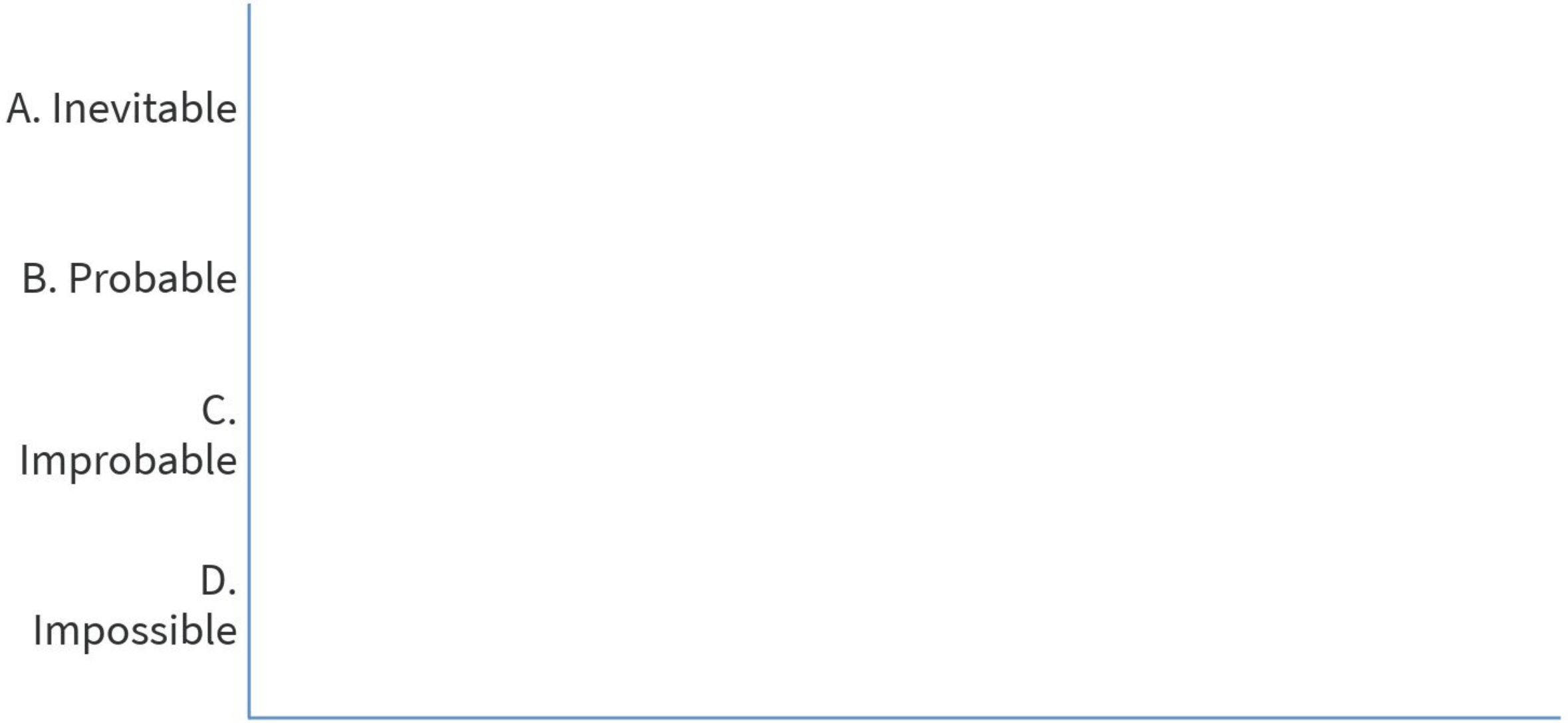
AI is ready to take over the world

¿Qué tan probable es que México sea una potencia en IA?



“The one who becomes a leader in this sphere will be the ruler of the world”

Vladimir Putin, President of Russia

“Artificial intelligence will cut across nearly every industry… It will shape the world that our kids and our grandkids grow up in"

Justin Trudeau, Prime Minister of Canada

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$4.861 trillion pesos*

in economic growth in Mexico by 2030

*based on numbers by PricewaterhouseCoopers

AI will transform the economy

GROWTH

14% increase in economic growth by 2030¶

PRODUCTIVITY

40% increase in productivity by 2035^

SECTORS

Retail
Financial services
Healthcare¶

OXFORD INSIGHTS

¶PwC
^Accenture

5.1 million jobs*

may be lost in Mexico due to automation by 2020

*estimate from World Economic Forum

AI will see job creation as well as job losses

Sectors at risk…

- admin and support services
- transportation and storage
- manufacturing
- wholesale and retail

(PwC)

Sectors expecting growth...

- data analytics
- healthcare
- education

(Gartner)

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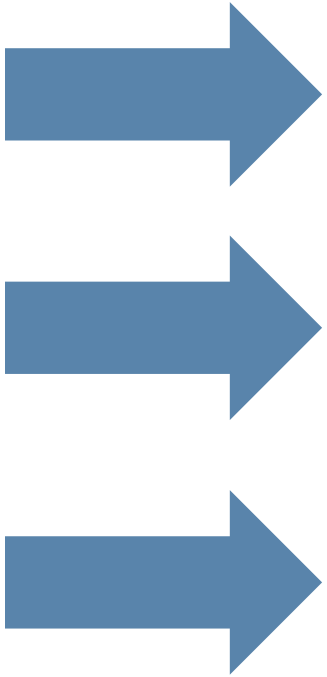
AI asks three questions of government



How to reach the economy of the future?

How to protect Mexican values and interests?

