Mexico’s competitiveness clusters in industrial innovation
Mexico is a leader and a referent in advanced manufacturing. It is also Latin America’s main exporter of medium and high technology. The country has created a favourable environment to attract investment and develop talent, which has allowed it to strengthen the necessary productive capacities to foster Mexican industries competitiveness both domestically and abroad. A key element to this process has been the ease with which new and superior technologies are adopted, increasing the possibilities to create even greater value. However, in a fast-changing political and economic international context and amidst revolutionary technological changes, Mexico is facing greater challenges to remain a competitive player in global supply chains.

In the digital era, technological innovation entails significant changes in the way goods and services are produced. The current approach to new industrial technologies is focused on generating, gathering, processing, and managing large amounts of data. In manufacturing, this translates into a new productive paradigm: Industry 4.0 (i4.0). Advances such as the Internet of Things, system integration, process automation through collaborative robots, virtual and augmented reality, cloud computing, and big data simulation and analysis software give way to a new type of hyper-flexible manufacturing, which can adapt quickly to changes in the market and the different requirements of each process, from design to marketing.

With that in mind, ProMéxico has conducted several studies to identify capabilities, key players, strategic projects, opportunity areas, and new trends in Mexican industries, to then improve their competitiveness. The current study main goal is to geographically identify clusters of those players taking part in and leading the development of i4.0-oriented advanced manufacturing activities in Mexico.

A competitiveness cluster is a group of actors from the triple helix (government, academia, and businesses) gathered in a common territory, who collaborate on innovative projects geared towards certain markets. These actors come from multinational companies, chambers of commerce, laboratories and, research centres to public institutions that support manufacturing. There are at least 35 competitiveness clusters distributed among 16 states in Mexico, that can be organised and classified according to the definition mentioned above and i4.0 parameters. Detailed information has been gathered for each of these clusters, such as their location, sector or industry, organisational structure, members, contact details, and relevant collaborative projects.

The findings included in this study provide descriptive data and updated contact details of key actors and synergies that conform Mexico’s industrial innovation ecosystem. Some of the clusters are still in their early development stages; whereas others have significant and fully-developed capacities. Thus, the document includes detailed information about the current i4.0 landscape in Mexico to promote the country among businesses, foreign governments, universities, and other players interested in manufacturing innovation.

As there are no previous exercises for identifying Mexican competitiveness clusters and their activities related to technological innovation, this document presents information gathered from primary and secondary sources. These sources include the innovation agendas drafted by the National Council for Science and Technology (Consejo Nacional de Ciencia y Tecnología - CONACYT), local governments development plans, the National Institute of Entrepreneurs (Instituto Nacional del Emprendedor - INADEM), the official websites of the different economic development and promotion ministries, and ProMéxico’s roadmaps. Likewise, the information presented was validated by contacting either online or by telephone the different cluster’s representatives and companies. The data of each cluster is presented here in Fact Sheet, standardised in length and style.

To identify competitiveness clusters focused on industrial innovation, ProMéxico worked around five thematic axes covering key aspects of industrial productive processes with an i4.0 approach. In doing so, the entities were identified and classified according to their actor’s activities in the following classifications:

- Digital factories
- Automation integration, movement, and control
- Energy (industrial efficiency and storage)
- Industrial supply
- Research, development, and technology

ProMéxico then applied three eligibility criteria. Thus, a cluster is defined as a competitiveness cluster if:

1. It is composed of groups or collectives representing triple helix actors, out of which at least one provides the cluster with a certain degree of cohesion and identity.
2. It is in a defined geographical area – be it a city, a metropolitan area or a state.
3. It offers several different forms of collaboration in line with the needs of its members and their respective markets.
The following chart summarises the five steps followed in preparation of the present work: conceptual precision of the activities to be considered, identification and validation of the different clusters, drafting of the clusters’ Fact Sheets, maps, and the present document. The sources consulted in each step are listed in the Bibliography.

<table>
<thead>
<tr>
<th>STEP</th>
<th>METHODOLOGICAL APPROACH</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Conceptual precision of the categories to be included</td>
</tr>
<tr>
<td></td>
<td>Industry 4.0 typology used to classify the different clusters and hubs, developing working definitions for each area:</td>
</tr>
<tr>
<td></td>
<td>- <strong>Research, development, and technology</strong>: comprises the ideas by visionary researchers and developers about the industry of the future, as well as the solutions that are to be launched into the market.</td>
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<td></td>
<td>- <strong>Digital factories</strong>: considers the IT solutions that enable the exchange and integration of value chain processes data to virtually develop products, plan and control production, and perform predictive analysis.</td>
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<td></td>
<td>- <strong>Automation integration, movement, and control</strong>: comprises everything related to process automation, industrial computing, energy transmission, and fluid and robotic power.</td>
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<td></td>
<td>- <strong>Energy (efficiency and industrial storage)</strong>: considers the use of innovative technologies to make electrical energy systems more flexible and intelligent so that industrial companies can significantly reduce their energy costs.</td>
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<tr>
<td></td>
<td>- <strong>Industrial supply</strong>: gathers suppliers of materials, components, individual systems, and innovative solutions that add value to their clients, both physically and digitally.</td>
</tr>
<tr>
<td>2</td>
<td>Identification of potential clusters</td>
</tr>
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<td></td>
<td>- <strong>Detection</strong> of articulated collectives related to strategic manufacturing sectors.</td>
</tr>
<tr>
<td></td>
<td>- <strong>Mapping</strong> of potential clusters organised by state and their corresponding topics.</td>
</tr>
<tr>
<td>3</td>
<td>Cluster validation in keeping with eligibility requirements</td>
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<td></td>
<td>- <strong>Compliance</strong> with the three cluster identification requirements: utilisation of advanced manufacturing processes, inclusion of actors from the triple helix, and existence of collaborative synergies among the actors involved.</td>
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<td></td>
<td>- <strong>Determination</strong> of the scope and approach of the cluster’s representative and driving body; collection of contact details.</td>
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<td></td>
<td>- <strong>Information</strong> gathering via online searching, interviews, and/or surveys.</td>
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<tr>
<td>4</td>
<td>Development of Fact Sheets about the validated clusters</td>
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<td></td>
<td>- <strong>Validation and standardisation</strong> of the information in terms of length, style, and format to include it in a database.</td>
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<tr>
<td></td>
<td>- <strong>Drafting</strong> of individual Fact Sheets about each cluster using the information compiled in the database.</td>
</tr>
<tr>
<td>5</td>
<td>Creation of maps and the present document</td>
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<tr>
<td></td>
<td>- <strong>Drafting</strong> of the present report describing our findings and the methodology used.</td>
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<tr>
<td></td>
<td>- <strong>Creation</strong> of maps illustrating the clusters identified and classifying them by category and specialisation.</td>
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</tbody>
</table>
Naturally, competitiveness clusters can be included in more than one subject classification. To solve this, ProMéxico set a specialisation for each cluster, according to their main activity area. Where necessary, the document also includes one or more subject sub-classifications based on those other areas covered by the cluster but that are not their main work focus. Likewise, ProMéxico included three clusters or consortia that function as a complementary institution to the clusters. Their relevance, as well as the reason for their inclusion, stems from the insertion of their technological and innovative capacities in several of the industries covered by the clusters.

The following table lists the names of the competitiveness clusters, together with the state where they are located, their specialisation, and their secondary topic areas.

### ALIGNMENT WITH INDUSTRY 4.0 THEMATIC AXES

<table>
<thead>
<tr>
<th>Name of the cluster</th>
<th>Research, development, and technology</th>
<th>Digital factories</th>
<th>Automation integration, movement, and control</th>
<th>Energy (industrial efficiency and storage)</th>
<th>Industrial supply</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AGUASCALIENTES</strong></td>
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<tr>
<td>1. InnovaTiA - information technology cluster of Aguascalientes</td>
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<tr>
<td>2. Aguascalientes Automotive Cluster</td>
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<tr>
<td><strong>BAJA CALIFORNIA</strong></td>
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<tr>
<td>3. Baja California Electronic Industry Cluster</td>
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<td></td>
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<tr>
<td>4. Baja California Aerospace Cluster</td>
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<tr>
<td>5. Cluster of Medical Products of the Californias</td>
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<tr>
<td>6. IT@Baja</td>
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<tr>
<td><strong>CHIHUAHUA</strong></td>
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<tr>
<td>7. Innovation and Technology Transfer Park - PIT2</td>
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<tr>
<td>8. Chihuahua Aerospace Cluster</td>
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<tr>
<td>9. Chihuahua Advanced Manufacturing Cluster</td>
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<tr>
<td>10. Chihuahua´s Automotive Cluster</td>
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<tr>
<td><strong>COAHUILA</strong></td>
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<tr>
<td>11. Coahuila Automotive Cluster (La Laguna - Saltillo)</td>
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<tr>
<td>Region</td>
<td>Cluster Name</td>
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<tr>
<td><strong>MEXICO CITY</strong></td>
<td>12. Mexico City Information Technology Cluster (ProSoftware)</td>
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<tr>
<td><strong>ESTADO DE MÉXICO</strong></td>
<td>13. Estado de México Automotive Cluster</td>
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<tr>
<td><strong>GUANAJUATO</strong></td>
<td>14. Guanajuato Automotive Cluster</td>
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<tr>
<td><strong>HIDALGO</strong></td>
<td>15. Scientific and Technological Park of the Autonomous University of the State of Hidalgo</td>
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<tr>
<td><strong>JALISCO</strong></td>
<td>16. Jalisco Information Technology Cluster</td>
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<td></td>
<td>17. Jalisco Electronics Industry Cluster</td>
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<td></td>
<td>18. State of Jalisco Advanced Manufacturing and Industry 4.0 Initiative</td>
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<tr>
<td><strong>MICHOACÁN</strong></td>
<td>19. Clustertim Technological Park</td>
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<tr>
<td><strong>NUEVO LEÓN</strong></td>
<td>20. Research &amp; Technological Innovation Park - PIIT</td>
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<td></td>
<td>21. Nuevo León Automotive Cluster</td>
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<td></td>
<td>22. Nuevo León Nanotechnology Cluster</td>
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<td></td>
<td>23. CSoftMty (Nuevo León ICT Cluster)</td>
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<td></td>
<td>24. Industry 4.0 state strategy - Nuevo León</td>
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<tr>
<td></td>
<td>25. Monterrey Aerocluster</td>
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<tr>
<td><strong>PUEBLA</strong></td>
<td>26. Puebla CIT Technological Park</td>
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<td></td>
<td>27. Central Region Automotive Cluster</td>
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<tr>
<td></td>
<td>28. Puebla Information Technology Innovation Cluster</td>
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<tr>
<td><strong>QUERÉTARO</strong></td>
<td>29. InteQSoft Cluster</td>
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<td>30. Querétaro Aerospace Cluster</td>
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<tr>
<td></td>
<td>31. Querétaro Technology, Engineering, and Design Centres Cluster</td>
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<tr>
<td></td>
<td>32. Creativity and Innovation Center 4.0</td>
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</tbody>
</table>
As shown in the table above, Mexico has 35 competitiveness clusters in 16 federal entities, plus 4 collaboration networks. Below is their distribution according to their alignment with the five thematic axes:

<table>
<thead>
<tr>
<th>TOPIC AREA</th>
<th>NUMBER OF CLUSTERS SPECIALISED IN THE TOPIC AREA</th>
<th>NUMBER OF CLUSTERS COVERING IT AS A SECONDARY TOPIC AREA</th>
<th>TOTAL NUMBER OF CLUSTERS ADDRESSING THE TOPIC AREA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research, development, and technology</td>
<td>12</td>
<td>23</td>
<td>31 (+4 networks)</td>
</tr>
<tr>
<td>Digital factories</td>
<td>9</td>
<td>20</td>
<td>29</td>
</tr>
<tr>
<td>Automation integration, movement, and control</td>
<td>2</td>
<td>26</td>
<td>28</td>
</tr>
<tr>
<td>Energy (industrial efficiency and storage)</td>
<td>-</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Industrial supply</td>
<td>16</td>
<td>10</td>
<td>26</td>
</tr>
</tbody>
</table>

35 CLUSTERS & 4 NETWORKS
IV. COMPETITIVENESS CLUSTERS MAPPING

The following section includes **FIVE MAPS**, each displaying the location of industrial innovation competitiveness clusters by thematic axis, stating whether it is their specialisation or their secondary topic area.
1. Aguacalientes Automotive Cluster
2. Baja California Electronics Industry Cluster
3. Cluster of Medical Products of the Californias
4. IT@Baja
5. Baja California Aerospace Cluster
6. Innovation and Technology Transfer Park - PIT2
7. Chihuahua Aerospace Cluster
8. Mexico City Information Technology Cluster - ProSoftware
9. Estado de México Automotive Cluster
10. Guanajuato Automotive Cluster
11. Scientific and Technological Park of the Autonomous University of the State of Hidalgo
12. Jalisco Information Technology Cluster
14. State of Jalisco Advanced Manufacturing and Industry 4.0 Initiative
15. Clustertim Technological Park
16. Research & Technological Innovation Park - PIIT
17. Nuevo León Automotive Cluster
18. Nuevo León Nanotechnology Cluster
19. CSoftMty (Nuevo León ICT Cluster)
20. Monterrey Aerocluster
21. Industry 4.0 state strategy - Nuevo León
22. Puebla CIT Technological Park
23. Central Region Automotive Cluster
24. Puebla Information Technology Innovation Cluster
25. InteQSoft Cluster
26. Querétaro Aerospace Cluster
27. Querétaro Technology, Engineering, and Design Centres Cluster
28. Creativity and Innovation Center 4.0
29. San Luis Potosí Automotive Cluster
30. Tamaulipas Scientific and Technological Park - TECNOTAM
31. CONACYT Complex Systems Network
32. Automotive Industry Technological Support Centres Strategy - ECATI
33. Nanoscience and Nanotechnology Thematic Network
34. Mexican Photonics Cluster

**Note:**
The states in lighter colour have three or more clusters.

Those clusters specialised in the topic area are highlighted, both in the map and the list.
MAP 2: Digital Factories

