



## D3.5. Discussion paper on Taiwan

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Abstract: The discussion paper on Taiwan is thought as a semi-confidential document delivered to the European Commission (*DG GROWTH* and EASME) to provide policy-makers with inputs for the policy discussion on cluster cooperation and for policy arrangements on clusters with Taiwan.

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## Contents

1.	Objective of the report .....	3
2.	Existing EU-Taiwan cluster cooperation .....	3
2.1.	Policy dialogue on cluster cooperation .....	3
2.2.	Cluster to cluster cooperation.....	5
3.	Good practices & success stories related to cluster cooperation.....	8
3.1.	Success story 1: CASTRA & Gran Systems .....	9
3.2.	Success story 2: Silicon Europe Worldwide project & TAITRA .....	10
3.3.	Success story 3: Azcom (Fondazione Distretto Green and High Tech Monza-Brianza) & ITRI .....	12
4.	Opportunities & potential for further EU-Taiwan cluster cooperation: thematic focus .....	14
4.1.	ICT sector .....	14
4.2.	Industry 4.0: Smart Machinery sector .....	15
4.3.	Biotechnology sector.....	16
4.4.	Renewable energy sector .....	17

# 1. Objective of the report

The purpose of the present document is to provide an overview on the existing European Union (EU) and Taiwan cluster cooperation, related good practices and success stories, and highlight opportunities for future cluster-based exchanges, including recommendations for an EU-Taiwan cluster policy dialogue.

A related document, the D2.3 Preparatory briefing on Taiwan, was developed by the European Cluster Collaboration Platform (ECCP) as a deliverable of the project to provide a basis for the analysis and recommendations included in this paper.

# 2. Existing EU-Taiwan cluster cooperation

The Taiwanese economy, the 22<sup>nd</sup> largest in the world, is mainly driven by manufacturing that supports exports of electronics, machinery and petrochemicals. Small and Medium Enterprises (SMEs) constitute the backbone of the private sector, accounting for 98% of the companies in Taiwan. The business environment is characterised by a well-developed commercial code, moderately open-market policies that facilitate the flow of goods and capital, and a comprehensive legal framework that protects and enforces property rights.

Overall Taiwan offers a stable economic and political environment. However, its dependence on external trade and foreign direct investment (FDI) exposes Taiwan to fluctuations in the global economy. Taiwan forecasts positive growth in the forthcoming years, but increasing strains in the global arena such as the trade war between China and the United States (US), the situation in the Korean peninsula and the competitive pressure from China and the Asian-Pacific region in general pose a threat to its economic and financial stability.

The EU and Taiwan have actively cooperated, achieving very successful outcomes. Nonetheless, the political constraints concerning the official status of Taiwan have limited the collaboration, which adopts a rather informal approach to commercial, cultural and scientific areas. Both partners expect to establish a formal framework to reinforce their ties and further explore potential areas of common interest aimed at bringing mutual benefits.

In particular, the present discussion paper focuses on the following strategic sectors: biotechnology, renewable energy, information and communication technologies (ICT) and smart manufacturing. Besides their strong impact in the future economic development, the synergies between the European Commission's (EC) strategy for the near term and the EU cluster community, as well as the Taiwanese government plans, make the aforementioned fields of great importance for cluster cooperation between the EU and Taiwan.

## 2.1. Policy dialogue on cluster cooperation

The concept of cluster in Taiwan is slightly different than in Europe, although there is a tendency towards a convergent model. In both cases, since SMEs constitute the predominant type of business,

clustering comes as a natural response to ensure the economy maintains its competitiveness in the global market. However, Taiwanese clusters develop from a science or industrial park established to fulfil the needs of a strategic sector and stimulate the regional economy. SMEs form the primary base, to which other organisations such as research centres, universities or incubators gradually join.

Cluster policy can be traced back to 1989, when the SME Administration (SMEA) – Ministry of Economic Affairs (MOEA), began to allocate resources to support the development of the so-called specialised local industries. Building on the established institutions and supported by financial incentives, clustering was encouraged to increase competitiveness by promoting horizontal and vertical cooperation among universities, SMEs and large firms, through transfer of knowledge and diffusion of technology<sup>1</sup>.

In 2008, the SMEA introduced the “Plan for the Provision of Integrated Services to Support SME Industry Cluster Innovation” in order to stimulate the development of clusters in key industries, promote industry cluster innovation and integration, and build an industry service network<sup>2</sup>. In the subsequent year, the Executive Yuan established the Local Industry Development Fund to promote local economic prosperity by providing funding assistance in line with the development needs of local industries, and approved the Council for Economic Planning and Development (CEPD).

In 2016, the Executive Yuan announced the “5+2 Major Innovative Industries Policy” that provides a framework to pursue a domestic reform meant to develop and diversify the Taiwanese economy into a more modern, innovative and energy efficient model. To achieve this, the plan calls for investments on infrastructures, promotes research labs, and proposes to foster (through funds and capital-access) R&D strategies in seven sectors, namely: agriculture, biotechnology, circular economy, defence, green energy, Internet of Things (IoT), and smart machinery.

