— ENTRE PARES 2016

SCIENCE & INNOVATION IN MEXICO

SHYAM SURIANARAYANAN
DIRECTOR, IP & APPLIED SCIENCES

SEPTEMBER 2016

THOMSON REUTERS™

180+ Patent & Trademark Offices linked to the World Intellectual Property Organization (WIPO)

100M+ Number of patents out there in the world now

4.5% Year-on-Year growth rate in global patent filings in 2014 (~2.7M Patents)

80% Of the technical knowledge is only disclosed in patents

PATENTS ARE A UNIQUE RESOURCE FOR TECHNICAL LITERATURE

IN THE NEXT 50+ MINUTES…

01 Patents 101
- Connecting Research & Development, Innovation & Patents
- Navigating The Research & Innovation Cycle
- Building Blocks For A Knowledge Economy

02 Innovation in Mexico
- Mexico's Scientific Output
- Patent Filings & Quality
- Technology Landscapes & Key Players
- Industry-Science Linkages

03 Case Study:
- How Do Other National Science Agencies Use Scientific Information To Make Strategic Decisions?

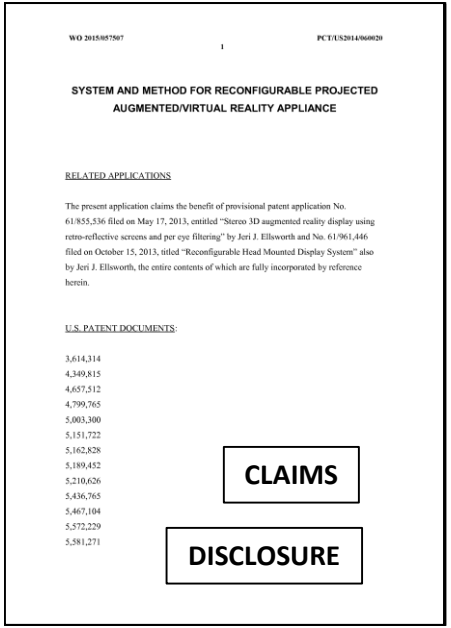
PATENTS 101 – A PRIMER

What is a Patent?

- Legal document
- Exclusive right given by law
- Complete disclosure of the invention

The majority are for incremental improvements

What does it look like?



WO 2015/057507 PCT/US2014/060020

1

SYSTEM AND METHOD FOR RECONFIGURABLE PROJECTED AUGMENTED/VIRTUAL REALITY APPLIANCE

RELATED APPLICATIONS

The present application claims the benefit of provisional patent application No. 61/855,536 filed on May 17, 2013, entitled "Stereo 3D augmented reality display using retro-reflective screens and per eye filtering" by Jeri J. Ellsworth and No. 61/961,446 filed on October 15, 2013, titled "Reconfigurable Head Mounted Display System" also by Jeri J. Ellsworth, the entire contents of which are fully incorporated by reference herein.

U.S. PATENT DOCUMENTS:

3,614,314
4,349,815
4,657,512
4,799,765
5,003,300
5,151,722
5,162,828
5,189,452
5,210,626
5,436,765
5,467,104
5,572,229
5,581,271

CLAIMS

DISCLOSURE

- **Front Page**
- **Disclosure**
- **Claims**

Patentability Conditions?

- Novel
- Non-Obvious
- Useful
- Unique
- Legally & morally acceptable

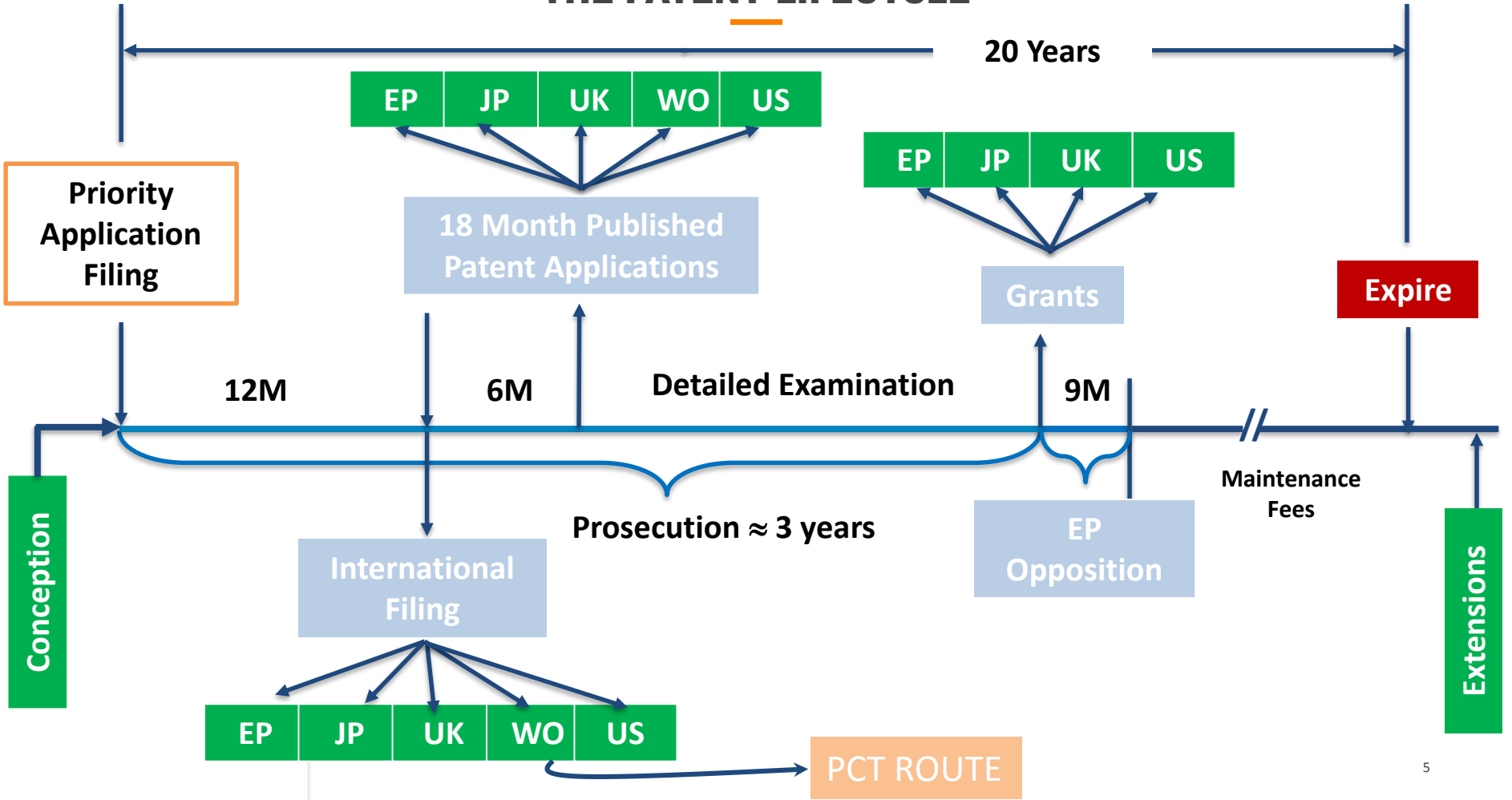
Legal & moral acceptability depends on which country protection is being filed for

What can be Patented?

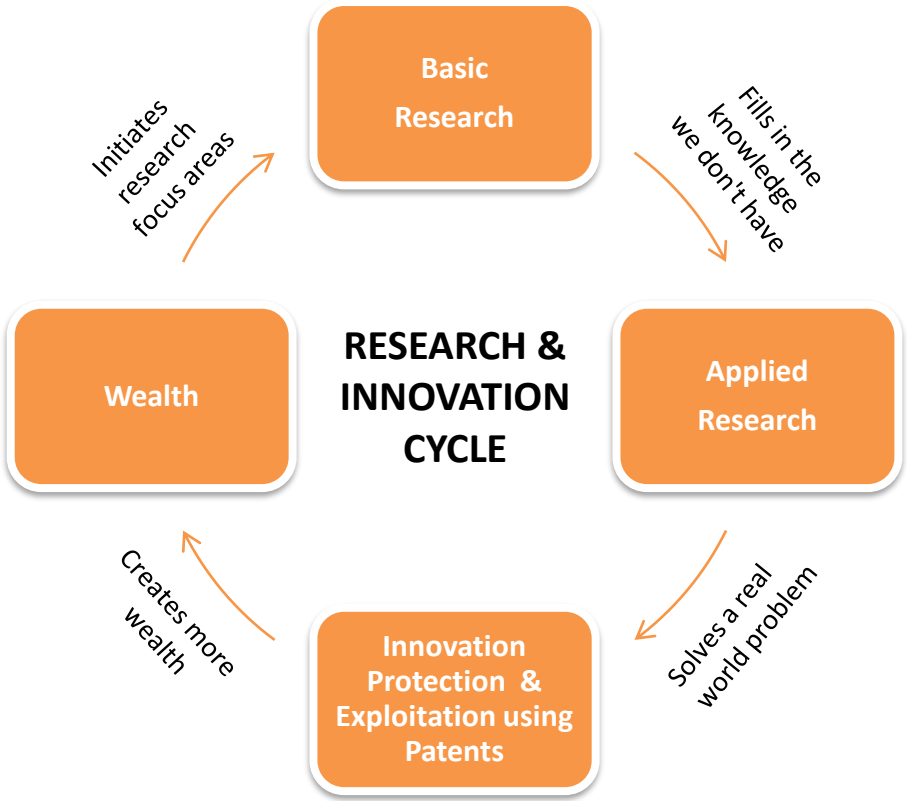
- A process
- A machine
- A composition of matter
- The manufacture of any of the above

What can be patented depends on the country

THE PATENT LIFECYCLE



CONNECTING RESEARCH & DEVELOPMENT, INNOVATION & PATENTS



NAVIGATING THE RESEARCH & INNOVATION CYCLE IS NOT EASY

RESEARCH OFFICES (UNIVERSITIES)

Emerging Research? Technology Trends?