1. InnovaTiA - information technology cluster of Aguascalientes
2. Aguacalientes Automotive Cluster
3. Baja California Electronic Industry Cluster
4. Baja California Aerospace Cluster
5. Cluster of Medical Products of the Californias
6. IT@Baja
7. Chihuahua Aerospace Cluster
8. Chihuahua Advanced Manufacturing Cluster
9. Chihuahua’s Automotive Cluster
10. Innovation and Technology Transfer Park - PIT2
11. Mexico City Information Technology Cluster - ProSoftware
12. Guanajuato Automotive Cluster
13. Jalisco Information Technology Cluster
15. Clustertim Technological Park
16. Research & Technological Innovation Park - PIIT
17. Nuevo León Automotive Cluster
18. CSofMty (Nuevo León ICT Cluster)
19. Industry 4.0 state strategy - Nuevo León
20. Puebla CIT Technological Park
21. Central Region Automotive Cluster
22. Puebla Information Technology Innovation Cluster
23. InteQSoft Cluster
24. Querétaro Aerospace Cluster
25. Querétaro Technology, Engineering, and Design Centres Cluster
26. Creativity and Innovation Center 4.0
27. San Luis Potosí Automotive Cluster
28. Sonora Aerospace Initiative Cluster
29. Tamaulipas Scientific and Technological Park - TECNOTAM

Note:
The states in lighter colour have three or more clusters.
Those clusters specialised in the topic area are highlighted, both in the map and the list.
MAP 3:

Automation integration, movement, and control

1. Aguacalientes Automotive Cluster
2. Baja California Electronics Industry Cluster
3. Baja California Aerospace Cluster
4. Cluster of Medical Products of the Californias
5. IT@Baja
6. Innovation and Technology Transfer Park - PIT2
7. Chihuahua Aerospace Cluster
8. Chihuahua Advanced Manufacturing Cluster
9. Chihuahua’s Automotive Cluster
10. Coahuila Automotive Cluster (La Laguna - Saltillo)
11. Estado de México Automotive Cluster
12. Guanajuato Automotive Cluster
13. Jalisco Information Technology Cluster
15. State of Jalisco Advanced Manufacturing and Industry 4.0 Initiative
16. Research & Technological Innovation Park - PIIT
17. Nuevo León Automotive Cluster
18. Nuevo León Nanotechnology Cluster
19. CSoftMty (Nuevo León ICT Cluster)
20. Industry 4.0 state strategy - Nuevo León
21. Monterrey Aerocluster
22. Puebla CIT Technological Park
23. Central Region Automotive Cluster
24. InteQSoft Cluster
25. Querétaro Aerospace Cluster
26. Querétaro Technology, Engineering, and Design Centres Cluster
27. Creativity and Innovation Center 4.0
28. Tamaulipas Scientific and Technological Park - TECNOTAM

Note:
The states in lighter colour have three or more clusters.
Those clusters specialised in the topic area are highlighted, both in the map and the list.
MAP 4:

Energy
(industrial efficiency
and storage)

1. Innovation and Technology Transfer Park - PIT2
2. Scientific and Technological Park of the Autonomous University of the State of Hidalgo
3. Research & Technological Innovation Park - PIIT
4. Industry 4.0 state strategy - Nuevo León
5. Nuevo León Nanotechnology Cluster
6. Querétaro Technology, Engineering, and Design Centres Cluster
7. Creativity and Innovation Center 4.0

Nota:
The states in lighter colour have three or more clusters.
MAP 5:

Industrial supply

1. Aguacalientes Automotive Cluster
2. Baja California Electronic Industry Cluster
3. Baja California Aerospace Cluster
4. Cluster of Medical Products of the Californias
5. IT@Baja
6. Innovation and Technology Transfer Park - PIT2
7. Chihuahua Aerospace Cluster
8. Chihuahua Advanced Manufacturing Cluster
9. Chihuahua’s Automotive Cluster
10. Coahuila Automotive Cluster (La Laguna - Saltillo)
11. Mexico City Information Technology Cluster - ProSoftware
12. Estado de México Automotive Cluster
13. Guanajuato Automotive Cluster
14. Jalisco Information Technology Cluster
15. Jalisco Electronics Industry Cluster
16. State of Jalisco Advanced Manufacturing and Industry 4.0 Initiative
17. Research & Technological Innovation Park - PIIT
18. Nuevo León Automotive Cluster
19. Monterrey Aerocluster
20. Industry 4.0 state strategy - Nuevo León
21. Central Region Automotive Cluster
22. Querétaro Aerospace Cluster
23. Querétaro Technology, Engineering, and Design Centres Cluster
24. Creativity and Innovation Center 4.0
25. San Luis Potosí Automotive Cluster
26. Sonora Aerospace Initiative Cluster

Note:
The states in lighter colour have three or more clusters.
Those clusters specialised in the topic area are highlighted, both in the map and the list.
V. GENERAL FINDINGS ABOUT MEXICO’S COMPETITIVENESS CLUSTERS

As shown in the last map, the primary focus in Mexican competitiveness clusters is industrial supply, a topic area 16 clusters specialise in. This falls in line with the logic behind the idea of a ‘competitiveness cluster’, as their purpose is based on producing and marketing products that satisfy the needs of niche markets. In fact, competitiveness clusters specialised in this topic area gather large multinational companies and SMEs from the aerospace and automotive industries; two Mexican sectors that satisfy foreign demand. It is worth mentioning that there are many SMEs in the country, which serve as supplier base for large investments in the sector and that are expected to develop greater collaborative synergies that, in turn, help to create more clusters specialised in industrial supply.

The second most recurrent thematic axis research, development, and technology with eight specialised competitiveness clusters established around research centres, and both public and private universities. However, if those that hold research, development, innovation, as their secondary topic area are considered, then the total amounts to 23 competitiveness clusters; thus, becoming the most recurrent thematic axis. Although federal and state policies only recently started promoting R+D+i, the fact that, in absolute terms, most of the clusters work on these topic areas, demonstrates that Mexico is not only a manufacturing centre but also offers a favourable climate for research and design. Likewise, there are nine competitiveness clusters specialised in digital factories, where Information and Communication Technology plays a prominent role that is closely linked to the Internet of Things, an essential requirement for establishing intelligent factories.

The study identified two clusters specialised in the thematic axis of automation integration, movement, and control. One of these focuses on the automotive industry, while the other focuses on Information Technology, though both develop projects aimed at bolstering manufacturing processes automation. It is also worth mentioning that none of the competitiveness clusters specialises in energy efficiency and storage. This could be due to the fact that in Mexico, energy issues usually revolve around hydrocarbons and renewable electricity production. Despite this, park-like clusters in Mexico also utilise wind and solar energy to satisfy their own energy needs. There are still plenty of opportunities for development and implementation of industrial energy efficiency and storage technologies.

Geographically, most clusters are in the northern, central, and norther-central regions of the country; which coincides with the historical manufacturing specialisation of these regions that is now focused on export production. The four states with the most competitiveness clusters, classified only by their primary topic area are: Nuevo León (6); Querétaro (4); Baja California (4); and Chihuahua (4). By contrast, as this economic activity is not predominant in the south-eastern region of the country, there are no clusters working on any of the thematic axes analysed.

According to their organisational modalities, there are 22 competitiveness clusters; in fact, given that the study searched for articulated agglomerations with a common identity, proximity, recognition, and projects, it is only natural for the notion of ‘industry clusters’ to conceptually overlap with that of ‘competitiveness clusters; thus, making them harder to identify. In addition, fostering competitiveness through cluster development has been en-
encouraged by government policies throughout this century. Unlike industry clusters, competitiveness clusters necessarily work under a triple helix approach (including government agencies, businesses, chambers of commerce, universities, and research centres), so much so that, without government or academia participation, a business cluster would not be a competitiveness cluster. Another organisational modality falls under the category of ‘initiatives’; such is the case of noteworthy collaborative synergies that have not yet been established under a formal articulation body and representation. ProMéxico has identified eight such cases. A third and final modality entails the existence of a physical space, commonly referred to as technological or scientific ‘park’, where the competitiveness clusters’ members conglomere. This document identifies six of such cases.

Sector wise, ProMéxico has observed a greater concentration of hubs working in the following areas: Information Technology (18), automotive (11), metal-mechanic (10), and aerospace (9). These sectors have been recognised by the governments of the states of Baja California, Nuevo León, Aguascalientes, Querétaro, and Jalisco as strategic sectors given their economic importance and their scientific-technological potential; thus, governments have actively encouraged their development through different public policies fostering R+D+i, technology transfer, specialised training, and foreign investment. In doing so, these competitiveness clusters have been at the forefront of cutting-edge technology implementation and, therefore, are highly competitive in comparison with other domestic industries.

It is worth mentioning that the metal-mechanic industry goes hand in hand with the automotive and aerospace sectors, as they all rely on forging and assembly. Other sectors found are: electronics (4), nanotechnology (2), advanced materials (3), medical devices (5), energy (3), biotechnology (2), and telecommunications (2). A common denominator in terms of collaboration, regardless of the industry, is the existence of educational and training programmes by both the academia and the private sector, and support schemes to establish competitive Tier 1 and Tier 2 supply companies.

Another finding worth mentioning that requires further validation is the fact that industrial innovation clusters are a fairly recent phenomenon in Mexico; indeed, 74% of the 35 competitiveness clusters analysed only began to operate during the last decade; that is, between 2007 and 2017. Furthermore, 91% of clusters came into existence during the 21st century. In fact, only three competitiveness clusters predate the turn of the century and all three of them count the electronics industry among their members, as it was one of the first industries to be boosted by the North American Free Trade Agreement.

Another interesting finding is that these competitiveness clusters are important sources of employment. On average, each group 116 companies employing approximately 26,000 people. Even though some of these companies belong to labour intensive sectors, such as the maquila industries in Baja California and Chihuahua or the large automotive assembly plants in Guanajuato and San Luis Potosí, most of the companies are Small and Medium Enterprises. In terms of job quality, it would be fair to say that given the types of activities specialised in R+D, engineering, software development, etc., most of the jobs are qualified jobs; however, job quality was not within the scope of the present study and is an important topic, which could be expanded upon in a future study.

Although most of the competitiveness clusters are still at an initial stage formulating plans, articulating efforts, and generating new capacities, it is worth mentioning that there are more mature competitiveness clusters with clear strengths by virtue of the sum of their corporate, governmental, and academic members’ economic and human resources. Below are some of the most noteworthy cases:
NOTEWORTHY COMPETITIVENESS CLUSTERS

A mature pool with decades of experience creating and developing capacities that counts international companies from Japan, South Korea, China, the United States, and Europe among its members. It has helped to launch and monitor projects together with the maquila industry, chambers of commerce, universities, and the three levels of government.

Currently, it is working towards increasing its level of specialisation under the impetus of the National Electronics, Telecommunications, and Information Technology Chamber (CANIETI, for its Spanish acronym) and the Ministry of Economy by incorporating advanced manufacturing and R+D to its activities, in order to foster growth in the sector’s main segment in Baja California.

Under the leadership of the local business community and the Technological Institute of Monterrey, the Chihuahua campus is outgrowing its current park status and slowly becoming a proper innovation ecosystem. The competitiveness cluster actively fosters technological development, business incubation, and human talent training. In addition, it benefits from venture capital and market access to boost the growth of existing companies in the region or the establishment of new ones.
The automotive industry has begun to grow exponentially during the last decade through investment by ‘anchor’ companies, such as Volkswagen, Pirelli, Mazda, and General Motors (the latter having an earlier presence in Mexico) and by a series of inputs and auto parts suppliers and service providers, Guanajuato has put together a strategy for further specialisation.

Together with the state government, the cluster has fostered training schemes and is promoting the creation of a new technological centre to facilitate research and development. Currently, the Centre for Applied Innovation in Competitive Technologies satisfies the sector’s technological needs and, being part of the ECATI Automotive Network, is well-positioned to broaden the scope of technological services offered to automotive and auto parts companies.

Having made an important investment in developing the software industry since the turn of the century and having consistently invested in capacity building (training, equipment, and certification), Jalisco is ripe to expand its trade base and consolidate its infrastructure. Thus, it is known for its high competitiveness.

Support by federal programmes, such as Prosoft, and the state government through the State Council for Science and Technology and, more recently, the Secretariat of Innovation, Science, and Technology, are bearing fruit and are helping to expand the outreach of Information Technology and other activities and sectors. Nowadays, the members of this competitiveness cluster are among the most relevant Mexican players in applying digital technologies to manufacturing.

Often dubbed the ‘Mexican Silicon Valley’, this pool has been fostered by the National Electronics, Telecommunications, and Information Technology Chamber (CANIETI, for its Spanish acronym). In order to foster specialisation in productive chains articulation, CANIETI created the Electronic Productive Chain programme, which has successfully helped to develop regional suppliers.

Initially, American technological companies, such as HP and IBM established in the region and laid the foundations for the creation of this cluster. Later, with the arrival of contract manufacturing companies, new supply dynamics came into being and contributed to the development and specialisation of innovation and technology development capacities. The pool’s companies and CANIETI have promoted links with local higher education entities, such as the Technological and Higher Studies Institute of Monterrey, the Western Technological and Higher Studies Institute, and the Autonomous University of Guadalajara, just to mention a few.
This might possibly be the best example of a competitiveness cluster born out of a brand new physical space that aggregated players around innovation. Fostered by the government of Nuevo León, this park houses two types of research and development centres, both public and private, and continues to grow in terms of guests. It is also worth mentioning the significant public infrastructure policy that has helped to develop the cluster and consolidate its capacities in a very short period of time.

The PIIT has managed to align the capacities of the centres it hosts with its own goals geared towards advanced manufacturing and advanced materials development. This is one of the competitiveness clusters where activities and projects related to all five Industry 4.0 thematic axes are conducted.

Being nanotechnology a new and growing field in Mexico, it is difficult to find other clusters bringing together many public and private players in the area. This cluster concentrates most of the area’s national scientific and technological capacities.

Despite still being at the early development stages, it comprises several companies developing advanced materials and an incubator equipped with basic and advanced equipment to support new projects during their initial and testing states.

This IT cluster, located in Querétaro, has been a positive and important articulator of inter-institutional efforts to promote specialisation of its member companies in new Industry 4.0 and Internet of Things technologies.

Not only does the competitiveness cluster has a clear leadership and strategy, but it is also highly efficient in integrating academic and governmental efforts in numerous collaborative projects.

Unlike other aerospace clusters, Querétaro’s triple helix has boosted productive chain integration, linked with academia to train highly-skilled personnel, and created a geographical cluster that aggregates important players around the city’s international airport.

Querétaro has a high concentration of research centres, which have also sought to articulate with the aerospace sector, especially the Querétaro Technology, Engineering, and Design Centre (CIATEQ) and the Electrochemical Technological Research and Development Centre (CIDETEQ).
VI. THEMATIC NETWORKS

Besides its competitiveness clusters, Mexico possesses thematic networks that bring together players interested in joining capacities to facilitate technological and innovative insertion in vertical industries, such as automotive and aerospace, and in less vertical ones, such as Information Technology and nanotechnology. There are 4 thematic networks working primarily around Industry 4.0’s technological research and development, each with their highly-specialised research axes linked to their own sectors. They come together in research centres, laboratories, and public and private universities, some within the clusters’ sphere of influence. Formally created and supported by the National Council of Science and Technology (CONACYT) during the last decade, their goal is to maximise the installed capacity of their members through communication networks and close collaboration, and thus strengthen their capacities with a market approach.