Lastly, the “2017 White Paper on Small and Medium Enterprises in Taiwan” includes within its strategy for promoting operational excellence and innovation, a “Project to Promote SME Clustering and Accelerate Innovative Commercialisation”, which aims to encourage the integration of industry clusters and application of knowledge services and operational innovation. Guidance offered through the programme in 2017 entailed providing assistance to SMEs on utilising a clustering approach to facilitate economies of scale, and favouring cooperation on joint innovation for products, service and operating models, thereby boosting overall industry value.

The EU and Taiwan maintain an active cooperation in trade and investment, as well as in science, technology and innovation (STI). The Administrative Arrangement on Cluster Cooperation, signed by the Taipei Representative Office in the EU and DG GROW of the European Commission, on the 6<sup>th</sup> of June 2018, is the most recent expression of this collaboration.

Some shared challenges that draw the attention of the EU and Taiwan are the following: personalised healthcare and medicine; digital security; smart cities and communities; competitive low-carbon

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<sup>1</sup> Hasan S., Klaiber H.A., Sheldon, I., «Regional innovation policy in Taiwan and South Korea: The impact of science parks on small and medium-sized enterprises’ productivity distributions» (2015)

<sup>2</sup> Foghani, S., Batiah, M., Rosmini, O., « Promoting Clusters and Networks for Small and Medium Enterprises to Economic Development in the Globalization Era” (2017), <http://journals.sagepub.com/doi/full/10.1177/2158244017697152>

energy; energy efficiency; and blue growth, with special emphasis in unlocking the potential of seas and oceans.

## 2.2. Cluster to cluster cooperation

Taiwan and the EU are very active trade and investment partners. The EU is the main foreign investor in the Taiwan economy and Taiwan is the 5<sup>th</sup> biggest trade partner of the EU from the Asia-Pacific region<sup>Erreur ! Signet non défini.</sup> and both intend to extend this partnership to other areas of common interest, such as further foster the STI cooperation projects and cluster-to-cluster (C2C) collaboration between clusters of both regions. The latter has been progressing steadily throughout the years, as shown by the joint organisation of cluster matchmaking events annually over the last few years.

It is understood that the Taiwanese cluster community is mainly represented by the Taiwan External Trade Development Council (TAITRA) and the Chinese National Federation of Industries (CNFI). Alongside the ECCP and other European and Taiwanese partners, the aforementioned organisations cooperated in two events of great importance for the European and Taiwanese cluster communities. The third event is scheduled to take place in Taiwan, in June 2018.

The first major cluster collaboration and matchmaking event was the “Taiwan European-Asian Cluster Matchmaking Event Opportunity for ICT Clusters”, in the scope of the European Innovation Week and the COMPUTEX Fair in Taipei in 2016. The event focused on ICT clusters and gathered 23 European clusters, from 11 Member States, and nine Taiwanese cluster representatives. The event was very well received by the participants, and considered very useful for the improvement of the partnership between European and Taiwanese clusters<sup>3</sup>. The event was a joint initiative of the European Commission in collaboration with the Europe Silicon Worldwide, the EU Chamber of Commerce in Taiwan, TAITRA, ECCP and the Industrial Technology Research Institute (ITRI).

In 2017, building on the success of the previous cluster collaboration and matchmaking event, the Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROWTH) through the ECCP in cooperation with TAITRA, the CNFI and the Royal Flemish Academy of Belgium for Science and the Arts organised the “2017 EU-Taiwan Cluster Matchmaking Event”, in Brussels. The event was held in the context of the “3<sup>rd</sup> EU-Taiwan Industrial Dialogue” that brought to Europe the largest Taiwanese delegation ever to an economic and trade mission<sup>4</sup>. The event gathered 21 European and 15 Taiwanese clusters in the technology fields of 5G, circular economy and smart industry. The event laid the foundations for cooperation and formal agreements between various European and Taiwanese clusters<sup>5</sup>.

The subsequent event took place in June 2018 in Taiwan. DG GROWTH through the ECCP, in collaboration with TAITRA, the CNFI and the Bureau of Foreign Trade (BoFT) - Ministry of Economic Affairs (MoEA), organised the “2018 EU-Taiwan Cluster Cooperation and Matchmaking Event” in the

<sup>3</sup> Taiwan 2016 Cluster Matchmaking Event, [www.clustercollaboration.eu/sites/default/files/event\\_proceedings\\_taiwan.pdf](http://www.clustercollaboration.eu/sites/default/files/event_proceedings_taiwan.pdf)

<sup>4</sup> Taiwan News, [www.taiwannews.com.tw/en/news/3197382](http://www.taiwannews.com.tw/en/news/3197382)

<sup>5</sup> D2.9 Proceedings Report EU-Taiwan Cluster Matchmaking Event 2017

context of the European Innovation Week and COMPUTEX Taipei tradeshow. The event brought together European and Taiwanese clusters from the following sectors:

- Circular economy
- Information and Communication Technologies (ICT)
- Renewable energy: special focus on offshore wind
- Smart cities & smart mobility
- Smart manufacturing

As mentioned above, the EU provides a very powerful tool to explore the full potential of clusters to the EU and their partners. The ECCP provides stakeholders with detailed information about clusters from all around the world. It aims at fostering the international cooperation through networking, supporting the emergence of new value chains through cross-sectorial cooperation and improving the competitiveness of the clusters registered on the platform. A total of 13 Taiwanese clusters are registered on the ECCP and are actively using the tools provided by the platform to improve their overall partnerships with European clusters. Moreover, there are 34 EU clusters and three European Strategic Cluster Partnerships-Going International (ESCP-4i) that indicate Taiwan as a target market.

These ESCPs-4i are:

- New Frontiers for Emerging Industries in Food<sup>6</sup>
- European Semiconductor Cluster Internationalisation Project (Silicon Europe Worldwide)<sup>7</sup>
- Internationalisation of cross-domain Smart City Solutions powered by ICT (SmartCityTech)<sup>8</sup>

There are examples of cluster collaboration activities and events between Taiwan and EU based companies and clusters, mainly focused on the ICT sector. Both regions are known for their excellence in the various fields of ICT. Taiwan in particular is a world-class hotspot for microelectronics; while the EU is strong in innovation and technology. In addition, Taiwan provides products with very competitive prices and deep specialisation.

European and Taiwanese clusters are increasing their cooperation activities in search of synergies and mutual opportunities to grow in the wider-ranging ICT industry, where Taiwan is stronger on semiconductors and Europe has considerable headway in nanotechnology, software and applications. Europe's lead in advance manufacturing systems is also an advantage that Taiwan will likely seek to exploit given its exposure to manufacturing systems in the world market. Artificial Intelligence (AI) show up as a crucial area for Taiwan and there is a strong likelihood for Taiwan to seek cluster cooperation on AI.

In the context of SEMICON Europe, TAITRA organised the “2017 Taiwan Semiconductor and Electronic Equipment/Component Seminar and Matchmaking” to foster a closer partnership between Taiwanese and European semiconductor manufacturers. The Taiwanese delegation consisted of the 10 leading manufacturers that wanted to understand the European landscape and were looking for potential

<sup>6</sup> New Frontier in Food ESCP-4i, [www.clustercollaboration.eu/escp-profiles/new-frontier-food](http://www.clustercollaboration.eu/escp-profiles/new-frontier-food)

<sup>7</sup> Silicon Europe Worldwide ESCP-4i profile, [www.clustercollaboration.eu/escp-profiles/escip](http://www.clustercollaboration.eu/escp-profiles/escip)

<sup>8</sup> SmartCityTech ESCP-4i profile, [www.clustercollaboration.eu/escp-profiles/smartcitytech](http://www.clustercollaboration.eu/escp-profiles/smartcitytech)

European partners. The event was a direct result of the Memorandum of Understanding (MoU) signed between TAITRA and Silicon Europe Worldwide at 2016 SEMICON in Grenoble.<sup>9</sup>

Also at the 2016 SEMICON in Grenoble, the French cluster Minalogic and the Taiwanese Metal Industries Research & Development Centre (MIRDC) signed a MoU with the objective of facilitating the development of the semiconductor application markets for Taiwan and the EU<sup>10</sup>.

The Taiwan Printed Circuit Association (TPCA), TAITRA and Taiwan Electronic Connection Association (TECA) organised a Trade Mission of Printed Board Circuits (PCB) & Electronic Connection Industry in Germany. The event wanted to join Taiwan's extensive expertise, R&D and supply chain with the EU's advanced technology and market opportunities<sup>11</sup>.

Another field that has recently drawn the attention of the cooperation initiatives between the EU and Taiwan is the wind power generation. In the scope of its transition strategy to renewable energies, Taiwan is investing heavily in wind farms, especially offshore. In this regard, it intends to attract the most competitive experts and technology, which currently exists in the EU.

The continuous cooperation in the organisation of the matchmaking events, visits and partnership agreements has been one of the main drivers to reinforce the EU and Taiwan cluster to cluster cooperation. The event held in June 2018 marks the 3<sup>rd</sup> consecutive year the "EU-Taiwan Cluster Cooperation and Matchmaking Event", proving the interest of both regions in cooperating at a higher level. Furthermore, both the European Chamber of Commerce and the European Economic and Trade Office in Taiwan play a key role in facilitating the dialogue between the EU and Taiwan and supporting the stakeholders of both regions to develop partnerships.