How to harness AI to help the bottom 80%

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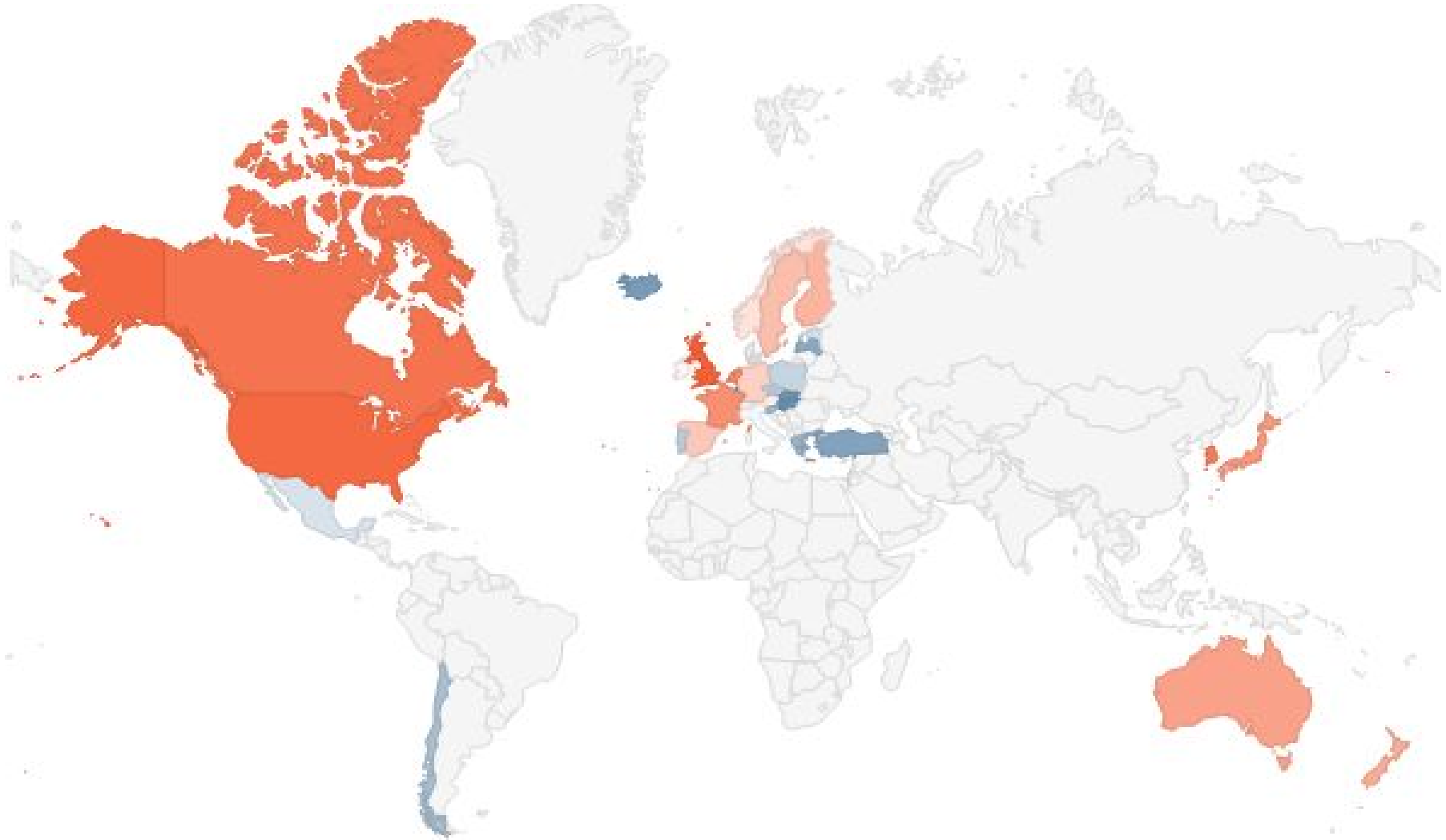
Countries are ready to move



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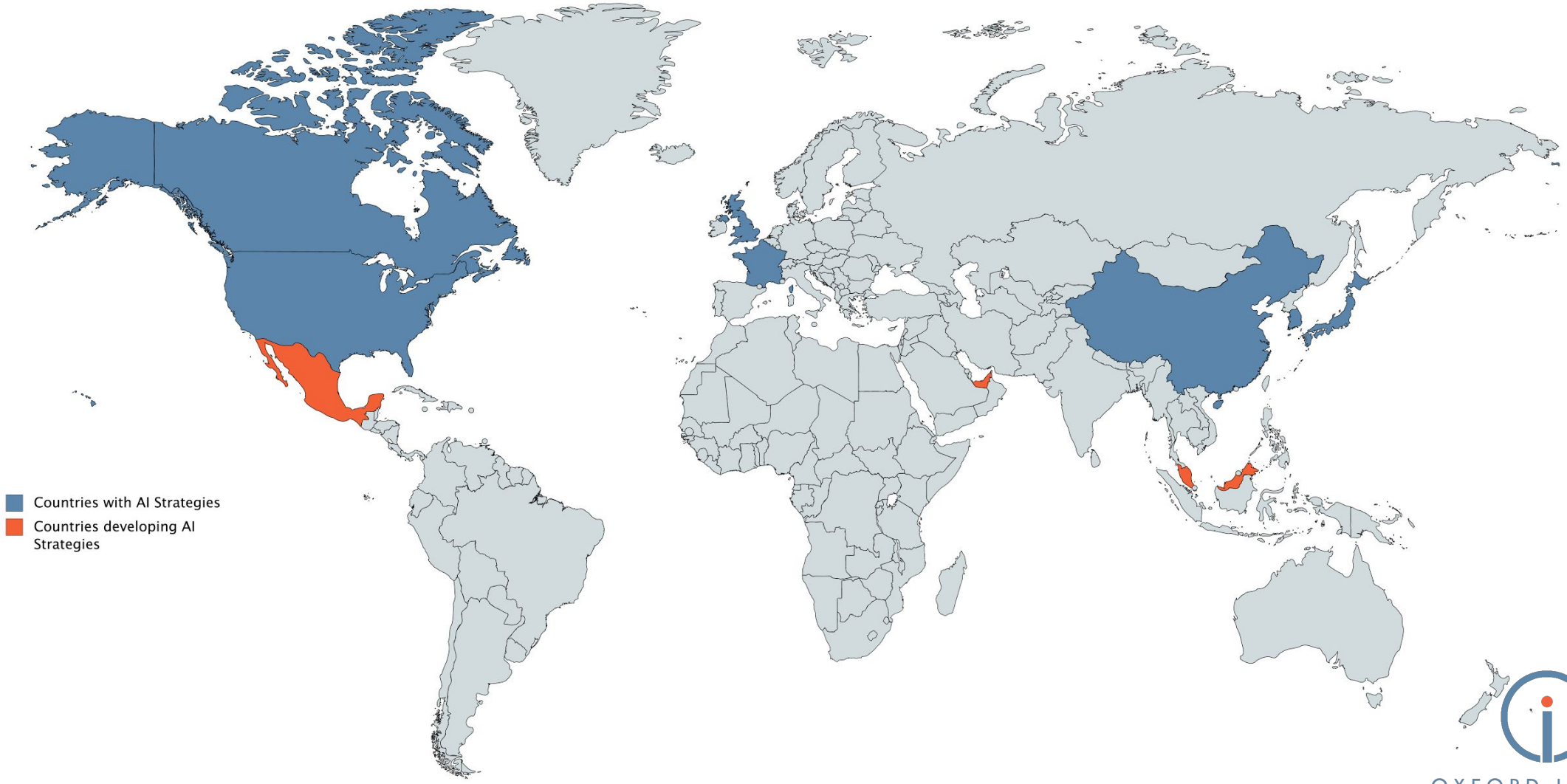
A few are starting to explore the answers



