D. 3.2 – Preparatory Briefing on the United States of America

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1. Objective of the report

The aim of this "preparatory briefing" is to provide up to date information on the cluster landscape in the United States of America (USA) in order to support European cluster organisations and their small and medium enterprises (SME) to familiarise themselves with the country and explore its potential for collaboration and market opportunities. More specifically, this briefing paper provides an overview of the country's economy and sectoral trends/strengths where clusters contribute. In addition, it aims at giving an idea of the existing cluster community, the cluster policies/local support to clusters and the cluster programmes - including their historical development and internationalisation activity when relevant.

A complementary report, "discussion paper", is also available and provides an overview on the existing EU-USA cluster cooperation, presents related good practices/success stories and opportunities for future exchange, including recommendations for an EU-USA cluster policy dialogue (non-public information).

2. USA Economy: focus on sectoral trends

2.1. Overview

The USA is a stable and democratic country and one of the world's largest economies with a Gross Domestic Product (GDP) per capita of $59,535[1] for 2017. Being one of the most influential nations, the USA holds membership in several relevant international organisations such as the International Monetary Fund (IMF), the World Bank (WB) and the United Nations (UN).

The country has a predictable business environment strengthened by a stable political context. The USA's Political Risk Index (PRI) scored an 85 in 2017[2], which places the USA among the first 30 countries with the lowest regional political risk in the world.

The diplomatic relationship between the European Union (EU) and the USA, which can be traced to 1953, was formalised with the Transatlantic Declaration in 1990 and the New Transatlantic Agenda (NTA) in 1995. It was further strengthened during the following years through new treaties and initiatives that boosted the transatlantic cooperation. The areas for joint action between the EU and USA include the commitment to promote development, to address global challenges and to contribute to the liberalisation and expansion of world trade.

As a consequence of these efforts, the EU-USA bilateral trade relationship is the most integrated economic relationship in the world.[3] The Transatlantic Trade and Investment Partnership (TTIP), a proposed trade and investment agreement between the EU and the USA, would largely promote cooperation between both regions. Basically the negotiations have been halted by the USA Administration in 2018 and might resume in its substance. In fact, the future seems uncertain in this regard. The 15th Round Transatlantic Trade and Investment Partnership

[1] https://data.oecd.org/united-states.htm
[2] https://www.marsh.com/content/marsh/political-risk-map-d3/prm-2018.html
[3] http://ec.europa.eu/trade/policy/countries-and-regions/countries/united-states/

Negotiations took place in October 2016 and since then no further negotiations have been conducted. This agreement could provide significant benefits for USA and EU companies and workers through eliminating existing trade barriers and better enabling the companies and workers to compete. This would represent a leading opportunity to strengthen the ties between the EU and USA. According to the European Commission, Directorate General for Trade, over the 2013 – 2014 period the USA was the most active country in the world to embrace procurement-related trade restrictions, especially at state level. The current monitoring period has revealed a growing trend in the country's states imposing their own domestic content requirements, among which stand the "Buy American" type amendments.

2.2. Opportunities for Europe – investment, trade and Science, Technology & Innovation cooperation

The relationship between the EU and the USA defines the shape of the global economy as a whole: either the EU or the USA are the largest trade and investment partners for almost all other regions and countries of the world. The EU-USA economic relationship accounts for a large percentage of the world's trade in goods and services. Moreover, the EU and the USA also provide each other with their most important sources of foreign direct investment (FDI)[4]. In fact, the EU and the USA economies together account for one third of the entire world GDP.

After 2008, the USA economy has been registering steady economic growth rates. In 2017, the USA economy grew at a rate of 4.5% and is expected to reach a growth rate of 5.4% in 2018[5]. Due to its large population and stable political situation, the USA is one of the most competitive markets in the world. Besides that, the country has an open economy and is one of the countries with the fewest political and security risks for businesses and their workers.

In regards to FDI, in 2017 the USA invested about $3.2 trillion[6] in the EU; while the EU FDI in the USA amounted to approximately $2.7 trillion[7]. From 2000 to 2017, the USA FDI in the EU consistently increased, which illustrates the importance of the EU-USA economic relations[8]. At the same time, the USA is one of the world's leading destinations of FDI mostly because the barriers put on foreign investment are low.

The EU and the USA are each other's largest trading partners. The EU-USA merchandise trade totalled roughly $739 billion during 2017, almost doubling the level at the start of the new century[9]. In 2017, the USA was a leading trading partner with the EU, accounting for 17% of the

[4] http://ec.europa.eu/eurostat/statistics-explained/index.php/Archive:USA-EU_-_international_trade_and_investment_statistics
[5] http://www.multpl.com/us-gdp-growth-rate/table/by-year
[6] https://www.statista.com/statistics/547108/us-fdi-in-eu/
[7] https://www.statista.com/statistics/188884/foreign-direct-investment-from-europe-in-the-us-since-1990/
[8] https://www.statista.com/statistics/547108/us-fdi-in-eu/
[9] European Union, USA; EU Merchandise trade with USA, page 2; http://trade.ec.europa.eu/doclib/docs/2006/september/tradoc_111704.pdf

total trade[10]. In the same year, the USA was the EU's largest partner for exports (20% of total extra-EU exports) and the second largest for EU imports (14% of total extra-EU imports)[11].

In terms of technology, the USA is believed to be the most powerful country in the world. The American firms are at or near the forefront in technological advances, especially in computers, pharmaceuticals, medical, aerospace, and military equipment[12]. In 2018, the country's total spending on research and development (R&D) is expected to reach around $580 billion, which represents about 2.8% of its GDP, and more importantly, will account for over a quarter of the global R&D investment[13]. This has been encouraging the EU to cooperate with the USA in several initiatives in research, development and innovation (RDI) through cooperation agreements.

Concerning RDI, the cooperation between the EU and the USA is governed by the "Agreement for Scientific and Technological Cooperation", which was signed in 1998 and renewed since then (now valid until October 2018). The priority areas for EU-USA cooperation in science, technology and innovation (STI) are: health, marine and arctic sciences, nanotechnologies, advanced materials and processes (NMP), and transport. Following the EU–US Summit in 2014, the EU and USA underlined the commitment "to expand cooperation in research, innovation and new emerging technologies, and protection of intellectual property rights as strong drivers for increased trade and future economic growth". They specifically referred to space cooperation, climate change and energy[14]. Furthermore, the future EU-USA STI cooperation priorities should be in line with those mentioned above. Thus, health, automated driving, clean energy, fusion energy, nanosafety, and synthetic biology are expected to be important cooperation fields in the near future[15].