<sup>9</sup> Silicon-Saxony News, [www.silicon-saxony.de/news/news-detail/archive/2017/november/article/silicon-europe-promotes-collaborations-with-taiwan-at-semicon-europa/20/](http://www.silicon-saxony.de/news/news-detail/archive/2017/november/article/silicon-europe-promotes-collaborations-with-taiwan-at-semicon-europa/20/)

<sup>10</sup> MIRDC News, [www.mirdc.org.tw/English/NewsView.aspx?Cond=1658](http://www.mirdc.org.tw/English/NewsView.aspx?Cond=1658)

<sup>11</sup> ECCP News, [www.clustercollaboration.eu/profile-events/matchmaking-taiwan-pcb-and-electronic-connector-industry-germany](http://www.clustercollaboration.eu/profile-events/matchmaking-taiwan-pcb-and-electronic-connector-industry-germany)

### 3. Good practices & success stories related to cluster cooperation

As indicated in the previous section, Taiwan and the EU have been working together towards an improved cluster cooperation, which is drawing the attention of an increasing number of clusters from both regions. Three success stories of international cooperation established between Taiwanese and EU member states clusters are presented below to illustrate the importance of continued C2C cooperation between the two regions and to provide information that can help other clusters to develop similar agreements.

The success stories include details on the: sector and stakeholders concerned, the process that has led to cooperation, policy support, common activities, and an indication of the main outcomes of the cooperation to date<sup>12</sup>. The information has been collected through a literature review and interviews with the relevant organisations.

The good practises and success stories are the following:

- Cooperation between Castra & Gran Systems
- Silicon Europe Worldwide project & TAITRA – MoU
- Cooperation between the Fondazione Distretto Green and Hi Tech Monza-Brianza Cluster and Industrial Technology Research Institute

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<sup>12</sup> Information on budget or funding is not publicly available.

## 3.1. Success story 1: CASTRA & Gran Systems

Cooperation between CASTRA & GRAN SYSTEMS	
<p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>Cluster Aerospace Technologies, Research and Applications (CASTRA, Bulgaria, EU)<sup>13</sup></li> <li>Gran Systems and mZone (Taipei City, Taiwan)<sup>14</sup></li> </ul>	 
<p><b>Sectors and subsectors concerned:</b></p> <ul style="list-style-type: none"> <li>ICT sector</li> <li>Aerospace sector</li> </ul>	
<p><b>Context:</b></p> <ul style="list-style-type: none"> <li>CASTRA gathers business entities, academic institutions and other bodies with expertise on products and services in aerospace, promoting R&amp;D, innovation and technological developments in the sector beneficial to society and citizens.</li> <li>Gran Systems is a Taiwanese system integrator, design and consulting firm that focuses its services on the precision machinery, semiconductor, aerospace, medical equipment and solar industries. Gran Systems has founded multiple companies and serves the board of multiple Taiwanese business, including the Association of Chinese Aviation Industry Development.</li> </ul> <p>The organisations met during the 2016 “European Innovation Week” in Taiwan.</p>	
<p><b>Type of cooperation:</b></p> <ul style="list-style-type: none"> <li>Both organisations have organised visits to their respective headquarters.</li> <li>The organisations share knowledge and work to identify and implement joint projects.</li> <li>CASTRA and Gran System agreed to cooperate on projects related to aerospace and created a framework on how a joint project could be formed between both clusters.</li> </ul>	
<p><b>Objective:</b></p> <ul style="list-style-type: none"> <li>To find mutual interests and work together to achieve them.</li> <li>Set up a joint project.</li> </ul>	
<p><b>Policy Support:</b></p> <ul style="list-style-type: none"> <li>The dialogue was possible because CASTRA and Gran System were able to meet at EU- Taiwan events organised by the EC through the ECCP, which allowed the connection to happen and have continuity over time.</li> </ul>	

<sup>13</sup> [www.castra.org](http://www.castra.org)

<sup>14</sup> [www.gransystems.com](http://www.gransystems.com)

**Results/outcomes:**

- A partnership between a Taiwanese and European cluster in the aerospace sector.
- A ready-to-use framework for both clusters to cooperate.

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## 3.2. Success story 2: Silicon Europe Worldwide project & TAITRA

### Silicon Europe Worldwide project & TAITRA sign MoU<sup>15</sup>

**Partners:**

- Silicon Europe Worldwide (Various MS, EU)<sup>16</sup>
- Taiwan External Trade Development Council (TAITRA, Taiwan)<sup>17</sup>



**Sectors and subsectors concerned:**

- ICT sector
  - Semiconductor sub-sector
  - Electronics sub-sector



**Context:**

- Silicon Europe joins European clusters in an alliance with extensive experience and knowledge across all the fields of electronics and software, bringing together European research institutes and companies in the fields of micro and nanoelectronics, photonics, ICT, software and IoT. Silicon Europe acts as an intermediary between the members (12 in total) and relevant research and academia, public authorities and industry partners.
- The Taiwan External Trade Development Council (TAITRA) is a non-profit government association that assists Taiwanese businesses and manufacturers to reinforce their international presence and cope with the challenges they face in the international markets.