Mexico will be in the first 10 countries in the world

AI strategies	Expected Q1/Q2 2018
G B UK	**A E** UAE
U S USA	**M Y** Malaysia
C A Canada	**M X** Mexico
F R France	
K R South Korea	
J P Japan	
C N China	

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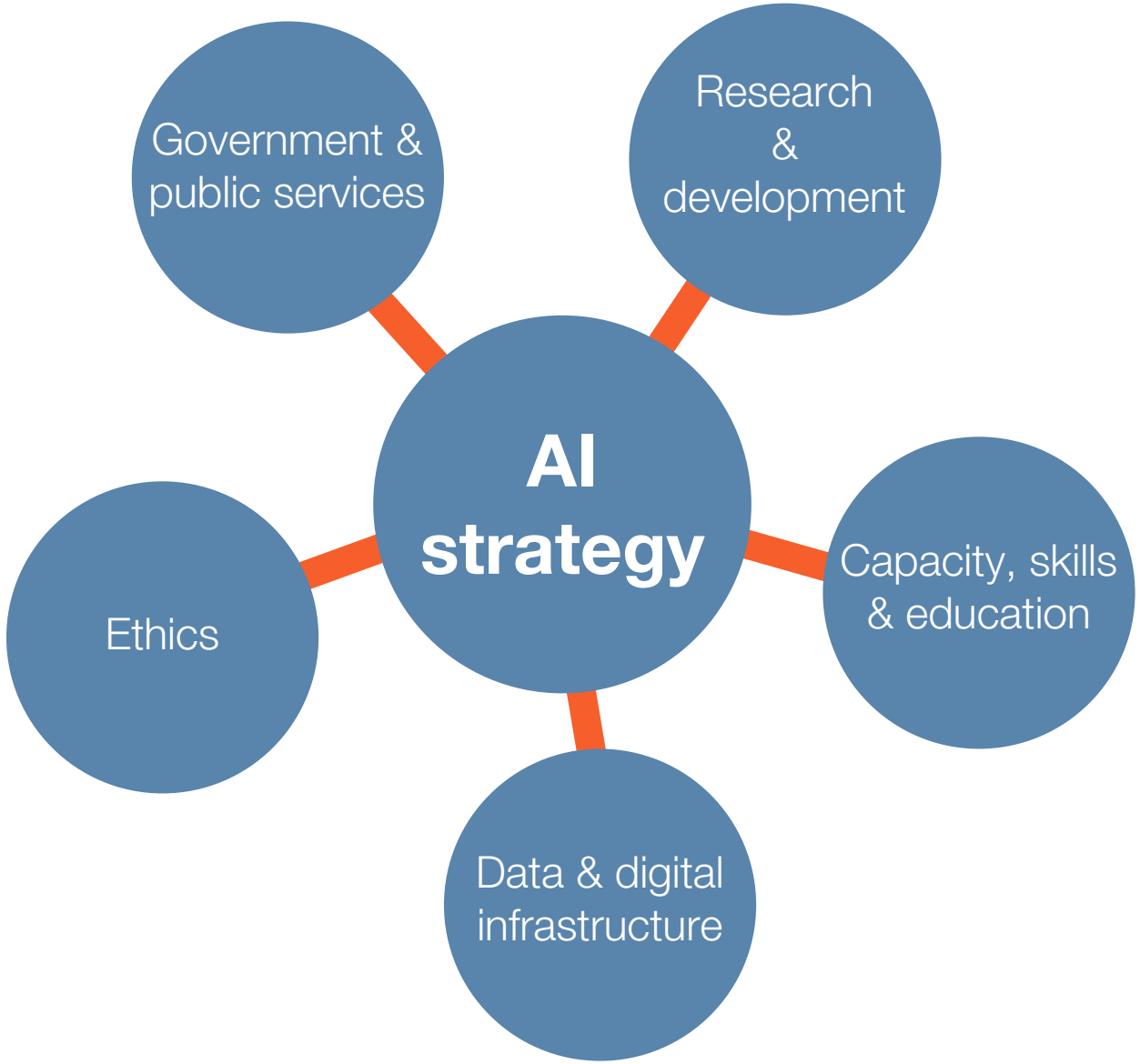
5 elements to consider



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¿Qué debería incluir un Estrategia Nacional de IA?

Artificial Intelligence from Mexico
Towards a Mexican National Initiative around AI

Dr. Miguel Gonzalez Mendoza

Profesor, Tecnológico de Monterrey (ITESM)

Presidente, Sociedad Mexicana de Inteligencia Artificial (SMIA)