Which technologies must be patent protected?

Scientific Diversity?

How to measure impact of Government funding?

GOVERNMENT AGENCIES

Develop & implement innovation policies?

How to link innovation to economic development?

Funding incentives?

Measure output in the form of Patents/Products?

TECHNOLOGY TRANSFER OFFICES

Identifying partners, licensees?

Map university patent volumes by categories?

Identifying overlapping technologies?

How do we track new inventions?

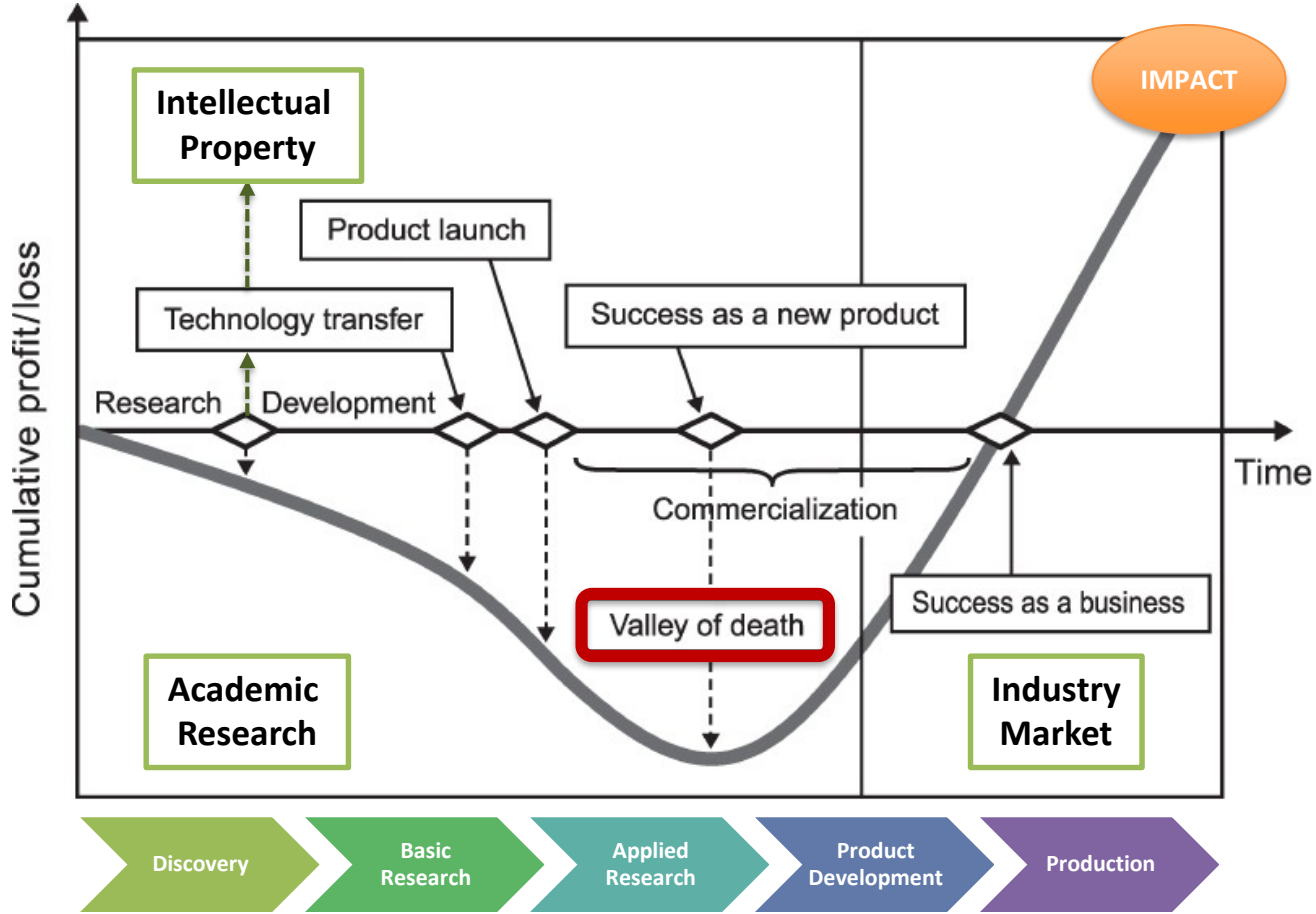
LIBRARY (UNIVERSITIES)

Conduct comprehensive prior-art searches?

How to define invention disclosures?

Identify emerging technology trends?

THE VALLEY OF DEATH



E.g. Pharmaceutical Industry

- In 2015, scientific journals published **1.2 million medical research papers**, but only **396 potential drugs** were submitted to U.S. regulators for permission to begin human testing.
- How do we bridge the gap?

TRANSCENDING THE VALLEY OF DEATH

- Due-diligence on proposals from universities
- Assessing proposed research against wider landscape (typically global in nature)

Informed Funding Decisions

- Understand the technology landscape *before* making any investment decisions:
  - Horizon Scanning
  - State of the Art?
  - Patentability?
  - Who are the Key Players?
  - **Opportunities & Threats**

- Measure the overall success of funding based on research output
- Measure impact of academic research Vs. country's economic growth

Assessing Research Output Periodically

- Assess funding impact with patent strength indices
- Structured analysis of scientific literature & patents provide innovation activity across the development spectrum

- Benchmark Key Performance Indicators (KPI) at country level
- Explore linkage between innovation and economic development

Updating Policy Decisions

- Assess Innovation with patent strength indices
- Creation of modelled data as a knowledge base allows for commercialisation performance to be verified and identify "what is good"

- Finding partners
- Finding licensing opportunities
- Finding markets for your technology

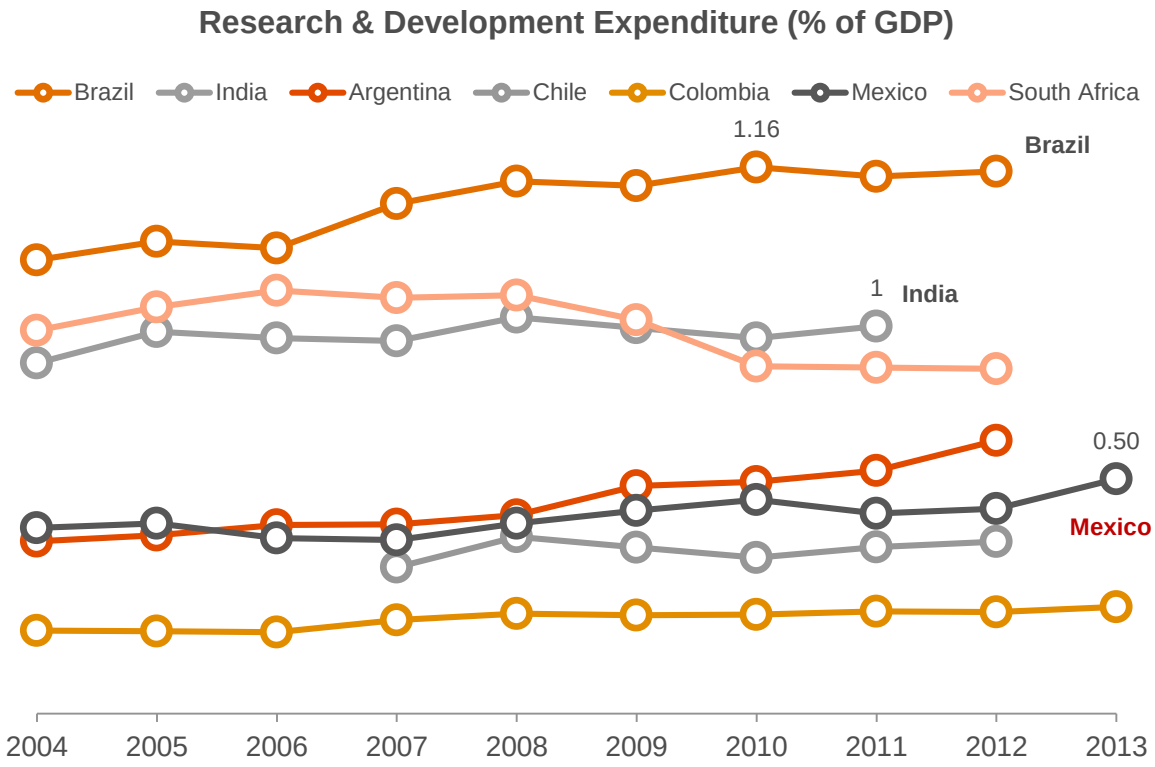
Exploring Industry-Science Linkages

- Conduct patent citation analyses to find in and out licensing partners
- Freedom-To-Operate?
- Patent/Scientific Literature landscaping can be done on multiple levels