<sup>15</sup> [www.clustercollaboration.eu/achievements/silicon-europe-worldwide-signs-mou-cooperation-taitra-taiwan](http://www.clustercollaboration.eu/achievements/silicon-europe-worldwide-signs-mou-cooperation-taitra-taiwan)

<sup>16</sup> [www.silicon-europe.eu](http://www.silicon-europe.eu)

<sup>17</sup> [www.taitra.org.tw](http://www.taitra.org.tw)

**Type of cooperation:**

- Support joint business and technological endeavours between the EU and Taiwan cluster community.
- The agreement between the organisations was signed during the 2016 SEMICON Europe exhibition that was held in Grenoble, from the 25<sup>th</sup> to the 27<sup>th</sup> of October.
- The terms of the agreement focus on developing strategic business alliances, joint research activities and the sourcing and sharing of technologies between SMEs and knowledge institutes located in both regions in the fields of micro and nanoelectronics, and smart-X systems.

**Objective:**

- The overall aim of the agreement is to provide a foundation and the framework to deepen the collaboration between both sides, as well as to support Europeans and Taiwanese to find new partnership opportunities to strengthen their competitive position in the international markets.

**Policy support:**

- Both organisations started formal talks during the 2016 European Innovation Week organised by the EU and Taiwan, in Taiwan<sup>18</sup>.

**Results/outcomes:**

- Signature of a Memorandum of Understanding (MoU) between TAITRA and Silicon Europe Worldwide, which will be continued by Silicon Europe Alliance.
- Develop local micro and nanoelectronics and smart-X systems.
- Increase cluster cooperation between Taiwan and Europe.
- Jointly organise activities bringing together SMEs and knowledge institutes from both regions.
- TAITRA organised the “2017 Taiwan Semiconductor and Electronic Equipment/Component Seminar and Matchmaking”, where the organisation gathered 10 leading manufacturers that wanted to understand the European landscape and were looking for potential European partners at the 2017 SEMICON Europe.
- After SEMICON Europe 2017, a Taiwanese company mission led by TAITRA, visited DSP Valley and High Tech NL (members of Silicon Europe Worldwide) and met several local companies.
- Silicon Europe Alliance is organising with TAITRA a joint booth at SEMICON Taiwan 2018.
- Furthermore, both are currently discussing the option to organise a joint event during Electronica/Semicon 2018.

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<sup>18</sup> The 2016 European Innovation Week was a joint initiative of the European Commission, including DG GROWTH, DG CONNECT and DG RTD, in collaboration with Silicon Europe Worldwide, GNSS.asia, the Bureau of Foreign Trade (BoFT) and the Department of Industrial Technology (DOIT) of Taiwan, the Enterprise Europe Network (EEN) coordinated by TAITRA, the European Chamber of Commerce in Taiwan (ECCT), the Industrial Technology Research Institute (ITRI) and the European Cluster Collaboration Platform (ECCP).

### 3.3. Success story 3: Azcom (Fondazione Distretto Green and High Tech Monza-Brianza) & ITRI

Cooperation between the Fondazione Distretto Green and Hi Tech Monza-Brianza Cluster and Industrial Technology Research Institute <sup>19</sup>	
<p><b>Partners:</b></p> <ul style="list-style-type: none"> <li>• Fondazione Distretto Green and Hi Tech Monza-Brianza (Italy, EU)<sup>20</sup></li> <li>• Azcom Technology (Italy, EU)<sup>21</sup></li> <li>• Industrial Technology Research Institute (ITRI, Taiwan)<sup>22</sup></li> </ul>	
<p><b>Sectors and subsectors concerned:</b></p> <ul style="list-style-type: none"> <li>• ICT sector</li> <li>• Network sub-sector</li> </ul>	
<p><b>Context:</b></p> <ul style="list-style-type: none"> <li>• Fondazione Distretto Green and Hi Tech Monza-Brianza is an Italian cluster focused on energy and ICT with the clear goal of revitalising the competitiveness of the Italian, and in particular, Northern Italy region, through the fostering of local innovation and R&amp;D and the creation of a wide network of members, promoting synergies among them.</li> <li>• Azcom Technology is an Italian company and a member of the Fondazione Distretto Green and Hi Tech Monza-Brianza cluster. It is a leader in advanced wireless communications and develops platforms for cellular communication, automotive, aerospace, home automation and mobile applications.</li> <li>• ITRI is a Taiwanese R&amp;D institute that aims at transforming Taiwan into an innovation-driven economy, focusing on the fields of smart living, quality health and sustainable environment.</li> </ul>	
<p><b>Type of cooperation:</b></p> <ul style="list-style-type: none"> <li>• ITRI and AZcom are both partners of the consortium of the project “5G-CORAL: A 5G Convergent Virtualised Radio Access Network Living at the Edge”.</li> <li>• The project is part of the European H2020 5G Public-Private Partnership (5G PPP) Infrastructure and was launched in Taiwan in September, 2017.</li> </ul>	

<sup>19</sup> [www.5g-coral.eu](http://www.5g-coral.eu)

<sup>20</sup> [www.distrettohmb.it](http://www.distrettohmb.it)

<sup>21</sup> [www.azcom.it](http://www.azcom.it)

<sup>22</sup> [www.itri.org.tw/eng](http://www.itri.org.tw/eng)

**Objective:**

- The cooperation aims to provide a convergent 5G multi-RAT access through an integrated virtualised edge and fog solution, which is flexible, scalable and interoperable with other domains including transport, core and clouds.