Tecnológico de Monterrey

I. AI R&D Landscape

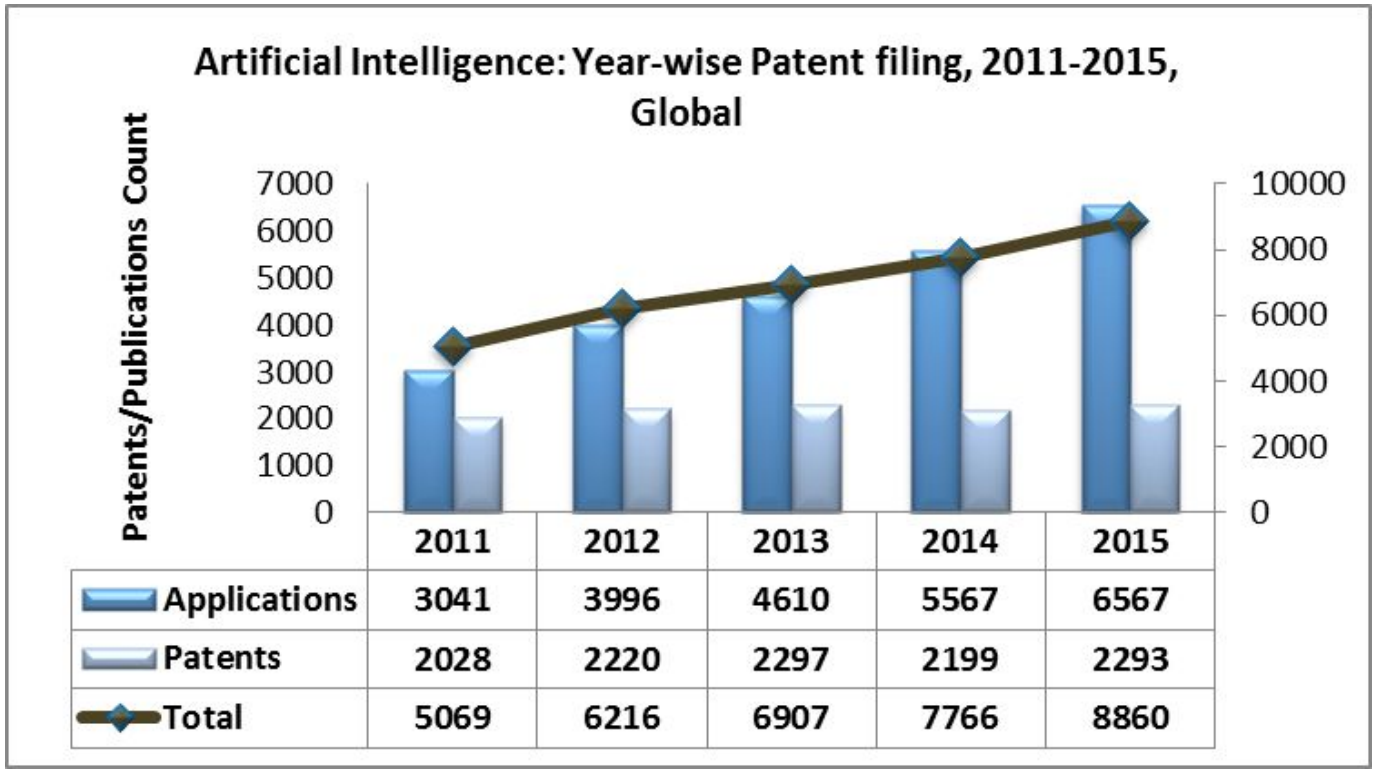
AI R&D Trends, Global perspective

America – North America is one of the leaders in the Artificial Intelligence space by virtue of the presence of some of the world's largest companies in the ICT domain such as Microsoft, Google, IBM, and so on.

Europe – Several research initiatives in the AI space are also being carried out in the European region with support from international bodies such as the European Commission, which are playing a key role in driving innovation by kick-starting collaborative projects on AI and robotics in Europe.

Asia – Asian countries such as China, South Korea, and Japan are leading innovation in this continent. The R&D initiatives in AI technologies in South Korea are increasing exponentially. The country is already ranked among the leaders in developing and providing industrial robots across the globe. The focus is now on making more intelligent machines. China holds a leading position in research and development of AI technologies and soutions with the highest IP activity recorded in this region

AI Patent Publishing Rate Rising Consistently Every Year

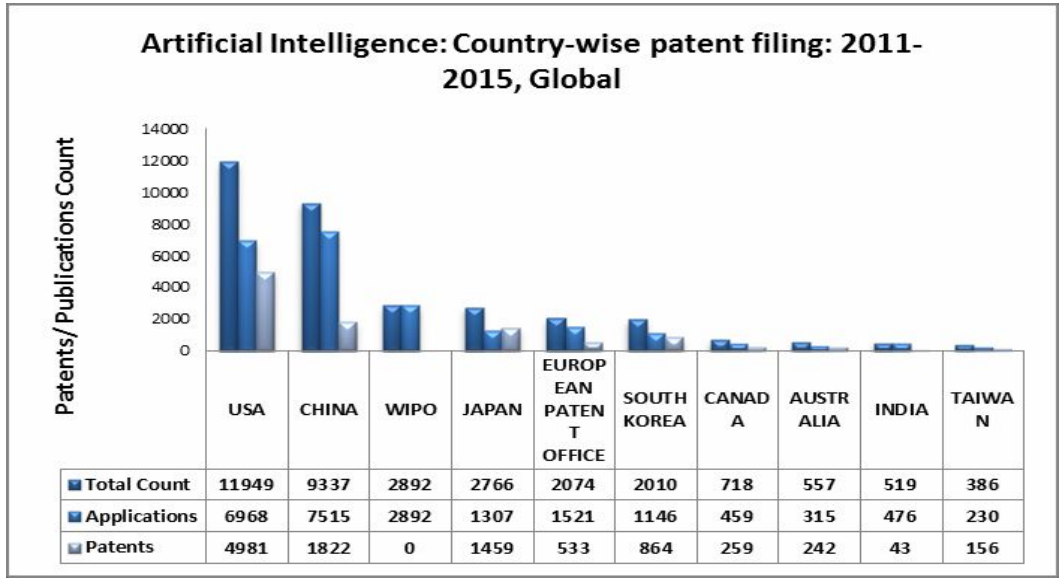


	2011	2012	2013	2014	2015
Applications	3041	3996	4610	5567	6567
Patents	2028	2220	2297	2199	2293
Total	5069	6216	6907	7766	8860

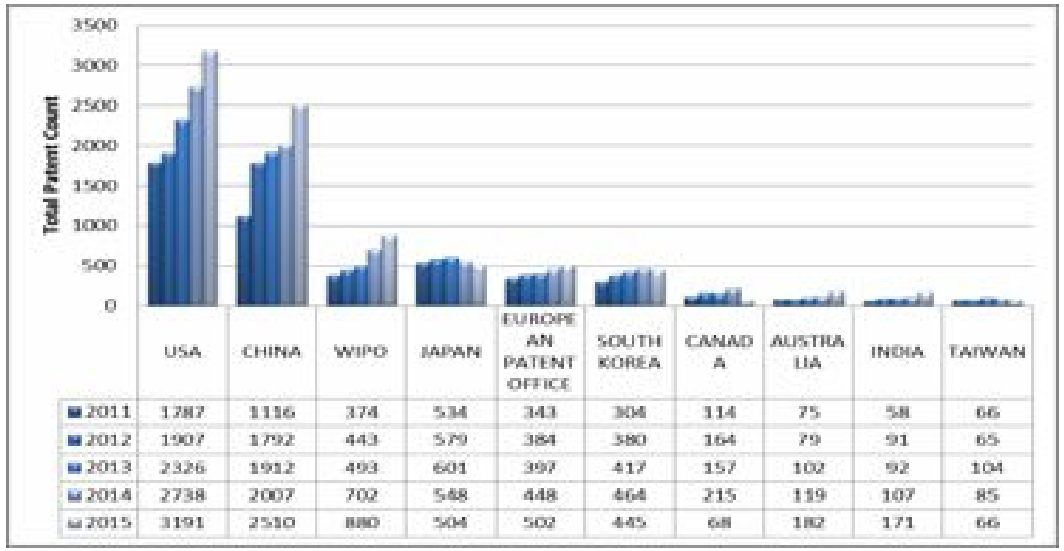
Source: Thomson Innovation and Frost & Sullivan Analysis

- This rise was primarily experienced due to increasing research in the areas of new disciplines of robotics and innovative smart phone and enterprise applications emerging in every sector.
- This increase in innovation and patenting is expected to continue globally in the next 5 years, considering the growing R&D trends in AI.

