innovation policy in a country, and their ability to sign off training.
- We looked to sample individuals from several different agencies or institutions (>4 in all cases).
- Individuals volunteered to take part in the interview – therefore they are to some extent a self-selected sample.

### How did we interview them?

- Interviews were undertaken with a mix of primarily face-to-face interviews, plus some telephone interviews in English and Spanish.
- Each interview lasted between 45 minutes and one hour.
- Interviewers were from Nesta, Fundación Chile, Fundación Idea or C230 Consultores.

### Within this project we have utilised the data from the interviews to:

- Validate the analysis of national innovation systems' strengths and weaknesses drawn from secondary publications.
- Understand the profiles of participants in the proposed programmes.
- Identify the content and topics these experts saw as most important for themselves and their organisations.
- Identify preferences in learning and accessing training.

## 2.2 Key findings from interviews on Pacific Alliance innovation systems, complementing secondary strengths and weaknesses analysis (1)

**Overall picture:** More effective innovation policy is a growing priority across the Pacific Alliance

- There is a trajectory of improvement in national innovation systems in all Pacific Alliance countries, although individual nations are improving from very different points of development.
- Increasingly, innovation has the attention of politicians, investment is improving, and there are some strong individual institutions with highly capable staff at the most senior levels.
- Innovation policy is broadening to cover a wider range of policy mechanisms and types of programme – including those targeted at cities and regions.

**Public sector ecosystem:**  
Co-ordination needs to improve – and focus more effectively on supporting the private sector

- Although some individual agencies are strong, they often don't co-ordinate effectively across the public ecosystem, sometimes from lack of incentives to collaborate, and sometimes from competing remits.
- There is some concern that projects and programmes are isolated rather than part of a systemic strategy.
- Improving connections between public agencies (including universities) with the private sector was seen as a key issue.

## 2.2 Key findings from interviews on Pacific Alliance innovation systems, complementing secondary strengths and weaknesses analysis (2)

### Long-term vision for innovation

- For many Pacific Alliance countries short-term government appointments and shifting political priorities seem to be preventing innovation institutions planning and executing for the long term.

### Learning from global innovation

- Pacific Alliance innovation policymakers have some access to latest international best practice, but most lack the time and support to fully understand and implement new approaches.
- Institutions do conduct semi-regular reviews of evidence, but they are not as a matter of course accessing ideas and evidence from outside. There is low awareness and take up of targeted professional development programmes – both nationally and internationally.
- Most executive development takes the form of one-off study tours and visits, without structured follow-up – learning from international experiences often not embedded agency approaches or practices.

### Regional inequity: the innovation system must work nationally and regionally

- A strong sense from stakeholders that innovation programmes should help address regional disparities – there is evidence that currently the system is fairly centralised, in terms of key assets in addition to capabilities.



## 2.2 Key themes for innovation policy training (1)

Our in-depth interviews set out to understand stakeholders' learning priorities and the capacity-building interventions they regarded as most important for improving their innovation system.

In no particular order of importance, we outline the popular themes below:

Themes	Emphasis
'Innovation 101'	The 'basics' of innovation policy: definitions, aspects, scope, and creating an awareness of the main 'levers', mechanisms and techniques a policymaker can deploy to support innovation.
Innovation policy design and prioritisation	The broader skills of public policy design applied specifically to innovation policy. Requires understanding public policy cycles, political systems, implementation paths, and the range of policy levers available. In addition selecting and prioritising innovation policy interventions.
Innovation programme management and implementation	Bridging the gap between strategy and design and effective implementation. Operational expertise and craft knowledge.
Evaluation of innovation policies	Techniques and approaches for assessing the impact of both specific innovation policies or programmes, and also broader innovation policy strategies at a regional or national level. Knowledge of post hoc and also real-time data and how to use it to influence politics, business and future policy design.
Data for innovation policy and measurement of innovation	Skills to understand, collect and interpret suitable data to measure innovation and track and monitor effectiveness for different kinds of innovation policy. In addition, skills to commission and support others to create and use data for evidence-based policymaking.
Foresight/road mapping capabilities	The ability of the public sector innovation system to deploy robust techniques to understand potential future paths and scenarios for technology and innovation development.
Learning from global innovation	Knowledge of where to go to access appropriate global best practice in innovation policy, and the networks and connections to learn from those experiences to improve innovation policy design and implementation in their own jurisdiction.

## 2.2 Topics and key challenges for innovation policy development (2)

Themes	Emphasis
<b>Entrepreneurship support</b>	The range of potential government interventions designed to boost entrepreneurship, including ensuring policymakers can understand the businesses their policies support, develop appropriate financing mechanisms for innovative entrepreneurship, and design effective structured support programmes like accelerators and incubators.
<b>University-business links</b>	All types of connections between higher education institutions and private businesses, including technology transfer, partnerships, spin-outs, commissioned R&D etc.
<b>Engaging with the private sector and incentivising innovation investment</b>	Understanding the motivations of firms, and deeper insights into the management of private sector innovation. The design and implementation of innovation policies which encourage firms and governments to invest in innovation projects.
<b>Sectoral innovation policies</b>	The skills required to understand the specific needs of industrial sectors and to design initiatives which are tailored for, and directed towards, a particular sector. In addition, the overall process by which a government establishes and enacts industrial sector priorities for innovation.
<b>Cross-government innovation strategy and coordination and policy mix</b>	Support and insight into methods for innovation policy formulation which operates across government departmental silos. In addition, how to evaluate an appropriate 'mix' of innovation policy initiatives across government departments to achieve broader strategic aims. Understanding how to support regional innovation strategies and boost regional innovation competencies.
<b>Communicating innovation and influencing politicians</b>	Persuasion and communication skills to ensure key stakeholders – including politicians – can understand the value of investing in innovation and make informed decisions regarding the desirability and effectiveness of different innovation policy options and programmes.

## 2.3 Current innovation policy executive development provision across the Pacific Alliance

From the evidence we have gathered, the current *in-country* provision on innovation policy training for policymakers in the Pacific Alliance is sparse. There are policy and innovation management qualification programmes at masters level and below – but very limited executive development options:

<b>Teaching methods:</b>	Primarily face-to-face, tutor-led, although increasingly incorporating experiential experiences
<b>Providers:</b>	Providers are usually universities, large government bodies/agencies, with a smaller number from international development agencies or large consultancies
<b>Subjects:</b>	Key areas include introductions to innovation management, as well as public policy and policy instruments, and some monitoring and evaluation
<b>Reach:</b>	Most programmes are aimed at entry or mid-level, and with low representation of senior government officials
<b>Output:</b>	The majority of programmes identified are programmes leading to a qualification rather than specialist ‘executive’ development
<b>Delivery:</b>	Primarily university-led taught courses such as Bachelors or Masters programmes from public or private universities

Senior innovation policymakers in the Pacific Alliance (for example our interviewees and validation workshop attendees), tended to be very highly qualified, often with US or European-based public policy Masters and PhDs.

However, the vast majority had NOT accessed specialist innovation policy training, either through executive development or qualification programmes. And they did not believe that their more junior hires were generally accessing innovation policy-specific programmes.

We found very few innovation policy-focused programmes. For example the Masters in STI Policy and Management, Universidad Peruana Cayetano Heredia, Peru which is addressed at both business and public officials.

Some of the most respected programmes cover some elements of innovation policy, but as a small part of much broader public policy *or* innovation management programmes, such as the highly-respected Cursos para Funcionarios from the Mexican Agency for International Development Co-operation, or the Masters in Innovation at the Universidad Adolfo Ibañez in Chile.

**We believe our scan of existing provision in Pacific Alliance countries, and programmes they are accessing globally, suggests a clear gap for programmes which focus specifically on the development of innovation policymakers – both for mid-level civil servants joining innovation agencies and ministries, and at the level of executive development for senior, experienced policymakers.**

## 2.4 Example profile of key target policymaker for executive development – 1 of 2



“We are not yet finding a way to set the context to promote innovation”

“There would be a real benefit in improving and strengthening the management skills of those with a Science and Technology background”

“The biggest problem and main challenge today is the lack of collaboration between government, academia and businesses”

“We often have lots of desires and ideas, but lack the implementation expertise”

**Juan Diego Rivera (54)**  
*Sub-Director of Science, Technology and Talents*

Has been working with Agency X for **six years**. Responsible for the **promotion of innovation policy** in science and technology programmes. Manages capabilities in Science and Technology areas. Reports to the Innovation Director of his agency (**Level 3**). **Engineer background**, and no previous training in public or innovation policy other than short courses within own organisation.

**Key individual and collective challenges:**

- Across the country and across organisations, there is a real need for a **common definition** of what innovation is and of what benefits innovation can bring.
- **Collaboration between** sectors and between organisations is still a weak link in the country’s innovation system.
- A major organisational challenge for Agency X and other organisations in the country is the **divide** between policymakers with a management and innovation background, and those with a science and technology background.
- A major gap in knowledge for his level of policymaking links to the lack of **hands-on** policy implementation and evaluation experience and expertise.