On the other hands, these networks also came into existence in response to the complexities of the normative framework that makes it difficult to create new public centres due to budgetary constraints. In order to enhance their resource management and to generate higher impact projects, these satellite or sub-centre networks were created around already existing organisations so that they could collaborate with private companies in ways similar to those of the competitiveness clusters. Thus, these networks complement the work of competitiveness clusters as they coexist within their own scheme and, in addition, become an important link between clusters.

NOTEWORTHY NETWORKS

Automotive Industry Technological Support Centres Strategy - ECATI (Estrategia de Centros para la Atención Tecnológica de la Industria (ECATI) Automotriz)

This was the first vertical network created by CONACYT. Founded in 2016 by 13 public research institutions, it seeks to articulate and aggregate scientific and technological research and development capacities to have direct impact on Mexico’s automotive sector.

ECATI Automotive has led to the creation of highly specialised centres and laboratories, such as the Aguascalientes Innovation and Technological Transfer Centre (CITTAA), based on the Aguascalientes Automotive Cluster and the National Light Materials Innovation and Development Laboratory for the Automotive Industry (Laniauto), and, primarily, the Applied Chemical Research Centre (CIQA) in Coahuila’s Automotive Cluster (La Laguna - Saltillo).

Nanoscience and Nanotechnology Thematic Network (Red Temática de Nanociencias y Nanotecnología)

One of the largest and best structured thematic networks in the country. It has 480 members working on advanced materials research, among other lines of work. In addition, the network actively looks for advocacy opportunities about the many aspects of manufacturing.

Supported by CONACYT, this network has its own strategy and promotes the development of technological management capacities among its members, located in more than 60 institutions across the country.
VII. FINAL REMARKS

The new Industry 4.0 productive paradigm has, in a short period of time, considerably impacted several Mexican players and sectors. The **35 COMPETITIVENESS CLUSTERS** are proof the country’s developing ecosystem, which is robust in manufacturing, as well as in design, and the implementation of innovative technologies in manufacturing.

Sectors such as aerospace, automotive, electronics, metal-mechanic, medical devices and Information Technology as spearheading the implementation of Industry 4.0 technologies. Their strategic value stems, in great measure, from foreign investment; however, their growth and development are the result of collaborative synergies among the different triple helix players and the talent aggregated in the competitiveness clusters.

It is important to highlight the dynamism of these clusters as they create and coordinate collaboration efforts – a task usually left to the private initiative willing to generate new business. Thus, mapping Mexico’s competitiveness clusters by focus areas according to Industry 4.0 trends, should help investors to identify where the different players, sectors, and projects are, together with other key elements beneficial to any investment project.

The thematic networks, led by research centres, are also open to develop new business, especially since they have a more practical approach towards the use of their research and design capacities. Likewise, the existence of more than one thematic network within each cluster facilitates project development and implementation by making better use of the resources available. Thus, these networks open the door to a new intercompetitiveness cluster collaboration dimension.

Mexico still faces important challenges, which investment can help turn into strengths. Even if Mexican talent implements new technologies successfully, the country still needs to explore its capacity to develop new technologies, innovate processes, and execute innovation-centred business projects by providing them with financing and guidance. On the other hand, there are opportunities in emerging niche markets ripe for fresh investment and players to develop, supply, and implement technologies related to energy efficiency, automation integration, and drive and control systems. Also, international cooperation between business and academia, as a means to assimilate knowledge and capacities, is a fertile ground by fostering alliances and bilateral scientific and technological cooperation agreements.

Finally, derived from the rapidly changing environment in which the clusters operate, it is required to maintain the information in this document updated, particularly that about the projects, development of capacities, and contact information. Also, it is likely that new clusters implementing Industry 4.0 processes and technology will rise. Hence, this document should be taken as a baseline as of the date of its edition. Nevertheless, this study has been useful to demonstrate that Mexico has important capacities for be a strong ally of the leaders in industrial innovation.
XIII. Fact sheets
**GENERAL DATA**

Name of the cluster: InnovaTiA - Clúster de tecnologías de información de Aguascalientes (InnovaTiA - information technology cluster of Aguascalientes)

Age: 2002

**Objectives and general approach:**

Promote university outreach and increase competitiveness in the information technology sector by fostering integration among enterprises in the sector to achieve greater collective efficiency and promote business development.

**Sectors or Industries:** Information Technology

**Geographical Scope:** Aguascalientes

**HIGHLIGHTS**

**Main strengths and projects:**

Joint training programmes and initiatives to boost competitiveness with the National Electronics and Information and Communication Technology Chamber (CANIETI), Aguascalientes Construction Industry Chamber, and the Mexican Global Network.

Availability of grants for to support 20 SMEs in integrating Information Technology to their process and, in turn, grow, in collaboration with the Centre for Competitiveness and Innovation of the State of Jalisco (CECOI) These grants allow SMEs supplying the automotive sector to acquire the tools to improve their capacities in terms of equipment, advanced management applications, marketing strategies, design, and innovation.

There is a standing agreement with the UP to foster the exchange of infrastructure, technological development, preferential technology provision, employment of high-performance students, and academic and research strengthening.

**STATE:**

**TRIPLE HELIX**

**Main Business Actors**

- Borealix
- DA Comp
- Grupo MX
- Kael Soft
- Ovante
- Link Things
- Softtek Aguascalientes

**Approximate number of:**

38 Companies

500 Employees

**Main government players**

State: Government of the State of Aguascalientes, Aguascalientes Competitiveness and Innovation Centre

**Main research and academic players**

- Pan-American University (UP)
- Technological University of Aguascalientes (UTA)

**CLUSTER REPRESENTATIVE**

Name of the Institution: Innovatia, A.C.

Type of Institution: Private

Boulevard Manuel J. Clouthier 2275-6
Campestre
20100
Aguascalientes

https://es-la.facebook.com/InnovaTiAAC/

Mr. José Enrique Santoyo Quezada
President

+52 (449) 238 2002

contacto@clusterinnovatia.com

**INDUSTRY 4.0**

**THEMED ACTIVITIES**

- Research, development, and technology
- Digital factories
- Automation integration, movement, and control
- Energy: efficiency and storage
- Industrial supplies

Primary
Secondary
Name of the cluster: Clúster del Ramo Automotriz de Aguascalientes (Aguascalientes Automotive Cluster)

Age: 2013

Objectives and general approach: Foster its members’ capability development in the areas of intellectual, business, technological, and financial capital, competitiveness and patents.

Sectors or Industries: Automotive

Geographical Scope: Aguascalientes

HIGHLIGHTS

Main strengths and projects: After the 2017 German-Mexican Automotive Forum in Aguascalientes, created the first dual engineering course, following the German model. Dr Alfred Vormfelde, expert in dual university education, will support the planning, development, and implementation of the dual higher education model, together with the UTA and the UPA.

The Cluster’s Innovation Committee collaborates with CANIETI and ITA to implement new Industry 4.0 solutions in order to improve the competitive advantage in manufacturing technologies, connectivity, and process integration.

Training and certification of all members to comply with automotive international standards in order to develop and expand the business base with German partners.

Collaboration with the Mexican Automotive Development (CeDIAM) of the Aguascalientes ITESM to foster innovation initiatives and improve key processes to the automotive industry value chain in particular and advanced manufacturing in general.

The Centre for Technology Transfer (CI-TTA) will start operating soon and will provide the hub with a greater R+D competitive advantage.

Main Business Actors
- Nissan
- Daimler
- ZF
- Metal & Stamping
- Cámara Nacional de la Industria Electrónica de Telecomunicaciones y Tecnologías de la Información (CANIETI)
- Senior Experten Service
- Bosch
- Clúster de Robótica y Automatización de Aguascalientes

Main governmental players
State: Government of the State of Aguascalientes

Main research and academic players
- Autonomous University of Aguascalientes (UAA)
- Polytechnic University of Aguascalientes (UPA)
- Technological University of Aguascalientes (UTA)
- University of the Valley of Mexico (UVM)
- Aguascalientes Institute of Technology and Higher Education (ITESM)
- Aguascalientes Campus

Approximate number of:
40 Companies
2,000 Employees

HIGHLIGHTS

AGUASCALIENTES

Universidad
1009, Int. 101
Fraccionamiento Los Bosques
20120
Aguascalientes

https://www.facebook.com/GrupoGIRAA/

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Director

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giraa2013@gmail.com

INDUSTRY

4.0

THEMED ACTIVITIES

Research, development, and technology
Digital factories
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies

Primary ● Secondary ●
Name of the cluster: Agrupamiento de la Industria Electrónica de Baja California (Baja California Electronic Industry Cluster)

Age: 1999

Objectives and general approach: Integrate and promote the development of the electronics industry to add new technologies and position itself - in the medium and long term - as an advanced electronic product design, development, and manufacturing cluster.

Sectors or Industries:
- Electronics
- Information Technology
- Telecommunications
- Aerospace
- Medical devices

Geographical Scope:
Baja California

Main strengths and projects:
Training, certification, and supplier development programmes to foster innovation and technological development to improve the Baja California electronics industry competitiveness.

Support for creating the BIT Centre (Business Innovation and Technology Centre): a space for all ITCs players to converge and strengthen the SMEs working in the sector by broadening their export offerings. The centre also seeks to foster collaboration between academia and the productive sector to create solutions to increase the use of ITCs and encourage secondary school students to study engineering by inviting them to conferences and trade fairs.

Support for creating a DesignLab in the BIT Centre to train industrial engineers in parts design for different industries.

Approximate number of:

250 Companies
40,000 Employees

Main Business Actors
- Foxconn
- Samsung
- Plantronics
- Honeywell
- Netek
- LG Electronics

Name of the Institution:
Cámara Nacional de la Industria Electrónica de Telecomunicaciones y Tecnologías de la Información (CANIETI) Sede Noreste

Type of Institution:
Public

Address:
Boulevard Díaz Ordaz
12415 Fraccionamiento El Paraíso
22106 Tijuana

Website:
http://www.canieti.org/sedes/noroeste.aspx

Contact:
Mr. José Francisco Elizondo Siller
President at North-western Regional Branch

Approximate number of:

Employees: 40,000
Companies: 250

- Foxconn
- Samsung
- Plantronics
- Honeywell
- Netek
- LG Electronics

Main governmental players
- Technical and Higher Education Centre (CETYS University)
- Technological University of Tijuana (UTT)
- Tijuana Institute of Technology (ITT)
- Research and Digital Technology Development Centre (CITEDI-IPN)
- Ensenada Centre for Scientific Research and Higher Education (CICESE)

Main research and academic players
- Technical and Higher Education Centre (CETYS University)
- Technological University of Tijuana (UTT)
- Tijuana Institute of Technology (ITT)
- Research and Digital Technology Development Centre (CITEDI-IPN)
- Ensenada Centre for Scientific Research and Higher Education (CICESE)

HIGHLIGHTS

State: Government of the State of Baja California
Municipal: Tijuana County Municipality

TRIPLE HELIX

THEMED ACTIVITIES

Research, development, and technology

Digital factories

Automation integration, movement, and control

Energy: efficiency and storage

Industrial supplies

Industry 4.0
Name of the cluster:
Clúster Aeroespacial de Baja California (Baja California Aerospace Cluster)

Age:
2012

Objectives and general approach:
Promote the sector’s competitiveness, develop a local supply network, boost innovation projects and collaboration with universities.

Sectors or Industries:
Aerospace

Geographical Scope:
Baja California

Main strengths and projects:
Training and certification projects for human talent working in metrology and interpretation of mechanical planes, and conventional and non-conventional machining through the Aerospace Specialised Technical Development Centre and the BIT Centre in collaboration with the UTT, the ITT, and the CETYS.

Joint programmes with Fundación Aéreo to encourage children and teenagers to acquire skills applicable to the aerospace industry.

Supplier development program in collaboration with business organisations and economic development councils to foster innovation and technology-based entrepreneurial projects; such as the United States-Mexico Foundation for Science (FUMEC).

Partnerships with CONACYT and CANFSA to create an Advanced Non-Ferrous Alloy Centre to foster research and innovation in industrial technologies and materials.

Name of the Institution:
Aerospace Clúster de Baja California, A.C. y Baja California Aerospace Alliance A.C.

Type of Institution:
Private

Objectives and general approach:
Promote the sector’s competitiveness, develop a local supply network, boost innovation projects and collaboration with universities.

Geographical Scope:
Baja California

HIGHLIGHTS

Main strengths and projects:
Training and certification projects for human talent working in metrology and interpretation of mechanical planes, and conventional and non-conventional machining through the Aerospace Specialised Technical Development Centre and the BIT Centre in collaboration with the UTT, the ITT, and the CETYS.

Joint programmes with Fundación Aéreo to encourage children and teenagers to acquire skills applicable to the aerospace industry.

Supplier development program in collaboration with business organisations and economic development councils to foster innovation and technology-based entrepreneurial projects; such as the United States-Mexico Foundation for Science (FUMEC).

Partnerships with CONACYT and CANFSA to create an Advanced Non-Ferrous Alloy Centre to foster research and innovation in industrial technologies and materials.

Main Business Actors
- Gulfstream
- Zodiac
- Eaton
- Honeywell
- Triumph Group
- UTC Aerospace Systems
- BAP
- GMPI

Approximate number of:
70 Companies
16,000 Employees

State: Government of the State of Baja California
Municipal: Tijuana County Municipality

Main governmental players
- Baja California State
- Tijuana Municipal

Main research and academic players
- Centre for Technical and Higher Education (CETYS)
- Autonomous University of Baja California (UABC)
- Technological University of Tijuana (UTT)
- Ensenada Centre for Scientific Research and Higher Education (CICESE)
- Centre for Advanced Non-Ferrous Structural Alloys (CANFSA)
- Tijuana Institute of Technology (ITT)

INDUSTRY 4.0 THEMED ACTIVITIES

Research, development, and technology
Digital factories
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies
**NAME OF THE CLUSTER:**
Clúster de Productos Médicos de las Californias
(Cluster of Medical Products of the Californias)

**AGE:**
2013

**OBJECTIVES AND GENERAL APPROACH:**
Become the largest regional medical product development and manufacturing cluster in the Americas.