The Horizon 2020 has been an important tool to promote EU-USA STI cooperation. The European Network of Research and Innovation Centres and Hubs USA (ENRICH in the USA)[16], a Horizon 2020 funded project, aims to be a central contact point for European research and innovation actors seeking to grow and reinforce collaboration across the Atlantic. This can serve EU clusters and especially COSME cluster projects. In addition, the Bilateral Coordination project for the Enhancement and Development of S&T Partnerships between the EU and USA (BILAT USA 4.0)[17], funded by Horizon 2020 programme, supports the cooperation and policy dialogue in this field[18], as well as other sectoral projects such as PICASSO[19] (also funded by Horizon 2020) in the ICT sector. There are also many other EU – USA agreements in place (e.g. the EU – US Task Force on Biotechnology research[20]), which offer a very well constituted framework to establish further collaboration and, therefore, enhance the attractiveness of the country for business. In October 2016, the European Commission and the US Department of Commerce (DoC) signed the

[10] European Union, Trade in goods with USA; key figures, page 2; http://trade.ec.europa.eu/doclib/docs/2006/september/tradoc_113465.pdf
[11] http://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20180419-1?inheritRedirect=true
[12] https://www.cia.gov/library/publications/resources/the-world-factbook/geos/us.html
[13] http://digital.rdmag.com/researchanddevelopment/2018_global_r_d_funding_forecast?pg=4#pg4
[14] http://ec.europa.eu/research/iscp/index.cfm?amp;pg=usa#policydialogue
[15] https://ec.europa.eu/research/iscp/pdf/policy/us%20clean_roadmap_2017.pdf
[16] https://usa.enrichcentres.eu/
[17] http://www.euussciencetechnology.eu/
[18] http://www.euussciencetechnology.eu/about/project
[19] http://www.picasso-project.eu/
[20] https://ec.europa.eu/research/biotechnology/eu-us-task-force/index_en.cfm

Implementing Arrangement, which facilitates collaboration under Horizon 2020[21]. Moreover, since February 2017 a new and simplified partner category has been introduced into the Horizon 2020 Model Grant Agreement, namely "International Partners", which expands the "third party" type participation for legal entities established in a non-associated third country not eligible for funding[22].

2.3. Sectoral strengths

As stated previously, the USA is the world's most technological advanced country and has one of the largest economies in the world. As a result, the country enjoys a forefront position in many key sectors whose potential for development has overshadowed those more traditional. As a matter of fact, even though the agricultural and manufacturing sectors remain strong and have the greatest contribution to the country's GDP, there are other fields in the service sector that have a prospective growth, which makes them attractive for foreign investment.

Although there are a variety of sectors that present market opportunities for the EU, some of them offer more potential gains due to their current expansion, status of innovation, attention from consumers, and relevant agreements between the EU and USA. Based on these criteria, and considering their position of leading advanced industries in the USA, **the agro food, energy, aerospace, biotechnology, information and communication technology (ICT), and water industrial sectors** are considered strategic sectors for the EU regarding the USA[23] .

Agro food sector

The USA is one of the world's leading agro food producers and suppliers due to its natural resources, and ability to produce high yields per acre through technology and good land conditions. This sector includes the production of agricultural commodities, purchase of agricultural products, and supply goods and services to farms[24].

In 2015, the agro food sector accounted for nearly a trillion dollars of the USA economy, representing around 5.5% of the country's GDP. Agro food and agro food related industries generated $992 billion to the USA's GDP in 2015. The output from farms accounted for $136.7 billion, which represented around 1% of the GDP[25]. Moreover, retail grocery businesses directly generated $2.82 trillion in economic activity in 2017[26].

In 2017, the USA agro food sector employed 22.8 million and generated approximately $763.1 billion in wages. Moreover, the direct employment of the agro food sector is equivalent to about 14.9% of the total employment in the USA[27].

[21] http://ec.europa.eu/research/iscp/index.cfm?pg=usa
[22] https://ec.europa.eu/research/iscp/pdf/policy/us%20clean_roadmap_2017.pdf
[23] www2.deloitte.com/content/dam/Deloitte/us/Documents/manufacturing/us-indprod-deloitte-and-council-on-competitiveness-advanced-tech-report.pdf
[24] https://investmentbank.com/agtech-trends/
[25] www.agweb.com/article/food--ag-industry-contributes-992-billion-to-us-economy-naa-ben-potter/
[26] www.feedingtheeconomy.com/assets/res/methodology.pdf
[27] www.feedingtheeconomy.com/assets/res/methodology.pdf

In 2016, there were 2,060,000 farms across the USA[28] and the total cropland area was around 253.1 million acres, and is foreseen to reach 253.7 million acres by the end of 2018[29]. In 2017, the largest 10 sources of income from the sale of farm commodities were cattle and calves, corn, soybeans, dairy products/milk, broilers, miscellaneous crops, hogs, wheat, chicken eggs, and hay. In addition, the top 10 agricultural producing states in terms of income were California, Iowa, Texas, Nebraska, Minnesota, Illinois, Kansas, North Carolina, Wisconsin, and Indiana[30].

In 2016, the USA agro food sector had a trade surplus, with the value of exports exceeding imports. In the same year, the value of agricultural exports reached $129.7 billion compared to $113.1 billion of agricultural imports, which led to a trade surplus of $16.6 billion. However, in recent years the trade surplus has generally declined since the value of imports continues to rise while the value of exports decreases due to the lower commodity prices and higher volatility[31].

In recent years, the USA agro food sector has been turning into a high-tech industry deeply grounded on machinery innovation, start-up creation and venture capital (VC) investments. Thus, the climate change challenges, the percentage of land available to grow crops and the need to increase the volume of food production have opened the USA agro food sector to innovation, which has been leading to new business opportunities[32].

In the USA, the number of agro tech start-ups has been increasing over recent years. In 2015, the total investment in agro tech accounted for $3.2 billion, which proves the importance of this sector to the USA VC investors[33]. In addition, agro tech mini-clusters and new fund investors are emerging in states such as Iowa, Missouri and Tennessee[34].

The USA agro tech start-ups are focused on a wide range of sub-sectors including beef, dairy, row crop, permanent crop, aquaculture, forestry, and fisheries. Moreover, the creation of an agro tech innovation ecosystem has contributed to the development of new technologies that include smart farming, precision farming, farming systems and machinery, vertical farming and crop efficiency. These technologies are deeply connected to advances in ICT technologies such as big data and internet of things[35].