**A desire to learn from international best practices and improve collaboration in innovation policymaking:**

- Very interested in opportunities for **professional development and training** within his own and across organisations.
- His ideal training programme would gather individuals at **different seniority levels**, from **different sectors** (public and private) and from **different organisations** within sectors.
- The most important aspects of the programme will have to be a **good follow up**, the possibility to apply teachings in **everyday work situations**, and learning from **international best practice** through visits.

## 2.4 Example profile of key target policymaker for executive development – 2 of 2



“I would like a very hands-on programme.”

“Travelling with our counterparts in other organisations would be very useful, but we need some impact above all. Participants should come back with a long-term vision and a physical output. Something really tangible!”

“We need to work on a basic and transparent profile for programme participants, to avoid any conflicts of interests.”

**Isabel Allende (45)**  
*Director for Technology Commercialisation*

Has been working with Agency Y for **two years**. Responsible for setting up and managing instruments and programmes to support the tech development of social and economic innovation. Reports to the General Director of her agency (**Level 2**). Bachelor in **Educational Science**, Masters in **Tech Commercialisation** from US University and 17 years of experience in tech transfer.

- Key individual and collective challenges:**
- There is a collective danger of **concept misalignment**, as there is no clear framework of reference for concepts related to innovation and innovation policy.
  - **Collaboration** and **co-ordination** between sectors and organisations in the country is also weak, causing duplication of functions and delays in execution.
  - A major challenge for Agency Y and other organisations in the country is that programmes are planned according to the current administration, with **little or no long-term vision**.
  - Policymakers at her level are lacking **prioritisation skills**: they do not have the proper tools and knowledge to determine and evaluate programme importance.

- A desire to improve knowledge circulation within innovation policymakers, taking advantage of practical executive development opportunities:**
- Very interested in opportunities and tools for **professional development, network creation** and **experience sharing**.
  - Her ideal training programme would combine **different seniority levels** from **different sectors** and a **tangible** output (report, strategy) for participants to bring home and circulate within their agencies.
  - Some of most important aspects of the programme will be its **applicability** in a policymaker’s day-to-day work life and the award of a diploma or certification for **recognition**.

**Three:** Recommendations for a collaborative capacity building programme on innovation policy targeting public sector officials

### 3. Building our recommendations

Our recommendations are informed by a combination of factors in this research:

So far we've looked at:

- ✓ The scale of demand and the nature of demand for capacity building identified by stakeholders
- ✓ Gaps and challenges identified in the reviews of latest literature

To define a set of recommendations in the next section we will also take into account:

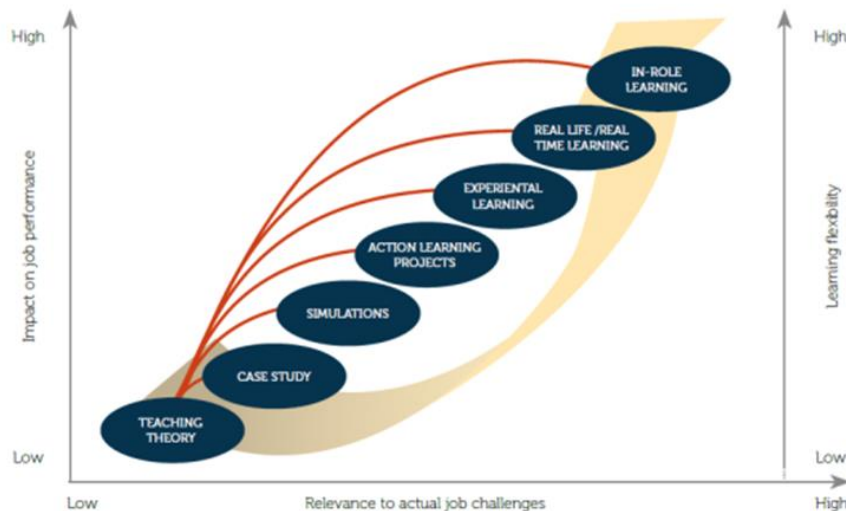
- ✓ Empirical evidence of what works in professional development and training
- ✓ Latest and best practices in capacity building for innovation policymakers globally
- ✓ Unique offers of the UK system and the greatest opportunities for sustainable partnership

## 3.1 What we know about what works in professional development and training

There is a growing body of evidence on the effectiveness of approaches to professional development and training.

Some believe there is a hierarchy of impact of different approaches, as the below diagram shows, although there is strong consensus that the most effective and sustainable capacity-building programmes require a blended approach of several of these features.

FIGURE 1:  
THE IMPACT MATRIX



It's important to strike a balance between the levels of investment required for different capacity-building approaches. For instance intensively curated experiential learning programmes will have a different cost-impact ratio compared to online self-directed learning resources.

According to the evidence, effective professional development courses for policymakers tend to have the following features:

- **Action oriented**
- **Collaborative**
- **Blended delivery models**
- **Long term, cumulative and sequenced**
- **Builds peer networks**
- **Supported by specialist expertise, mentoring and coaching**
- **Helps de-risk the application, and testing of new approaches and innovations**



### 3.2 Global Best Practice in capacity building for innovation policy

There are a range of initiatives designed to support innovation policymaking around the world. The most widespread are full-time **postgraduate courses** in science, technology and innovation policy.

When it comes to professional development, there are a limited number of short, **executive education** programmes for innovation policymakers – for example the Manchester University courses on the Evaluation of Science, Technology and Innovation Policy, and Foresight and Futures. Universities like Manchester also occasionally offer bespoke courses for policymakers.

A wide range of for-profit and not-for-profit providers offer **short courses** in technology transfer, commercialisation and IP.

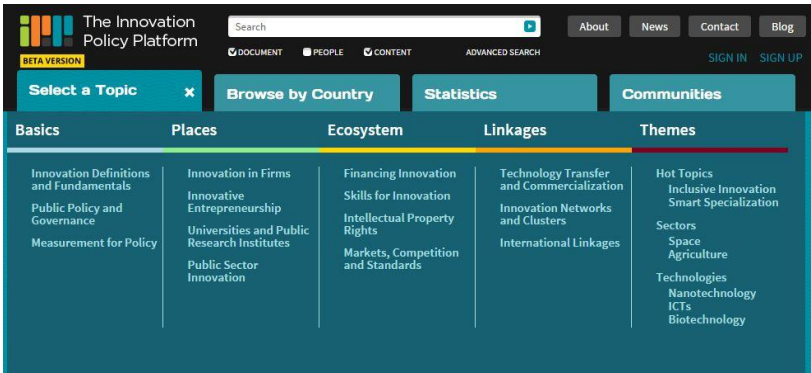
Although very few and far between, there are **membership-based initiatives** where innovation policymakers can share ideas, best practice and benchmark approaches – for instance TAFTIE.



The European Network of Innovation Agencies

Multilateral institutions have also developed offers for policymakers, often focused on developing economies. For example the OECD World Bank Innovation Policy Platform is an **open access resource** for policymakers which provides rationales for different policy interventions alongside access to statistics databases and online forum facilities.

The World Bank also has a Massive Open Online Course (**MOOC**) on innovation policy that it is in the process of redeveloping.



### 3.3 Mapping the expertise and current innovation policy training offer in the United Kingdom

Our findings suggest that UK-Pacific Alliance development programmes should draw on the expertise of the *whole* of the UK system, rather than a single training provider.

As part of this project, we undertook a rapid mapping exercise of existing training and development support in the UK, targeting innovation policymakers. We utilised our existing networks, and asked other experts on their awareness of UK organisations providing training, development programmes or qualifications to innovation policymakers internationally. We have begun mapping their offerings in the following categories:

- Key areas of expertise relating to innovation policy.
- Service offerings in professional education and training (and target audience).
- Relevant experience (in international innovation policy capacity building).

- Links to other relevant online resources, courses and materials

The full table is provided in a separate annex and indicates a small but growing number of key players in the UK system working internationally with programmes dedicated to different elements of innovation policymaking.

The next two slides provide illustrative examples of ‘whole system expertise.’ Both topics were identified as key areas within our workshop with Pacific Alliance stakeholders:

- Monitoring, measuring and evaluating innovation policy
- Improving university-business interactions

Example UK institutions providing innovation policymaker professional development, policy programme support, or postgrad qualification programmes:




3.3.1 Examples of combinations of institutions illustrating what the UK can offer: Example areas  
- monitoring, evaluation and evidence-based decision-making for innovation policy

Sharing experience



Cutting edge analysis, ideas and experimentation



Existing training and skills offers



3.3.2 Examples of combinations of institutions illustrating what the UK can offer: Example area - improving university-business interaction

Sharing experience



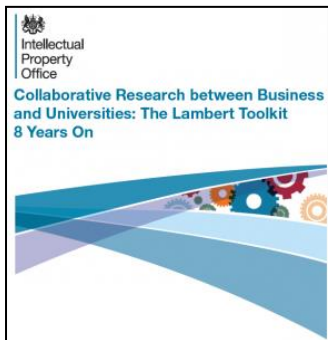
Cutting edge analysis, ideas and experimentation



- This government programme helps businesses get strategic business advice on:
- finance and cash flow
  - recruiting and developing staff
  - improving leadership and management skills
  - marketing, attracting and keeping customers
  - making the most of digital technology



Existing training and skills offers



### 3.4.1 Developing design principles for capacity building programmes

#### Key findings from interviews

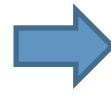
Learning needs and potential for impact varies according to level of influence.