**SECTORS OR INDUSTRIES:**
Medical devices

**GEOGRAPHICAL SCOPE:**
Baja California

**HIGHLIGHTS**

**MAIN STRENGTHS AND PROJECTS:**
Organises MEDSummit every year, where different suppliers promote their offerings and have the opportunity to network with medical supplies companies. The organisers also hold conferences to debate current issues affecting the industry and, also, to generate business meetings, the Medical Devices Regulatory Forum (Cofepris & FDA) and the Mechanical Engineering University Forum.

**MAIN GOVERNMENTAL PLAYERS**
State: Secretariat of Economic Development of Baja California
Municipal: Tijuana City Council

**MAIN RESEARCH AND ACADEMIC PLAYERS**
- National Autonomous University of Mexico (UNAM)
- University of Xochicalco
- College of the Northern Frontier
- CETYS University
- UC San Diego
- Tijuana Institute of Technology (ITT)

**MAIN BUSINESS ACTORS**
- Apon Industries
- Centurion Medical Products
- Flexmedical
- Harmac Medical Products
- Industrias Apson
- Stryker Tijuana
- Cardinal Health
- Kieran Label Corp

**APPROXIMATE NUMBER OF:**
74 Companies
9,000 Employees

**TYPE OF INSTITUTION:**
Private

**NAME OF THE INSTITUTION:**
Asociación Industrial de Productos Médicos de las Californias, A.C

**ADDRESS:**
Camino Antiguo a Tecate, 16590-B Niños Héroes 22120 Tijuana

**WEBSITE:**
https://www.industriamedica.org/

**CONTACT:**
Mr. Ángel de la Campa
President
+52 (664) 629 0988
info@industriamedica.org

**INDUSTRY 4.0 THEMED ACTIVITIES**

- Research, development, and technology
- Digital factories
- Automation integration, movement, and control
- Energy: efficiency and storage
- Industrial supplies
Name of the cluster: IT@Baja

Age: 2003

Objectives and general approach:
Lead the Information Technology sector development strategy in the State of Baja California.

Sectors or Industries:
Information Technology
Telecommunications

Geographical Scope:
Baja California

HIGHLIGHTS

Main strengths and projects:
Development of human capital through certification of competencies (both soft and hard), revision and updating of academic programmes (from secondary school onwards), boot camps, cross training (industry - academia), lighting talks, graduate and post-graduate degrees, and Hackatons.

Offer support to secure financing for ICT-based projects and entrepreneurs from institutions such as INADEM, CONACYT, and the PROSOFT3.0 programme.

Internationalisation of IT and software development SMEs through a high-level business development mentoring programme to improve sales strategies and techniques tailored for the American market.

Together with BAJAINNOVA, approach the state’s installed industry to activate the region’s Information Technology and innovation ecosystems by fostering technology transfer partnerships in topics related to Industry 4.0, manufacturing digitalisation, and IoT.

Main Business Actors
- Grupo Tress
- Hits
- Softtek
- Alestra
- ArkusNexus
- BajaDev
- Boxel Interactive

Approximate number of:
Companies: 40
Employees: 1,500

Main governmental players
State: Government of the State of Baja California, Secretariat of Economic Development of Baja California (SEDECO)
Municipal: Tijuana County Municipality

Main research and academic players
- Technical and Higher Education Centre (CETYS)
- Technological University of Tijuana (UTT)
- Ensenada Centre for Scientific Research and Higher Education (CICESE)

INDUSTRY 4.0 THEMED ACTIVITIES

Research, development, and technology
Digital factories
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies
**GENERAL DATA**

**Name of the cluster:**
Parque de Innovación y Transferencia Tecnológica - PIT2
(Innovation and Technology Transfer Park - PIT2)

**Age:**
2009

**Objectives and general approach:**
Leverage enterprises and entrepreneurs working in high-impact and innovative projects.

**Sectors or Industries:**
- Automotive
- Aerospace
- Metal-mechanic
- Biotechnology
- Information Technology

**Geographical Scope:**
Chihuahua

**HIGHLIGHTS**

**Main strengths and projects:**
High-impact business incubator offering specialised consultancy and mentoring services, a technology transfer office, access to private and public funding, and links with academia and chambers of commerce.

Landing programme to facilitate operations and growth of international companies interested in investing in the State of Chihuahua.

Metrology, mechatronic and manufacturing, design, advanced materials, and industrial engineering laboratories; and is planning to create an IoT laboratory to promote technology-based enterprises.

**Approximate number of:**
- 50 Companies
- 300 Employees

**Main Business Actors**
- ADS Systems
- FabLab
- TGC
- Solar Smart
- DiagTech
- ESJ
- DPS
- Codetec
- RIPPSA
- BambuCode

**Main governmental players**
- State: Government of the State of Chihuahua

**Main research and academic players**
- Monterrey Institute of Technology and Higher Education (ITESM) - Chihuahua Campus

**STATE:**
CHIHUAHUA

**CLUSTER REPRESENTATIVE**

**Name of the Institution:**
Parque Tecnológico Orión del Instituto Tecnológico y de Estudios Superiores de Monterrey

**Type of Institution:**
Private

Avenida Heroico Colegio Militar
47000
Nombre de Dios
31300
Chihuahua

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Director at Orion Technological Park

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**INDUSTRY 4.0**

**THEMED ACTIVITIES**

- Research, development, and technology
  - Digital factories
  - Automation integration, movement, and control
  - Energy: efficiency and storage
  - Industrial supplies

Primary ● Secondary ●
Name of the cluster:
Clúster Aeroespacial de Chihuahua
(Chihuahua Aerospace Cluster)

Age:
2010

Objectives and general approach:
Foster aerospace competitiveness by improving capabilities, obtaining certifications, and developing a local supply network.

Sectors or Industries:
Aerospace
Metal-mechanic

Geographical Scope:
Chihuahua

HIGHLIGHTS
Main strengths and projects:
Soft-landing, shelter, start-up, and industrial real estate programmes offering legal assistance, recruiting, import-export, tax, and logistics services, among others.

Development and promotion of aerospace Tier 1 and Tier 2 suppliers with capacities in machining, sheet metal, special treatments and processing, and assembly.

Support for aerospace manufacturing quality control certifications and guarantees (NADCAP and AS9100), as well as training in high-precision machining, thermal and metal-chemical treatments, and aircraft parts design.

Main Business
Actors:
- Cessna
- Safran
- Beechcraft
- Bell Helicopter
- Honeywell
- American Industries
- NordamSoisa
- KamanHawker
- Altasen
- BTEC

Approximate number of:
45
Companies
17,000
Employees

Main government players
State: Government of the State of Chihuahua
Municipal: Chihuahua City Council

Main research and academic players
- Centre for Advanced Materials Research (CIMAV)
- High Technology Training Centre (CENALTEC)
- Technological University of Chihuahua (UTCH)
- Monterrey Institute of Technology and Higher Education (ITESM) - Chihuahua Campus

TRIPLE HELIX

STATE:
CHIHUAHUA

General Data

Cluster Aerospace de Chihuahua
(Chihuahua Aerospace Cluster)

2010

Foster aerospace competitiveness by improving capabilities, obtaining certifications, and developing a local supply network.

Sectors or Industries:
Aerospace
Metal-mechanic

Geographical Scope:
Chihuahua

HIGHLIGHTS
Main strengths and projects:
Soft-landing, shelter, start-up, and industrial real estate programmes offering legal assistance, recruiting, import-export, tax, and logistics services, among others.

Development and promotion of aerospace Tier 1 and Tier 2 suppliers with capacities in machining, sheet metal, special treatments and processing, and assembly.

Support for aerospace manufacturing quality control certifications and guarantees (NADCAP and AS9100), as well as training in high-precision machining, thermal and metal-chemical treatments, and aircraft parts design.

Main Business
Actors:
- Cessna
- Safran
- Beechcraft
- Bell Helicopter
- Honeywell
- American Industries
- NordamSoisa
- KamanHawker
- Altasen
- BTEC

Approximate number of:
45
Companies
17,000
Employees

Main government players
State: Government of the State of Chihuahua
Municipal: Chihuahua City Council

Main research and academic players
- Centre for Advanced Materials Research (CIMAV)
- High Technology Training Centre (CENALTEC)
- Technological University of Chihuahua (UTCH)
- Monterrey Institute of Technology and Higher Education (ITESM) - Chihuahua Campus

Cluster Representative

Name of the Institution:
Chihuahua Aerospace Cluster

Type of Institution:
Private

Avenida William Shakespeare
157
Complejo Industrial Chihuahua
31136
Chihuahua

http://www.aerospaceclusterchihuahua.com

Mr. René Espinosa
President

+52 (614) 442 8462

aerospace@indexchihuahua.org.mx

INDUSTRY 4.0
THEMED ACTIVITIES

- Research, development, and technology
- Digital factories
- Automation integration, movement, and control
- Energy: efficiency and storage
- Industrial supplies

Primary
Secondary
**GENERAL DATA**

Name of the cluster: Clúster de Manufactura Avanzada de Chihuahua (Chihuahua Advanced Manufacturing Cluster)

Age: 2015

Objectives and general approach: Integrate local suppliers.

Sectors or Industries:
- Electronics
- Metal-mechanic
- Automotive
- Aerospace
- Medical devices

Geographical Scope: Chihuahua

**HIGHLIGHTS**

Main strengths and projects:
Actions to access public calls for resources for the benefit of regional industries, and to ensure that any tax incentives for leading companies are subject to their inclusion in the national industry.

Generate strategies to develop new products through market research and studies.

Develop enterprises in different manufacturing sectors incorporating them, according to their approach and specialization, to domestic and international markets.

Implement ongoing training and certification programmes in collaboration with educational institutions working in innovation programmes.

**TRIPLE HELIX**

Main Business Actors:
- Grupo MSSA
- ICP Automation
- Fasi Tecnologías
- PIMA
- FEM Automatización Industrial
- AMD Automation

Approximate number of:
- 250 Companies
- 50,000 Employees

Main governmental players:
State: Secretariat of Innovation and Economic Development, Government of the State of Chihuahua

Main research and academic players:
- Technological University of Ciudad Juárez (UTCJ)
- Autonomous University of Ciudad Juárez
- Ciudad Juárez Institute of Technology (ITCJ)
- Monterrey Institute of Technology and Higher Education (ITESM) - Chihuahua Campus

**CLUSTER REPRESENTATIVE**

Name of the Institution: Clúster de Manufactura Avanzada de Chihuahua

Type of Institution: Private

Rio Nilo
4049-9B
Córdova Américas
32310
Ciudad Juárez

https://www.clustermach.com

Mr. Pablo M. Ortega
Director

+52 (656) 477 0301

contacto@clustermach.com

**INDUSTRY 4.0**

**THEMED ACTIVITIES**

- Research, development, and technology
  - Digital factories
  - Automation integration, movement, and control
- Energy: efficiency and storage
  - Industrial supplies
Sectors or Industries:
Automotive

Name of the cluster:
AutoClúster Chihuahua
(Chihuahua´s Automotive Cluster)

Objectives and general approach:
Develop capacities and process certification.

Geographical Scope:
Chihuahua

Main strengths and projects:
Offers training, courses, and certification through the High Technology Training Centre (CENAL TECT) to all those who wish to train and acquire new technical industry-related skills in order to become self-employed or start their own business in aerostructures, sheet metal forming, computer-assisted design, geometric dimensioning and tolerancing, metal stamping, etc.

Advanced Materials Research Centre (CIMAV) for research and development of advanced materials and manufacturing processes in 58 testing, calibration, and technical procedures laboratories. 139 scientists and technicians work in topic areas such as nanostructured materials, computer simulation and molecular modeling, materials integrity and design, and renewable energy, among others.

Integration of cable looms, forging, foundry, moulding, and electronic components suppliers.

Objectives and general approach:
Develop capacities and process certification.

Main research and academic players:
- Monterey Institute of Technology and Higher Education (ITESM) Chihuahua Campus
- Technological University of Chihuahua (UTCH)
- Centre for Advanced Materials Research (CIMAV)
- High Technology Training Centre (CENALTEC)
- University La Salle Chihuahua (ULSA)

Geographical Scope:
Chihuahua

Name of the cluster:
AutoClúster Chihuahua
(Chihuahua´s Automotive Cluster)

Age:
2009

Main strengths and projects:
Offers training, courses, and certification through the High Technology Training Centre (CENAL TECT) to all those who wish to train and acquire new technical industry-related skills in order to become self-employed or start their own business in aerostructures, sheet metal forming, computer-assisted design, geometric dimensioning and tolerancing, metal stamping, etc.

Advanced Materials Research Centre (CIMAV) for research and development of advanced materials and manufacturing processes in 58 testing, calibration, and technical procedures laboratories. 139 scientists and technicians work in topic areas such as nanostructured materials, computer simulation and molecular modeling, materials integrity and design, and renewable energy, among others.

Integration of cable looms, forging, foundry, moulding, and electronic components suppliers.
Name of the cluster: Clúster Automotriz de Coahuila (La Laguna - Saltillo) (Coahuila Automotive Cluster) (La Laguna - Saltillo)

Age: 2012

Objectives and general approach:
Develop the automotive industry in the La Laguna region and promote projects to increase competitiveness through innovative solutions.

Sectors or Industries:
Automotive

Geographical Scope:
La Laguna Area (Coahuila and Durango)

Main strengths and projects:
Enhance members’ visibility through promotion and PR activities around the Automotive Cluster potential to attract foreign investment and through other activities such as the 2018 Laguna Automotive Expo (2018 Expo Automotriz Laguna).

Foster specialised training and certification to strengthen the cluster and its links with education sector; it helps to increase the workers’ income levels and quality of life. It plans to create a high technology specialist training centre.

Improve local supply chain integration (T2 and T3) focused on supply, packaging, transport, competitive storage, turnkey projects, industrial canteens, and facilities protection systems in compliance with automotive industry standards.

Increase innovation capacities to adopt new technologies boosting participation in greater value added activities and creating the conditions to foster research and technological development in the region.