ADDITIONAL TOOLS TO SUPPORT MEXICO'S PLAN TO CREATE A KNOWLEDGE ECONOMY

A CLOSER LOOK: INNOVATION IN MEXICO

INNOVATION IN MEXICO

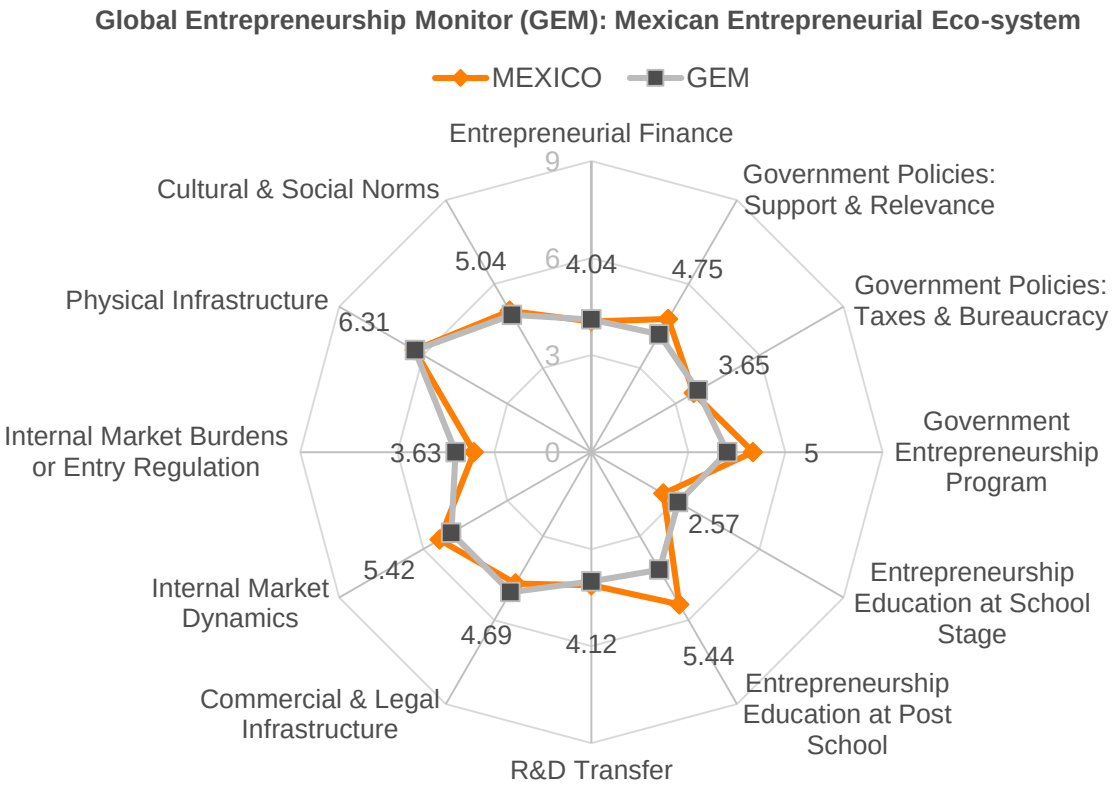


KEY INDICATORS

- Mexico GDP experiencing a CAGR of ~3%
- Mexico invests less than 0.5% of its GDP in Research & Development
- SME contribution to GDP: 52%
- The country ranks 61st (2016) on the Global Innovation Index (GII):
  - Down from 57th position in 2015 – **The lower ranking was influenced by low Intellectual Property Receipts in Mexico**
  - Better than India (66th) and Brazil (69th)

Source: World Bank, Global Innovation Index, World Economic Forum and IP&S Professional Services

INNOVATION IN MEXICO – ENTREPRENEURIAL ECO-SYSTEM

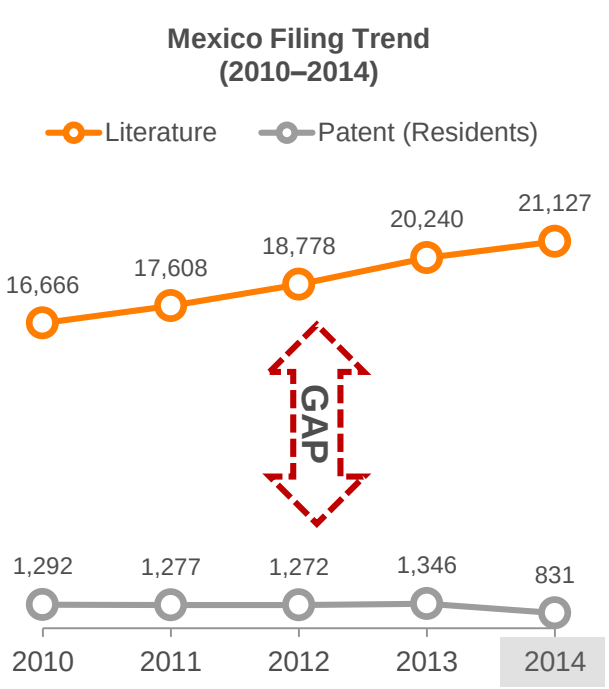


Scale
1 = Highly Insufficient
9 = Highly Sufficient

Source: Global Entrepreneurship Monitor 2016 Report

MEXICO'S SCIENTIFIC OUTPUT

MEXICO'S SCIENTIFIC OUTPUT (2010-2014)



Top Technology Domains in Mexico	Publications in Mexico (Based on Address)	Patents from Residents (Based on first filing)
Medical Sciences	10,788	830
Chemistry & Metallurgy	11,348	859
Electronics & Telecommunication	9,509	456

- We observe a clear upward trend in scientific publications while patent creation by Residents has remained flat.
- Typically, once a country establishes the key technology areas, patents in those areas are given more focus.

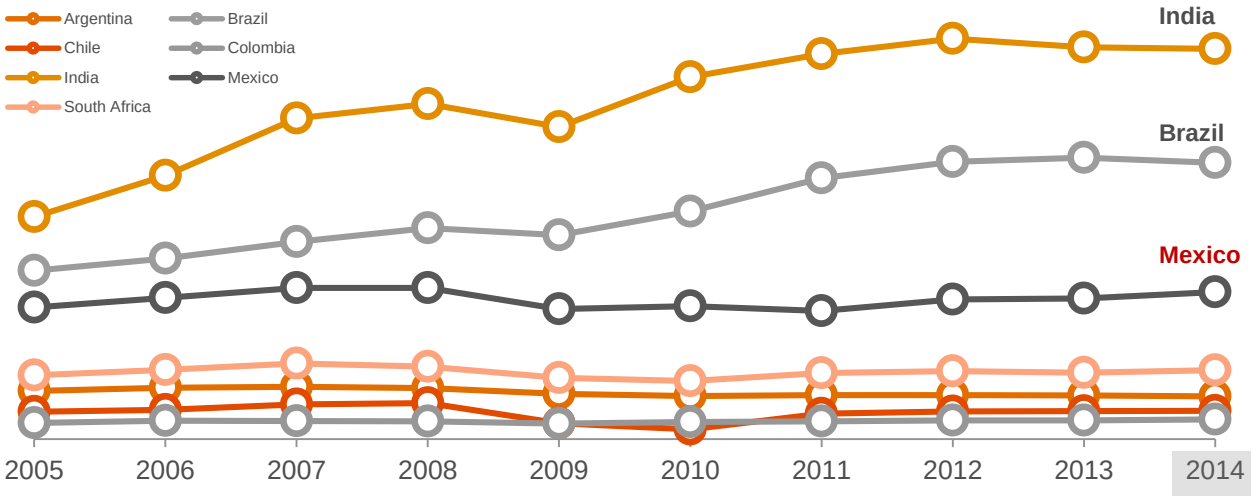
Source: Web of Science, Thomson Innovation and IP&S Professional Services

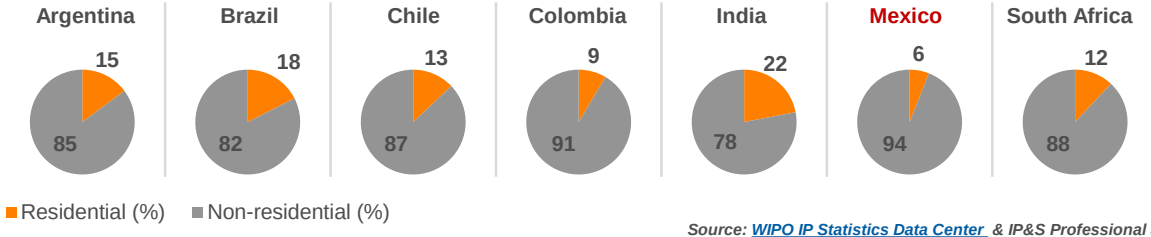
Residents: *Patent inventions originated from the respective country (First filing from that company)*

Kindly note that the patent data from 2014 onwards is incomplete due to lag in application publication

WHAT ARE THE PATENT FILING TRENDS?