Cross-innovation system co-ordination is a major challenge.



Policymakers benefit from experiences more than lectures, and need ongoing support to apply knowledge.



Senior policymakers are very time-poor, and need training which helps them directly achieve their strategic priorities.



'One off' workshops have limited impact. They need connected activities with longer-term relationships.



#### Resulting design principle

More than one approach needed: a) targeted and tailored for leaders, and b) open access guides and resources for greatest reach across system.

Should emphasise and enable cross-system, collaborative, learning and development.

Should involve immersion in UK system and opportunity to build peer networks.

Should be practical, applied to immediate and major challenges, and fit alongside the day job.

Ambitious, connected activities and access to whole UK system assets and networks, plus the UK's global Newton networks: 'do together to learn together'.



### 3.4.2 We drew on these principles to make two interlinked proposals to discuss and validate in expert workshops



In-depth, targeted  
course for leaders

#### Collaborative Innovation Policy Leadership Programme

- Hands-on, practical problem-solving
- **Cross system cohorts** from across each country
- Taught content from leading experts
- Immersive experiences in UK
- Peer mentoring and expert coaching
- 6-12 month duration with short periods of residential with action-learning and reviews and global network (20 contact days, of which 10 in UK)



Open platform for  
maximum reach

#### Online cutting-edge innovation policy knowledge platform

- **Open access** with range of resources (fact-sheets, toolkits, videos, best-practice guides)
- Broad content – e.g. key concepts – innovation 101, innovations in innovation support, evaluation and experimentation, understanding needs of innovative business, big data, challenge prizes etc.

## 3.5 Validation workshops to explore recommendations and revise proposals

The following slides summarise the findings of expert stakeholder workshops held in each Pacific Alliance country.

These were attended by up to 12 senior innovation policy makers and programme managers from a range of ministries and agencies, plus the project team and, where possible, a representative of the British Embassy in the relevant Pacific Alliance country. The workshops took place in late March and early April 2015.

### Aims

- To discuss and interrogate the findings of the scoping exercise to identify the priority challenges and capacity building needs of innovation policymakers in each country.
- To work with senior stakeholders to test and refine the initial proposals for a new collaborative initiative between the UK and the Pacific Alliance nations
- To ensure project recommendations are based on user needs and feasible in practice as well as in theory.

### Approach

In addition to presenting overall findings for discussion, the workshops involved a number of interactive exercises designed to help prioritise thematic content and refine the suggested approach.

Extensive notes were taken during workshop discussions and written suggestions and feedback were also captured



### 3.5 Workshop key findings – Chile

The feedback on proposals was positive, with an emphasis on ensuring tangible outputs, and embedding learning from the programmes within the system. The approach was seen as of considerable potential value to Pacific Alliance working relationships on innovation in addition to future partnerships with the UK.

#### Key concerns / issues discussed:

- **Ensuring sustainability** through embedding materials in learning processes of an agency or ministry – beyond those immediately engaged in the programme.
- **Getting buy-in** from key senior political stakeholders in the remaining term of the current government.

#### Identified priority topic areas for executive development:

1. **University-industry links**, including tech transfer, and public sector capability in supporting university-business interaction.
2. **Engaging the private sector** in public sector innovation policy, and public sector capability in understanding private sector innovation needs.
3. **Co-ordination of innovation policy across government** and innovation policy mix.
4. **Impact evaluation of innovation policies**

#### Key suggestions / feedback from participants

1. **Leadership Programme:**
  - Get sign off / buy-in from Level 1 leaders – possibly through kick-off UK conference.
  - Two separate UK trips to embed learning.
  - Require a ‘tangible’ output from the programme, video, report, policy etc.
  - Linking programme activities to hands-on expertise in the UK that can be collaborated with for solutions.
2. **Open access platform:**
  - Interactivity: it should build a digital community. A place to discuss, feeds itself with content by the people that are a part of it.
  - Defining users: Who will use the platform? A library model or a MOOC model?
  - Histories: should include ‘stories’ of the development and success of innovation policies in the UK for PA to learn from.
  - Embedding materials in sustainable organisational learning.
  - All material potentially available in Spanish.



## 3.5 Workshop – Chile



Name	Organisation
Andrés Zahler	Ministry of Economy
Etienne Choupay	Ministry of Economy
Marcia Varela	CORFO
Dario Morales	CORFO
Rocío Duque	CONICYT
Jaime Alvarez	CNID
Rodrigo Gallardo	FIA
Pilar Trivelli	INAPI
Astrid Waltermann	CMI
Roman Yosif	Laboratorio de Gobierno



### 3.5 Workshop key findings – Colombia

They discussed in-depth concerns with the focus and direction of the Colombian innovation system. In general they welcomed the proposals, but expressed scepticism about the value of an Open Access content platform across the Pacific Alliance countries.

#### Key concerns / issues discussed:

- Despite increased budgets, concerns that Colciencias was sufficiently focused on innovation.
- The tension in the system between an enterprise innovation focus and other topics like post-conflict resolution.
- Too much focus on supply side of innovation and not enough on demand.
- Concerns about a lack of impact evaluation meaning little evidence-based decision making in policy.
- Capacity building in the regions was particularly important.

#### Identified priority topic areas for executive development:

- Data and measurement for impact, quality of evaluation of projects.
- Major innovation programme management.
- Co-ordination of innovation policy across government and innovation policy mix.

#### Key suggestions / feedback from participants

##### 1. Leadership Programme:

- It should focus on participants at Levels 2 and 3.
- With senior attendees (on short contracts?) need clear plan for transferring / embedding learning.
- Strong support for a tangible ‘product’ from participation.
- Should encourage ‘regional champions’ to be involved.
- Mixed view on whether to bring cohorts to the UK or UK experts to Colombia.

##### 2. Open access platform:

- Compared to other workshops, greater scepticism regarding whether individuals would take the time to access – they recommended using it should be mandatory.
- Very clear that it should not repeat or overlap with existing provision.
- Suggested it would need to be mixed face-to-face training and online materials – and also group component.
- Could be great for engaging regional actors who are not well connected to the central system.



Name	Institution
Mónica Vargas	Fondo Newton-Caldas
Catalina Ortiz	iNNpulsa
María Isabel Vélez	Colciencias
Diana Lucio	Observatorio de Ciencia y Tecnología (OCyT)
Marco Llinás	Consejo Privado de Competitividad
Juan Felipe Quintero	Consejo Privado de Competitividad
Nazly Frías	Departamento Nacional de Planeación (DNP)

## 3.5 Workshop key findings – Mexico

There was strong support for both programme proposals, with concerns that selection for programmes should be very transparent, and have real in-depth opportunities to work with and learn from UK counterparts.

### Key concerns / issues discussed:

- Ensuring innovation teams (and those with innovation responsibilities who did *not* see themselves as innovators) within non-innovation ministries and agencies such as agriculture, energy, defence, etc., could be included.
- Spreading shared definitions and understandings of innovation across very different areas of policy.
- Being aware of the regional dimension of innovation policy.
- CONACYT's central role as primary innovation agency.

### Identified priority topic areas for executive development:

- Engaging private sector and incentivising innovation investments.
- University-business links/relationships.
- Data and measurement for impact, quality of evaluation of projects

### Key additional suggestion:

- Industrial development models and industrial policy.