In summary, the USA's great potential for innovation in agro food and agro tech may lead to important cooperation opportunities with the EU. In fact, in the last two years similar to the mini-clusters of the USA, many agro tech accelerators and start-ups emerged in Europe, which indicates the importance of this sector to the EU.

Energy sector

The USA is one of the world's largest energy consumers. In 2017, the USA total primary energy consumption was equal to approximately 97.7 quadrillion British thermal units (Btu), which

[28] www.statista.com/statistics/196103/number-of-farms-in-the-us-since-2000/
[29] www.statista.com/statistics/201762/projection-for-total-us-cropland-area-from-2010/
[30] www.ers.usda.gov/faqs/
[31] www.ers.usda.gov/faqs/
[32] www.forbes.com/sites/maggiemcgrath/2017/06/28/the-25-most-innovative-ag-tech-startups/
[33] https://investmentbank.com/agtech-trends/
[34] https://techcrunch.com/2018/03/08/major-trends-in-agtech-for-2018/?guccounter=1
[35] https://investmentbank.com/agtech-trends/

represents about 15% of the world's energy consumption[36, 37,38]. The USA is also a leader in the production and supply of energy. The USA's energy companies produce oil, natural gas, coal, renewable fuels, as well as electricity from clean energy sources such as wind, solar, and nuclear power. These companies further transmit, distribute, and store energy through complex infrastructure networks that are supported by emerging products and services such as smart grid technologies. As a result, the USA is one of the world's most attractive markets with total investment in the energy sector equal to $276 billion in 2016[39].

In 2016, about 29% of global warming emissions in the USA came from the electricity sector, mainly from fossil fuels like coal and natural gas[40]. Thus, the USA Government has been highly focused on promoting the consumption and production of alternative energy sources in order to reduce the dependence on fossil fuels. In this context, the USA energy sector offers several opportunities in the Renewable Energy, Renewable Fuels, Nuclear Energy, and Smart Grid and Battery Storage industrial sub-sectors[41].

The USA is home to a prosperous renewable energy industry, with globally competitive firms in all technology subsectors, including the wind, solar, geothermal, hydropower, biomass, and biofuels sectors. In 2017, the total renewable energy production and consumption reached about 11 quadrillion Btu, which represents 18% of the total energy consumption in the USA[42]. In 2017, the USA had the second highest investment in the world, with nearly 21 GW of new renewable energy capacity. Moreover, in May 2018, Ernst & Young ranked the USA as the second most attractive country for renewable energy investment[43].

In the USA, the pellet and ethanol industries are also increasing their capacity, particularly to serve overseas markets, due to the country's access to abundant natural resources. The USA ethanol industry is the largest and most efficient in the world, comprised of technological innovations to produce nearly 15 billion gallons of ethanol per year. In 2017, the ethanol industry exported about 1.4 billion gallons of ethanol, which is in line with the USA's strategy to export to new markets. Investment opportunities also exist for the development of advanced biofuels utilising new technologies and feedstocks, particularly in the aviation sector. In 2017, over 5 million metric tons were exported and new pellet mills have been brought online to meet the growing demand[44].

The USA is the world's largest producer of nuclear power, accounting for about 30% of the world's nuclear generation of electricity. The country has 99 nuclear reactors, located in 31 states, which produced 805 billion kWh in 2017, nearly 20% of the USA's total electrical output[45]. By 2021, four new nuclear reactors are expected to come online, and license applications exist for 20 additional new reactors. Subsectors of the civil nuclear industry are represented by

[36] https://www.eia.gov/energyexplained/?page=us_energy_home
[37] https://www.eia.gov/outlooks/ieo/pdf/0484(2017).pdf
[38] http://www.energyjustice.net/solutions/factsheet
[39] https://www.selectusa.gov/energy-industry-united-states
[40] https://www.ucsusa.org/clean-energy/renewable-energy/public-benefits-of-renewable-power#.WnNC3ahl8dU
[41] https://www.selectusa.gov/energy-industry-united-states
[42] https://www.eia.gov/energyexplained/?page=us_energy_home
[43] https://www.selectusa.gov/energy-industry-united-states
[44] https://www.selectusa.gov/energy-industry-united-states
[45] http://www.world-nuclear.org/information-library/country-profiles/countries-t-z/usa-nuclear-power.aspx

companies that produce nuclear components, nuclear fuel, nuclear engineering and construction, and nuclear advisory services. During the next decade, the nuclear power industry is expected to generate more than $100 billion in exports, which will create numerous new job opportunities in the USA[46].

Furthermore, the USA is an international leader in the development and deployment of smart grid technologies and services. The smart grid subsector is defined by the electric grid equipment and services required for the modernisation of distribution and transmission systems, as well as the ICTs that support a fully networked grid and enable two-way communications and electric flows. This sector is gaining a renewed focus on investment. Reasons for increased investment include reliability enhancement, connecting to renewables, demand shifts, cost increases, and market reforms that create more options for independent generators and as such require new connections to transmission systems. This includes a strong interest from USA utilities to address the potential effects of distributed energy resources. Since 2009, investment in the modernisation of America's electricity infrastructure has increased dramatically, in large part due to the nearly $8 billion in 99 public-private Smart Grid Investment Grant (SGIG) projects involving more than 200 electric utilities. These projects have helped push the deployment of smart meters to more than 40% of the country's 144 million electricity consumers. In addition to public-private programmes like the SGIG, investor-owned utility investment in grid modernisation continues to rise. In 2017, the USA had a leading position in the deployment of advanced technologies, with an investment total of $14.4 billion[47].

In summary, the high and growing demand for energy in the USA combined with a competitive workforce and supply chain capable of building, installing, and servicing all energy technologies makes the country one of the world's most attractive markets for EU businesses in the energy sector. Moreover, the growing demand for clean and sustainable energies offers an opportunity for EU businesses providing alternative and sustainable ways to produce, store and service energy.

Aerospace sector

In 2017, the USA aerospace industry accounted for approximately $143 billion in export sales. The aerospace industry had a positive trade balance of around $85 billion, accounting for the largest trade surplus of any manufacturing industry in the USA in 2017. In addition, in 2017, the inward stock of FDI into the USA aerospace manufacturing industry totalled approximately $21 billion[48]. The country leads both segments of the sector - commercial and defence. The USA profits from being the largest market in the world, having extensive distribution systems, a skilled workforce and strong support at local and national level for policy and promotion. The aerospace industry in the USA is mature and competitive enough to host highly innovative companies from the EU[49].