Patent Filing Trend for Emerging Markets (2005–2014)





Source: WIPO IP Statistics Data Center & IP&S Professional Services

Residential: *Patent inventions originated from the respective country (First filing from that company)*

Non-residential: *Patent applications originated from the foreign country and protected in the indicated country (First filing in a foreign country)*

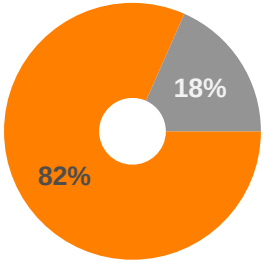
Kindly note that the data from 2014 onwards is incomplete due to lag in application publication

KEY: Country (Patent Filings in Thousands – Since 2005)

COMPARING PATENT QUALITY VS. QUANTITY (LAST 10 YEARS)

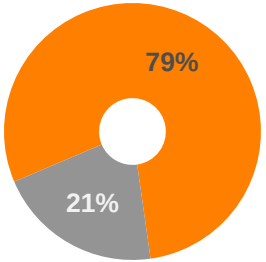
INDIA

Residential Grant Success



~18% of the total residential application are granted

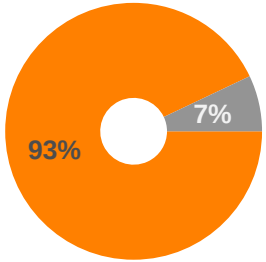
Non-residential Grant Success



~21% of the total non-residential application are granted

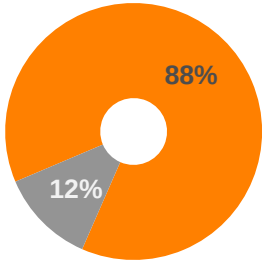
BRAZIL

Residential Grant Success



~7% of the total residential application are granted

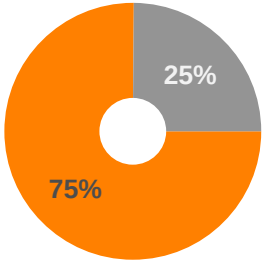
Non-residential Grant Success



~12% of the total non-residential application are granted

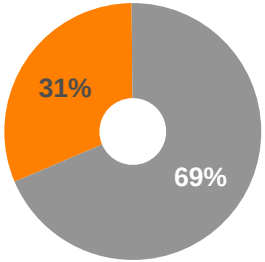
MEXICO

Residential Grant Success



~25% of the total residential application are granted

Non-residential Grant Success



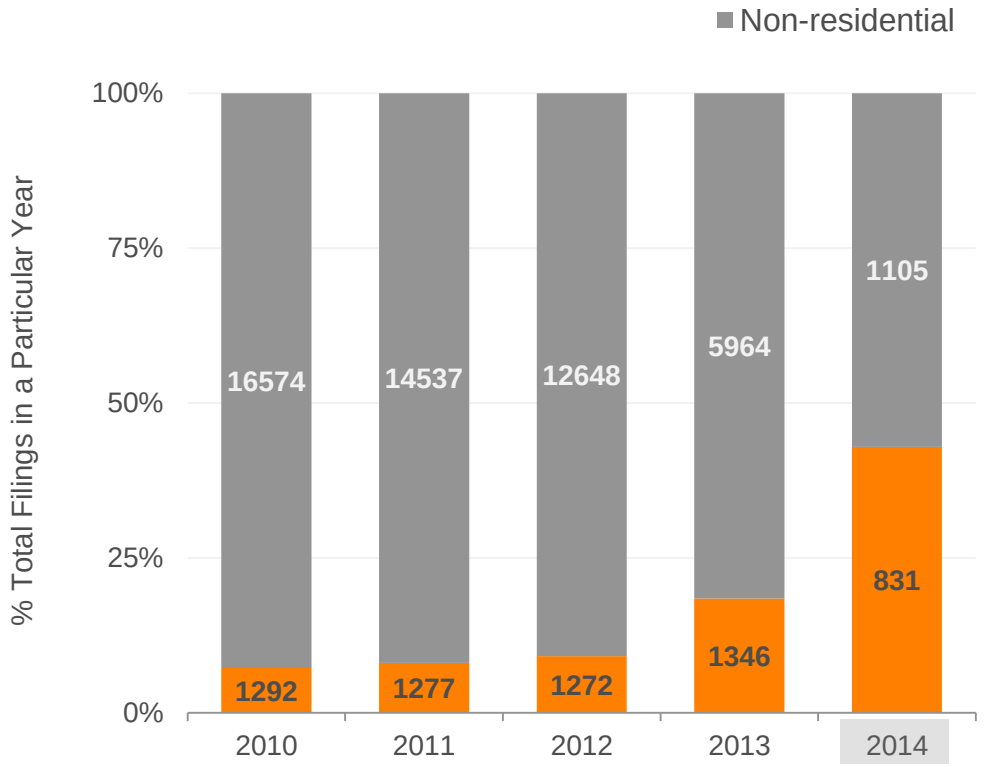
~69% of the total non-residential application are granted

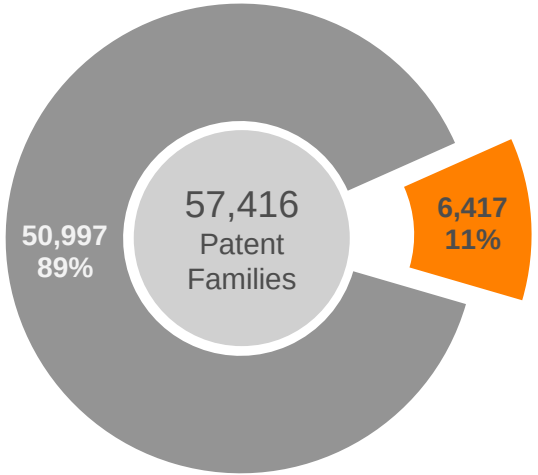
■ Published Applications ■ Granted Applications

Source: ***WIPO IP Statistics Data Center*** ***& IP&S Professional Services***

Note: Mexico's patent volumes are lower in comparison to Brazil and India

PATENT FILING SPLIT BY RESIDENTS VS. NON-RESIDENTS

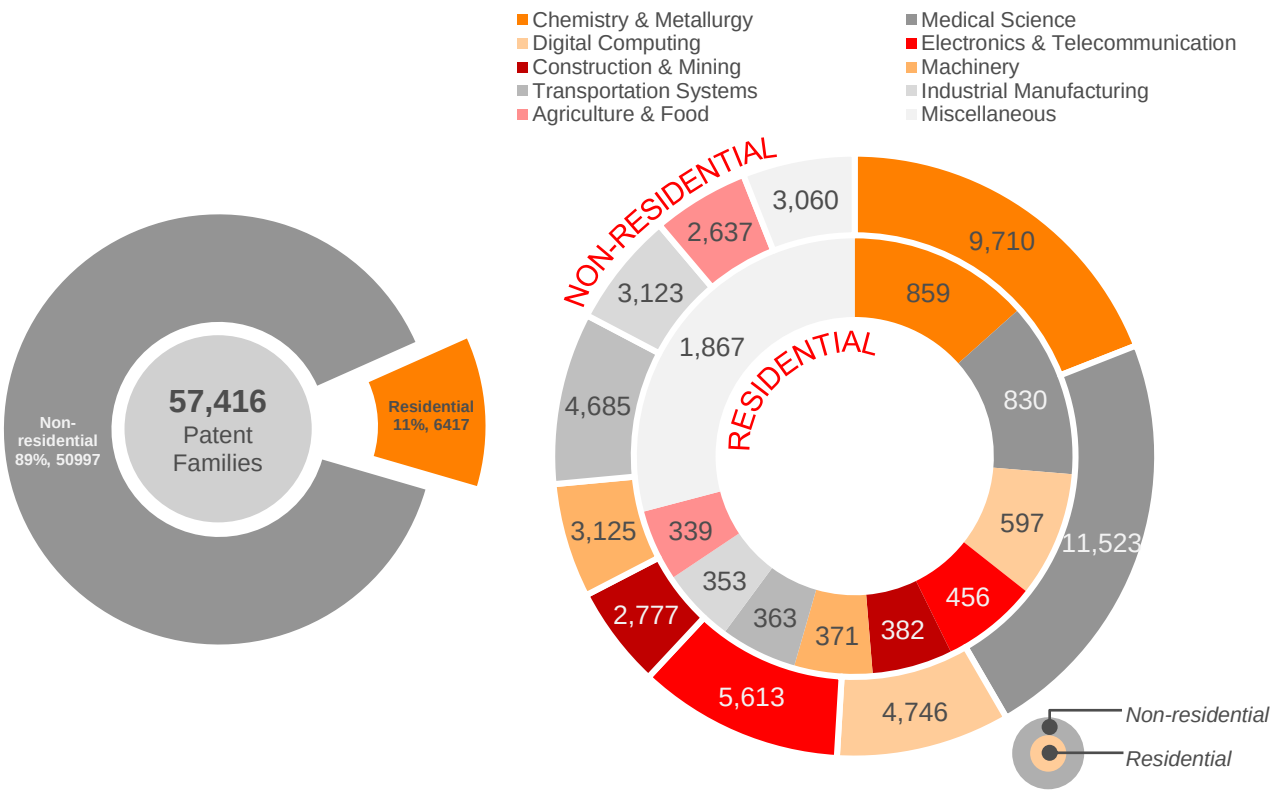




Source: Thomson Innovation & IP&S Professional Services

Kindly note that the data from 2014 onwards is incomplete due to lag in application publication

WHAT ARE THE KEY TECHNOLOGY SEGMENTS (2010-2015)?