### Key suggestions / feedback from participants

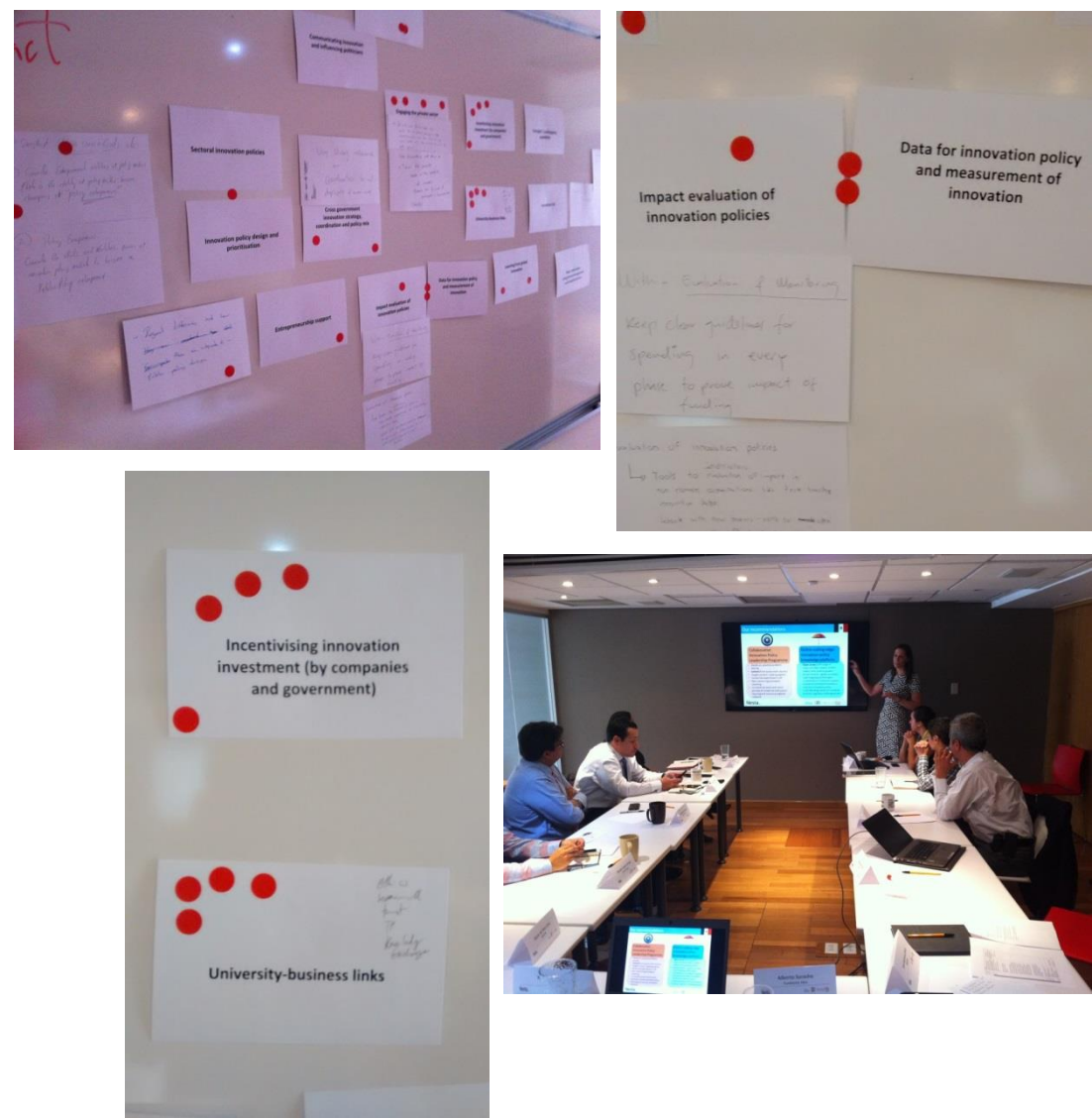
#### 1. Leadership Programme:

- The selection process for the programme should be very structured and transparent – possibly decided by the Inter-Sectorial Committee
- There should be very tangible outputs: a new policy document or a detailed call for proposals.
- The Programme should target primary Levels 2 and 3.
- It should engage the participants' counterparts in the UK as much as possible – they should take part in the programme too.
- These connections should aim persist through the programme, and beyond.
- Level 1 policymaker could be engaged through the broader Newton programme, encouraging them to send participants.

#### 2. Open access platform:

- It could be free access generally, but a payment to complete a certification.
- It would need a relatively open licence for others to incorporate the material into their programmes.





Name	Organisation
Raúl Rendón Montemayor	Ministry of Economy
Eduardo Piedra	Secretariat of Finance
Teresa de León Zamora	CONACYT
María del Mar Caso	INADEM
José Espinosa	INADEM
Javier Siqueiros Alatorre	Government of Morelos
Guillermo Fernández	FUMEC
Salvador López	British Embassy

## 3.5 Workshop key findings – Peru

The group endorsed both the programme options as interesting and valuable within the Peruvian system, but expressed concerns that fast turnover of policymakers could prevent the embedding of learning within organisations

### Key concerns / issues discussed:

- The important distinction between elected innovation policymakers, appointed innovation policymakers and career civil servant innovation policymakers.
- Concern that official ‘maps’ of agency and ministry roles in innovation don’t necessarily reflect actions and responsibilities on the ground.

### Identified priority topic areas for executive development:

1. **University-industry links**, including tech transfer.
2. **Communicating the importance of innovation to stakeholders such as politicians and the public** in order to secure suitable budgets for innovation policy.
3. **Engaging the private sector in innovation** – both its own innovation, and with government programmes.
4. **Prioritising the right areas for innovation policy investment** – particularly to create a sustainable ecosystem.

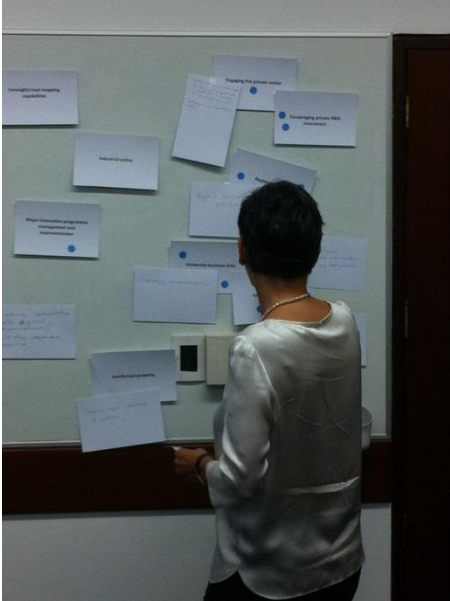
### Key suggestions / feedback from participants

#### 1. Leadership Programme:

- Should be a range of different ministries represented in cohorts.
- Some UK experts should travel to the Pacific Alliance countries.
- Could it include links to main UK government agencies related to S&I as well as UK universities and research centres?
- Cohort participants should gain political / Level 1 backing for projects before they begin the programme.
- It should result in a detailed national policy proposal.

#### 2. Open access platform:

- Platform and virtual courses must include basic knowledge about policy instruments design.
- A current migration from one civil service career system to another gives an opportunity to map training needs and embed new learning.
- Should be more of a course than a digital library.
- An introductory course on innovation could be applied to a wide range of Level 4 and below through inductions.



Name	Organisation
Gisella Orjeda	CONCYTEC
Juana Kuramoto	CONCYTEC
Antonio Morán Cárdenas	CONCYTEC
Pavel Corilloclla	CONCYTEC
Maggy Manrique	Ministry of Production
Benjamín Quijandría	National Institute for Innovation in Agriculture
Claudia Celis	British Embassy
Adrián Lauer	British Embassy

## 3.5 Summary of validation workshop findings (1)

### Thematic priorities

We saw a spread of issues within each of the countries, indicating a wide range of personal and institutional priorities. However, among these there were four broad themes that were consistent shared priorities:

- **Cross-government co-ordination and whole system working** – while there are pockets of expertise in all countries, disconnections between institutions, or between design and implementation, is hindering the impact of policies.
- **Engaging the private sector** – understanding the needs, motivations and limitations of business and a lack of effective engagement strategies was seen as a major hindrance to innovation policy. This wasn't limited to technology commercialisation, but covered all aspects of open innovation.
- **Evaluation and data** – evaluation methods, measurement of innovation and data strategies, but also how to make better use of this knowledge to influence programme design and prioritisation.
- **University-business links** – across a broad range of issues, from culture and trust to intellectual property negotiation and technology transfer.

### Programme proposals

Overall the workshops revealed considerable endorsement and enthusiasm for both the outline proposals, but reinforced the importance of getting the detailed design and implementation right. The design principles were very strongly endorsed.

There was particularly strong interest in the collaborative leadership programme – a useful indication given that many of the workshop participants were highly-influential potential targets of the programme. However, the stakeholders also frequently acknowledged that there was an important gap in resources that a) reach beyond this core group to improve the national baseline knowledge and capabilities for supporting innovation, and b) help embed the learning from any professional development programme into organisational practices and norms.

Stakeholders were very interested in open access resources that could be applied throughout the system. Targeted practice guides as well as baseline resources were seen as likely to have greater immediate impact than an ambitious attempt to create a shared resource platform across the Pacific Alliance.



## 3.5 Summary of validation workshop findings (2)

### Feedback on collaborative leadership programme



There was a lot of enthusiasm for the cross-system cohort approach, the combination of taught content and tailored, immersive access to UK experience, expert support and importantly, peer policymaking communities. The long-term and cumulative approach of a programme like this was thought to be valuable.

The approach was regarded as original and of vastly higher impact than a one-off workshop. The stakeholders were very keen on the ability to access insights from across the UK system rather than one sole training provider.

Design considerations raised include:

- **Selection of participants** – There was a consensus across countries that this should be focused on Levels 2 and 3, and potentially Level 4s (Directors, Programme Directors and some Senior Programme Managers). While some countries envisaged selection as unproblematic, others such as Mexico thought it would be very important to have a transparent and open selection process. While the focus would be national, countries were interested in the potential participation of regional champions too. In some countries where there are a large number of short-term contracted positions within the senior policymaking community, such as Colombia, there were additional challenges to selecting participants for greatest long-term impact.
- **Time requirement** – There was strong agreement that this needed to fit alongside the day job, but at the same time, that UK immersion was essential. While 12 months seemed like too long an engagement, six months seemed about right, with two separate visits to the UK – one more general and one more focused on the chosen challenge.
- **Commitment to impact** – In order to ensure the programme benefits reached beyond participants, stakeholders thought there should be a clear commitment to action from participants, and a tangible output to the process. In some cases this was a new policy design, in others a report or presentation to local partners, or even a new collaborative initiative.
- **Tailoring** – cohorts should share in core learning, but be able to focus on their own priorities.