The United States Leads in Patenting Activities



	USA	CHINA	WIPO	JAPAN	EUROPEAN PATENT OFFICE	SOUTH KOREA	CANADA	AUSTRALIA	INDIA	TAIWAN
Total Count	11949	9337	2892	2766	2074	2010	718	557	519	386
Applications	6968	7515	2892	1307	1521	1146	459	315	476	230
Patents	4981	1822	0	1459	533	864	259	242	43	156

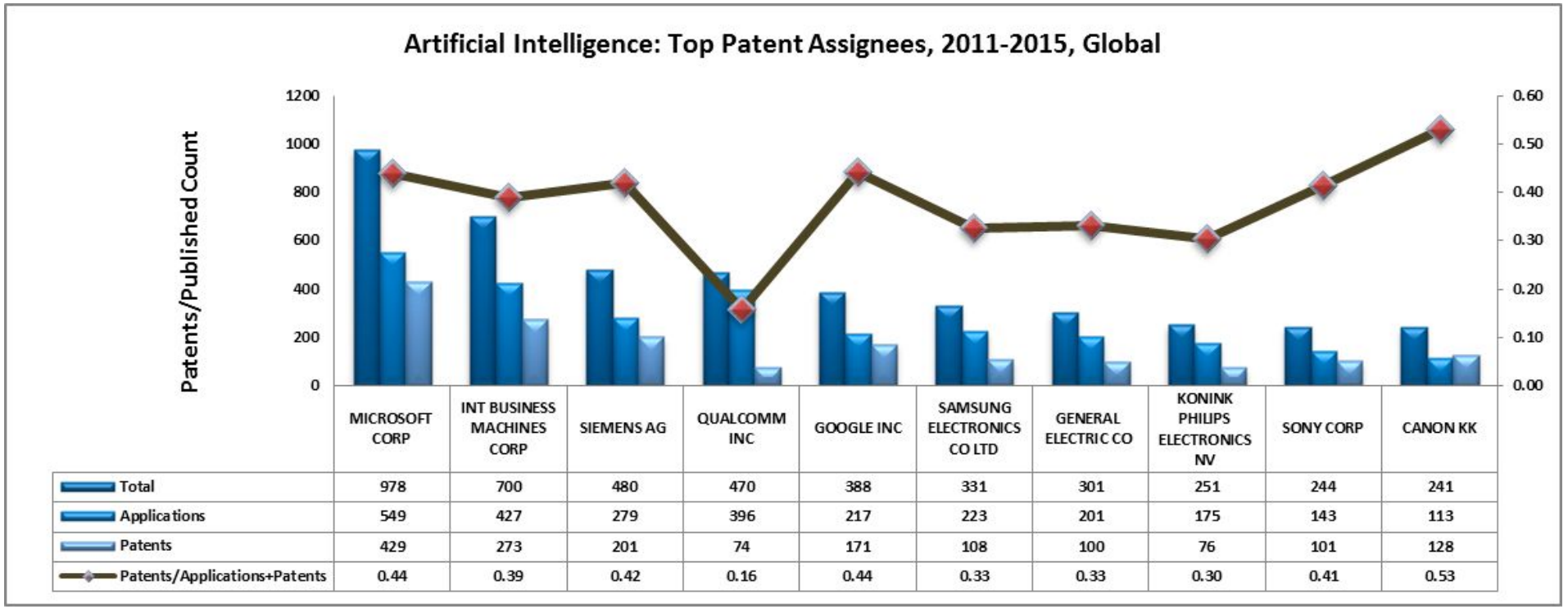


	USA	CHINA	WIPO	JAPAN	EUROPEAN PATENT OFFICE	SOUTH KOREA	CANADA	AUSTRALIA	INDIA	TAIWAN
2011	1787	1116	374	534	343	304	114	75	58	66
2012	1907	1792	443	579	384	380	164	79	91	65
2013	2326	1912	493	601	397	417	157	102	92	104
2014	2738	2007	702	548	448	464	215	139	107	85
2015	3191	2510	880	504	502	445	68	182	171	66

- A cumulative of 45.22% of the total patents have been filed in the Asian region, representing the high rate of innovations in comparison to the United States and Europe.
- Considering the fact that the Asian economies are growing faster than any other region in the world, more focus will be given to the development of intelligent technologies using AI.
- This will have a direct impact on the rate of patent filings in this region, which will compete with other regions to obtain a leading position.