**Policy support:**

- Distretto and ITRI established contacts during the EU-Taiwan Matchmaking Event organised by the ECCP in June 2016 in Taipei, Taiwan. Then Distretto acted as a bridge between its company member Azcom and ITRI.
- 5G-CORAL is funded under the H2020-EU.2.1.1. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies - Information and Communication Technologies (ICT) programme.
- The partners were brought together by the 5G Infrastructure Public Private Partnership (5G PPP) as a complementary 5G project (EU-Taiwan), on the phase 2 projects<sup>23</sup>.

**Results/outcomes:**

- The matchmaking mission brought beneficial results to the members of Fondazione Distretto.
- Collaboration extended beyond the clusters, bringing together universities and private companies from Taiwan and EU member states in a cooperation project between Taiwan and the EU.
- Improved 5G connectivity across both regions.

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<sup>23</sup> 5G PPP: [www.5g-ppp.eu](http://www.5g-ppp.eu)

## 4. Opportunities & potential for further EU-Taiwan cluster cooperation: thematic focus

There is significant potential for the implementation of a C2C cooperation framework, with a specific thematic focus. The opportunities discussed within this section are founded on the analysis presented by the preparatory briefing developed by the ECCP (May 2018), which provides further justification for fostering C2C cooperation efforts in the sectors described.

### 4.1. ICT sector

Taiwan is the largest ICT products manufacturer in the world and the sector keeps growing year after year. This consistent growth is the result of the government's effort to keep the sector competitive through easing regulations, funding mechanisms to boost the industry, and investment in fostering local talent.

Since 1980, with the inauguration of the Hsinchu Science Park, Taiwan has tried to replicate the Silicon Valley (California, US) example. In 2016, with the “5+2 Major Innovative Industries Policy”, the Executive Yuan reinforced its statement to make Taiwan the Asian Silicon Valley. The plan aims at transforming the Taiwanese industries and promoting IoT technology, fostering entrepreneurship by focussing on mobile lifestyle, artificial intelligence (AI), automated driving, augmented reality (AR) and virtual reality (VR), and IoT information security<sup>24</sup>.

Currently the sector is shifting its focus to IoT and AI development, due to the rise of the 4<sup>th</sup> Industrial revolution. As a result, Taiwan is investing heavily in the production of IoT hardware, software, services and technology to be ahead of the demand for such products and services and therefore, securing its opportunities to become a smart digital island<sup>25</sup>.

As previously mentioned, ITRI and Azcom (member of the Fondazione Distretto Green and Hi-Tech Monza Brianza cluster) are part of the 5G-CORAL<sup>26</sup> project. The EC will launch another call together with Taiwan to validate the 5G technologies and architectures, extending the cooperation between the two regions on the 5G networks sub-sector<sup>27</sup>.

In addition, there are two current ESCP-4i projects on the ICT sector that aim at internationalising to Taiwan:

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<sup>24</sup> National Development Fund (NDF), Executive Yuan, « Asia Silicon Valley Development Plan for industrial transformation » (2017), [english.ey.gov.tw/News\\_Hot\\_Topic.aspx?n=58F0F1B08BA63877&sms=21D7639DF54C05F6](https://english.ey.gov.tw/News_Hot_Topic.aspx?n=58F0F1B08BA63877&sms=21D7639DF54C05F6)

<sup>25</sup> National Development Fund (NDF), Executive Yuan, « AI Taiwan Action Plan - Transforming industry with artificial intelligence » (2018) [english.ey.gov.tw/News\\_Hot\\_Topic.aspx?n=D53925F50550A904&sms=4037A32CDEF1DDCF](https://english.ey.gov.tw/News_Hot_Topic.aspx?n=D53925F50550A904&sms=4037A32CDEF1DDCF)

<sup>26</sup> Funded under the “H2020-EU.2.1.1. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies – ICT”

<sup>27</sup> <https://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/ict-23-2019.html>

- **European Semiconductor Cluster Internationalisation Project (Silicon Europe Worldwide)<sup>28</sup>**

Silicon Europe Worldwide has been a two-year project that started in 2016. The project funded by COSME aimed at implementing the internationalisation strategy of Silicon Europe<sup>16</sup> strengthening the presence of the cluster globally. Taiwan was the first region to be approached, taking advantage of the partner's already established relationship with Taiwanese stakeholders and the missions that were already taking place between the EU and Taiwan. Now at the end of the two years, the project is expected to continue being part of the internationalisation programme of the Silicon Europe cluster consortium but it may be scaled down to the core elements of the consortium or yet it may be drastically scaled down due to funding shortages. The fact is that Silicon Europe recognised that the strategy of focussing on semiconductors was too difficult for the EU consortium, the nanotech edge of Europe was not sufficiently put forward, nor enough focus on SMEs concrete projects was made due to steep learning curves between the two industries and all together the ICT and manufacturing systems are too large and crucial for the EU to be well-off in not pursuing a strong cooperation with Taiwan.