## 3.5 Summary of validation workshop findings (3)

### Feedback on open access content platform



While the design principles were clear, it was also evident that both the cost implications of providing the intensive professional development opportunity, and the likely impact, meant that this should be restricted to fairly senior policymakers.

There was, therefore, a strong commitment to a (closely connected) initiative with a far wider reach into more junior positions, wider stakeholder networks and regions. While an online platform was of interest in principle, stakeholders were mostly interested in generating new learning resources rather than a shared website that could delay progress.

Design considerations raised include:

- **Selecting content** – the consensus seemed to be that this should at least start from a fairly basic set of learning objectives (innovation 101) and then broaden out into additional content priorities. There was interest in a set of resources that gave insights into the historical development, challenges and strategic choices made in the UK, including within Innovate UK.
- **Ensuring accessibility** – the resources would need to be bilingual, user tested, and go beyond a digital library to be focused into pragmatic practice guides. Various approaches to delivery were suggested ranging from MOOCs to virtual and physical workshops.
- **Incentivising usage** – certification was popular, although there wasn't pressure to link this to formal qualifications. Some stakeholders suggested it would be possible to build interactive digital communities alongside the platform, others were sceptical about take-up rates if the programme wasn't compulsory.
- **Embedding in existing learning strategies (or stimulating them)** – while options varied across countries, there were suggestions of incorporating this content into new observatory platforms or learning programmes such as CORFO's academia, or integrating into formal civil service training programmes. The material should be creative commons to enable integration and adoption by a range of regional consultancies and trainers.

**We draw on all workshop feedback to create the final recommendations on the following slides:**



# Recommendation part 1: Collaborative Innovation Policy Leadership Programme

<b>What?</b>	High-intensity professional development programme for cross-system <b>cohorts</b> of innovation policy leaders (Levels 2 and 3) focused on addressing specific national challenges. Co-designed by the UK in partnership with the Pacific Alliance nations.
<b>For whom?</b>	Each 'intake' would comprise five cohorts of five leaders from across each national innovation system. (Mexico, Colombia, Peru, Chile, UK) <ul style="list-style-type: none"><li>• In each case this could involve for example participants from a) an innovation agency, b) the finance ministry, c) the research funding body, d) the intellectual property agency, d) the ministry of economy.</li><li>• Individual governments would select individual participants and the mix of agencies to be represented according to their national priorities.</li><li>• The programme would seek to build cross-system capabilities and address systemic failures as well as building individual organisational capabilities.</li></ul>
<b>How would it work?</b>	A modular programme comprising: <ul style="list-style-type: none"><li>• Action learning through a challenge-focused practical approach.</li><li>• Taught content on latest global developments, approaches and evidence in innovation policy from leading experts</li><li>• Immersive experiences in the UK innovation system .</li><li>• Ongoing peer mentoring and expert advice to cohorts on real-life challenges and projects they have selected.</li></ul>
<b>What would be the duration?</b>	Six months, combining some intensive residential (probably two five day visits by cohorts to the UK in month one and month three) with action learning periods and online review meetings. The first UK visit would be broad in coverage while the second would be highly targeted according to the chosen challenge area.
<b>How would they learn?</b>	<b>From leading experts</b> – classroom content, lectures and workshops. <b>From practitioners</b> – demonstration, study visits, shadowing. <b>From peers</b> – collective problem solving approach and creation of sustainable support networks for future activities.
<b>What would they learn?</b>	<b>Learning what to do:</b> Diagnosing problems, global best practice and evidence, new models and opportunities and UK experience focusing on priority areas of: cross-government coordination and whole system working; engaging the private sector; evaluation and data, and university-business links. Tailor-made programme based on newly commissioned content in addition, where appropriate, to existing courseware and services in the UK. <b>Learning how to do it:</b> Using a national challenge focus, the cohort will work together as a team to apply and test new approaches with support from UK peers, peer cohorts and expert coaches and facilitators from the UK. [This programme will be supplemented by practice guides to help embed changes in home organisations – see recommendation part two.]
<b>What would the outcomes be?</b>	<ul style="list-style-type: none"><li>• Performance and effectiveness of programmes.</li><li>• Creativity and leadership by participating policymakers in adopting and testing new approaches.</li><li>• Unblocking system failures, new connections and identification of complementarities across national systems, and across the Pacific Alliance innovation system.</li><li>• Continuous learning through alumni networks, peer support and global conferences.</li></ul>



## Recommendation part 2: Creation of a set of open access practitioner guides to designing and managing public innovation support programmes

<b>What?</b>	<p>Practice guides (3-5 in first instance) focusing on thematic challenge areas identified in our research.</p> <ul style="list-style-type: none"> <li>• These bilingual guides would embed learning and new practice in innovation agencies across the Pacific Alliance including, but not limited to, that developed as part of the collaborative leadership programme.</li> <li>• They would capture and codify models and methods within the UK innovation system, including practitioner tips and insights.</li> <li>• They would incorporate and curate existing UK content, latest and best practice, and generate new content where gaps exist.</li> </ul> <p>Standalone resources, these could additionally be developed in each system into train the trainer workshops by UK partners in collaboration with peers in the Pacific Alliance countries.</p>
<b>For whom?</b>	<p>They would be designed to target senior programme managers and implementers in innovation agencies and ministries, but would be relevant to a broad range of policymakers and managers.</p> <p>Particular targets for these resources would include:</p> <ul style="list-style-type: none"> <li>• Those joining an innovation agency, as part of an induction or orientation process and needing overviews, examples and a sense of the range of global best practice or those looking to implement innovation support in a regional context</li> <li>• Those looking to practically implement policies, programmes and initiatives generated by senior policymakers who have completed the leadership development programme.</li> </ul>
<b>How would it work?</b>	<p>The guides would be designed for and with policy and programme practitioners, and delivery would include effective user experience testing.</p> <p>Initial topics beyond and 'innovation 101' could be for instance:</p> <ul style="list-style-type: none"> <li>• Monitoring, evaluating and experimenting with innovation support programmes.</li> <li>• Understanding the motivations and barriers to innovation in firms and incentivising and supporting innovation in firms through competitive grant programmes.</li> <li>• Private sector innovation support programmes that address public and social challenges.</li> <li>• Designing programmes that build productive partnerships between universities and firms for innovation.</li> <li>• Communicating the importance of investing in innovation for economic growth to different audiences e.g. businesses, politicians/ public.</li> </ul> <p>The guides would be designed according to a common framework, for instance:</p> <ul style="list-style-type: none"> <li>➤ What we did, what we learned, and what we do now in the UK.</li> <li>➤ Common shared challenges and how to overcome them (including practitioner insights from Innovate UK and others).</li> <li>➤ In-depth models and insights from one or two UK programme cases.</li> <li>➤ Latest thinking/practice globally and key innovations in approach.</li> <li>➤ Links to further resources like those on OECD IPP or organisations within the UK.</li> </ul> <p>They would be as short and as accessible as possible while maintaining enough rigour and detail to be both credible and practically useful.</p> <p>Part of the development and piloting phase of the materials should involve embedding materials in local training and learning programmes.</p>



## Recommendation part 2: Creation of a set of open access practitioner guides to designing and managing public innovation support programmes

<b>How would the resources be accessed?</b>	<p>The resources would be open access both on the Innovate UK website, and embedded within partner government websites and training initiatives.</p> <p>Other options to be explored in addition to train the trainer workshops could include publicising the resources through webinars or online courses.</p>
<b>How would policymakers and managers be incentivised to use the resources?</b>	<p>Several strategies could be considered:</p> <ul style="list-style-type: none"><li>• Linking materials to topics focused on by leadership programme cohorts – so that participants in that programme can draw on the materials to assist in embedding learning in their organisations and implementing policies</li><li>• A modular training approach linked to the practice guides, where completion of several elements could lead to a certificate</li><li>• Embedding the materials in compulsory programmes within innovation agencies in the Pacific Alliance – such as core training, induction processes, or linked to specific new project development.</li></ul> <p>Users can pick and choose the guides relevant to them – with different learning experiences depending on their needs, for example:</p> <ul style="list-style-type: none"><li>• A light-touch engagement with a range of areas in order to heighten awareness of important concepts or opportunities from global best practice in innovation policy.</li><li>• A longer, more intensive learning experience with the materials as part of learning the ‘trade’ of an innovation policymaker entering from academia or a non-innovation policy role.</li><li>• Using practitioner implementation guides and toolkits to assist in the deployment of new innovation policies and programmes</li></ul>
<b>What would the outcomes be?</b>	<ul style="list-style-type: none"><li>• Wider sensitisation about innovation and the most effective policies to support it for economic and social impact amongst the policymaking community and the communities they seek to influence.</li><li>• Embedding the leadership programme learning across a wider range of innovation agency staff in Pacific Alliance countries</li><li>• Practical library or ‘toolbox’ for a range of policy training initiatives.</li><li>• Dual English and Spanish-language materials to assist with the development of language skills for easier access to other global best practice materials by Pacific Alliance policymakers.</li><li>• Greater awareness through the materials of the potential for learning and collaboration between the UK and Pacific Alliance countries on innovation policy.</li></ul>

## 3.6 Conclusions, and recommended next steps:

### Demand and opportunity

#### Market need

- Our scoping study indicates:
  - clear target audiences,
  - strong demand from senior policymakers and perceived need across the systems,
  - thematic priorities for capacity building from innovation policymakers in the Pacific Alliance.