State: Secretariat of Economic Development of Coahuila, Secretariat of Economic Development of Durango
Municipal: Government of Torreón Municipality, Government of the Gomez Palacio Municipality

Main Business Actors
- Caterpillar
- Johnson Controls
- John Deer
- Takata
- Toyota Boshoku
- FENSA
- Grupo SSC
- Lincoln Electric
- Yura Corp
- PKC Group

Main governmental players

Main research and academic players
- Technological University of Torreón (UTT)
- Monterrey Institute of Technology and Higher Education (ITESM) - Saltillo Campus
- Autonomous University of La Laguna (UAL)
- University La Salle Laguna
- TecMilenio University
- La Laguna Institute of Technology

Approximate number of:
40 Companies
25,000 Employees

HIGHLIGHTS

COAHUILA
Calzada Manuel Gómez Morín 489
Torreón Residencial 27268 Torreón

www.clusterautomotrizlaguna.com

Mr. José Luis Hotema
President
+52 (871) 791 3347
jl_hotema@clusterautomotrizlaguna.com

INDUSTRY 4.0
THEMED ACTIVITIES

Research, development, and technology
Digital factories
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies
**Name of the cluster:**
Clúster Automotriz del Estado de México (Estado de México Automotive Cluster)

**Age:**
2005

**Objectives and general approach:**
Develop the industry’s capabilities through high commercial value and high industrial intelligence value outreach initiatives and strengthen business networks through business links.

**Sectors or Industries:**
Automotive

**Geographical Scope:**
Estado de México

**Main strengths and projects:**
Develop an innovation promotion programme focused on manufacturing processes and a technology roadmap in collaboration with the Automotive Mechatronics Research Centre (CIMA ITESM-Toluca).

Foster human capital and automotive industry related courses through projects such as Technical Route (Trayecto Técnico), Labour Formalisation through Inspection (Formalización del Trabajo a través de inspección) and a Partnership Agreement with the Directorate General for Higher Education of the Estado de México (Convenio de Colaboración con la Dirección General de Educación Superior del Estado de México).

Foster research and development by developing and implementing Technological Roadmaps in each company, hosting the first Inter-Clusters Innovation Conference, creating practical guidelines to participate in the calls for proposals for the CONACYT.

Develop suppliers through a Programme for the Certification of Mexican Automotive Suppliers. By mapping and promoting T2 and T3 automotive suppliers in Estado de México, implement programme involving service providers development and negotiations for global steel, aluminium, polymers, lubricants, etc.
Name of the cluster: Clúster Automotriz de Guanajuato (Guanajuato Automotive Cluster)

Age: 2013

Objectives and general approach:
Preserve and strengthen the regional automotive industry through projects that promote growth and competitiveness.

Sectors or Industries:
Automotive

Geographical Scope:
Guanajuato

Main strengths and projects:
It has a Human Capital Development Programme aimed at improving general conditions in order to create safe, healthy, and dignified working conditions for all its members.

Develop suppliers and supply chains conducive to securing the provision of quality goods and services in due time, in compliance with specifications, and at the right price. In addition, it aims to analyse, develop, manage, and share strategies and experiences to promote international trade and logistics opportunities and solutions.

Innovation programme aimed at linking businesses with universities and research centres to develop new technologies, processes, and materials able to solve the industry’s practical problems.

Approximate number of:
350 Companies
120,000 Employees

Main governmental players
State: Government of the State of Guanajuato, Secretariat of Sustainable Economic Development

Main research and academic players
- Interdisciplinary Professional Unit of Engineering of the National Polytechnic Institute - Guanajuato Campus
- Monterrey Institute of Technology and Higher Education (ITESM) - León Campus
- University of Guanajuato (UPG)
- Mathematics Research Centre (CIMAT)
- Applied Innovation in Competitive Technologies Centre (CIATEC)
- National Metrology Centre (CENAM)

HIGHLIGHTS

Mr. Fidel Otake
President

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sotake@claugto.org

http://claugto.org/

State:
Government of the State of Guanajuato,
Secretariat of Sustainable Economic Development

Main business actors
- VW Honda
- General Motors
- Mazda
- Pirelli
- GKN
- Hella
- Hutchinson
- Lear Corp
- Kasai
- Getrag
- MD Manufacturing
- Sinman
- Rochling
- Ryob

Subject: Automotive

State: Guanajuato

Geographical Scope:
Guanajuato

Approximate number of:

Companies
Employees

- 350
- 120,000

Main business actors:
- VW Honda
- General Motors
- Mazda
- Pirelli
- GKN
- Hella
- Hutchinson
- Lear Corp
- Kasai
- Getrag
- MD Manufacturing
- Sinman
- Rochling
- Ryob

Main governmental players:
- Government of the State of Guanajuato, Secretariat of Sustainable Economic Development

Main research and academic players:
- Interdisciplinary Professional Unit of Engineering of the National Polytechnic Institute - Guanajuato Campus
- Monterrey Institute of Technology and Higher Education (ITESM) - León Campus
- University of Guanajuato (UPG)
- Mathematics Research Centre (CIMAT)
- Applied Innovation in Competitive Technologies Centre (CIATEC)
- National Metrology Centre (CENAM)
**General Data**

Name of the cluster:
Parque Científico y Tecnológico de la Universidad Autónoma del Estado de Hidalgo
(*Scientific and Technological Park of the Autonomous University of the State of Hidalgo*)

Age:
2012

Objectives and general approach:
Strengthen the links between scientific research and technological development and the productive sectors; to facilitate knowledge and technology transfer between academia and the private sector.

Sectors or Industries:
Energy
Biotechnology

Geographical Scope:
Hidalgo

**Highlights**

Main strengths and projects:
Collaborate with PEMEX to establish a Pilot Plant to test the catalysts used in fuel reforming. PEMEX seeks to determine the optimum operating conditions and compare the performance of the different catalysts available in the market.

Transfer Office that fosters the implementation of research and technologies by businesses and promotes their protection, licensing, and commercialisation to secure an equal distribution of royalties.

Business Incubator for Technology-based Companies (IEBT) that promotes partnerships between new technology-based companies and installed businesses looking for innovation and development projects; in addition, it seeks to develop new business opportunities through marketing, consultancy, licensing, and spin-out/spin-off mechanisms.

**Main Business Actors**
- Petróleos Mexicanos (PEMEX)
- Bosch
- SACSA
- Skill Tech
- SASA en Línea

Approximate number of:
10 Companies
13,000 Employees

**Main Governmental players**
State: Government of the State of Hidalgo

**Main research and academic players**
- Autonomous University of the State of Hidalgo (UAEH)
- Autonomous University of Tlaxcala (UAT)
- Pachuca Institute of Technology (ITP)
- Polytechnic University of Pachuca (UPP)

**Cluster Representative**

Name of the Institution:
Universidad Autónoma del Estado de Hidalgo (UAEH)

Type of Institution:
Private

Carretera Pachuca – Actopan Km. 4, Torres de Rectoría, 3er piso Campo de Tiro 42039 Pachuca

[https://www.uaeh.edu.mx/pcyt/](https://www.uaeh.edu.mx/pcyt/)

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Director at Scientific and Technological Park

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amilap@uaeh.edu.mx

**Industry 4.0 Themed Activities**

- Research, development, and technology
- Digital factories
- Automation integration, movement, and control
- Energy: efficiency and storage
- Industrial supplies

Primary ●
Secondary ●
** GENERAL DATA **

**Name of the cluster:**
Polo de Tecnologías de la Información de Jalisco (Jalisco Information Technology Cluster)

**Age:**
2001

**Objectives and general approach:**
Boost technology-based business specialisation in all productive sectors, implement Information Technology in strategic sectors, strengthen productive capacities, competitiveness, and market positioning.

**Sectors or Industries:**
Information Technology

**Geographical Scope:**
Jalisco

**HIGHLIGHTS**

**Main strengths and projects:**
Software Centre of Guadalajara (CSW) financed mainly by the State Government. In this 7,000 m² office space converge IT companies and players from the triple helix (industry, government, academia) plus civil society organisations converge to generate IT projects and business opportunities.

Intel SMEs project to foster start-ups and small and medium enterprises entrepreneurship and technological innovation by giving them access to infrastructure, equipment, and mentoring. Participating organisations: UdeG, ITESO, ITESM, Latinrep, Eneri, Electrónicos online.com, Continental, Interlatin, Marcom Logix.

The CSW IoT Laboratory is a space where professionals, entrepreneurs, and any party interested in the Internet of Things can develop innovative solutions thanks to Intel’s Technology Kit, which is available at the laboratory and includes from sensors and micro-processors to Intel’s software development platform.

**TRIPLE HELIX**

<table>
<thead>
<tr>
<th>Main Business</th>
<th>Actors</th>
</tr>
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<tbody>
<tr>
<td>- HP</td>
<td>- Intel</td>
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<tr>
<td>- IBM</td>
<td>- Level 5</td>
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<td>- Consejo de Cámaras Industriales de Jalisco (CCIJ)</td>
<td>- NASoft</td>
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Approximate number of:

<table>
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<th>500</th>
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</thead>
<tbody>
<tr>
<td>Companies</td>
<td>Employees</td>
</tr>
</tbody>
</table>

**Main governmental players**


**Main research and academic players**

- University of Guadalajara (UdeG)
- Monterrey Institute of Technology and Higher Education (ITESM) - Guadalajara Campus
- Western Institute of Technology & Higher Education (ITESO)

**CLUSTER REPRESENTATIVE**

**Name of the Institution:**
Instituto Jalisciense de Tecnologías de la Información (IJALTI) y Clúster de Integradores de Alta Tecnología A.C.

**Type of Institution:**
Private

Avenida López Mateos Sur 2077
Jardines de Plaza del Sol 44510
Guadalajara

www.ijalti.org.mx

Mr. Eduardo Chávez
Managing Director

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informes@ijalti.org.mx

**INDUSTRY 4.0 THEMED ACTIVITIES**

- Research, development, and technology
- Digital factories
- Automation integration, movement, and control
- Energy: efficiency and storage
- Industrial supplies

Primary ● Secondary ●

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**STATE:**
JALISCO

**TRIPLE HELIX REPRESENTATIVE**

**Name of the Institution:**
Instituto Jalisciense de Tecnologías de la Información (IJALTI) y Clúster de Integradores de Alta Tecnología A.C.

**Type of Institution:**
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**GENERAL DATA**

Name of the cluster: Agrupamiento de la Industria Electrónica de Jalisco (Jalisco Electronics Industry Cluster)

Age: 1992

Objectives and general approach: Member support services, business centre, training, certification, government management, market intelligence and research.

Sectors or Industries: Electronics, Information Technology

Geographical Scope: Jalisco

**HIGHLIGHTS**

Main strengths and projects: Development of the regional supply chain and network through domestic and international trade missions.

Availability of human capital development programmes such as the Advanced Human Resources Training Programme in Semiconductors Technology and Design (PADTS) run by CINVESTAV Guadalajara with the support of COE-CYT JAL, the Electronics Industry Comprehensive Security Certification (CISE), and subsidies for up to 65% of training costs by the Centre for Industrial and Academic Integration (CIIA).

Support for start-ups and technology-based companies to participate in events and trade fairs such as the SingularityU Mexico Summit, the Epicentro Innovation Festival, the 2017 Engineering Conference, and the High Technology Industry Conference (CIAAT).

**Main Business Actors**
- Intel
- HP
- Jabil
- Flextronics
- Dell
- IBM
- Agilent (Interlatin)
- Foxconn
- Sanmina
- Oracle
- Benchmark

**Approximate number of:**
- 750 Companies
- 150,000 Employees

**Main government players**

**Main research and academic players**
- Centre for Research and Advanced Studies (CINVESTAV) - Guadalajara Unit
- Western Institute of Technology and Higher Education (ITESO)
- Monterey Institute of Technology and Higher Education (ITESM) - Guadalajara Campus
- University of Guadalajara (UdeG)
- Pan-American University (UP)
- University of the Valle de Mexico (UVM)
- Jalisco Technological University (UTJ)

**THEMED ACTIVITIES**

- Research, development, and technology
- Digital factories
- Automation integration, movement, and control
- Energy: efficiency and storage
- Industrial supplies

**STATE: JALISCO**

**CLUSTER REPRESENTATIVE**

Name of the Institution: Cámara Nacional de la Industria Electrónica, de Telecomunicaciones y Tecnologías de la Información (CANIETI) Sede de Occidente

Type of Institution: Public

Avenida López Mateos 2077, Local Z-31
Jardines de Plaza del Sol 44510
Guadalajara

www.canieti.info/

Mr. Isaac Ávila Ahumada
President at Western Regional Branch

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presidenteoccidente@canietigdl.com.mx

**INDUSTRY 4.0**
Name of the cluster:
Iniciativa de Manufactura Avanzada e Industria 4.0 del Estado de Jalisco (State of Jalisco Advanced Manufacturing and Industry 4.0 Initiative)

Age: 2011

Objectives and general approach:
Create the necessary conditions to boost, coordinate, and contribute to regional development through educational, scientific, and technological development and innovation. Lead the Industry 4.0 State Strategy and the IoT Strategy, including the Creative Digital City project.

Sectors or Industries:
Information Technology

Geographical Scope:
Jalisco

HIGHLIGHTS

Main strengths and projects:
Availability of the Technology Platforms Programme to foster scientific research, technological development, and strategic innovation through the quadruple helix, generating synergy to strengthen the state economy and social welfare.

The Industry 4.0 Enablers project will prepare students from the Decentralised Technological Higher Education Public Bodies, part of the SICYT, to face the strategic development challenges of the Fourth Industrial Revolution.

Support for the Internet of Things Innovation Centre (CIOT) and the Advanced Manufacturing Centre, a digital transformation solution hub focused on IoT ideation, design, prototyping, testing, and manufacturing.

Joint creation, with CANIETI, of the Jalisco SMEs Digital Transformation Programme to foster high technology initiatives, talent development, and cutting-edge equipment through centres equipped with the latest technology and highly-qualified staff.

Name of the Institution:
Secretaría de Innovación, Ciencia y Tecnología del Estado de Jalisco (SICYT)

Type of Institution:
Public

Address:
Avenida Faro 2350
Verdevalle 44550
Guadalajara

Website:
https://sicyt.jalisco.gob.mx/

Contact:
Mr. Jaime Reyes Robles
Secretary

Approximate number of:
- 30 Companies
- 3,000 Employees

Main research and academic players:
- Monterrey Institute of Technology and Higher Education (ITESM) - Guadalajara Campus
- Centre for Research and Advanced Studies (CINVESTAV) - Guadalajara Unit
- José Mario Molina Pasquel y Henríquez Institute of Technology - Zapopan Unit

Cluster representative:
State:
Government of the State of Jalisco, State Council for Science and Technology of the State of Jalisco (COECYTJAL)

THEMED ACTIVITIES

Research, development, and technology
Digital factories
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies

Primary ❨ Secondary ❩
Name of the cluster:
Clúster de Tecnologías de la Información de Ciudad de México (ProSoftware)
Mexico City Information Technology Cluster (ProSoftware)

Age:
2007

Objectives and general approach:
Develop IoT capabilities to solve regional problems.