Source: Thomson Innovation and Frost & Sullivan Analysis

US Innovators Dominate with Maximum Granted Patents

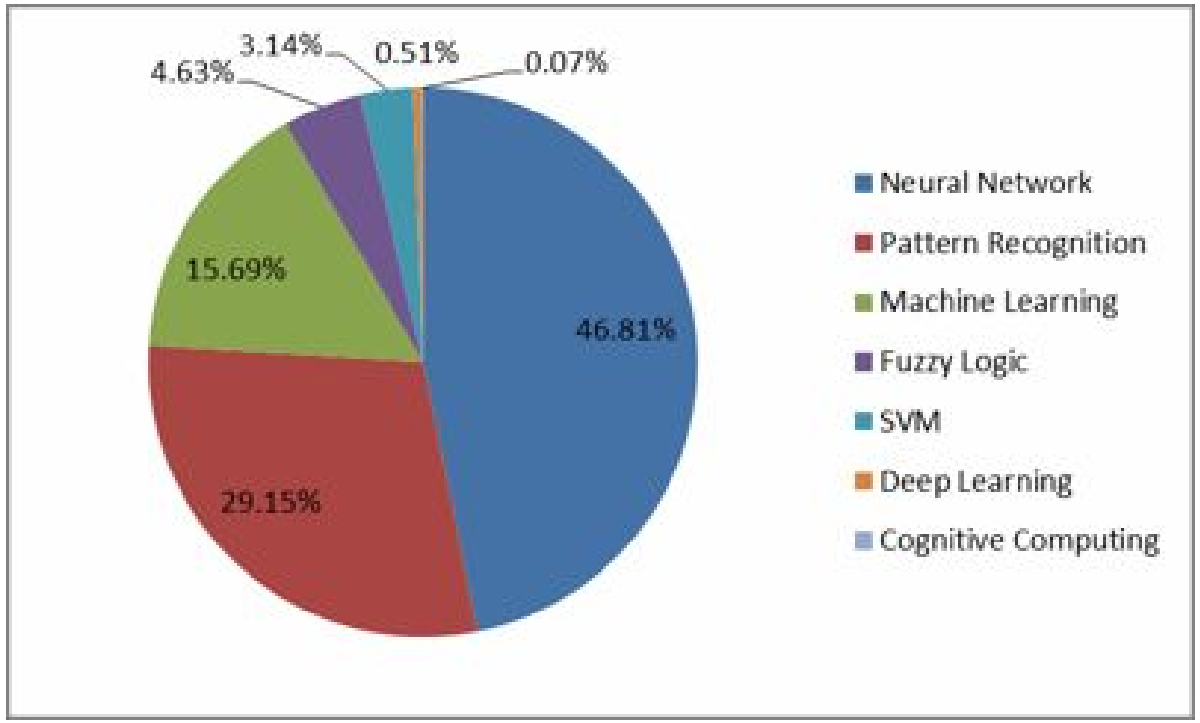


	MICROSOFT CORP	INT BUSINESS MACHINES CORP	SIEMENS AG	QUALCOMM INC	GOOGLE INC	SAMSUNG ELECTRONICS CO LTD	GENERAL ELECTRIC CO	KONINK PHILIPS ELECTRONICS NV	SONY CORP	CANON KK
Total	978	700	480	470	388	331	301	251	244	241
Applications	549	427	279	396	217	223	201	175	143	113
Patents	429	273	201	74	171	108	100	76	101	128
Patents/Applications+Patents	0.44	0.39	0.42	0.16	0.44	0.33	0.33	0.30	0.41	0.53

Source: Thomson Innovation and Frost & Sullivan Analysis

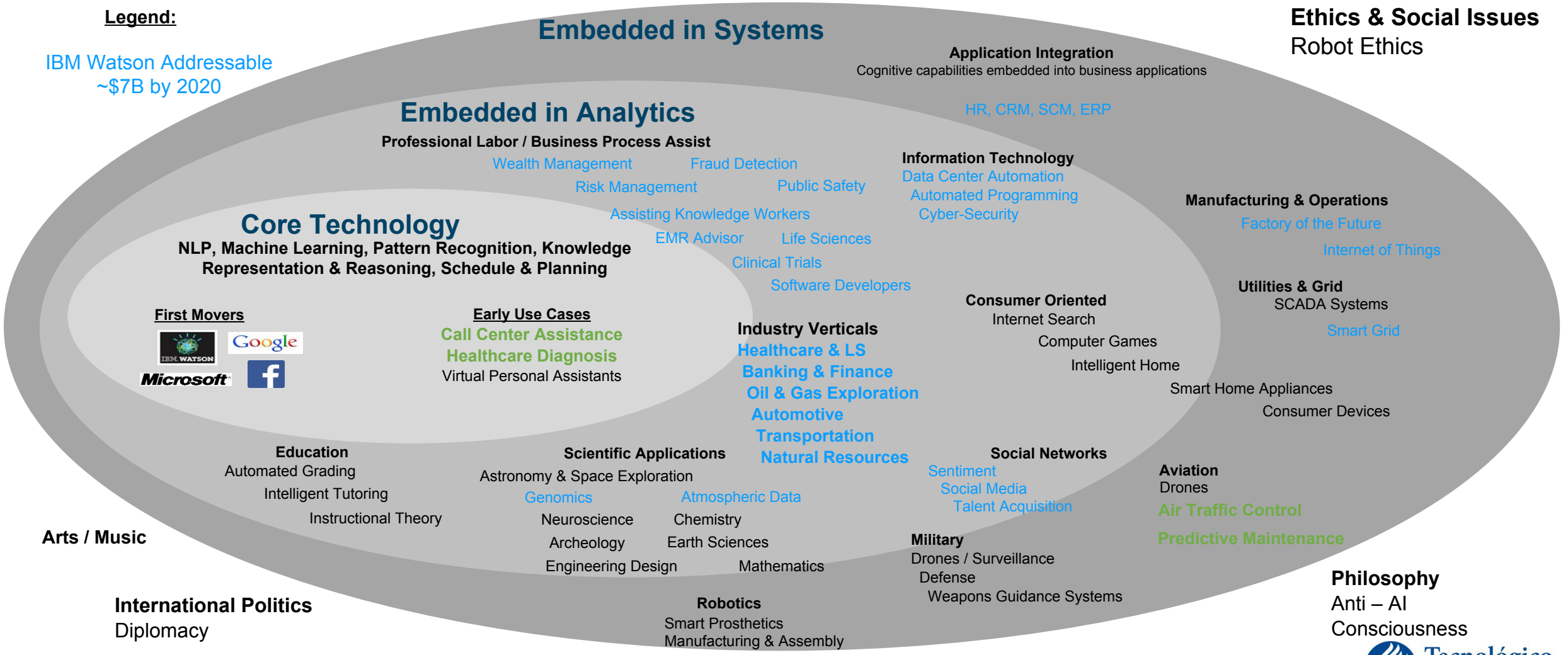
The above exhibits show the top patent assignees in the field of Artificial Intelligence. The graph clearly indicates the domination of US innovators, with a cumulative 60.89% share of the total number of patents. The patent publishing rate compared to the total patents applied for has been fairly consistent for all innovators mentioned in the list other than Qualcomm.

Distribution of patents across the various sub-disciplines of AI



- Entities from the North American and European regions have so far dominated the patent landscape in the AI space.
- However, increased research activities around robotics in countries such as Japan, China, and South Korea have fuelled the growth of patents emerging from innovators in these regions.
- The presence of significant innovators in the space such as Samsung, Canon and Sony, which rank among the top patent holders worldwide, is a clear indication of significant advancements in AI in the Asian continent.

These commercialization methods broaden the frontier of AI into solutions and use cases that are increasingly diverse and expansive



Source: MI Analysis, Gartner, Bloomberg, AI.org

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II. Challenges / Projects & Founding

Challenges in AI: US

Region	Key initiatives	Focus of R&D	Key Supporting Entities
The United States	Accessible Transportation Technologies Research Initiative (ATTRI)	The project's primary focus is to help improve the mobility aspects of individuals with disabilities leveraging AI powered intelligent transportation technologies and applications.	· Defense Advanced Research Projects Agency (DARPA) · National Science Foundation (NSF) · Quantum Artificial Intelligence Laboratory (QuAIL) · NASA · White House Office of Science and Technology Policy · Department of Defense (DoD)
	• National Robotics Initiative (NRI) • DARPA Robotics Challenge (DRC)	The projects are aimed at accelerating innovations in the field of collaborative robots in the United States that can operate safely in a human-machine co-operative environment. Additional goals include development of semi-autonomous terrestrial robots capable of operating in extreme physical conditions.	