#### Current provision

- We conclude that that need is not being well met currently by market offerings, either:
  - in the Pacific Alliance region or,
  - internationally

#### The role of the UK

- We conclude that the UK is well-placed to provide expert support in the areas of:
  - Practical experience
  - Craft knowledge
  - Cutting-edge thinking
  - Augmentations to existing training offers
- The UK has strengths in themes and topics of particular interest to the key Pacific Alliance stakeholders.
- Focusing on UK strengths and differentiating from other national government training offers will be important.

#### Using Newton to create a sustainable programme

- The programme will be more attractive and sustainable because of the collaborative partnership opportunity offered by the Newton Fund
- It is more cost effective for Pacific Alliance stakeholders
- It also creates resources for UK partners to invest in developing new and improved training offers relevant for a global audience.

#### Using this opportunity to help the UK develop new capabilities

- Capacity building for innovation policymakers is relatively new
- There is no established competency framework for innovation policy, and only a small range of initiatives to draw on and learn from around the world.
- Innovate UK could produce a world-first offer for innovation agencies to share and develop learning.
- It could also build a productive global network of peers across emerging and developed economies.

#### Working across Newton

- We recommend Innovate UK commission programmes that could operate with the Pacific Alliance, but that can also be scaled up and made available across Newton partners.

### 3.6 Conclusions, and recommended next steps:

#### Geographical considerations and building a global peer learning network

In this scoping study we were set the challenge of identifying options for capacity building that could operate at a **regional and even global scale**.

Our research suggests that working on innovation partnerships at a regional scale can present challenges – for example in terms of formal sign off. However, it also indicates that there are many advantages to designing this initiative at a regional, and ultimately global scale.

The regional, Pacific Alliance perspective of the programme is highly valuable and indeed unique. However, the UK should continue to engage with each national government and stakeholder group to understand and take into account their unique perspectives and needs. This should also be the case as-and-when Innovate UK choose to roll the programme out to other regions in addition.

For greatest impact the approach should be peer and practice-driven and supported (but not constrained) by diplomatic initiatives.

Advantages we identify include:

a) **economies of scale** – substantial core content is relevant to all countries and through the programme UK policymakers can interact with a far wider range of individuals and countries in a time efficient way

b) **productive network building** – while policymakers learn from case studies, examples and techniques they learn most from their peers, and gain from sustainable relationships with both regional and UK peers that will last far beyond the duration of this programme.

## 3.6 Conclusions, and recommended next steps:

### Delivery approach

#### **Timing:**

This scoping exercise has stimulated enthusiasm and interest among senior stakeholders in the Pacific Alliance innovation systems. Innovate UK should build on this momentum, and move as rapidly as possible onto a detailed design phase and a first pilot programme.

#### **Collaborative programme design:**

We recommend a detailed design phase is undertaken in close collaboration with stakeholders and delivery organisations in partner countries. This will help ensure appropriate content and focus, but also ensure resources link directly into national initiatives (e.g. innovation and entrepreneurship observatories in Colombia and Mexico or CORFO's Academia, or Fundación Chile's human capital development programmes). This should last for up to six months, followed by a pilot programme.

#### **Piloting, testing and embedding for sustainable impact:**

The programme should be seen as a collaborative experiment. With this in mind, in addition to the pilot professional development programme, the practice guides should be primarily developed in the UK but improved and adapted into train the trainer resources in partnership with organisation(s) in the Pacific Alliance region. The resources should not replicate existing offers, for example the OECD/World Bank IPP, but should instead complement newly developed content with available free resources and wider multilateral initiatives.



## 3.6 Conclusions, and recommended next steps:

### Delivery approach

#### **Delivery consortium:**

For greatest impact on UK and partner countries we suggest an integrated 'whole system' offer from the UK that incorporates a range of organisations and government initiatives, but is co-ordinated by a single neutral partner. The pump-priming from Innovate UK to develop content, design and test a new approach and secure contacts should mean the programme is sustainably delivered, with the support of UK government networks overseas, beyond the lifetime of Newton funding.

#### **The lead partner will require:**

Exceptional policy networks across the UK innovation system and internationally; cutting-edge knowledge of theory and practice in innovation policy; the proven ability to research and create well designed professional learning resources; practical experience of running innovation support programmes; exceptional networks across the UK innovation policy community and the legitimacy to act as its representative, convening power to bring together different actors (universities, consultancies, not-for-profits and government agencies) to develop and deliver a shared offer. The partner should also demonstrate how the programme will out-survive Newton funding.

#### **Complementary initiatives:**

Gaining profile and buy-in for the programmes will be crucial. We recommend that Innovate UK consider using separate Newton funds focused on capacity building to co-ordinate a Newton-wide conference of senior innovation agency and policymaker professionals in the UK in late 2015 or early 2016. This conference would particularly target, if possible, policymakers at the 'Level 1' seniority. Improving and cementing the reputation of the UK as a global leader in innovation policy would assist in gaining support for programmes across countries and targeting initiatives for greatest social and economic impact in partner countries. In addition, Newton partners should consider holding local events for innovation policymakers within the Pacific Alliance, potentially linked to the practice guides and targeting a more junior level of policymaker.

## Appendix:

- Project team
- Project team organisations overview
- Interviewee list
- Bibliography

### **Supplementary data – Available on request**

- Current UK provision of innovation policymaker development – Word file
- Pacific Alliance current innovation policymaker development provision – Excel file
- Interview write ups (Word and Excel files)

## Specialist



**Albert Bravo-Biosca**

Senior Economist

## Core Team



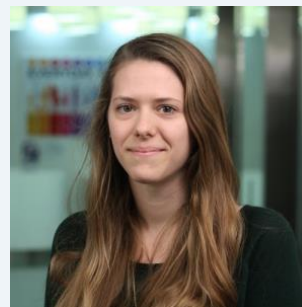
**Benjamin Reid**

Principal  
Researcher



**Kirsten Bound**

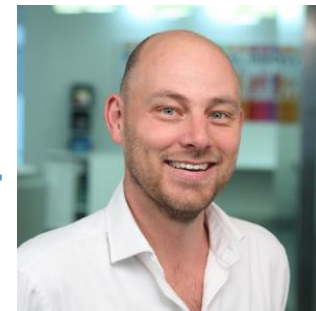
Head of  
International  
Innovation



**Florence Engasser**

Research  
Assistant

## Specialist



**Brenton Caffin**

Director of  
Innovation Skills

## Expert Project Partners



**Alberto Saracho-Martínez**

Partner and Director,  
Economic Development  
Division



UK Science  
& Innovation  
Network

**Innovate UK**

Technology Strategy Board



**Newton  
Fund**



**Hernán Araneda**

Head of the Centre  
for Innovation in  
Human Capital

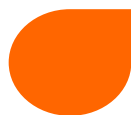




- ✓ Chilean non-profit organisation, set us as a PPP fostering innovation
- ✓ Extensive experience in capacity building, technology transfer, innovation public policy
- ✓ Work with Latin America and Global organisations

*Aims to transform Chile into a pole of innovation entrepreneurship through funding, human capital development and systemic interventions*

## SELECTIVE PORTFOLIO



**National Skills Certification System:** design, pilot and installation in 15 economic sectors; the project has certified 50,000+ workers and is a component of the National Innovation Strategy for Competitiveness



**Innpulsa Colombia:** development of a Public Sector Open Innovation Platform for key Colombian anchor sectors (2013)



- ✓ Mexican and Colombian public policy think-tank for innovation and entrepreneurship
- ✓ Specialists in analysis, policy design and capacity building
- ✓ Extensive experience in South America and across the world

*Aims to drive economic and social sustainable development in Mexico and Latin America through the generation of innovative ideas in public policies*

### SELECTIVE PORTFOLIO



**B20 Business Summit:** FI brought together 14 heads of state and 400 global CEOs to enrich the G20 discussions in 2012



**Promoting Innovation in SMEs:** 'The State of the Art' has become a go to guide for the design on innovation policy in Mexico and Latin America

# Interviewees: Chile, Colombia

Country	Organisation	Name	Job Title
Chile	CORFO	Patricio Aguilera	Chief Executive Officer
		Claudio Maggi	Head of Competitive Development Division
		Macarena Aljaro	Technological Programme Sub-Director
		Marlene Sánchez	Antofagasta Regional Director
	CNID	Gonzalo Rivas	President
		Jaime Alvarez	Executive Secretary
	CONYCIT	Gonzalo Arenas	International Cooperation Programme Director
		Denise Saint-Jean	Head of Scholarship Division
	Ministry of Economy	Andrés Zahler	Head of Innovation Division
		María José Bravo	Strategic Sector and Statistics Responsible, Innovation Division
Colombia	iNNpulsa	Catalina Ortiz	Ex-Director
		Mary Luz Escobar	Manager of Products and Services
		Juliana Ossa Duque	Director of Business HyperGrowth
	Colciencias	Alejandro Olaya	Sub-Director General
	National Planning Department	Paula Escobar	Sub-Director of Education
	Ministry of Commerce, Industry and Tourism	Alejandro Gómez Cano	Advisor at the Micro and SMEs Division
	Colombian Observatory of Science and Technology	Mónica Salazar	Director
	Cali's Commerce Chamber	Isabella Echeverry Peñón	Director of Business Innovation and Entrepreneurship
	Private Council on Competitiveness	Marco Llinás Vargas	Vice-President
	Ruta N Corporation	Elkin Echeverri	Director of STI Plan