[46] https://www.selectusa.gov/energy-industry-united-states
[47] https://www.selectusa.gov/energy-industry-united-states
[48] https://www.selectusa.gov/aerospace-industry-united-states
[49] Pastor Cornejo, M. (2015) « El mercado Aeronáutico en EE.UU » ICEX - Oficina Económica y Comercial de la Embajada de España en Los Ángeles

In 2018, the global aerospace industry revenues are forecasted to grow 4.1%, which will represent almost double the revenues from 2017. This growth is expected to occur due to the global economic recovery and the increasing passenger travel demand[50]. In terms of exports revenues, the USA aerospace industry is the most important in the world, accounting for about 40% of the exported aerospace products worldwide in 2017[51]. In the same year, commercial aircraft, general aircraft and civil space systems were the subsectors that most contributed to the USA's exports revenues[52].In 2017, Washington, California and Kentucky were the top three states for Aerospace & Defence (A&D) exports for the same period. However, it is important to highlight that the states of Connecticut, Texas and Georgia also have a high volume of A&D exports[53]. Furthermore, China, United Kingdom (UK) and France were the top destinations for USA A&D exports in 2017[54].

The most promising subsectors in the industry are Unmanned Aircraft Systems (UAS or drones) and the Airport Infrastructure & Aviation Security. Given the rapid growth of military and civil governmental UAS operations, there is tremendous potential in the sector. In the case of the first sub-sector, the USA Government has shown its commitment through initiatives like the creation of the Federal Aviation Administration (FAA) Center of Excellence for UAS and the partnership with industry through the Focus Area Pathfinder initiative. Moreover, the FAA has established Bilateral Aviation Safety Agreements (BASAs) that promote bilateral cooperation in various aviation areas, including maintenance, flight operations, and environmental certification[55]. With respect to the second subsector, Airport Infrastructure & Aviation Security, markets continue to grow both in the USA and abroad. As air traffic management moves to greater reliance on data communications, the focus on aviation security has shifted from countermeasures to physical threats to contain and mitigate cybersecurity threats. The growing presence of UAS has helped to increase the importance of cybersecurity measures, given the dangers of loss of control and pirated data[56, 57].

A&D is one of the EU's key high-tech sectors on the global market. In 2017, the EU A&D revenues amounted to approximately $257 billion, confirming the EU's position in the global market[58]. In fact, the European A&D sector, led by France and the UK, is closing the gap with the USA in terms of revenue growth, likely due to increased market competitiveness, increased defence spending and continued growth in commercial aircraft production. This could allow the EU to access markets abroad and, more specifically, to take advantage of the good conditions of the USA Aerospace sector. As seen in other sectors, the USA and the EU signed in 2011 a Memorandum of Cooperation (MoC) on civil aviation research and development, which covers the Single European Sky ATM Research Programme (SESAR) and Next Generation Air Transportation System (NextGen) cooperation for global interoperability. This joint collaboration aims at

[50] https://www2.deloitte.com/global/en/pages/manufacturing/articles/global-a-and-d-outlook.html
[51] http://www.worldstopexports.com/aerospace-exports-by-country/
[52] https://www.defensenews.com/industry/2018/07/11/which-us-aerospace-and-defense-sectors-excelled-in-2017/
[53] https://www.aia-aerospace.org/wp-content/uploads/2016/09/AIA-Exports-by-State-2017.pdf
[54] https://www.aia-aerospace.org/wp-content/uploads/2017/06/2017_AnnualReport_FF_Final_Web.pdf
[55] https://www.faa.gov/aircraft/air_cert/international/bilateral_agreements/overview/
[56] https://www.selectusa.gov/aerospace-industry-united-states
[57] https://www.selectusa.gov/aerospace-industry-united-states
[58] https://www.asd-europe.org/facts-figures

harmonising the modernisation and advances in air navigation systems worldwide to support cooperation, clear communication, seamless operations and optimal safe practices. The MoC is focused on five main areas: transversal activities; information management; trajectory management; communication, navigation, and surveillance (CNS) and airborne interoperability; and collaboration projects[59]. In addition, the FAA and SESAR Joint Undertaking (SJU)[60] initiated a collaboration focused on the areas of cybersecurity and remotely piloted aircraft systems (RPAS)[61].

Defence technologies such as UAS or drones can have both military and civil uses. The importance of defence dual-use technologies has led the EU to develop dual-use defence programmes, which may represent an opportunity to foster the defence sector. Currently, there are many examples of dual-use products designed for both military and civilian purposes, ranging from equipment to protect against nuclear, chemical and biological hazards used by military personnel, police forces and fire fighters, to electronic boards and computers developed for armoured vehicles, public transport and industrial applications. This approach can be applied to almost every defence industry product, which may lead to important EU-USA cooperation opportunities[62].

In the USA and in the EU, some of the leading aerospace companies have been decreasing their annual investments in R&D. In fact, A&D companies are among the lowest R&D spenders, which have created a market opportunity for technologically intensive companies. In this context, technologically intensive companies have been entering the market in order to bring innovation to the sector. Thus, the commercial technology entrants have large workforces focused on developing new technologies and implementing innovative methodologies.

Considering the importance of the commercial technology entrants, large companies, such as Boeing and Airbus, have already shown their interest in high-tech firms working in areas that include cybersecurity, integrated circuits, drones, small electric airplanes, and augmented reality. Therefore, this represents an important opportunity to EU and USA companies focused on developing technologies related to A&D[63].

Regarding earth observations, NASA's Earth Observing System (EOS) includes a set of polar-orbiting and low inclination satellites for long-term global observations of the land surface, biosphere, solid earth, atmosphere, and oceans. Thus, EOS enables an improved understanding of the Earth as an integrated system[64]. The EOS also aims to provide information and resources for the Earth science research community and the general public, which may represent an opportunity for EU-USA cooperation. In fact, the EU is investing in earth observations satellites, which may also create opportunities for clusters related to the earth observations satellites market.