Sectors or Industries:
Information Technology

Geographical Scope:
Mexico City and Estado de México

Main strengths and projects:
Launch MxIoT, an Industry 4.0 strategy diagnostic, planning, and implementation platform to foster advanced manufacturing.

Create the ProSoftware laboratory ‘Industry 4.0 and emerging technologies’ to create Information Technology solutions based on the intensive use of emerging technologies such as Internet of Things, 3D printing, and virtual reality to create smart cities, disruptive, differentiated, and incremental business models, and to implement innovation strategies.

Main Business Actors
- Ercom Technologies
- Sinersys
- Huerística
- Infoanalítica
- Roca Sistemas

Main governmental players
State: Secretariat of Economic Development of Mexico City

Main research and academic players
- Monterrey Institute of Technology and Higher Education (ITESM) - Estado de México
- Campus National Autonomous University of Mexico City (UACM)
- National Polytechnic Institute (IPN)
- National Autonomous University of Mexico (UNAM)
- Metropolitan Autonomous University (UAM)

Approximate number of:
60 Companies
500 Employees

Name of the Institution:
Clúster de Tecnologías de la Información de Ciudad de México (ProSoftware)

Type of Institution:
Private

Avenida Poniente 140
839
Industrial Vallejo
02300
Mexico City

www.prosoftware.mx

Mr. José Antonio Montoya
President

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State: Secretariat of Economic Development of Mexico City

Research, development, and technology
Digital factories

Automation integration, movement, and control
Energy: efficiency and storage

Industrial supplies

Primary
Secondary
**GENERAL DATA**

**Name of the cluster:**
Clustertim Parque Tecnológico (Clustertim Technological Park)

**Age:**
2007

**Objectives and general approach:**
Consolidate the Michoacán information and communication industry and accelerate SMEs by providing work facilities for start-ups, training and competitive development, as well as international promotion of their services.

**Sectors or Industries:**
Information Technology

**Geographical Scope:**
Michoacán

**HIGHLIGHTS**

**Main strengths and projects:**
Collaboration with TECHBA to participate in their programmes and generate links with their IT and digital animation companies in Canada and the United States.

Creation of a Technological Park that rents out offices to technology-based companies, organises conferences and networking events, promotes visits and professional internships by students and teachers, offers training and courses, academic programmes updates, and a job bank.

Art and Experiences Digital Innovation Centre (CIDEA), production of interactive media and film post-production, building of 3D scenery for digital animation, green screens, recording sets, movement capture and post-production, in collaboration with Cinepolis and Morelia Movie Festival.

**Main governmental players**
State: Secretariat of Education of the State of Michoacán, Secretariat of Economic Development of Michoacán; State Information and Communication Technology Centre (CETIC), Secretariat of Innovation, Science, and Technological Development (SICDET)

**Main research and academic players**
- Technological University of Morelia (UTM)
- Uruapan Higher Institute of Technology (ITSU)
- University of Vasco de Quiroga (UVAQ)
- University of Morelia (UDEM)
- Tacambaro Higher Institute of Technology (ITST)
- Los Reyes Higher Institute of Technology (ITSLR)
- Apatzingán Institute of Technology (ITA)

**Approximate number of:**
65 Companies
600 Employees

**INDUSTRY 4.0 THEMED ACTIVITIES**

**Research, development, and technology**

**Digital factories**
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies

**STATE:**
**MICHOCÁN**

**CLUSTER REPRESENTATIVE**

**Name of the Institution:**
Clustertim Parque Tecnológico

**Type of Institution:**
Private

**Address:**
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Morelia

**Website:**
www.clustertim.com.mx/

**Contact Person:**
Mr. Federico Aura González
President

**Phone Number:**
+52 (443) 310 9600

**Email:**
contacto@clustertim.com.mx
GENERAL DATA

Name of the cluster:
Parque de Investigación e Innovación Tecnológica - PIIT
(Research & Technological Innovation Park - PIIT)

Age:
2007

Objectives and general approach:
Progress from a manufacturing-based industry to a knowledge-based one and promote a culture of innovation and entrepreneurship.

Sectors or Industries:
Nanotechnology
Advanced Materials
Energy
Information Technology

Geographical Scope:
Nuevo León and northeastern Mexico

HIGHLIGHTS

Main strengths and projects:
Four high technology incubators focused on nanotechnology, biotechnology, IT, sustainable housing, and renewable energy with more than 300 linked projects.

Recently signed an agreement with the company SunPower to create a new renewable energy research centre. It is expected that, by 2025, there will be more than 50 operational research and development centres.

Comprehensive Sustainable Urban Development Plan, in conjunction with Ciudad Innova, in a 2,500-hectare area around the PIIT.

Active member of the Association of University Research Parks (AURP) and the International Association of Science Parks (IASP), which represent the most well-known scientific and technological parks in the world.
GENERAL DATA

Name of the cluster:
Clúster Automotriz de Nuevo León
(Nuevo León Automotive Cluster)

Age:
2007

Objectives and general approach:
Boost growth and competitiveness in
the regional automotive sector through
collaboration, relations, and synergy
among business, government, and aca-
demia. Value chain integration: OEMs,
T1, T2, T3, and support organisations.

Sectors or Industries:
Automotive
Metal-mechanic
Advanced Materials

Geographical Scope:
Monterrey - Saltillo

HIGHLIGHTS

Main strengths and projects:
Human capital and value chain develop-
ment programmes, supplier develop-
ment, gap mapping and identification,
annual meeting of automotive suppliers.

The Innovation Committee fosters in-
frastructure projects to validate finished
vehicles, develops early solutions for
OEMs and disruptive innovation subsys-
tems, influences science and technology
public policies, and organises the MAIN-
FORUM Conference.

Multi-Business Consolidation Centre
(CLAUT-CC) that seeks to strengthen the
automotive industry value chain.

T/IREELE HELIX

Main Business
Actors
- Kia
- Caterpillar
- Johnson Controls
- Daimler
- Kalcon
- Metalsa
- Ternium
- International
- Polaris

Approximate number of:
76
Companies
50,000
Employees

Main governmental
players
State: Secretariat of Labour and Economy
of Nuevo León

Main research
and academic players
- University of Monterrey (UDEM)
- Autonomous University of Nuevo León (UANL)
- Monterrey Institute of Technology and Higher
  Education (ITESM) - Monterrey Campus
- Regiomontana University (U.ERRE)

STATE:
Nuevo León

CLUSTER REPRESENTATIVE

Name of the Institution:
Clúster Automotriz de Nuevo León

Type of Institution:
Private

Rio Colorado
226, Plaza Santa Elena,
Locales 8 y 9, Del Valle
66220
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INDUSTRY 4.0
THEMED ACTIVITIES

Research, development, and technology
Digital factories
Automation integration,
movement, and control
Energy: efficiency and storage
Industrial supplies

Primary ●
Secondary ●
GENERAL DATA

Name of the cluster:
Clúster de Nanotecnología de Nuevo León
(Nuevo León Nanotechnology Cluster)

Age:
2008

Objectives and general approach:
Contribute to the State of Nuevo León’s transformation into the country’s knowledge and advanced manufacturing hub, fostering synergy among industry, government, and academia through agents of change such as innovation and advanced and/or nanostructured materials implementation.

Sectors or Industries:
Nanotechnology
Advanced Materials

Geographical Scope:
Nuevo León and northeastern Mexico

HIGHLIGHTS

Main strengths and projects:
Develop specialised human capital, create specialist courses at Nuevo León universities, foster the adoption of nanomaterials by 40% of the region’s companies.

30% of the country’s nano projects are carried out in Nuevo León, with more than 300 linked projects, 16 scaling platforms, 5 new companies, and 3 in the commercial phase.

The current collaborative processes include developing new nano-products, advanced materials, and nanostructures together with the PIIT Nanotechnology Incubator and the Nuevo León Biocluster.

TRIPLE HELIX

Main Business Actors
- Vitro
- Cigma
- CEMEX
- Whirlpool
- Lamosa

Approximate number of:
20 Companies
30,000 Employees

Main governmental players
State: Nuevo León Institute for Innovation and Technology Transfer, Secretariat of Labour and Economy of Nuevo León

Main research and academic players
- Monterey Institute of Technology and Higher Education (ITESM)
- Autonomous University of Nuevo León (UANL)
- Engineering and Industrial Development Centre (CIDESI)
- Centre for Advanced Materials Research (CIMAV)
- Optics Research Centre (CIO)

STATE: NUEVO LEÓN

CLUSTER REPRESENTATIVE

Name of the Institution:
Clúster de Nanotecnología de Nuevo León, A.C.

Type of Institution:
Private

Avenida Investigación
305
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INDUSTRY 4.0
THEMED ACTIVITIES

Research, development, and technology

Digital factories

Automation integration, movement, and control

Energy: efficiency and storage

Industrial supplies

Primary ● Secondary ●
Name of the cluster: CSoftMty - Clúster TIC de Nuevo León (CSoftMty - Nuevo León ICT Cluster)

Age: 2014

Objectives and general approach: Contribute to economic growth and a better quality of life through innovation, market development and promotion, and information and communication technology infrastructure and human talent.

Sectors or Industries: Information Technology

Geographical Scope: Nuevo León

HIGHLIGHTS

Main strengths and projects: Working groups to develop human capital projects, develop markets, and entrepreneurial innovation. Looks to increase in the offer of software engineers from 2,000 to 14,000 and collaboration with Nuevo León strategic sectors.

Creation of the Institute of Information Technology Talent Development (IDETI) by the Nuevo León Software Council to increase the intellectual capital available in the ICT industry.

Integrate the SW centre into the PIIT at Monterrey’s IT Cluster in a building able to host, incubate, and scale IT companies.

Main strengths and projects:
- Working groups to develop human capital projects, develop markets, and entrepreneurial innovation. Looks to increase in the offer of software engineers from 2,000 to 14,000 and collaboration with Nuevo León strategic sectors.
- Creation of the Institute of Information Technology Talent Development (IDETI) by the Nuevo León Software Council to increase the intellectual capital available in the ICT industry.
- Integrate the SW centre into the PIIT at Monterrey’s IT Cluster in a building able to host, incubate, and scale IT companies.

Main Business Actors:
- Softtek
- Neoris
- Alestra
- Accenture
- IBM
- Monterrey IT Cluster (NEISI Innovation Novalan, LIS Software Solutions, Axen Next Gen IT)

Approximate number of:
400 Companies
15,000 Employees

Main governmental players:
State: Nuevo León
- Nuevo León Innovation and Technology Transfer Park

Main research and academic players:
- Autonomous University of Nuevo León (UANL)
- National Laboratory of Advanced Informatics (LANIA)
- Monterrey Institute of Technology and Higher Education (ITESM) - Monterrey Campus
- Regiomontana University (U.ERRE)
- University of Monterrey (UDEM)

CLUSTER REPRESENTATIVE

Name of the Institution: CSoftMty
Type of Institution: Private

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INDUSTRY 4.0
THEMED ACTIVITIES

- Research, development, and technology
- Digital factories
- Automation integration, movement, and control
- Energy: efficiency and storage
- Industrial supplies
- Primary
- Secondary
**GENERAL DATA**

**Name of the cluster:**
Estrategia Estatal de Industria 4.0 - Nuevo León
(*Industry 4.0 state strategy - Nuevo León*)

**Age:**
2017

**Objectives and general approach:**
Facilitate cooperation among the state government, academia, and the private sector in Industry 4.0 projects; such as Internet of Things, big data, training, strengthening infrastructure, study programmes, and remote product monitoring.

**Sectors or Industries:**
Information Technology

**Geographical Scope:**
Nuevo León

**HIGHLIGHTS**

**Main strengths and projects:**
$160 million Mexican pesos seed fund for Industry 4.0 private sector projects.

Organisation of international events; such as the World Manufacturing Forum in Monterrey aimed at Industry 4.0, Expomanufactura 2018, and Intelligent Day 4.0.

**Main governmental players**
State: Secretariat of Labour and Economy of Nuevo León

**Main research and academic players**
- Monterrey Institute of Technology and Higher Education (ITESM) - Monterrey Campus
- Autonomous University of Nuevo León (UANL)
- Regiomontana University (U.ERRE)
- University of Monterrey (UDEM)

**HIGHLIGHTS**

**Main government actors**
Mr. Abraham Tijerina-Priego
Strategy Coordinator at Nuevo León’s 4.0 Programme

**Approximate number of:**
- 10 Companies
- 10,000 Employees

**CLUSTER REPRESENTATIVE**

**Name of the Institution:**
Secretaria de Economía y el Trabajo de Nuevo León

**Type of Institution:**
Public

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Washington 2000 Oriente Obrera 64010 Monterrey

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**INDUSTRY 4.0 THEMED ACTIVITIES**

- Research, development, and technology
- Digital factories
- Automation integration, movement, and control
- Energy: efficiency and storage
- Industrial supplies
**GENERAL DATA**

Name of the cluster: Monterrey Aerocluster

Age: 2009

Objectives and general approach:
Develop and promote the aerospace industry and aerospace services in the State of Nuevo León, including a highly competitive integrated value chain.

Sectors or Industries:
- Aerospace
- Metal-mechanic

Geographical Scope:
Nuevo León and northeastern Mexico

**HIGHLIGHTS**

Main strengths and projects:
International promotion programme to attract clients and investment in installed capacities, including strategies such as: Paris Airshow, Farnborough, International Airshow, ILA Berlin, ADSS Seattle, Aeromart, Montreal.

Plans for a specialised training programme and financial support to develop human capital and obtain industry certifications; such as, the ISO9100 internal auditor course.

Domestic and international strategic alliances with the Nuevo León Transformation Industry Chamber (CAINTRA), the Nuevo León Manufacturing Cluster Association, the Mexican Federation of Pilots and Aircraft Owners, Chihuahua Aerospace Cluster, The Competitiveness Institute (TCI), and the Dolinalotnicza Aerospace Cluster in Poland.

**TRIPLE HELIX**

**Main Business Actors**
- AZOR
- Katcon
- United Technologies Aerospace Systems
- HEMAQ
- FRISA
- EZI Metals

**Approximate number of:**
- 65 Companies
- 3,500 Employees

**Main governmental players**
State: Secretariat of Labour and Economy of Nuevo León, Research and Technological Innovation Park (PIIT), Monterrey Institute for Innovation and Technology Transfer

**Main research and academic players**
- Aeronautical Engineering Research and Innovation Centre of the Autonomous University of Nuevo León
- Monterey Institute of Technology and Higher Education (ITESM) - Monterey Campus
- University of Monterrey (UDEM)
- Apodaca Nuevo León Polytechnic University (UPAPNL)

**GENERAL DATA**

**STATE:** NUEVO LEÓN

**CLUSTER REPRESENTATIVE**

Name of the Institution: Monterrey Aerocluster

Type of Institution: Private

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**INDUSTRY 4.0**

**THEMED ACTIVITIES**

- Research, development, and technology
- Digital factories
- Automation integration, movement, and control
- Energy: efficiency and storage
- Industrial supplies

Primary ● Secondary ●
Name of the cluster: Parque Tecnológico CIT de Puebla (Puebla CIT Technological Park)

Age: 2010

Objectives and general approach:
Create a high quality technological and scientific cluster to attract and develop enterprises and institutions to research and promote high economic and technological value projects.