- **Internationalisation of cross-domain Smart City Solutions powered by ICT (SmartCityTech)<sup>29</sup>**

The SmartCityTech partnership aims at facilitating the cooperation between city and smart systems stakeholders that want to implement smart systems in urban areas. The focus is to develop a smart specialisation focus, build a global ecosystem, create local and global businesses and mobilise funding opportunities available towards smart cities and smart systems.<sup>30</sup>

The success stories discussed earlier (Sections 3.2 and 3.3) are great examples of the willingness of the regional stakeholders to cooperate. The ESCP Going International projects also demonstrate the interest of EU clusters to develop their businesses in Taiwan. Partners recognise the long lasting impacts the cooperation partnership will have in their activities.

## 4.2. Industry 4.0: Smart Machinery sector

Smart machines consist of manufacturing equipment that is intelligent, self-learning, and can communicate with other machines and human operators through transmitting data in real time. Given the ICT capacity of Taiwan, the transition to the Industry 4.0 will be smooth and will have a great impact on the economy. Moreover, the extensive exposure of Taiwan industry around the world in the manufacturing of equipment goods makes a priority for Taiwan to acquire emerging technologies in advance manufacture systems and AI. In this domain they compete with EU industrial power in manufacturing systems, but the exposure of both EU and Taiwan to the global value-chains enables considerable room for cooperation. Germany and Italy as well as Spain and France are the most exposed Member States. The move would strengthen Taiwan's international presence and gain flexibility in responding to market demands.

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<sup>28</sup> Silicon Europe Worldwide ESCP-4i profile: [www.clustercollaboration.eu/escp-profiles/escip](http://www.clustercollaboration.eu/escp-profiles/escip)

<sup>29</sup> SmartCityTech ESCP-4i profile: [www.clustercollaboration.eu/escp-profiles/smartcitytech](http://www.clustercollaboration.eu/escp-profiles/smartcitytech)

<sup>30</sup> SmartCityTech: [www.smartcitytech.eu](http://www.smartcitytech.eu)

The Executive Yuan has committed to investing in the Central and Southern Taiwan Science Parks to introduce smart machinery into the industries and to develop smart machinery applications in the manufacturing and ICT industries<sup>31</sup>. Taiwan wants to develop the industry locally, ensuring it can meet the global market demands and exchange with foreign regions, like the EU, to cooperate and ultimately become a smart machinery R&D and manufacturing base.

In 2017, the German Trade Office and the Taiwanese Smart Machinery Promotion Office organised the 2<sup>nd</sup> Germany-Taiwan Smart Machinery Forum. The event was attended by the Industrial Development Bureau, MoEA, ITRI and the MIRDC. The visit was complemented with visits to various German manufacturing sites such as the Volkswagen plant, the DMG Mori factory, the Mercedes Benz production line and the Bosch Rexroth manufacturing site. During this visit, there were two signing ceremonies<sup>32</sup>:

- A MoU between TAITRA and Bremen Invest.
- A MoU between the Taiwanese Fair Friend Group (FFG) and Siemens Germany – to integrate Siemens technology in FFG machine tools and collaborate on product lifecycle management, manufacturing operations management and totally integrated automation.

The EU H2020 Framework and the Taiwanese government are funding the Clear5G project that aims at investigating and demonstrating key enablers necessary to support machine type communications traffic networks, in the Factories-of-the-Future<sup>33</sup> environment. The project will strengthen the manufacturing capabilities of Taiwan and Europe.

### 4.3. Biotechnology sector

Biotechnology, especially the commonly designated 'red biotech', is of great importance to the EU and Taiwan. For instance, one of the main issues that both regions face is the ageing population that requires an ever-growing focus on healthcare, which is described as one of the fastest developing fields in science and technology (S&T) in Taiwan<sup>34</sup>. However, progress in biotechnology also leads to positive impacts on multiple sectors other than healthcare, such as agriculture ('green biotech') and environment and chemicals ('white biotech').

Aiming to become a hub of biomedical R&D in the Asia-Pacific region, the Taiwanese government actively fuels the growth of biotechnology<sup>35</sup>. As a matter of fact, besides being selected as one of the priority sectors in the "5+2 Major Innovative Industries Policy" (2016), biotechnology has received continuous institutional support since 1980 showing the early on importance given to the field.