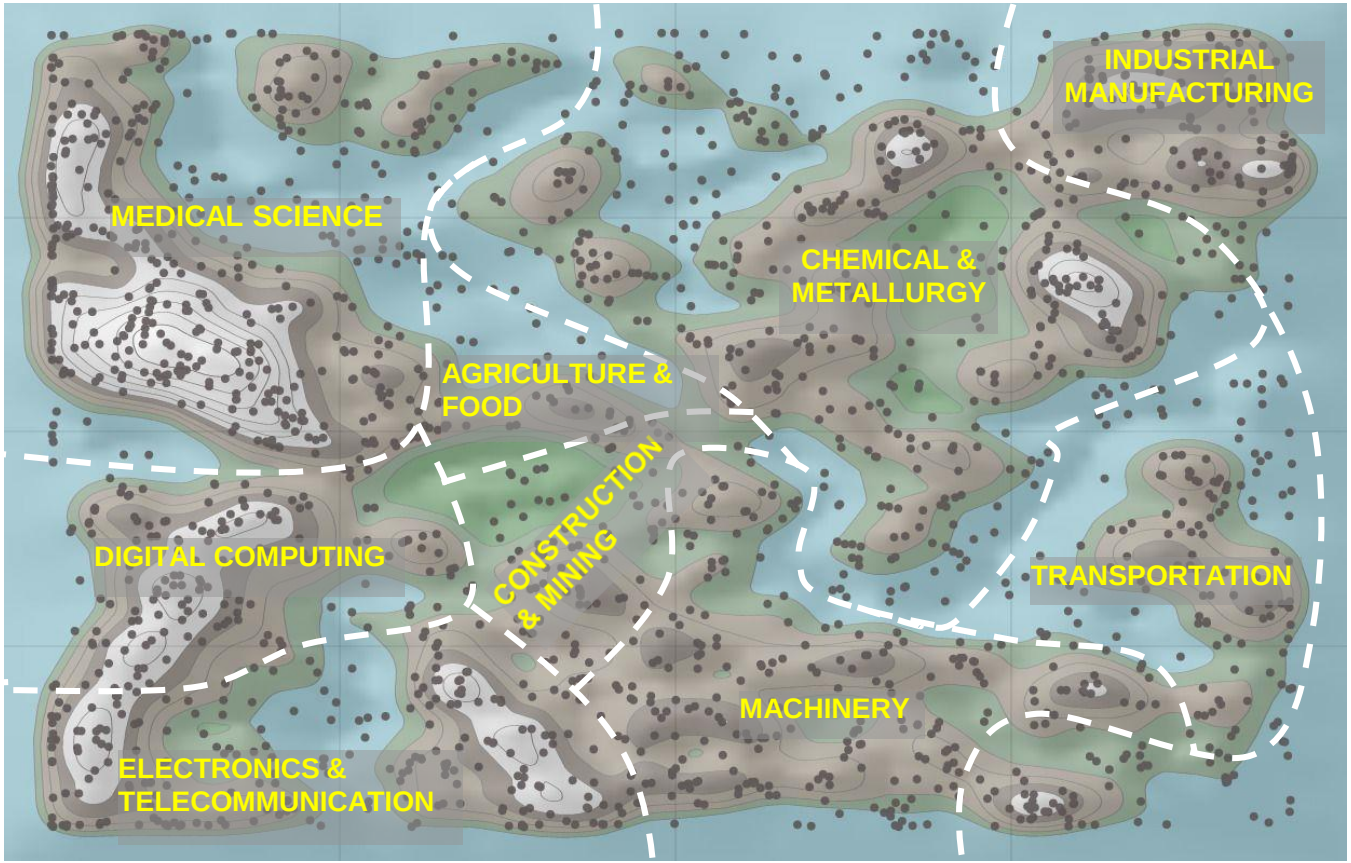


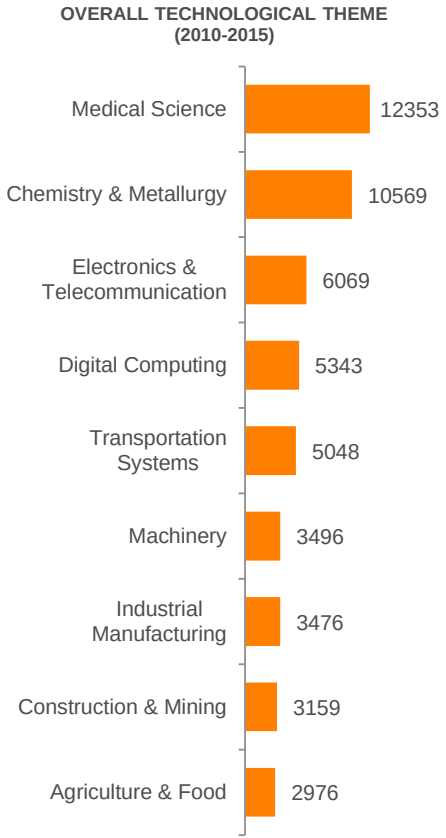
Residential: *Patent inventions originated from the respective country (First filing from that company)*
Non-residential: *Patent applications originated from the foreign country and protected in the indicated country (First filing in a foreign country)*

OBSERVATIONS

- Medical Science, and Chemistry & Metallurgy are the top innovating domains in Mexico
- Residential technological domains such as Digital Computing, Construction & Mining, Machinery, Industrial Manufacturing, and Agriculture & Food are at par with their non-residential counterparts
- The non-residential innovators are protected under core technological domains as opposed the residential innovators, whose innovations are spread across various domains

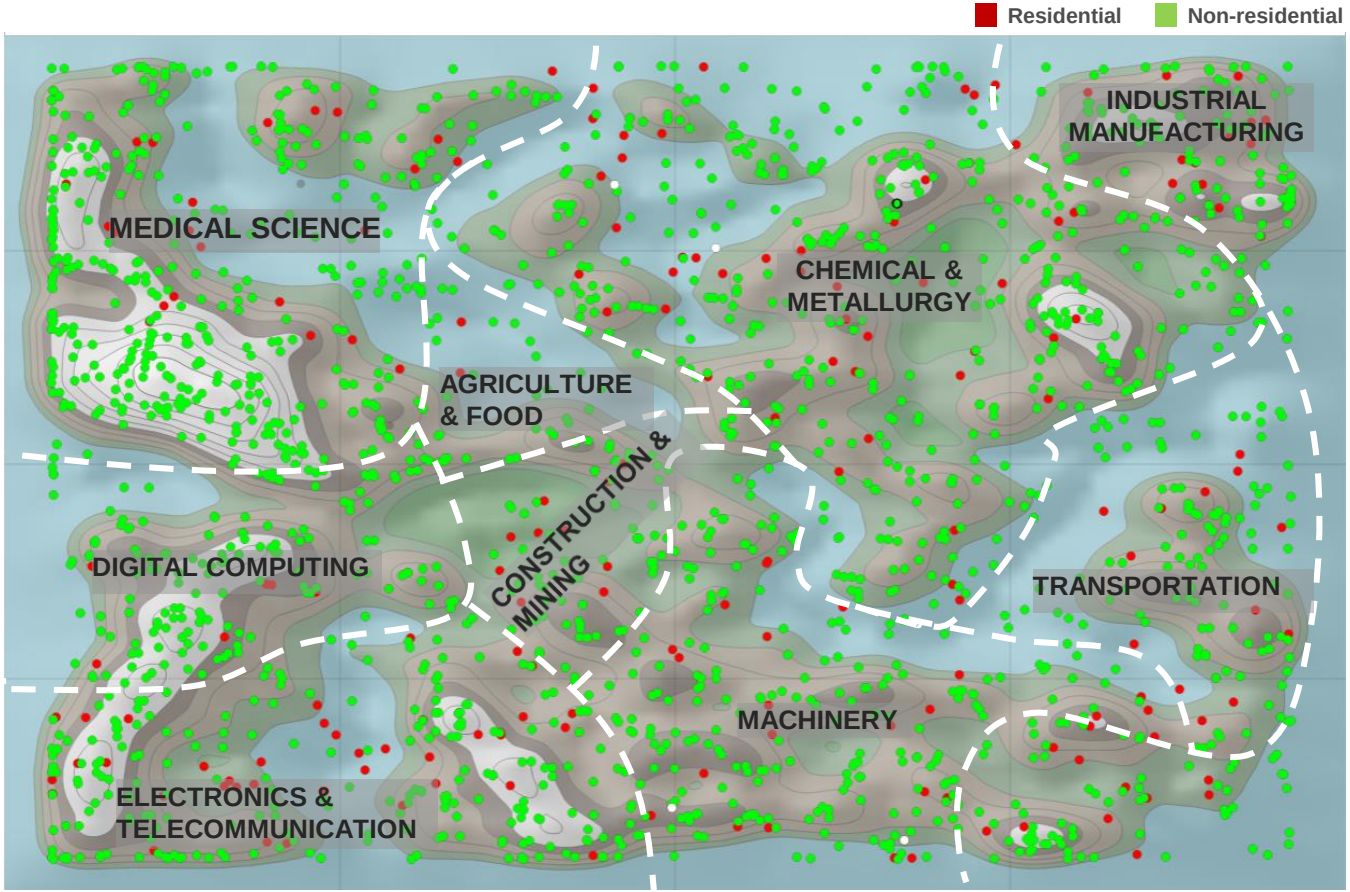
MEXICO'S PATENT TECHNOLOGY LANDSCAPE (2010-2015)