Sectors or Industries:
Information Technology
Metal-mechanic

Geographical Scope: Puebla

HIGHLIGHTS

Main strengths and projects:
The Technological Park hosts newly created companies as well as technology-based companies under the ‘landing’ model.

The Centre for Design and Manufacturing Innovation is a research academic body and part of the Puebla Campus of the Monterrey Institute of Technology and Higher Education; it offers consultancy services, product analysis and design, process automation, laboratory tests (mechanical, electrical, thermal fluids, and electronic), as well as training.

Creation of the first liaison office in Beijing, China, to promote and increase the intellectual and cultural awareness of students, tutors, and the entire academic community in the campus through international exchange, internships, and research opportunities in the best Asian universities and academic institutions.

Main Business Actors
- T-Systems
- Orcius
- Vink
- Technit Solutions

Approximate number of:
13 Companies
500 Employees

Main government players
State: Government of the State of Puebla

Main research and academic players
- Monterrey Institute of Technology & Higher Education (ITESM) - Puebla Campus

STATE:
PUEBLA

CLUSTER REPRESENTATIVE

Name of the Institution: Parque Tecnológico CIT de Puebla - ITESM Puebla

Type of Institution: Private

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Reserva Territorial Atixcayotl
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INDUSTRY 4.0
THEMED ACTIVITIES

Research, development, and technology
Digital factories
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies
**Name of the cluster:**
Clúster Automotriz de la Zona Centro (Central Region Automotive Cluster)

**Age:**
2012

**Objectives and general approach:**
Enhance the regional automotive industry competitiveness through knowledge transfer and exchange of best practices, access to exclusive government funding for groups, joint projects, and research and development synergies.

**Sectors or Industries:**
Automotive
Metal-mechanic

**Geographical Scope:**
Puebla and Tlaxcala

**Main strengths and projects:**
Strong links with industrial organisations such as CANACINTRA, CIDAUT Latin America, and other automotive clusters to promote research.

Working groups focused on human capital development; such as CLAUZ dual training collaborative project, which seeks to map the sector’s human resources needs.

Working groups focused on supply to map the regional supply network, implement a productivity and development programme, and attract funding.

Creation of an infrastructure capacities catalogue to foster innovation methodologies transfer between businesses and sharing of best practices.

**Main Business Actors**
- Audi
- Brose
- Concord
- Rassini
- Volkswagen
- TruckLite

- Cámaras Nacional de la Industria de Transformación (CANACINTRA)

**Approximate number of:**
30 Companies
15,000 Employees

**Main governmental players**
State: Council for Science and Technology of the State of Puebla, Secretariat of Competitiveness, Labour, and Economic Development of Puebla, Secretariat of Tourism and Economic Development of Tlaxcala

**Main research and academic players**
- Foundation for Transport and Energy Research and Development (CIDAUT)
- People’s Autonomous University of the State of Puebla (UPAEP)

**HIGHLIGHTS**

**PUEBLA**
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**STATE:**
PUEBLA

**CLUSTER REPRESENTATIVE**

**Name of the Institution:**
Clúster Automotriz de la Zona Centro

**Type of Institution:**
Private

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**INDUSTRY 4.0 THEMED ACTIVITIES**

- Research, development, and technology
  - Digital factories
  - Automation integration, movement, and control
- Energy: efficiency and storage
  - Industrial supplies

Primary ●
Secondary ●
Name of the cluster: Clúster para la Innovación en Tecnologías de la Información de Puebla (Puebla Information Technology Innovation Cluster)

Age: 2011

Objectives and general approach: Foster partnerships to boost innovation and competitiveness in the Information Technology sector.

Sectors or Industries: Information Technology

Geographical Scope: Puebla

Main strengths and projects:
- Imminent launch of the Internet of Things Innovation and Technological Development Centre (MXIoT), where companies will be able to design, prototype, and generate new products and services.
- Active participation in the iCluster 2.0 project within the Project #12 framework to generate synergies through online communities and by mapping all Mexican clusters that, linked to North America, drive the country’s economy.
- Development of certified human capital, technology courses and computing courses for those wishing to be at the forefront of technology, whether online or face-to-face.

Main Business Actors
- Gabo Software
- GoSistems
- B2B Consultores
- Sysne
- Zutri
- Eduit
- Evidit
- GABO Software
- PymeWeb

Approximate number of:
- 25 Companies
- 300 Employees

Main governmental players
State: Government of the State of Puebla

Main research and academic players
- National Institute of Astrophysics, Optics and Electronics (INAOE)
- People’s Autonomous University of the State of Puebla (UPAEP)
- Ibero-American University of Puebla (UANL)
- Tepeaca Institute of Technology (ITT)
- Atlixco Higher Institute of Technology (ITSA)
- Madero University

HIGHLIGHTS

TRIPLE HELIX

CLUSTER REPRESENTATIVE

Name of the Institution: Clúster para la Innovación en Tecnologías de la Información de Puebla

Type of Institution: Private

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INDUSTRY 4.0

THEMED ACTIVITIES

- Research, development, and technology
- Digital factories
- Automation integration, movement, and control
- Energy: efficiency and storage
- Industrial supplies

Primary ● Secondary ●
Name of the cluster: InteQSoft Cluster (Clúster InteQSoft)

Age: 2006

Objectives and general approach:
Promote the development of the information and communication technology in Querétaro to create technological solutions for industries involved in manufacturing, trade, and services such as aerospace, finance, and automotive.

Sectors or Industries:
Information Technology

Geographical Scope:
Querétaro

Main strengths and projects:
Wide network of alliances to develop human capital and foster companies commercial internationalisation.

Working commissions to develop collaborative projects and activities focused on associativity, human capital, IT Centre, interactive media, and embedded systems.

Since 2014, it has been running VORTICE Itech Park, which is part of the Smart City project in Maderas City - a 4,000-square-meter facility specialised in creating collaborative and technological solutions and houses more than 60 companies in educational groups. The park houses an incubator, IoT projects, and software & BPO development centres.

Name of the Institution:
Vórtice IT Clúster Querétaro

Type of Institution:
Private

Objectives and general approach:
Promote the development of the information and communication technology in Querétaro to create technological solutions for industries involved in manufacturing, trade, and services such as aerospace, finance, and automotive.

Geographical Scope:
Querétaro

HIGHLIGHTS

Main strengths and projects:
Wide network of alliances to develop human capital and foster companies commercial internationalisation.

Working commissions to develop collaborative projects and activities focused on associativity, human capital, IT Centre, interactive media, and embedded systems.

Since 2014, it has been running VORTICE Itech Park, which is part of the Smart City project in Maderas City - a 4,000-square-meter facility specialised in creating collaborative and technological solutions and houses more than 60 companies in educational groups. The park houses an incubator, IoT projects, and software & BPO development centres.

Main business actors:
- General Electric
- Icorp
- C3Technology
- Praxis
- Tralix
- EOS
- Sati

Approximate number of:
120 Companies
14,000 Employees

Main governmental players:
State: Secretariat of Sustainable Development (SEDESU), Council for Science and Technology of the State of Querétaro (CONCYTEQ)

Main research and academic players:
- University of Mondragón, National Polytechnic Institute (IPN)
- Monterrey Institute of Technology & Higher Education (ITESM) - Querétaro Campus
- University of the Valley de México (UVM)
- Engineering and Industrial Development Centre (CIDESI)
- Advanced Technology Centre (CIATEQ)
- Information & Communication Technology Research & Innovation Centre (INFOTEC)

HIGHLIGHTS

Main research and academic players:
- University of Mondragón, National Polytechnic Institute (IPN)
- Monterrey Institute of Technology & Higher Education (ITESM) - Querétaro Campus
- University of the Valley de México (UVM)
- Engineering and Industrial Development Centre (CIDESI)
- Advanced Technology Centre (CIATEQ)
- Information & Communication Technology Research & Innovation Centre (INFOTEC)

Main governmental players:
State: Secretariat of Sustainable Development (SEDESU), Council for Science and Technology of the State of Querétaro (CONCYTEQ)

Main business actors:
- General Electric
- Icorp
- C3Technology
- Praxis
- Tralix
- EOS
- Sati

Approximate number of:
120 Companies
14,000 Employees

THEMED ACTIVITIES

Research, development, and technology
Digital factories
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies

State:
Querétaro

CLUSTER REPRESENTATIVE

Name of the Institution:
Vórtice IT Clúster Querétaro

Type of Institution:
Private

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INDUSTRY 4.0

Research, development, and technology
Digital factories
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies
Name of the cluster: Aerocluster de Querétaro (Querétaro Aerospace Cluster)

Age: 2004

Objectives and general approach:
Boost development opportunities for the aviation and space industries at a state, national, and international levels; to bolster employment and training of highly specialised human capital, and SMEs and large companies development and integration to the value chain, as well as establishing strategic alliances.

Sectors or Industries:
- Aerospace
- Metal-mechanic

Geographical Scope:
Querétaro

Main strengths and projects:
- Consolidated working groups with input from the triple helix, human capital development, supply development, institutional innovation and internationalisation links.

Since the cluster’s creation, the Mexican Federation of Aerospace Industry (FEMIA) and the Aeronautic University of Querétaro (UNAQ) were created.

Cooperation with the recently formed National Aeronautics Thematic Network (RTNA) funded by CONACYT. Detailed strategic planning, roadmap for Querétaro’s aerospace sector, human capital strategies, and international links.

Creation of the National Centre of Aeronautical Technology (CENTA), located in a 4.5-hectare site in the Querétaro Aerospace Park.

Plans to create a competitive intelligence observatory, develop and implement the first internationally recognised certifying body to issue AS9100 certifications, create a sensors and flight control technologies (GPS, IMUs, MEMS, RF) research and development group.

Main Business Actors:
- Bombardier
- Airbus Helicopter
- Safran
- Aernnova Aerospace
- Axon Interconex
- Duqueine Group

Approximate number of:
65 Companies
15,000 Employees

Main governmental players:
State: Secretariat of Sustainable Development (SEDESU), Council for Science and Technology of the State of Querétaro (CONCYTEQ), Secretariat of Education of the State of Querétaro

Main research and academic players:
- Aeronautic University of Querétaro (UNAQ)
- Monterrey Institute of Technology and Higher Education (ITESM) - Querétaro Campus
- Autonomous University of Querétaro (UAQ)
- Querétaro Institute of Technology (ITQ)

HIGHLIGHTS

State: Querétaro
Carretera Estatal Querétaro Tequisquiapan Km. 23, 22547 Parque Aeroespacial Querétaro 76270 Querétaro

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INDUSTRY 4.0 THEMED ACTIVITIES

Research, development, and technology
Digital factories
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies

Primary ● Secondary ●
Name of the cluster: Polo de Centros Tecnológicos, de Ingeniería y Diseño de Querétaro (Querétaro Technology, Engineering, and Design Centres Cluster)

Age: 1984

Objectives and general approach: Contribute to value creation through knowledge application and R+D project development, as well as engineering and design services.

Sectors or Industries: Electronics

Geographical Scope: Querétaro

Main strengths and projects:
Querétaro’s CONACyT centres have strengthened their R+D capacities, established a wide network of links with other centres in the country, and the aerospace, automotive, electronic, and Information Technology industries. Also possesses specialised programmes to develop human capital.

Work towards capacity strengthening. CIDESI seeks to create an entrepreneurship ecosystem where students and researchers can develop technology and prototypes aimed at establishing technology-based companies. Whereas CIATEQ is working towards the creation of a doctoral programme in advanced manufacturing.

Plans to consolidate CIDETEQ’s new laboratories: 14 laboratories to conduct applied research and technological development in areas such as alternative energies for solar concentrates, effluent treatment, biofuels, coatings and industrial processes, and soil treatment; additionally strengthening the Micro and Nanofluidics National Laboratory (Labmyn).

Creation of the Applied Science & Advanced Technology Research Centre (CICATA) of the National Polytechnic Institute - Querétaro Unit, equipped with innovation capacities and linkage programmes with companies working in advanced manufacturing.

Name of the Institution:
Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional (CINVESTAV) – Unidad Querétaro

Type of Institution:
Private

Main Business Actors
- DSP Texas Instruments
- National Instruments
- Freescale Semiconductor
- Tecnalia

Main research and academic players
- Monterrey Institute of Technology and Higher Education (ITESM) - Querétaro Campus
- National Polytechnic Institute (IPN)
- Engineering and Industrial Development Centre (CIDESI)
- Centre for Research and Advanced Studies (CINVESTAV) - Querétaro Unit
- Electrochemistry Research and Technological Development Centre (CIDETEQ)
- Advanced Technology Centre (CIATEQ)

Approximate number of:
15 Companies
1,000 Employees

Main governmental players
State: Secretariat of Sustainable Development (SEDESU), Council for Science and Technology of the State of Querétaro (CONCYTEQ)

HIGHLIGHTS

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INDUSTRY 4.0
THEMED ACTIVITIES

Research, development, and technology
- Digital factories
- Automation integration, movement, and control
- Energy: efficiency and storage
- Industrial supplies

Primary ●
Secondary ●
Name of the cluster:
Centro de Innovación y Creatividad 4.0
(Creativity and Innovation Centre 4.0)

Age:
2017

Objectives and general approach:
Boost the capabilities of the Technological University of Querétaro innovation ecosystem by bringing together human capital and its students in multidisciplinary, transdisciplinary, and organisational convergence space that includes other organisations, advanced technologies, and links with the productive sector. Also, it is an intelligent solutions centre aimed especially at SMEs and entrepreneurs with technological backgrounds.

Sectors or Industries:
Information Technology

Geographical Scope:
Querétaro

HIGHLIGHTS

Main strengths and projects:
The Creativity and Innovation Centre 4.0 is part of a wider platform what will promote UTEQ’s participation in Industry 4.0, in collaboration with FUMEC, to create the Centre for Intelligent Manufacturing Innovation, including an Accelerated Prototyping Laboratory.