# Interviewees: Mexico, Peru

Country	Organisation	Name	Job Title
Mexico	Ministry of Finance	Raúl Rendón Montemayor	General Director of Innovation, Services and Domestic Trade
		Eduardo Piedra	Director of sectoral and regional productivity analysis
	CONACYT	Teresa de León Zamora	Head of Technology Commercialisation
	INADEM	Adriana Tortajada	Area Director
	FUMEC	Guillermo Fernández de la Garza	Executive Director
	Government of the State of Morelos	Brenda Valderrama	Secretary of Innovation, Science and Technology
Peru	CONCYTEC	Juana Kuramoto	Director of STI Policy and Programmes
		Antón Sebastian Willems Delanoy	Deputy Director of Technology Transfers
		Antonio Manuel Morán Cárdenas	Sub-Director of Science, Technology and Talents
		Omar Corilloclla	Director of Research and Studies
		Alejandro Afuso	Executive Director of FINCYT and Responsible Executive of Innovate Peru
	Ministry of Production	Alejandro Bernaola	General Director of Innovation, Knowledge Transfer and Business services
		Sergio Rodríguez	Sub-Director of Innovation
		Maggy Manrique	Sub-Director of Technology Transfer



# Bibliography (1)

- **Arbeláez, M.A., Parra, M.** (2011) *Innovation, R&D Investment and Productivity in Colombian Firms*. Washington D.C.: IADB.
- **Biblioteca del Congreso Nacional de Chile (BCN).** (2014) *Indicadores Ciencia y Tecnología: Comparado Chile, Argentina, Portugal y Holanda*. Santiago: Biblioteca del Congreso Nacional de Chile.
- **Bitrán, E. and Benavente, J. and Maggi, C.** (2011) *Bases para una Estrategia de Innovación y Competitividad para Colombia*. Santiago: Centro de Productividad Universidad Adolfo Ibáñez.
- **Business Monitor International (BMI).** (2013) *Colombia Business Forecast Report Q3 2013*. London: Business Monitor International Ltd.
- **Brunner, J. and Elacqua, G.** (2003) *Capital Humano en Chile*. Santiago: Universidad Adolfo Ibáñez.
- **Cabrero Mendoza, E., et al.** (2006) “El diseño institucional de la política de ciencia y tecnología en México: revisión y propuestas para su reforma”. In Cabrero Mendoza, E., et al. (Eds), *El diseño institucional de la política de ciencia y tecnología en México*. México D.F.: Universidad Autónoma de México.
- **Comité Intersectorial para la Innovación (México).** (2011) *Programa Nacional de Innovación*. México: Gobierno de México.
- **CONCYTEC.** (2013) *CONCYTEC – nuevos tiempos para la CTI. Memoria 2012-2013*. Lima: CONCYTEC.
- **Congress of the Republic of Colombia.** (2011) *Law 1450 of 2011*. Available from: [http://www.secretariasenado.gov.co/senado/basedoc/ley\\_1450\\_2011.html](http://www.secretariasenado.gov.co/senado/basedoc/ley_1450_2011.html) [Accessed: 29/04/2015].
- **Congress of the Republic of Colombia.** (2009) *Law 1286 of 2009*. Available from: [http://www.colciencias.gov.co/sites/default/files/upload/reglamentacion/ley\\_1286\\_de\\_2009.pdf](http://www.colciencias.gov.co/sites/default/files/upload/reglamentacion/ley_1286_de_2009.pdf) [Accessed: 29/04/2015].
- **CONICYT.** (2013) *Memoria de Gestión 2010-2013*. Santiago: CONICYT.
- **Consejo Minero.** (2014) “Panorama económico de la minería”. [Online] Available from: <http://www.consejominero.cl/chile-pais-minero/panorama-economico-de-la-mineria/> [Accessed: 15/01/2015].

## Bibliography (2)

- **Consejo Nacional de Innovación para la Competitividad (CNIC).** (2010) *Agenda de Innovación y Competitividad 2010-2020*. Santiago: CNIC.
- **Consejo Privado de Competitividad.** (2014) *Informe Nacional de Competitividad 2014-2015*. Bogotá D.C.: Consejo Privado de Competitividad.
- **Consejo Privado de Competitividad.** (2013) *Compite No. 20*. Bogotá D.C.: Consejo Privado de Competitividad.
- **CORFO.** (2013) “Institucionalidad Ciencia, Tecnología E Innovación. Informe Final”. Corfo.cl. [Online] Available from: <http://www.corfo.cl/sala-de-prensa/noticias/2013/mayo-2013/comision-asesora-en-ciencia-tecnologia-e-innovacion-entrega-informe-al-presidente> [Accessed: 15/01/2015].
- **Cornell University, INSEAD and WIPO.** (2014) *The Global Innovation Index 2014: The Human Factor in Innovation*. Ithaca, Fontainebleau and Geneva.
- **DANE (National Administrative Department of Statistics).** (2013) *Encuesta de Desarrollo e Innovación Tecnológica en la industria manufacturera (EDIT VI)*. Bogotá D.C.: DANE.
- **Díaz, J.J. and Kuramoto, J.** (2011) *Políticas de ciencia, tecnología e innovación*. Lima: CIES.
- **Departamento Nacional de Planeación (DNP).** (2015) *Bases del Plan Nacional de Desarrollo 2014-2018*. Available from: <https://colaboracion.dnp.gov.co/CDT/Prensa/Bases%20Plan%20Nacional%20de%20Desarrollo%202014-2018.pdf> [Accessed: 29/04/2015].
- **Departamento Nacional de Planeación (DNP)** (2012) ‘Law 1530 of 2012’. Available from: <https://www.sgr.gov.co/LinkClick.aspx?fileticket=8UjxKq3dJsYper cent3D&tabid=182> [Accessed: 19/05/2015.]
- **ERAWATCH.** (2015) Platform on Research and Innovation policies and systems. Available from: [http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country\\_pages/cl/country?section=ResearchPolicy&subsection=ResPolFocus](http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/cl/country?section=ResearchPolicy&subsection=ResPolFocus) [Accessed: 29/04/2015].

## Bibliography (3)

- **Escalante, J.** (2014). “Fondos estatales y privados impulsaron emprendimientos en 2014”. *El Comercio*. [Online] 30th December. Available from: <http://elcomercio.pe/economia/peru/fondos-estatales-y-privados-impulsaron-emprendimientos-2014-noticia-1781673> [Accessed: 19/01/2015].
- **Ezell, S.J., and Atkinson, R.D.** (2010) *The Good the Bad and the Ugly (and self-destructive) of Innovation Policy: A Policymaker's Guide to Crafting Effective Innovation Policy*. Washington D.C.: The Information Technology and Innovation Foundation.
- **Foro Consultivo Científico y Tecnológico (FCCyT).** (2007) *Fortalecimiento del Sistema de Centros Públicos de Investigación sectorizados en CONACyT*. México D.F.: FCCyT.
- **FCCyT.** (2006a) *Conocimiento e Innovación en México: Hacia una política de estado. Elementos para el Plan Nacional de Desarrollo y el Programa de Gobierno 2006-2012*. México D.F.: Gobierno de México.
- **FCCyT.** (2006b) *Propuestas para contribuir el diseño del PECITI 2012-2037*. México D.F.: FCCyT.
- **Fundación IDEA.** (2013) *Evaluación Transversal: Políticas y Programas para el desarrollo de la juventud*. México D.F.: Fundación IDEA.
- **Fundación Telefónica.** (2011) *InnovaLatino: Impulsando la innovación en América Latina*. Madrid: Fundación Telefónica.
- **Global Entrepreneurship Monitor (GEM).** (2014) *Dinámica Empresarial Colombiana 2013*. Bogotá D.C.: GEM Colombia.
- **GEM.** (2013a) *Monitor Global de la Actividad Emprendedora – México 2013*. México D.F.: GEM México.
- **GEM.** (2013b) *Global Entrepreneurship Monitor 2012 Global Report*. London: Global Entrepreneurship Research Association.
- **Gómez, H. and Mitchell, D.** (2014) *Innovación y Emprendimiento en Colombia Balance, Perspectivas y Recomendaciones de Política 2014-2018*. Bogotá D.C.: Fedesarrollo.
- **Goodman, J. S. and O’Brien, J.** (2012) “Teaching and learning using evidence-based principles”. In Rousseau, D.M. (Ed.), *Oxford handbook of evidence-based management*, pp.309-336. Oxford: Oxford University Press.