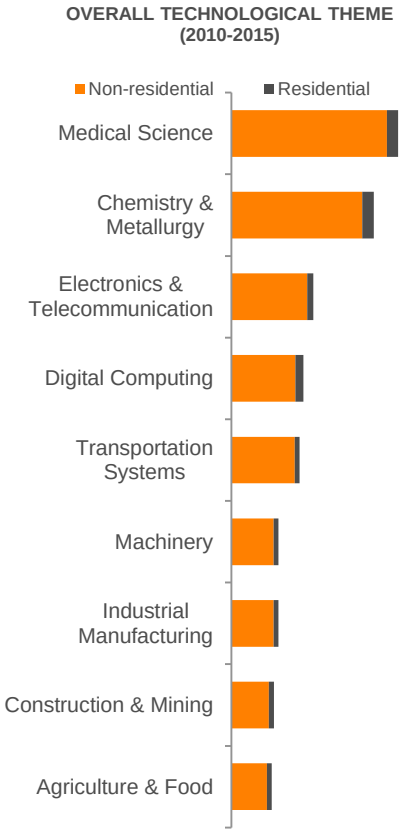




Source: Thomson Innovation, Derwent World Patents Index and IP&S Professional Services

NON-RESIDENTS ARE PROTECTING CORE TECHNOLOGIES IN MEDICAL SCIENCE AND DIGITAL COMPUTING WHILE RESIDENTS ARE INNOVATING AT PAR ON AREAS LIKE ELECTRONICS & TELECOM, CONSTRUCTION & MINING

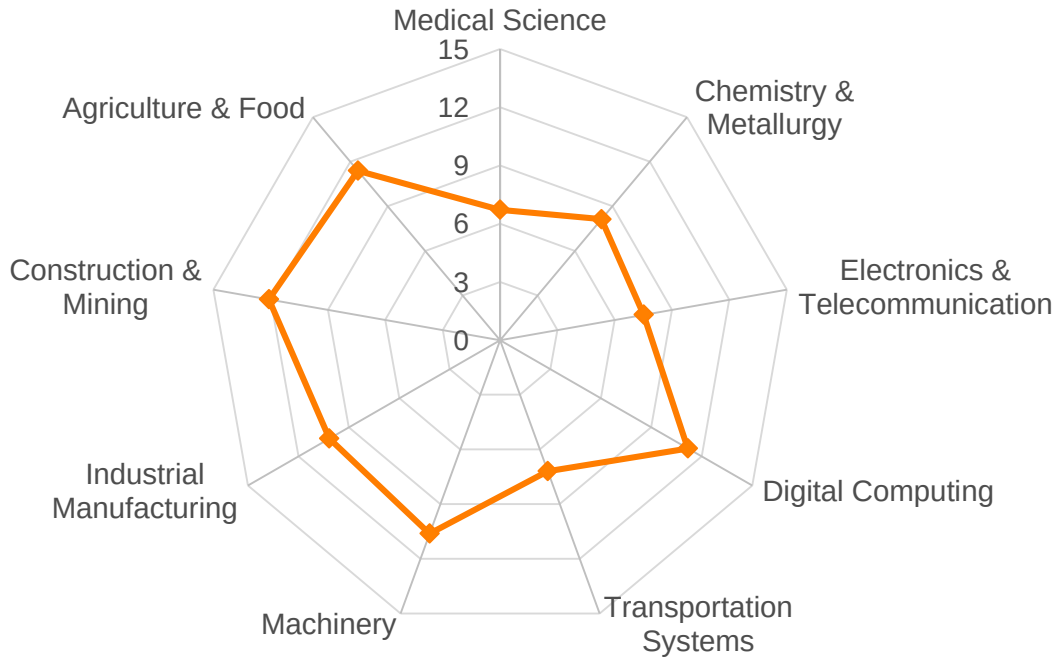




Source: Thomson Innovation, Derwent World Patents Index and IP&S Professional Services

MEXICO'S SHARE IN TECHNOLOGY DOMAIN (2010-2015)

Mexico's Resident Share (%) in top Technological Domains (2010-2015)



Source: Derwent World Patents Index and IP&S Professional Services

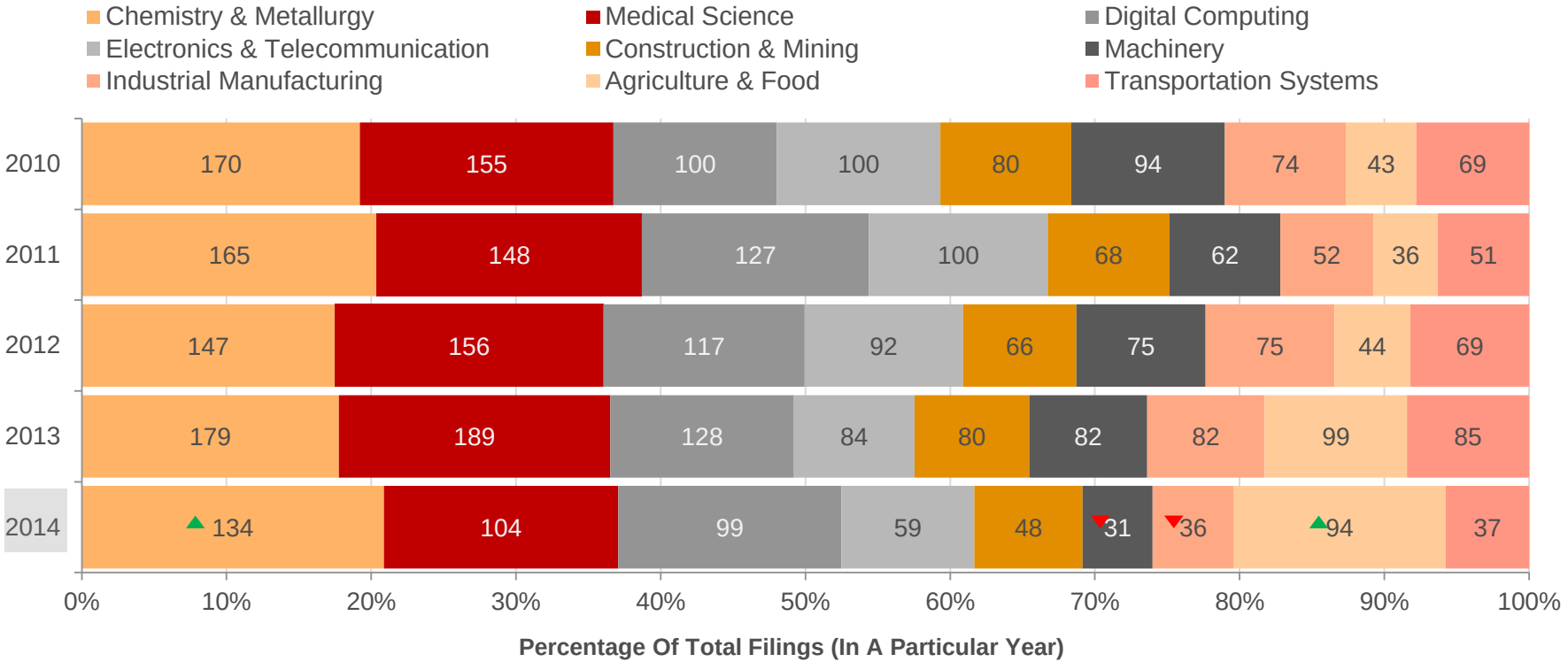
KEY INNOVATION AREAS

- Digital Computing
- Machinery
- Industrial Manufacturing
- Construction & Mining
- Agriculture & Food