The Intercontinental Airport of Querétaro (AIQ) will be part of the High Technology Industrial Park (PIAT) - alongside the cargo terminal -; the State Government will partially finance the project through a trust that will provide 103 hectares of land and 12% of the total capital.

Name of the cluster:
Centro de Innovación y Creatividad 4.0
(Creativity and Innovation Centre 4.0)

Age:
2017

Objectives and general approach:
Boost the capabilities of the Technological University of Querétaro innovation ecosystem by bringing together human capital and its students in multidisciplinary, transdisciplinary, and organisational convergence space that includes other organisations, advanced technologies, and links with the productive sector. Also, it is an intelligent solutions centre aimed especially at SMEs and entrepreneurs with technological backgrounds.

Sectors or Industries:
Information Technology

Geographical Scope:
Querétaro

HIGHLIGHTS

Main strengths and projects:
The Creativity and Innovation Centre 4.0 is part of a wider platform what will promote UTEQ’s participation in Industry 4.0, in collaboration with FUMEC, to create the Centre for Intelligent Manufacturing Innovation, including an Accelerated Prototyping Laboratory.

The Intercontinental Airport of Querétaro (AIQ) will be part of the High Technology Industrial Park (PIAT) - alongside the cargo terminal -; the State Government will partially finance the project through a trust that will provide 103 hectares of land and 12% of the total capital.
Name of the cluster: Clúster Automotriz de San Luis Potosí (San Luis Potosí Automotive Cluster)

Age: 2015

Objectives and general approach:
Boost the growth of the automotive industry in San Luis Potosí by promoting integration and value chain creation under a solid regulatory and competitiveness framework and generating relations among businesses, government, and academia.

Sectors or Industries:
- Automotive
- Metal-mechanic

Geographical Scope:
San Luis Potosí

HIGHLIGHTS

Main strengths and projects:
Human development programmes and strengthening of the UTSLP courses on mechatronic and plastic injection, as statistics show the local automotive industry will need 100,000 qualified workers by 2021.

Promotion of supplier development through the Certificate in Inventory Production and Management.

Approximate number of:
- 218 Companies
- 60,000 Employees

Main governmental players
State: Secretariat of Economic Development of San Luis Potosí, San Luis Potosí Institute of Scientific and Technological Research

Main research and academic players
- Advanced Technology Centre (CIATEQ)
- Technological University of San Luis Potosí (UT)
- Polytechnic University of San Luis Potosí (UPSL)
- Monterrey Institute of Technology and Higher Education (ITESM) - San Luis Potosí Campus

Main Business Actors
- BMW
- General Motors
- ABB
- Robert Bosch
- Plastic Omnium
- TI Automotive
- LEAR
- Metalsa

INDUSTRY 4.0 THEMED ACTIVITIES

Research, development, and technology
Digital factories
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies
**General Data**

Name of the cluster:  
**Iniciativa Clúster Aeroespacial de Sonora (Sonora Aerospace Initiative Cluster)**

Age:  
2012

Objectives and general approach:  
Strengthen the development of human capital, infrastructure, and procurement to attract aerospace foreign direct investment.

Sectors or Industries:  
- Aerospace
- Metal-mechanic

Geographical Scope:  
Sonora

**Highlights**

Main strengths and projects:  
Promotion of casting processes, machining, and secondary processes; as well as aerostructures and compound materials. The State's strategy seeks to develop the supply chain with an innovation-oriented approach, mainly in turbine and aerostructure manufacturing, and creation of specialist talent in line with the sector's needs.

The Secretariat of Economy is currently fostering the Suppliers Acceleration and Development Plan for the aerospace and advanced manufacturing industries.

The construction of the Hermosillo Institute of Technology, and the Regional Centre for Aerospace Research, Innovation, and Technological Development (CIDTISA) is nearly completed.

The Federal Government is expected to contribute with 40 million Mexican pesos to create an aviation school in the Hermosillo Institute of Technology.

The State's strategy seeks to develop the supply chain with an innovation-oriented approach, mainly in turbine and aerostructure manufacturing.

**Main Business Actors**

- Rolls Royce
- Goodrich
- Bodycoat
- Ducommun
- Radiall
- United Technologies
- TECOnnect
- Câmara Nacional de la Industria de Transformación (CANACINTRA)

**Main Governmental players**

State: Secretariat of Economy of the State of Sonora

**Main Research and Academic Players**

- Sonora Automotive and Aerospace Research and Development Centre (STAADIS) of the Monterrey Institute of Technology and Higher Education (ITESM) - North Sonora Campus
- Sonora Institute of Technology (ITS)
- Sonora Institute of Advanced and Aerospace Manufacturing (IMAAS)
- Centre for Metrological Assistance - National Metrology Centre (CAM - CENAM) of the University of Sonora

**Approximate number of:**

<table>
<thead>
<tr>
<th>Companies</th>
<th>Employees</th>
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<td>60</td>
<td>10,000</td>
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**Cluster Representative**

Name of the Institution:  
Secretaría de Desarrollo Económico de Sonora

Type of Institution:  
Public

Avenida Cultura y Comonfort  
Centro de Gobierno,  
Edificio Sonora Sur, 3º piso  
Vado del Río  
83280  
Hermosillo

http://www.economia.sonora.gob.mx/portal/aeronautico-aeroespacial

Mr. Jorge Vidal Ahumada  
Secretary of Economy

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**Industry 4.0**

**Themed Activities**

- Research, development, and technology
- **Digital factories**
- Automation integration, movement, and control
- Energy: efficiency and storage
- **Industrial supplies**

Primary ●  
Secondary ●
GENERAL DATA

Name of the cluster:
Parque Científico y Tecnológico de Tamaulipas - TECNOTAM
(Tamaulipas Scientific and Technological Park - TECNOTAM)

Age:
2009

Objectives and general approach:
Bring together scientific research and higher education institutions with technology-based companies and government bodies, for innovation, technological development, and specialised training to increase the state’s competitiveness and its integration into the knowledge-based economy.

Sectors or Industries:
Information Technology
Medical devices

Geographical Scope:
Tamaulipas

HIGHLIGHTS

Main strengths and projects:
The Tamaulipas CINVESTAV is located in the 127 hectare park and offers programmes of excellence at master and doctoral levels in Computer Sciences, and has over 20 researchers working in fields such as Computational Intelligence and Advanced Optimisation.

Business building (soft landing) equipped with biometrics, voice and data infrastructure, and web hosting servers.

The CRETAM has four departments; together, they articulate the following academic programmes: Science and Mathematics, Art Education, Management and Innovation, and Language.

INDUSTRY 4.0

THEMED ACTIVITIES

Research, development, and technology
Digital factories
Automation integration, movement, and control
Energy: efficiency and storage
Industrial supplies
Networks
GENERAL DATA

Age:
2016

Objectives and general approach:
Support decision-making and intelligent optimisation of large-scale, complex problems through techniques and models based on different disciplines such as mathematics and computing sciences. Maximise synergies among research groups and/or network members and foster joint collaboration in project development.

Sectors or Industries:
Information Technology

Geographical Scope:
National

HIGHLIGHTS

Main strengths and projects:
All projects are multidisciplinary with contributions from Mathematics (artificial intelligence, mathematical programming, statistics, fuzzy logic), Engineering (systems, computing), and hybrid disciplines (multi-criteria analysis, low-risk decision making, collective decision-making), and administrative areas.

It includes the following sub-networks:
1. Thematic network to support intelligent optimisation and decision-making in complex and large-scale systems
2. Thematic network on applied computational intelligence
3. Thematic network on power electrical systems and intelligent networks
4. Mexican thematic network on supercomputing
5. Thematic network on next generation systems and networks
6. Thematic network on language technologies

CLUSTER REPRESENTATIVE

Name of the Institution:
Consejo Nacional de Ciencia y Tecnología (CONACYT)

Type of Institution:
Private

Carretera Tijuana-Ensenada
3918
Fraccionamiento Zona Playitas
22860
Ensenada

Mr. Fernando López Irarragorri
 Coordinator

+52 (81) 1492 0364
ferny@yalma.fime.uanl.mx

https://www.conacyt.gob.mx/index.php/redes-tematicas-de-investigacion/category/sistemas-computacionales-complejos

Main research and academic players
- Monterrey Institute of Technology and Higher Education
- Western University
- Autonomous University of Nuevo León
- Sonora Institute of Technology
- Autonomous University of Ciudad Juárez
- Anáhuac University
- University of the Americas
- Centre for Research and Advanced Studies of the National Polytechnic Institute
- Autonomous University of Sinaloa
ESPECIALIZATION IN TECHNOLOGY AND INNOVATION IN THE AUTOMOTIVE INDUSTRY (ECATI) AUTOMOTIVE INDUSTRY TECHNOLOGICAL SUPPORT CENTRES STRATEGY (ECATI)

**GENERAL DATA**

**Age:**
2016

**Objectives and general approach:**
Leverage the contribution of the CONACYT centres to the automotive sector by creating groups and building alliances between the centres and complementary organisations.

**Sectors or Industries:**
Automotive

**Geographical Scope:**
National

**HIGHLIGHTS**

**Main strengths and projects:**
Given the large variety of areas of specialisation demanded by the automotive sector, the ECATI Automotive seeks to join efforts and individual expertise from its centres to complement capacities in addressing the industry’s challenges, as well as to provide the required services. The ECATI has been working on two joint projects:

Seeks to assess ECATI’s value proposition and has led to the identification of five flagship projects fit to be developed with an interinstitutional approach:

2. Technology transfer and assimilation.
3. ECATI Vehicle (develop and demonstrate the centre’s capacities to design motor vehicles)
4. ICTs for autonomous vehicles
5. SINAPAnet (National Online Automotive Testing System)

Developing a technological roadmap to identify suitable areas for technological research and development to be addressed by ECATI Automotive in order to respond to the medium- and long-term needs and opportunities of the industry.

The interaction among these centres has resulted in several initiatives; such as the creation of the National Laboratory for Automotive Innovation and Development of Light Materials (LANIAUTO), and the MTH Consortium focused on moulds, dies, and tooling, among others.

- Engineering and Industrial Development Centre (CIDESI)
- Advanced Technology Centre (CIATEQ)
- Applied Innovation in Competitive Technologies Centre (CIATEC)
- Information & Communication Technology Research & Innovation Centre (INFOTEC)
- National Institute of Astrophysics, Optics and Electronics (INAOE)
- Optics Research Centre (CIO)
- Applied Chemistry Research Centre (CIQA)

- Electrochemistry Research and Technological Development Centre (CIDETEQ)
- Mathematics Research Centre (CIMAT)
- Centre for Advanced Materials Research (CIMAV)
- Mexican Corporation for Materials Research (COMMIMSA)
- Ensenada Centre for Scientific Research & Higher Education (CICESE)
- San Luis Potosi Institute of Scientific and Technological Research (IPICYT)
**OBJECTIVES AND GENERAL APPROACH:**
Foster the development of nanotechnology through joint applied science project design and implementation to draw on existent resources and expertise in order to ensure there are appropriate linkages between the public and private sectors.

**SECTORS OR INDUSTRIES:**
Nanotechnology

**AGE:**
2009

**GENERAL DATA**

**NAME OF THE INSTITUTION:**
Red de Nanociencias y Nanotecnología (RNYN)

**TYPE OF INSTITUTION:**
Private

**CLUSTER REPRESENTATIVE**

**Libramiento Norponiente**
2000
Real de Juriquillas
76230
Querétaro

**http://www.nanored.org.mx/**

**Mr. Gabriel Luna Bárcenas**
RNYN General Coordinator

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glunascf@yahoo.com

**HIGHLIGHTS**

**Main strengths and projects:**
There is high interinstitutional participation within the CONACYT Nanoscience and Nanotechnology Network, which is currently working on three RNYN flagship projects:

1) **AQUA 20/20** assesses the quality of water for human consumption and its environmental impact for social and economic development.
2) **Standardisation and comparison among laboratories determining the size and distribution of nanoparticles by transmission electron microscopy.**
3) **Sinanotox: National Nano-toxicological Assessment System.**

It has three sub-networks:

1. **Nanoscience and Nanotechnology Division:** Fosters exchange among researchers and undergraduate and graduate students, as well as links between industry and academia.
2. **Mexican Nanoscience Research Groups Network (REGINA):** Promotes collaboration among research groups working in Nanoscience, in order to generate interdisciplinary projects and optimise the use of computing systems and experimental equipment. It also organises academic forums and conferences.
3. **UAM Nanoscience Network:** Disseminates information about Nanoscience and Nanotechnology in Mexico and abroad.

**Main research and academic players**

- Engineering & Industrial Development Centre (CIDESI)
- Applied Innovation Centre for Competitive Technologies (CIATEC)
- Yucatán Scientific Research Centre, A.C. (CICY)
- Ensenada Centre for Scientific Research and Higher Education (CICESE)
- Centre for Food Research & Development, A.C. (CIAD)
- Advanced Materials Research Centre (CIMAV)
- Applied Chemistry Research Centre (CIQA)
- Centre for Research and Assistance in Technology and Design of the State of Jalisco, A.C. (CIATEJ)
- Electrochemistry Research and Technological Development Centre (CIDETEQ)
- Northwest Biological Research Centre, S.C. (CIBNOR)
- Optics Research Centre, A.C. (CIO)
- Nanoscience and Nanotechnology Research Centre (CNyN)
- Advanced Technology Centre, Querétaro Unit (CIATEQ)
- National Metrology Centre (CENAM)
- Centre for Research and Advanced Studies (CINVESTAV) - Querétaro Unit
- Mexican Corporation of Materials Research, S.A. de C.V. (COMIMSA)
- Institute of Engineering of the National Autonomous University of Mexico (IF - UNAM)
- National Institute of Astrophysics, Optics and Electronics (INAOE)
- National Institute of Nuclear Research (ININ)
- San Luis Potosí Institute of Scientific and Technological Research (IPICYT)
- CINVESTAV Irapuato National Laboratory of Genomics for Biodiversity (LANGEBIO)
GENERAL DATA

Age:
2017

Objectives and general approach:
Contribute to increasing the competitiveness of the optics and photography sector in Mexico, through applied research, technological development and innovation; through the training of highly specialized talent in scientific disciplines and engineering, and by infrastructure of research, standardization, accreditation, certification and fab-lab laboratories for shared use.

Sectors or Industries:
Telecommunications, Information Technology, Energy, Automotive Aerospace, Medical devices

Geographical Scope:
International

HIGHLIGHTS

Main strengths and projects:
Development of technology and innovation for the optics and photonics industries through the Mexican Institute of Photonic Manufacturing, in which fab-lab shared, educational facilities will be concentrated for the training of specialized talent, training and personnel training, and certification of labor and product competencies.