[59] https://publications.europa.eu/en/publication-detail/-/publication/29cc1d3f-9019-4395-a051-f95ef9dfc9cb/language-en
[60] https://www.sesarju.eu/
[61] http://www.sesarju.eu/sites/default/files/documents/reports/State-of-Harmonisation.pdf
[62] www.friendsofeurope.org/security-europe/dual-use-technologies-defence-industry-interests-merge
[63] https://www.strategyand.pwc.com/trend/2018-defense
[64] https://eospso.nasa.gov/content/nasas-earth-observing-system-project-science-office

In summary, travel demand, new technologies and security threats are fuelling increases in aircraft production, defence budgets and the global supply chain. The prospective growth of the aerospace industry is very positive and the available budget for R&D seems to be increasing each year, which will help to develop new fields with huge potential. This includes space, which is a priority both for the EU[65] and the USA[66].

In terms of legislation, the policy environment is favourable too. Thus, there are already many joint initiatives between the EU and the USA in the aerospace sector (more information is provided in the document "Discussion paper on the United States of America" from the ECCP).

Biotechnology sector

The biotechnology sector comprises a wide range of fields such as pharmacy, food, agriculture, environment, medicine and energy. Being all of them very profitable, biotechnology as a whole offers a safe place for investment in the USA. The country emerged as a leader in biotechnology in the 1970's due to the synergies among universities, financing, health policies, regulation of the intellectual property and the free market economy.

In 2016, the USA biotechnology sector totalled $139.4 billion in revenues, which represented a 7% increase when compared to 2015. The biotechnology industry employed 203,210 in 708 public companies, which also represented an increase compared with previous years[67]. Moreover, in 2015, the USA was responsible for 70% of the global research and innovation done in biotechnology and 86% of the financing raised[68]. These figures place the USA very far ahead of its closest competitors. In fact, the country represents triple the volume of the European industry, led by France, United Kingdom and Germany.

Around 70% of the biotechnology companies are located in 10 states, with North Carolina, Massachusetts and California being the most prominent. California is the most powerful among them, representing 50% of the industry in the country. Companies in California are concentrated around the San Francisco (Bay Area), San Diego and Los Angeles clusters.

The trend in the biotechnology sector is promising with benefits growing each year, particularly in health, which represents 68% of the gains in the sector. In fact, the USA biotechnology sector revenue is estimated to have grown on average >10% per year over the past decade[69] and its revenues in 2015 amounted to $133 billion[70]. The budget planned by the government for 2017 offers a strong support for biomedical R&D[71].

It is also worth mentioning, 52% of the capital raised in 2015 in the biotechnology sector was captured by SMEs (IBIS world). As a result of the booming stock market, historic amounts of

[65] https://ec.europa.eu/programmes/horizon2020/en/h2020-section/space
[66] https://www.nsf.gov/statistics/2018/nsf18308/pdf/nsf18308.pdf
[67] https://www.ey.com/Publication/vwLUAssets/ey-beyond-borders-biotech-report-2017/$FILE/ey-beyond-borders-biotech-report-2017.pdf
[68] http://www.biocat.cat/sites/default/files/estudio_de_mercado_de_biotecnologia_en_eeuu_2016.pdf
[69] http://www.nature.com/nbt/journal/v34/n3/full/nbt.3491.html
[70] https://www.statista.com/topics/1634/biotechnology-industry/
[71] https://fas.org/sgp/crs/misc/R45150.pdf

innovation capital are available to the smaller players in the industry, which remain the wellspring of future breakthroughs[72].

Information and Communication Technologies (ICT) sector

The ICT is an umbrella term that comprises computers, chips, software, networking, telecommunications, programming and information systems technologies, and the Internet. In 2017, the global ICT industry surpassed $4.5 trillion and is forecasted to reach $4.8 trillion in 2018. The USA market represents about 31% of the worldwide total, which made it the largest ICT market globally in 2017[73]. The USA's leading position can be justified by its stable economic growth, robust private consumption, wage increase, and lower energy prices[74].

With a vibrant culture of technological innovation and entrepreneurial activity, the USA technology sector is home to many leading and innovative hardware, software and tech service providers such as Google, Apple, Microsoft, Cisco, Hewlett-Packard, Dell, Oracle and Symantec. As a matter of fact, the country is the world leader in start-up hubs with Silicon Valley, New York City, Los Angeles, Boston, Chicago and Seattle consistently ranked as the world's top 10 start-up ecosystems.

These technological hubs enjoy great resources including top universities, leading tech companies, innovative multinational companies and active venture capital firms. This favours a competitive and dynamic market, where small and new companies often outrun the bigger players offering a better service, more innovative products, lower prices, and the ability to respond flexibly to changing customer habits and preferences[75].

Besides the American private industry, which finances roughly 60% of the total R&D[76] investment, the US Government supports the ICT sector not only through funding but by creating a policy environment that fosters technological innovation[77]. The USA invests 2.7% of its GDP in R&D[78], a higher percentage than the 2% invested by the EU for the same period (2017)[79], and puts great effort in implementing initiatives devoted to enhance the impact of ICT. Moreover, to enhance the USA's competitive advantage in ICT, the Trump Administration has prioritized funding in the FY2019 budget request for fundamental AI research and computing infrastructure, machine learning, and autonomous systems[80].

The potential of the USA ICT sector is unquestionable and the market conditions are optimal for European companies to benefit from conducting business in the country. This can be applied in general terms but more particularly to blockchain, IoT, Big Data, machine learning, and Artificial Intelligence (AI), which are considered the main drivers of the sector's growth. Smart speakers/home devices, virtual reality (VR), drones, and wearables are also expected to

[72] http://www.ey.com/Publication/vwLUAssets/EY-beyond-borders-2015/$FILE/EY-beyond-borders-2015.pdf
[73] https://www.comptia.org/resources/it-industry-trends-analysis
[74] https://atradius.nl/rapport/market-monitor-ict-usa-2018.html
[75] http://www.strategyand.pwc.com/perspectives/2016-technology-industry-trends
[76] http://www.oecd.org/centrodemexico/estadisticas/
[77] https://www.whitehouse.gov/administration/eop/ostp/divisions/technology
[78] http://uis.unesco.org/apps/visualisations/research-and-development-spending/
[79] https://ec.europa.eu/eurostat/statistics-explained/index.php/Europe_2020_indicators_-_R%26D_and_innovation
[80] https://www.selectusa.gov/software-and-information-technology-services-industry-united-states

experience a high volume of sales in 2018. Conversely, the smartphone segment is expected to slow down due to the increase of the prices for key components[81].