Challenges in AI: Europe

Region	Key initiatives	Focus of R&D	Key Supporting Entities
Europe	Artificial Intelligence for Large-Scale Computer- Assisted Reasoning (AI4REASON)	The prime focus of the project is to enable complete automation of reasoning procedures that are used in solving complex mathematical challenges.	The European Commission
	Project SecondHands	The prime focus of the initiative is to accelerate the development of AI powered civilian humanoid mobile robots equipped with supreme computer vision capabilities to help human workers in complex jobs.	
	Cognitive Systems and Robotics Initiative	The initiative is aimed at developing cognitively superior robots that efficiently perform human-scale activities in a wide range of operating environments	

Challenges in AI: Asia

Region	Key initiatives	Focus of R&D	Key Supporting Entities
China	Made in China 2025 (MiC2025) Initiative	The initiative is geared toward enhancing the development of intelligent industrial robots that can operate safely in human-machine collaborative working environments.	• Ministry of science and Technology • Ministry of Industry and Information Technology • Chinese Academy of Sciences • Chinese Academy of Engineering National Development and Reform Commission
Japan	Robot Revolution Initiative	Development of technologies to enhance data driven intelligence for robots to use them across sectors.	• National Institute of Informatics • Ministry of Economy, Trade and Industry (METI) • Public Security Intelligence Agency • Japanese Aerospace

Challenges in AI: Mexico

Key initiatives	Focus of R&D	Key Supporting Entities
Red Temática de Tecnologías del Lenguaje.	To promote the development of these technologies and its main objective is to bring together researchers in the area and coordinate their efforts at the national level in the search for solutions to both fundamental problems in the automatic treatment of human language in general, and in the treatment of Spanish spoken in Mexico, in particular.	CONACYT
Red Temática Para el apoyo a la decisión y optimización inteligente de sistemas complejos y de gran escala	To create a multidisciplinary group of researchers and companies that carry out R & D activities in areas related to administration, operations research, decision support and artificial intelligence. The aim is to take advantage of the synergies established between network participants to tackle complex and large-scale problems of national or international interest, for the development of solution methods based on multicriteria decision support and intelligent optimization.	CONACYT
Red Temática en Inteligencia Computacional Aplicada.	The use of these intelligent technologies, given the amount of talent gathered and their knowledge dissemination plans for social benefit purposes. To achieve all the objectives and to be reflected in more competitive products and services that allow us to expand our margin of competitiveness, the activities of this network must be continuous and maintain the effort for several years.	CONACYT

Challenges in AI: Mexico

Key initiatives	Focus of R&D	Key Supporting Entities
Red Temática en Sistemas y redes de próxima generación	To create a national work network initiative in the area of Next Generation Systems and Protocols that is aligned with the National Goals, the immediate needs of the country, scientific challenges and international trends. And on the other hand, to support digital inclusion in the educational, social, business and government sectors.	CONACYT
Red Temática Mexicana de supercómputo	To establish the Mexican Supercomputing Network (RedMexSu) supported by an infrastructure, advanced connectivity, applications, services and training of high-level human resources..	CONACYT
Red Temática de Sistemas eléctricos de potencia y redes inteligentes.		CONACYT

III. Graduate Programs
Talent development for R&D in IA

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Graduate Programs in ICT in Mexico having IA related programs*

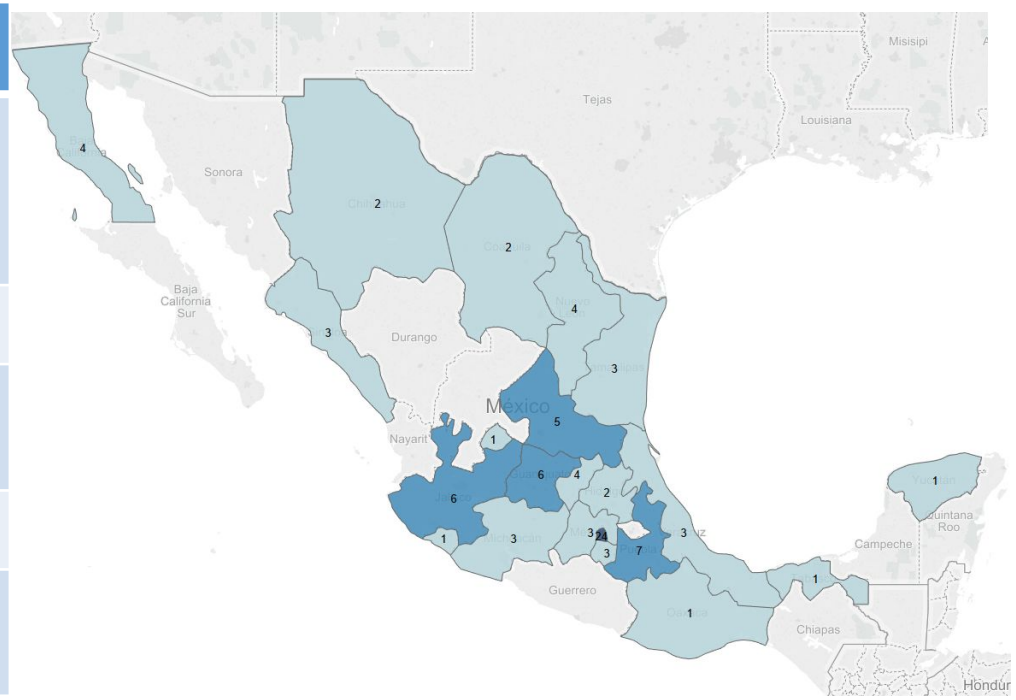
Information and Communication Technologies (ICT) Graduate Progrmas in the Mexican National Graduate Certificate of Quality (PNPC), CONACYT

- Computer Science, Computational Sciences / Computational Systems, Software Engineering, Computational Technology
- Artificial Inteligence / Inteligent Systems
- Information Sciences / Information Systems
- Electrical, Electronics and Telecommunications

* The approach does not include other areas using AI as a tool (i.e. Mechanics, social sciences…)

PNPC ICT Graduate Programs, Research avenue

	MSc				PhD			
	Reciente Creación	En Desarrollo	Consolidado	Competencia Internacional	Reciente Creación	En Desarrollo	Consolidado	Competencia Internacional
Ciencias Computacionales	4	8	8	3	4	3	4	1
Inteligencia Artificial	1	1	1		1			
Ciencias de la Información	2	2	2		2	1	1	
Electrónica y Telecomunicaciones	3	9	18	3	4	1	12	1



INAOE, BUAP, CIC-IPN, CICESE, CIMAT, UNAM, Universidad de Guanajuato, Tecnológico de Monterrey