## Bibliography (4)

- **Hulten, C.R.** (2001) "Total factor productivity. A short biography". In: Hulten, C.R., Dean, E.R. and Harper, M.J. (Eds.), *New Developments in Productivity Analysis*, pp.1-54. Chicago: University of Chicago Press.
- **Innovacion.cl.** (2014) "Centro de excelencia llega a Chile para potenciar la sustentabilidad minera". [Online] Available from: <http://www.innovacion.gob.cl/2014/07/centro-de-excelencia-llega-a-chile-para-potenciar-la-sustentabilidad-minera/> [Accessed: 02/02/2015].
- **Innovos Group** (2013). *Evaluación Final del Programa de Ciencia y Tecnología (FINCyT)*. Córdoba: Innovos Group.
- **Instituto Mexicano para la Competitividad (IMCO).** (2014) *Los Emprendedores de TIC en México. Recomendaciones de política pública para su nacimiento, crecimiento y consolidación*. México D.F.: IMCO.
- **Inter-American Development Bank (IADB).** (2014) *Programa de apoyo a la Innovación y la Competitividad*. Washington D.C.: IADB.
- **IADB.** (2010a) *Ciencia, Tecnología e Innovación en América Latina y el Caribe*. Washington D.C.: IADB.
- **IADB.** (2010b) *Industrial Policy in Chile*. Washington D.C.: IADB.
- **IMD.** (2014) *World Competitiveness Yearbook*. Lausanne: IMD World Competitiveness Centre.
- **INEGI.** (2012) *México de un Vistazo 2012*. Aguascalientes: INEGI.
- **INEGI and CONACYT.** (2012) *Encuesta sobre Investigación y Desarrollo Tecnológico y Módulo sobre Actividades de Biotecnología y Nanotecnología*. Aguascalientes: INEGI.
- **Kantis, H., Federico, J., and García, S.I.** (2014) *Index of Systemic Conditions for Dynamic Entrepreneurship: A tool for action in Latin America*. Rafaela: Asociación Civil Red Pymes Mercosur.
- **LAVCA.** (2013) "Scorecard 2013: The Private Equity and Venture Capital Environment in Latin America". Latin American Private Equity & Venture Capital Association.

## Bibliography (5)

- **Lundvall, B.A.** (2010) *National Innovation Systems: Towards a Theory of Innovation and Interactive Learning*. London: Anthem Press.
- **MICRODATOS.** (2013) *Segundo Estudio de Competencias Básicas de la Población Adulta y Comparación Chile 1998-2013*. Santiago: OTIC.
- **Ministerio de Economía, Fomento y Turismo (Chile).** (2015) *Resultados Preliminares IV Encuesta sobre Gasto y Personal en I+D*. Santiago: Gobierno de Chile.
- **Ministerio de Economía, Fomento y Turismo (Chile).** (2014a) *Innovación y la Ley sobre Incentivo Tributario a la I+D*. Santiago: Gobierno de Chile.
- **Ministerio de Economía, Fomento y Turismo (Chile).** (2014b) *Cuenta Pública 2014*. Santiago: Gobierno de Chile.
- **Ministerio de Economía, Fomento y Turismo (Chile).** (2014c) *8va Encuesta de innovación en Empresas, 2011-2012. Principales Resultados*. Santiago: Gobierno de Chile.
- **Ministerio de Economía, Fomento y Turismo (Chile).** (2013) *¿Cuánto cooperan las empresas para innovar?* Santiago: Gobierno de Chile.
- **Ministerio de la Producción (Peru).** (2012) "65.5% de empresas manufactureras realizan actividades de innovación en el Perú". [Online] Available from: <http://www.produce.gob.pe/index.php/prensa/noticias-del-sector/1128-655-de-empresas-manufactureras-realizan-actividades-de-innovacion-en-el-peru> [Accessed: 15/01/2015].
- **Observatorio de Ciencia, Tecnología e Innovación (OCyT).** (2014) *Indicadores de Ciencia y Tecnología 2013*. Bogotá D.C.: OCyT.
- **OECD.** (2015) *Latin American Economic Outlook: Education, Skills and Innovation for Development*. Paris: OECD Publishing.
- **OECD.** (2014a) *OECD Reviews of Innovation Policy: Colombia*. Paris: OECD Publishing.
- **OECD.** (2014b) *National Intellectual Property Systems, Innovation and Economic Development: With perspectives on Colombia and Indonesia*. Paris: OECD Publishing.
- **OECD.** (2014c) *Financing SMEs and Entrepreneurs 2014 : An OECD Scoreboard*. Paris: OECD Publishing.

## Bibliography (6)

- **OECD.** (2013a) *Latin American Economic Outlook: SME Policies for Structural Change*. Paris: OECD Publishing.
- **OECD.** (2013b) *Estudios Económicos de la OECD – Chile: Visión General*. Paris: OECD Publishing.
- **OECD.** (2013c) *Knowledge-based Start-ups in Mexico*. Paris: OECD Publishing.
- **OECD.** (2012) *Nota País, México: Programa para la Evaluación Internacional de Alumnos (PISA)*. s.l.: s.n.
- **OECD.** (2011a) *OECD Reviews of Innovation Policy: Peru*. Paris: OECD Publishing.
- **OECD.** (2011b) *OECD Factbook 2011-2012: Economic, Environmental and Social Statistics*. Paris: OECD Publishing.
- **OECD.** (2009) *OECD Reviews of Innovation Policy: Mexico*. Paris: OECD Publishing.
- **OECD.** (2007) *OECD Reviews of Innovation Policy: Chile*. Paris: OECD Publishing.
- **Parra, M.** (2013) *Exenciones fiscales para la I+D+i, experiencias en América Latina y retos pendientes. Evaluación del caso colombiano*. Washington D.C.: IADB.
- **Pearson and CUREE.** (2012) *Understanding What Enables High Quality Professional Learning: A report on the research evidence*. London and Coventry.
- **Peña Ahumada, J.A., and Archundia Navarro, L.** (2006) “En El Marco Institucional de la Política de Ciencia y Tecnología en México”. In Cabrero Mendoza, E., et al. (Eds), *El diseño institucional de la política de ciencia y tecnología en México*, pp.133-200. México D.F.: Universidad Autónoma de México.
- **Perfetti, J.J.** (2010) “Ciencia, Tecnología e Innovación (CT+I)”, in *Colombia 2010-2014: Propuestas de Política Pública*. . Bogotá D.C.: CAF and Fedesarrollo.
- **Porter, M.E., and Stern, S.** (2002) “National Innovative Capacity”. In Porter, M.E. et al. (Eds.). *The Global Competitiveness Report 2001–2002*. New York: Oxford University Press.

## Bibliography (7)

- **Presidency of the Council of Ministers (Peru).** (2015) “Jefa del Gabinete entrega más de s/. 16 millones para primer Centro de Excelencia del Perú”. [Online] Available from: <http://www.pcm.gob.pe/2015/01/jefa-del-gabinete-entrega-mas-de-s-16-millones-para-primer-centro-de-excelencia-del-peru/> [Accessed: 21/01/2015].
- **Presidency of the Republic of Colombia.** (2012) *Decree 1500 of 2012*.
- **Presidency of the Republic of Colombia.** (2006) *Decree 2828 of 2006*. Available from: [www.mincit.gov.co/descargar.php?id=19809](http://www.mincit.gov.co/descargar.php?id=19809) [Accessed: 29/04/2015].
- **Presidency of the Republic of Colombia.** (1991) *Decree 585 of 1991*. Available from: [http://www.colciencias.gov.co/sites/default/files/upload/reglamentacion/decreto\\_585\\_de\\_1991.pdf](http://www.colciencias.gov.co/sites/default/files/upload/reglamentacion/decreto_585_de_1991.pdf) [Accessed: 29/04/2015].
- **Presidency of the Republic of Colombia.** (1968) *Decree 2869 of 1968*. Available from: [http://www.mineducacion.gov.co/1621/articles-104217\\_archivo\\_pdf.pdf](http://www.mineducacion.gov.co/1621/articles-104217_archivo_pdf.pdf) [Accessed: 29/04/2015].
- **Red Interamericana de Competitividad (RIAC).** (2012) *Señales de Competitividad de las Américas 2012*.
- **Rivas, G. and Rovira, S.** (Eds). (2014) *Nuevas instituciones para la Innovación, Prácticas y Experiencias en América Latina*. Working Document No 601. Santiago: UN ECLAC.
- **Sánchez Zinny, G.** (2014) “¿Cómo generar más emprendimiento e Innovación en América Latina?”. [Online] El País Internacional. Available from: [http://internacional.elpais.com/internacional/2014/09/10/actualidad/1410367562\\_157223.html](http://internacional.elpais.com/internacional/2014/09/10/actualidad/1410367562_157223.html) [Accessed 12/02/2015].
- **Thorsell, J. and Bridge, J.** (2014) “Executive Development: a cry for immediate benefit”. In *World Commerce Review*, June 2014, pp.64-68.
- **Tvevad, J.** (2014) *Policy Briefing: The Pacific Alliance: Regional integration or fragmentation?* Strasbourg: European Parliament, DG EXPO.
- **Watkins, A., and Ehst, M.** (2008) *Science, Technology and Innovation: Capacity Building for Sustainable Growth and Poverty Reduction*. Washington D.C.: World Bank Publications.
- **World Bank.** (2015) Open Data Indicators on Research and Development. [Online] Available from: <http://data.worldbank.org/> [Accessed: 21/01/2015].