Furthermore, the smart city technologies are leading fields in the USA. The smart city technologies are grounded in IoT, which allows 'things' to connect and exchange data. In the USA, smart city technologies are expected to make city planning and design more efficient and make citizens' lives easier. Thus, 66% of the USA cities are investing in smart city technologies, such as smart meters and intelligent traffic signals[82]. The USA city governments are investing approximately $41 trillion over a 20-year period to upgrade the city's infrastructure and benefit from smart city technologies, which indicates their importance for the country[83].

The EU and the USA enjoy a privileged position in the ICT sector. The EU and the USA have jointly developed a set of trade related principles for the ICT services sector in the EU-USA Trade Principles for ICT Services. This initiative tackles areas such as the protection of intellectual property or the protection of privacy and of the confidentiality of personal and commercial data. It includes references to the local infrastructure or the foreign ownership, stating the need to ensure the equality for foreign and national suppliers of ICT services[84]. In the research and innovation domain, the project PICASSO aimed at reinforcing EU-USA ICT collaboration in pre-competitive research in key enabling technologies related to societal challenges of common interest (e.g. 5G Networks, Big Data, IoT and Cyber Physical Systems).

Finally, the continued advancements towards a more harmonized transatlantic market would also have a positive effect on market growth. In addition, the EC's annual ICT policy dialogue with the US Department of State represents an opportunity to strengthen the cooperation in the ICT sector[85].

Water sector

The water industry in the USA is growing rapidly, offering opportunities in different related sectors such as equipment, oil and gas. The water technology market is starting to be more convergent, meaning that communication between the different actors is increasing. Specific questions or problems are addressed through efforts of actors working together in the network, for example participating in public-private partnerships. The increasing collaboration and communication between the different actors in the USA water sector related to technologies has led to the development of an important technology-economic network[86,87,88,89].

In 2015, the USA water withdrawals totalled 321,672 million gallons per day. Thermoelectric power, irrigation and public supply are the main sources of freshwater withdrawals in the USA. Managing water is a growing concern in the communities across the country, which are starting

[81] https://atradius.nl/rapport/market-monitor-ict-usa-2018.html
[82] www.information-age.com/smart-city-technology-123473905/
[83] www.americancityandcounty.com/2018/06/05/enhancing-urban-growth-with-smart-city-technology/
[84] http://trade.ec.europa.eu/doclib/docs/2011/april/tradoc_147780.pdf
[85] https://ec.europa.eu/digital-single-market/en/americas
[86] http://www.weisermazars.com/uploads/src/uploads/2017%20U.S.%20Water%20Industry%20Outlook.pdf
[87] http://bv.com/docs/reports-studies/sdr-water-industry.pdf
[88] http://www.ey.com/Publication/vwLUAssets/Cleantech_Water_Whitepaper/%24FILE/Cleantech-Water-Whitepaper.pdf
[89] https://www.rvo.nl/sites/default/files/2013/10/The%20water%20technology%20sector%20in%20the%20US.pdf

to face challenges regarding water supply, water treatment and delivery systems[90]. Therefore, in recent years, water technology has been playing a key role in the USA's water sector.

The Environmental Protection Agency (EPA) Office of Water launched the Water Technology Innovation Blueprint, which identifies the USA's main market opportunities for technology and institutional innovation. This strategy provides examples of emerging innovation pioneers, identifies tools for assessing water risk, and frames a more robust set of actions that the EPA will take to promote technology innovation for clean and safe water[91]. According to this strategy, there are ten specific market opportunities related to water technology in the USA: (i) conserving and recovering energy; (ii) recovering nutrients; (iii) improving and greening of the water infrastructure; (iv) conserving and eventually reusing water; (v) reducing costs and improving techniques for water monitoring; (vi) improving performance of small drinking water systems; (vii) reducing water impacts from energy production; (viii) improving resiliency of water infrastructure to the impacts of climate change; (ix) improving access to safe drinking water and sanitation; and (x) improving water quality of oceans, estuaries, and watersheds.

In summary, the aging water infrastructures and consequent need for rehabilitation offer a promising opportunity for European businesses in the water sector. Because of concerns over sustainability and water safety, opportunities particularly exist for European businesses that provide alternative water supply strategies and advanced purification technologies.

3. Cluster community in USA

In the USA, the cluster community has been a catalyst for economic growth for over a century. The USA clusters for industrial sectors as well as for the entertainment industry emerged at the beginning of the twentieth century. Hollywood, for example, started in the city of Los Angeles in the early 1900s[92] and the largest USA automotive cluster in the region of Detroit in the 1910s[93]. The high technology-oriented clusters have however emerged in the USA much later. Silicon Valley, for example, arose in the 1970s after the establishment of the Homebrew Computer Club, an informal club constituted of electronic engineers and technically minded hobbyists who had frequent meetings to trade parts and circuits as well as to share information regarding the construction of computing devices[94].

According to the Cluster Mapping Project[95] developed by Harvard Business School and the US Economic Development Association (EDA), there are:

- **US traded clusters** (national and international) in 51 different sectors. Traded clusters are those that concentrate in particular regions that provide competitive advantages but sell products or services across regions and countries. Examples of traded clusters include financial services in New York City, information technology in Silicon Valley, and

[90] https://owi.usgs.gov/vizlab/water-use-15/#view=USA&category=total
[91] https://www.epa.gov/sites/production/files/2014-04/documents/clean_water_blueprint_final.pdf
[92] http://www.u-s-history.com/pages/h3871.html
[93] https://www.gilderlehrman.org/history-by-era/politics-reform/essays/motor-city-story-detroit
[94] http://www.atariarchives.org/deli/homebrew_and_how_the_apple.php
[95] http://www.clustermapping.us/

video production and distribution in Los Angeles. Traded clusters usually represent a mix of companies of various sizes that by definition go international.

- **US local clusters** in 16 different sectors. Local clusters sell products and services primarily for the local market. The local clusters represent a wide range of sectors such as: local entertainment including video rental services and movie theatres; local health services including drug stores and hospitals; and local commercial services including drycleaners.

Despite their importance, the cluster organisations in the USA are not as simply institutionalised as in the EU. In fact, there are numerous clusters that are represented by a formal cluster organisation and tend to be supported by local Economic Development Agencies (EDA's), whereas some others are part of public and/or private organisations (e.g. Federal Agencies, Industry Associations, EDA's etc.) that aim to promote competitiveness and innovation in the sector.