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<sup>31</sup> MoEA, [www.moea.gov.tw](http://www.moea.gov.tw)

<sup>32</sup> German Trade Office Taipei, [www.taiwan.ahk.de/news/details/artikel/taiwanese-delegation-visited-germany-for-2nd-germany-taiwan-smart-manufacturing-forum/?cHash=4b08a787806c05ec41f7c0e80991a40b](http://www.taiwan.ahk.de/news/details/artikel/taiwanese-delegation-visited-germany-for-2nd-germany-taiwan-smart-manufacturing-forum/?cHash=4b08a787806c05ec41f7c0e80991a40b)

<sup>33</sup> Factories of the Future PPP: towards competitive EU manufacturing, [ec.europa.eu/research/press/2013/pdf/ppp/fof\\_factsheet.pdf](http://ec.europa.eu/research/press/2013/pdf/ppp/fof_factsheet.pdf)

<sup>34</sup> Hu, Chin-Lung, « Overview of Biotechnology Industry in Taiwan, Biotechnology & Pharmaceutical Industries Promotion Office », 2017

<sup>35</sup> Executive Yuan, Republic of China (Taiwan), 2016 [english.ey.gov.tw/News\\_Hot\\_Topic.aspx?n=F0F9D3A3016103DA&sms=311E6AC9C5FF64EE](http://english.ey.gov.tw/News_Hot_Topic.aspx?n=F0F9D3A3016103DA&sms=311E6AC9C5FF64EE)

Taiwan greatly benefits from the well-developed high-tech sector that can easily transfer know-how and technology advances to biotechnology. Moreover, the government is planning to set up multiple R&D infrastructures close to universities with the objective to foster national talent and meet the demand of the sector for progress and human capital.

All in all, Taiwan's focus on biotechnology, long expertise on ICT and agricultural plan exerts a remarkable attraction among EU companies that look for potential cooperation opportunities. In this regard, the ESCP Going International New Frontiers for Emerging Industries in Food (Food Processing and Manufacturing; Food Technology) aims at easing the market entry of food related SMEs, strengthening EU competitiveness in foreign markets and developing new technology for the sector. One of its target markets is Taiwan due to Taiwan's agriculture potential and the strict regulations imposed for agricultural-related companies.

In 2017, the Chinese International Economic Cooperation Association and Taiwan Bio Industry Organisation organised a mission to Belgium, Netherlands, Switzerland and Germany. The delegation was composed of 13 representatives of various biotechnology companies from Taiwan. The Taiwan Bio Industry Organisation<sup>36</sup> is a cluster that represents healthcare, agriculture, industrial and environmental biotechnology companies.

## 4.4. Renewable energy sector

Taiwan sees the transition to renewable energies as a key step to ensure its energy independence<sup>37</sup>. The "5+2 Major Innovative Industries Policy" sets out clear goals for Taiwan to achieve energy independence and to enhance energy security, environmental sustainability and boost a green economy.

The initiatives range from solar and wind power projects, including off-shore wind power, to smart city planning. The government is launching incentives for businesses and private households to invest in solar panels<sup>38</sup> and calling for extensive investments in offshore windfarms. The government also aims at installing smart meters across Taiwan to help manage fluctuations, conserve energy and improve the generation of energy<sup>39</sup>.

To foster innovation in the energy sector, Taiwan is liberalising the sector, allowing entrepreneurial initiatives to flourish and increase the innovation within the sector. In the transport sector, Taiwan is providing incentives to buy electric vehicles and is committed to banning the sale of fossil fuel motorcycles and cars by 2035 and 2040, respectively.

President Tsai stated, towards the end of 2017, her intent to work closely with the EU to tackle the green energy challenge together. The interest by European companies in investing in Taiwanese firms

<sup>36</sup> [www.taiwanbio.org.tw](http://www.taiwanbio.org.tw)

<sup>37</sup> «Taiwan green shift defies energy security fears » Financial Times

<sup>38</sup> National Development Fund (NDF), Executive Yuan, « Green Energy Roofs project: Solar panels on every rooftop » (2017), [english.ey.gov.tw/News\\_Hot\\_Topic.aspx?n=76D79F4BEA1158D5&sms=DB1AA370D75B8DD1](http://english.ey.gov.tw/News_Hot_Topic.aspx?n=76D79F4BEA1158D5&sms=DB1AA370D75B8DD1)

<sup>39</sup> National Development Fund (NDF), Executive Yuan « Energy transformation: Industrial innovation for green energy technologies » (2017), [https://english.ey.gov.tw/News\\_Hot\\_Topic.aspx?n=A8A56944A0458D4B&sms=0064637C15D6B84F](https://english.ey.gov.tw/News_Hot_Topic.aspx?n=A8A56944A0458D4B&sms=0064637C15D6B84F)

focussed on green energy is a major factor for the EU-Taiwan cooperation on green energies to work. The Taiwanese president sees the potential cooperation in the green energy sector as a way to further incentivise EU and Taiwanese industries to cooperate<sup>40</sup>.

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<sup>40</sup> Taiwan Today, [www.taiwantoday.tw/news.php?unit=2,6,10,15,18&post=126856](http://www.taiwantoday.tw/news.php?unit=2,6,10,15,18&post=126856)