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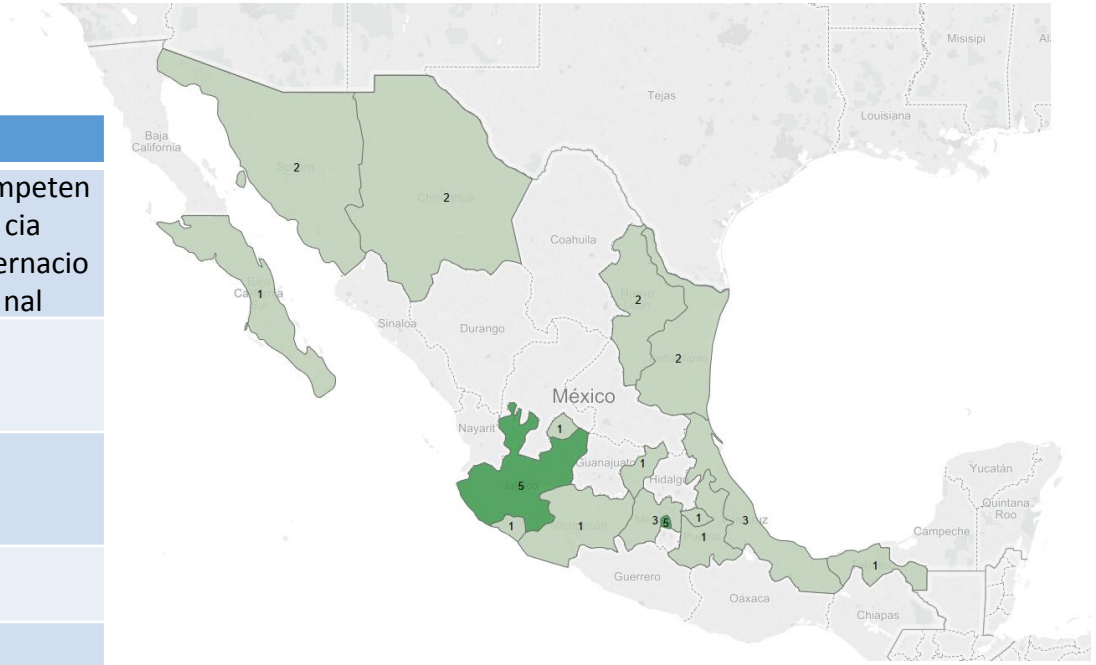
PNPC ICT Graduate Programs, Research avenue

Área SNI	#	%
Ingeniería	86	86%
Físico-Matemáticas y Ciencias de la Tierra	8	8%
Biotecnología y Ciencias Agropecuarias	2	2%
Humanidades y Ciencias de la Conducta	1	1%
Ciencias Sociales	1	1%
Biología y Química	2	2%
Total	100	

PNPC ICT Graduate Programs, Professional avenue

	Especialidad				Maestría			
	Reciente Creación	En Desarrollo	Consolidado	Competencia Internacional	Reciente Creación	En Desarrollo	Consolidado	Competencia Internacional
Sistemas Computacionales /SW					7	6	1	
Sistemas inteligentes y multimedia					1			
Sistemas de Información		2	1		3	7	2	
Electrónica y Telecomunicaciones Embebidos		3			2	4		



UdG, LANIA, UAEMex, INFOTEC, Tecnológico de Monterrey

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PNPC ICT Graduate Programs, Professional avenue

Área SNI	#	%
Ingeniería	31	79%
Físico-Matemáticas y Ciencias de la Tierra	1	3%
Ciencias Sociales	7	18%
Total	39	

IV. Oportunity for a Mexican National Centre of Research in Artificial intelligence

Opportunity in Mexico

- AI has become an essential technology in many applications.
- In Mexico there are recognized researchers in this field; dispersed in various institutions.
- The need for a critical mass that has a high international impact, that generates technology that implies a substantial economic impact in the country.

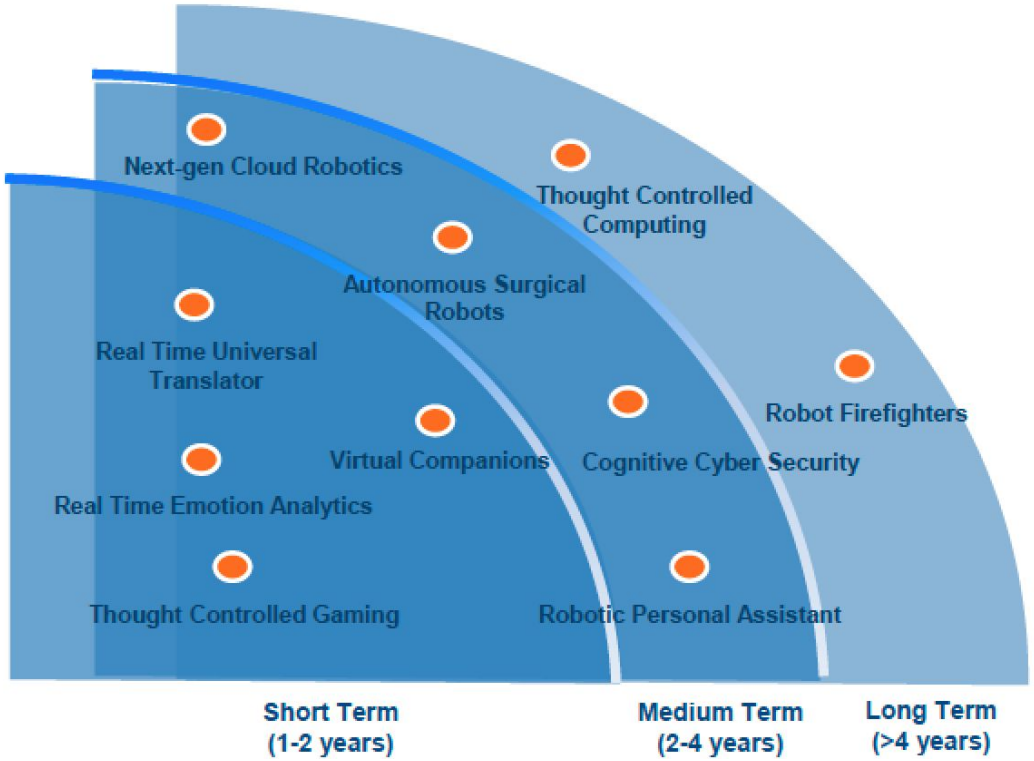
Vision

- The Center should be a driver in Mexico of such opportunities with a medium and long-term focus.

- The Center will be oriented to the production of research ***articles*** in forums of international excellence and to the production and development of ***patents***, with the participation of commercial companies associated with the center and possibly in collaboration with its international parent companies.

Areas & Projects

- Some of the initial projects:
  - Development of service robots
  - Smart surveillance systems
  - Towards a "general medical assistant"
  - Smart assistants for decision making
  - Planning algorithms for the supply chain
  - Biometric sensors / instrumented mannequins
  - Modeling and simulation of the brain



Some of the probable application opportunities that AI will power in near futur

Thank you!

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