These cluster organisations are mostly composed of businesses or focussed on businesses. Some clusters, such as the Advanced Power Cluster or the Huntsville Defence Cluster, aim at supporting high-technology businesses and connecting them with R&D organisations, such as the National Aeronautics and Space Administration (NASA).

Regarding the establishment of clusters, many traded clusters have been created over the recent years, especially in the business services sector and distribution and electronic commerce sector[96]. On the other hand, some traded clusters have disappeared in recent years, such as in the construction and insurance services sectors.

The USA is starting to take interest in the system of a label or guarantee of quality from national programmes such as the European Secretariat for Cluster Analysis (ESCA) certification. This system is new to the USA since the country does not define cluster organisations similar to the EU. Currently there are two bronze labelled clusters in the USA – the Cumberland Emerging Technologies (biotechnology) and the Research Triangle Cleantech Cluster (energy and environment)[97].

3.1. Cluster Mapping

The US Cluster Mapping Project aggregates all the US clusters providing valuable insights on business environment, demographics and performance of the clusters. The platform can be considered as a formal US cluster connector and can, to a certain extent, be considered as a cluster macro-association.

The US Department of Commerce aims at linking the US Cluster Mapping Project with the Cluster Mapping initiatives in several countries and regions, including: Canada, EU, Mexico and South Korea. Recommendations for cooperation between the US Cluster Mapping project and the ECCP are included in the “Discussion paper on the United States of America” from the ECCP.

[96] *Establishments Time series by Traded Cluster 1998-2013,* U.S. Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School. Data Sources; www.clustermapping.us/cluster#timeline
[97] ESCA, Jan 2017. http://cluster-analysis.org/benchmarked-clusters/?country=6a7389f0dba345fab09a30cd321b3d23

3.2. USA Clusters in Agro Food, Energy, Aerospace, Biotechnology, ICT and Water

The agro food, energy, aerospace, biotechnology, ICT and water sectors represent some of the most promising opportunities for the EU. This section identifies and provides information on key clusters in the aforementioned sectors.

Agro food clusters

Sacramento Food and Agriculture cluster, California

The Sacramento region (California) is home to one of the largest agricultural economies in the world. Thus, the Food and Agriculture cluster is a key part of Sacramento's economy. According to the Sacramento Area Council of Governments (SACOG), the Sacramento cluster is divided into four main subsectors: Food and Agricultural Production, Food and Agricultural Processing, Food and Agricultural Distribution, and Food and Agricultural Support[98].

In 2015, Sacramento's Food and Agriculture cluster created a $3.4 billion annual output[99]. In 2014, cluster subsectors generated more than 31,200 jobs, which represented approximately 3% of the region's total employment. Food production, specifically the crop production industry, was the subsector that generated the largest percentage of jobs, representing 45% of the cluster's employment. The distribution subsector represented 27% of the cluster's employment, processing accounted for 21% and support contributed 7% of the cluster's job opportunities[100].

In 2014, there were approximately 1,800 establishments in the Sacramento Food and Agriculture cluster. The production subsector had the highest number of firms; however, it represented one of the lowest averages of workers per establishment when compared to other subsectors of the cluster. Conversely, the processing subsector had a smaller number of total establishments, but had the highest average number of workers per establishment[101].

Furthermore, the Sacramento cluster is highly related to the development of R&D activities in the agro food sector. Sacramento is home to one of the world's leading universities in the agro food sector, the University of California Davis (UC Davis). UC Davis is focused on conducting world class R&D activities in plant science, food science, veterinary medicine, and engineering. Furthermore, the university promotes entrepreneurship through programs like Venture Catalyst, the UC Davis Food and Agriculture Entrepreneurship Academy and food and agriculture initiatives led by the World Food Center. UC Davis includes a Smart Farm with a 15 acre farming innovation and demonstration center[102].

[98] www.sacog.org/sites/main/files/file-attachments/coe-los_rios_food_and_ag-web.pdf
[99] https://valleyvision.org/projects/next-economy-food-agriculture-industry-cluster/
[100] www.sacog.org/sites/main/files/file-attachments/coe-los_rios_food_and_ag-web.pdf
[101] www.sacog.org/sites/main/files/file-attachments/food_and_agriculture_cluster_report_final.pdf
[102] http://blog.agshowcase.com/2017/01/16/innovation-on-the-farm-building-an-agricultural-technology-ecosystem-around-sacramento/

Sacramento also has a flourishing entrepreneurial ecosystem. Currently, there are over 100 seed and seed-related companies located near to UC Davis. Since 2010, Agriculture and Bio Tech Startups in Sacramento have generated $211 million, which indicates the importance of innovation and technology to Sacramento's Food and Agriculture cluster[103].

Salinas, California

Salinas is recognised by its nutrient-rich soil and suitable farming climate. The region is home to an $8 billion agriculture industry that is highly linked to innovation. Moreover, Salinas is the number one food producer in the USA and is home to major agriculture businesses such as Dole, Driscoll's and Taylor Farms.

Salinas is the world's largest lettuce producer, as well as the number one producer of pinot noir grapes in California. The region produces around 60% of the USA's leafy greens. Furthermore, in the Monterey County around 75,000 job opportunities are supported by agriculture, which means that one out of five jobs in the county is related to this sector[104].

Salinas has a vibrant innovation and entrepreneurial ecosystem. Every year around 5,300 students graduate from the four Post-Secondary Institutions in the Salinas area. The region has over 50 startups in the Western Growers Center for Technology and Innovation and hosted 4 Forbes AgTech Summits. Approximately 5,000 farms are in the THRIVE Network and 22 companies have already graduated from the THRIVE Accelerator[105].

St. Louis agtech cluster, Missouri

Agriculture technology is a key industry in St. Louis, Missouri. In recent years, the St. Louis agtech cluster was created to respond to the specific needs of the region's firms and R&D institutes. The St. Louis agtech cluster is mainly focused on providing capital, facilities, workforce, and networks for innovative firms, combined with efforts to attract foreign investment.

The St. Louis agtech cluster has been mainly supported by its core team, which includes multinational firms such as Monsanto and Bunge, as well as institutions like the Danforth Center, the Missouri Botanical Garden, Washington University and other regional universities such as the University of Missouri in Columbia. Furthermore, core elements of the cluster include a specialised research centre and incubator facilities focused on supporting commercialisation, industry-specific start-up capital and support, networking efforts, as well as developing industry-driven skills.