POTENTIAL INNOVATION AREAS

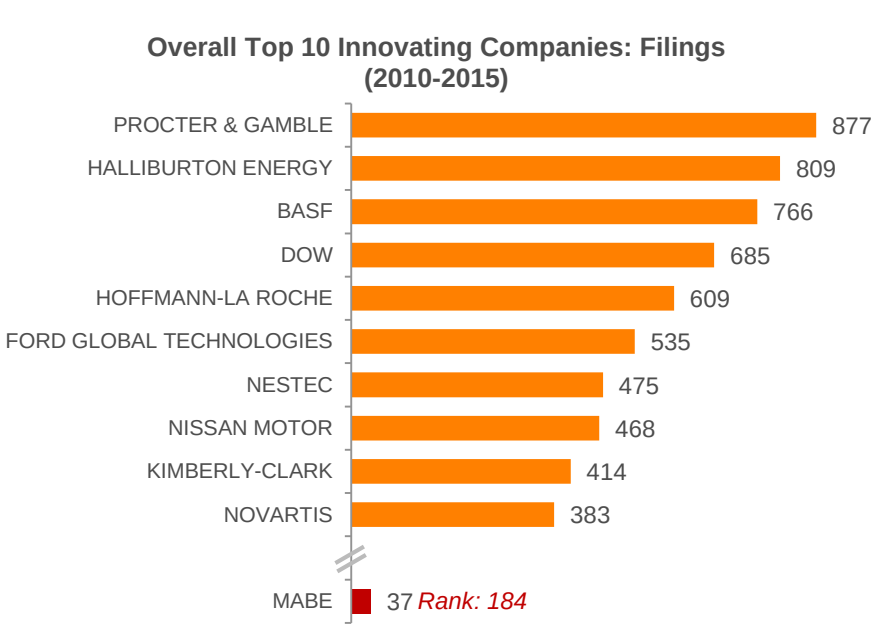
- Medical Science
- Chemistry & Metallurgy
- Electronics & Telecommunication
- Transportation Systems

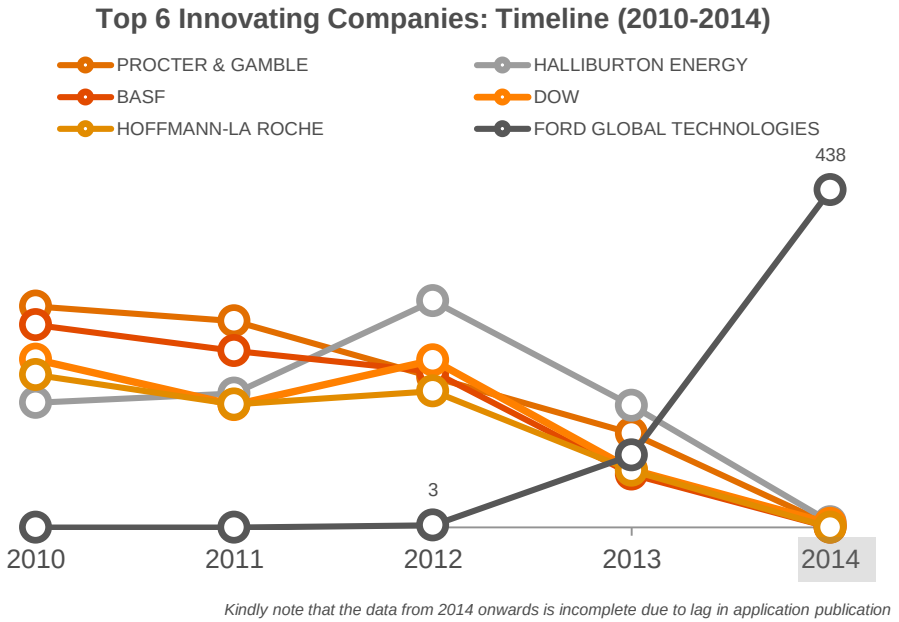
TECHNOLOGICAL SHIFTS (2010-2014): WHILE TOP TECHNOLOGY AREAS REMAINED STABLE, MACHINERY & INDUSTRIAL MANUFACTURING DECLINED WHILE AGRICULTURE & FOOD IS SHIFTING IN THE POSITIVE DIRECTION



Kindly note that the data from 2014 onwards is incomplete due to lag in application publication

WHO ARE THE TOP INNOVATORS (BY CORPORATIONS)?



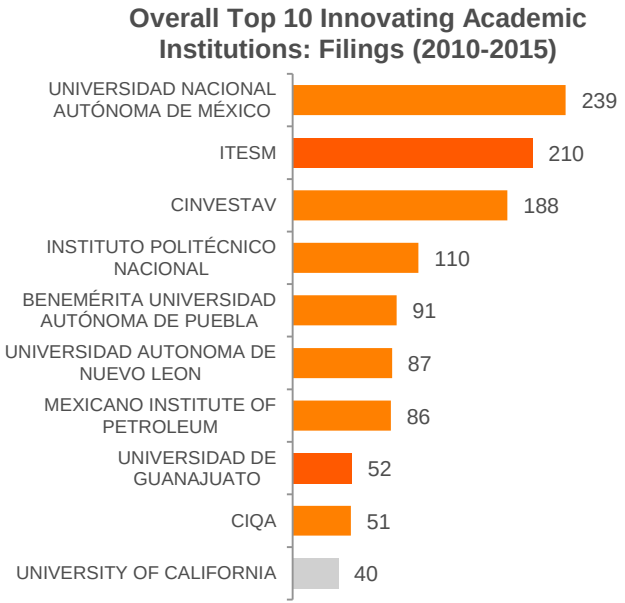


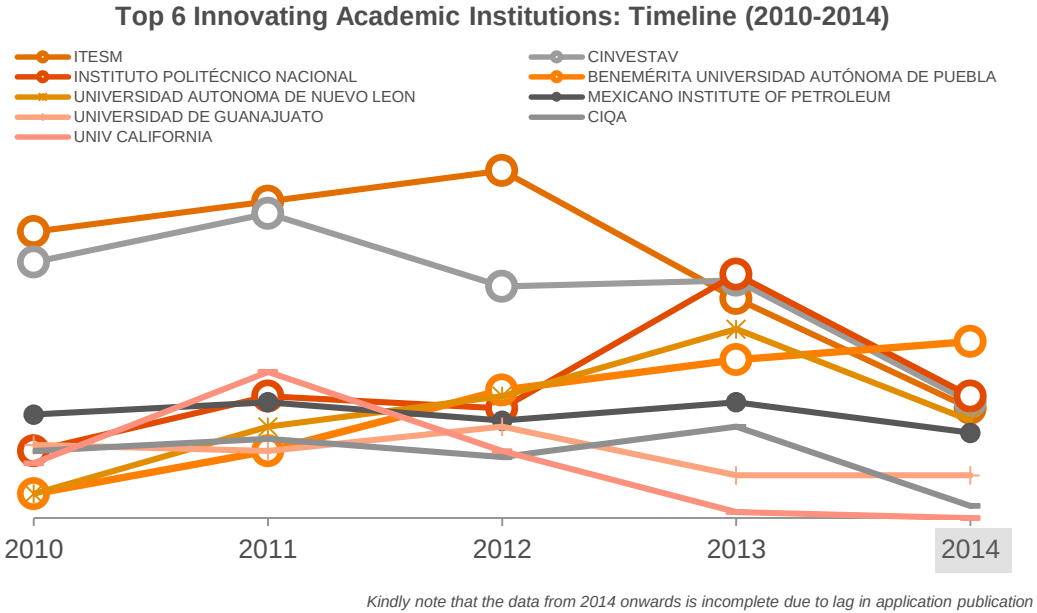
Kindly note that the data from 2014 onwards is incomplete due to lag in application publication

…Ford recently announced that it will be adding a new assembly plant in Mexico. The Detroit automaker said it will invest $1.6 billion into the facility and create 2,800 jobs by 2020, with construction expected to begin this summer….

Source: NBC News

WHO ARE THE TOP INNOVATORS (BY ACADEMIC INSTITUTIONS)?



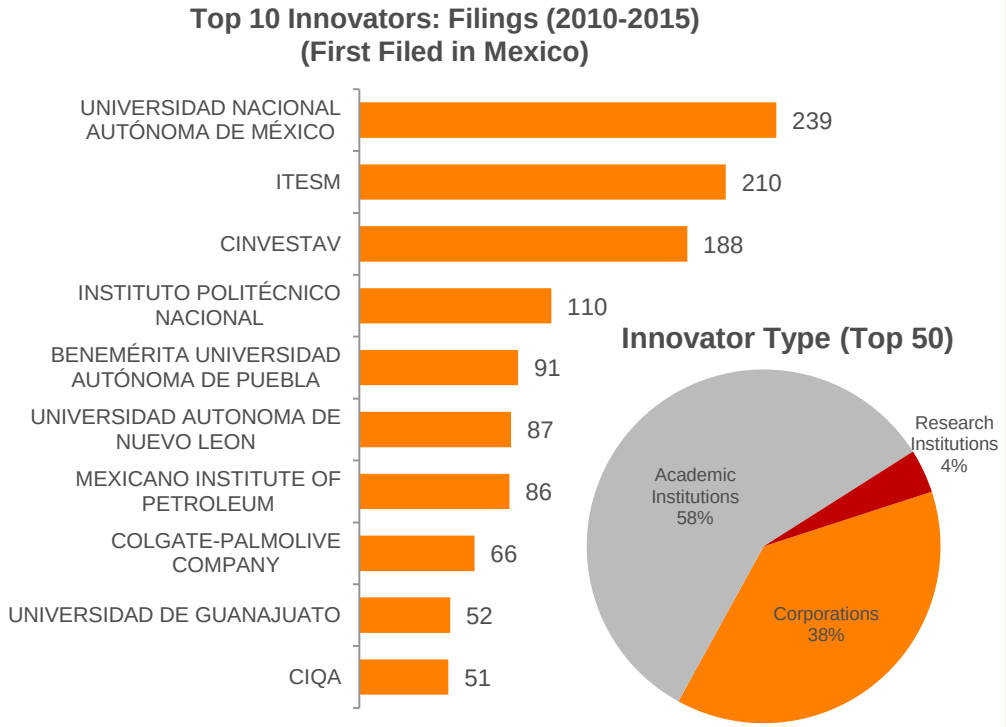


Kindly note that the data from 2014 onwards is incomplete due to lag in application publication

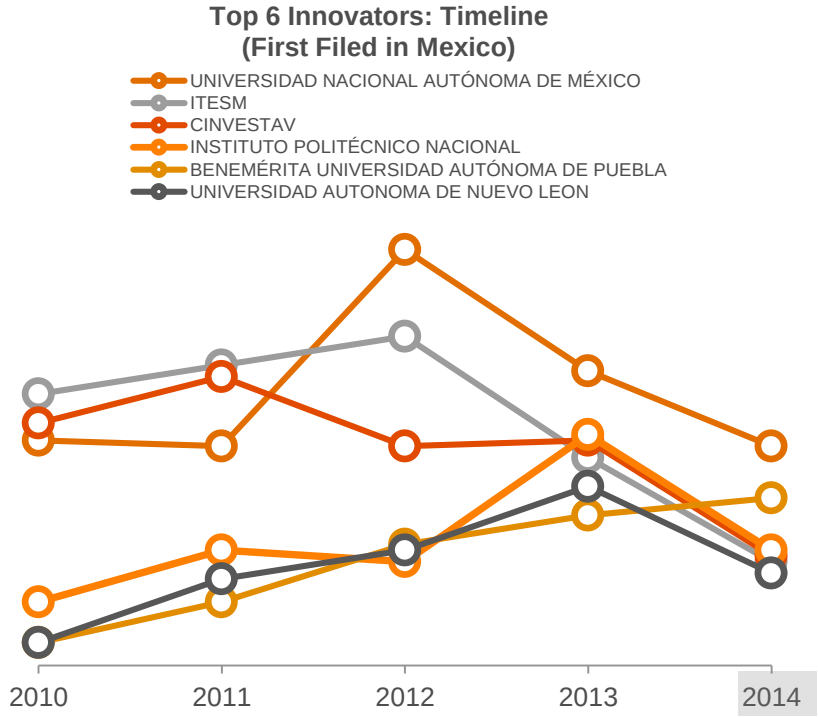
…US Embassy Mexico City would like to congratulate five Mexican universities that were selected by the U.S. Department of State, Partners of the Americas, and NAFSA: Association of International Educators as the most recent winners of 100,000 Strong in the Americas Innovation Fund grants for academic exchange. The Mexican universities selected are Universidad Panamericana, Universidad Veracruzana, Universidad Intercultural Maya Quintana Roo, Monterrey Institute of Technology and Higher Education (ITESM), and the Universidad de Guanajuato…

Source: U.S. Embassy & Consulates in Mexico

WHO ARE THE TOP MEXICAN INNOVATORS (BY FIRST FILING)?



Note: Top 50 assignees control ~30% of the innovations

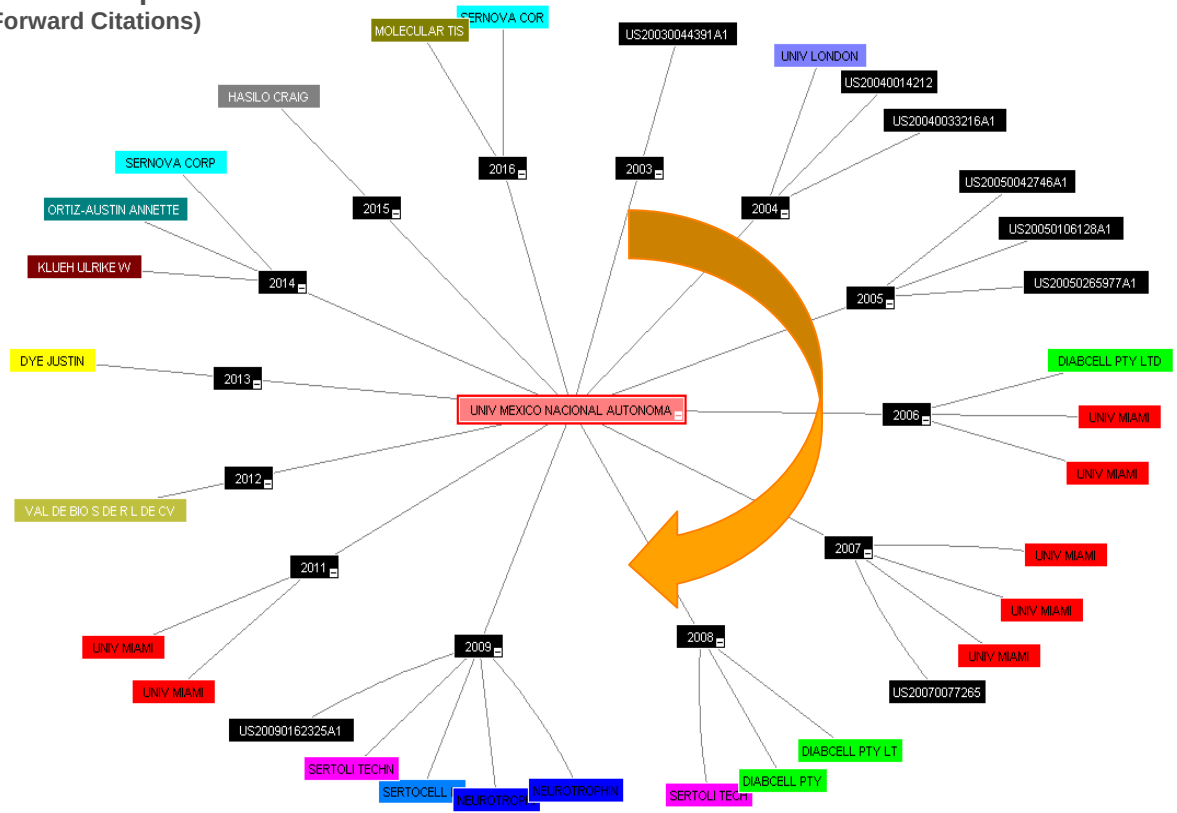


Kindly note that the data from 2014 onwards is incomplete due to lag in application publication

INDUSTRY-SCIENCE LINKAGE: POTENTIAL PARTNERSHIPS

Publication No	US6716246B1
Priority Application	MX199810667A
Country of Origin	Mexico
Assignee	Universidad Nacional Autonoma de Mexico
Priority Date	1998-12-15
Technology Theme	Medical Science
Total Citations	33
Top Citing Company	DIABCELL (3) SERNOVA (2) NEUROTROPHINCELL (2)
Top Citing University	UNIVERSITY OF MIAMI (7)

Citation Map
(Forward Citations)



Source: Thomson Innovation and IP&S Professional Services

SUMMARY OF KEY OBSERVATIONS

- Mexican focus on economic growth through innovation (by creating a knowledge economy) forms part of the national strategy
- Notable growth in scientific output from Mexico
- Mexico should focus on a shift to indigenous patenting, especially for technologies coming from government investment in Research & Development
- This spirit of new growth, combined with a solid patent office IMPI & legal infrastructure is creating an exciting market for local and multinational corporations

CASE STUDY

How Do Other National Science Agencies Use Scientific Information To Make Strategic Decisions?

KING ABDULAZIZ CITY FOR SCIENCE AND TECHNOLOGY (KACST)

CLIENT PROFILE	• King Abdulaziz City for Science and Technology (KACST) is an independent scientific organization administratively reporting to the Prime Minister. KACST is both the Saudi Arabian national science agency and its national laboratories. • The science agency function is involved in science and technology policy making, data collection, funding of external research, and provides services such as the patent office. KACST has over 2,500 employees.
CLIENT NEEDS	• Having a fair and reliable way through trusted data to measure and evaluate the output and performance of Academic and research institutes from a quantitative and qualitative perspective - **To provide strategic direction in areas of research focuses** - **Develop national research priorities** - **Bridge gaps between research & Industry**
IP&S SOLUTION	A research performance report and custom dashboard was delivered to help senior management evaluate and make robust funding decisions for the national research institutions. The data sets used: • Non-Patent Literature (Web of Science) • Patents (Derwent World Patents Index)  
IMPACT	• **The strategic reports helped department heads to set research directions nationally.** • **The organization is now focusing on improving their research programs.** • **http://www.kacst.edu.sa/en/about/publications/Pages/other.aspx**

WE ACCELERATE THE PACE OF YOUR INNOVATION

Intellectual Property & Science powers the Lifecycle of Innovation through trusted information, intuitive technology platforms and insightful experts.


THOMSON REUTERS™