The agtech cluster is primarily a skills-based cluster with some technological and supply chain elements (manufacturing, regulatory, and financial services, farmers). Thus, it is composed of 700 bioscience firms that generate 15,000 jobs, of which 300 are start-ups.

West Michigan's agricultural and food processing cluster

[103] www.selectsacramento.com/clusters/agritech/
[104] http://agtechsalinasca.com/why-salinas/
[105] http://agtechsalinasca.com/why-salinas/

West Michigan is one of the most diverse and rich areas for agriculture, second only to California. 20% of the region is surrounded by fresh water, which allows large-scale farming and food processing. Thus, West Michigan has approximately 9,000 farms and around 1.1 million acres of harvest crop land.

West Michigan's agribusiness sector produces one-third of Michigan's total agricultural sales, contributing $1.5 billion to the regional economy. In addition, the region provides around 26,000 jobs and generates $579 million in labour income.

The West Michigan agricultural and food processing cluster is home to diverse national and international food brands, including Kellogg's, Gerber, Country Fresh, Mead Johnson Nutrition, and Coles. Dairy production, wood products, agriculture support, greenhouses, nurseries, as well as bakeries and tortilla manufacturing are among the cluster's largest product groups. Moreover, meat processing and grain milling have also been contributing to West Michigan's economy.

The West Michigan agricultural and food processing cluster also has a highly innovative R&D ecosystem. The cluster comprises several agriculture and food related innovation and research organisations, especially in the fields of biological product manufacturing, and medicinal and botanical manufacturing. These organisations include Bayer CropScience Ltd., SPI Pharma, Amway, and Oliver Products[106].

Energy clusters

The Colorado Clean Energy Cluster (CCEC)

The Colorado Clean Energy Cluster (CCEC) is an "enterprise to attract, incubate and grow clean energy enterprises'". CCEC is a project-driven non-profit economic development organisation aimed at growing primary jobs in Colorado in the area of clean energy through formal partnerships between clean energy companies, the public sector and higher education.

As a unique state-wide organisation fostering market transformation for clean energy, the CCEC is focused on innovative and entrepreneurial ways to grow the clean energy sector through actionable projects and initiatives that directly benefit Colorado clean energy companies[107]. The CCEC has a member base of over 32 companies, employing over 3,000 people. In addition, the CCEC partners include Colorado State University, Exponential Engineering Company, Fort Collins Area Chamber of Commerce, Rocky Mountain Institute, Sustainable Power Systems LLC, The City of Boulder, Colorado, among others[108].

Smart Grid Cluster, Illinois

Illinois has a leading position in the USA's energy production. The state is the USA's leader in terms of electricity generation from nuclear power, producing approximately one-eighth of the

[106] www.rightplace.org/industry-sectors/food-processing/agribusiness
[107] http://www.coloradocleanenergy.com/
[108] http://www.coloradocleanenergy.com/about

country's nuclear power generation. Illinois has the only chemical facility in the USA that converts raw uranium yellowcake into uranium hexafluoride. In addition, Illinois is also a leader in biodiesel production capacity and has considerable wind-powered electricity generating capacity[109].

The Smart Grid Cluster supports economic growth for companies focused on promoting the future of energy and the grid. The cluster offers a set of business, technical and financing support services that leverage the Illinois region's corporate and research assets and help promote the energy innovation ecosystem. The Smart Grid Cluster is supported through SBA and is managed by a partnership of Illinois' energy organisations[110].

Active cluster participants include corporations, utilities, research institutions, federal labs, and start-ups. In this context, the cluster service providers include key players, such as the Coalition: Energy, Energy Foundry, EnterpriseWorks, Illinois Science Technology Coalition (ISTC), Illinois Institute of Technology and IMEC. The cluster's partners also include important players, such as ABB[111], Argonne National Laboratory, ComEd, Elevate Energy, Honeywell, Village of Oak Park, among others[112].

The Research Triangle Cleantech Cluster (RTCC)

The Research Triangle Region of North Carolina is a global leader in the cleantech sector. The region is home to hundreds of companies and thousands of employees focused on developing technologies in smart grid, smart transportation, and smart water. Thus, the Research Triangle Cleantech Cluster (RTCC) was created to build upon the region's success and serve as a catalyst for future development.

RTCC is an industry-led, industry-funded programme of the Research Triangle Regional Partnership focused on accelerating the growth of the Research Triangle Region's cleantech economy. RTCC works to ensure the region is recognised globally for its leadership in research, innovation and market growth in the clean technology sector. The cluster creates competitive advantage for both companies and the region by strategically focusing business, government, non-profit and academic partners and resources on a single vision and plan to promote cleantech innovation and company growth[113].

Cleantech San Diego

Cleantech San Diego is a member-based trade organisation that aims to position the greater San Diego region, including Imperial County, as a global leader in the cleantech ecosystem. Thus, Cleantech San Diego is focused on accelerating clean technology innovation and the adoption of sustainable business practices for the benefit of the region's economy and environment.

As a nonprofit organisation, Cleantech San Diego aims to support industry members by promoting collaborations across the private-public-academic landscape, leading advocacy

[109] https://www.eia.gov/state/analysis.php?sid=IL
[110] http://smartgridcluster.com/
[111] http://new.abb.com/
[112] http://smartgridcluster.com/
[113] http://www.researchtriangle.org/clusters/rtcc

efforts to promote cleantech priorities, and encouraging investment in the San Diego region. Currently, the organisation includes around 100 local businesses, universities, governments, and nonprofits, such as UC San Diego, the Metropolitan Water District of Southern California, County of San Diego, San Diego Regional Economic Development Corporation, American Council on Renewable Energy (ACORE), and Avangrid Renewables[114].

Aerospace clusters

Seattle, Washington

The main aerospace cluster in the world is located in Seattle, Washington State, and is the home of recognised companies such as Boeing. The industry employs approximately 136,000 people in 175 firms directly related with aerospace manufactures and more than 1,400 aerospace-related establishments. According to the Washington State Department of Commerce, aerospace accounted for around 60% of Washington's foreign exports in 2017 and generated $69.9 billion[115].

Washington State produces 1,400 aircrafts and UAS annually, representing nearly 90% of all commercial aircraft manufacturing in the USA[116]. As a matter of fact, the state is second only to California in hosting US companies that supply parts to Airbus – Europe's largest aerospace company[117]. These numbers are expected to rise over the coming years as production of aircraft ramps up to meet the increasing demand for travel. In this respect, the Washington Aerospace Industry Strategy aims at growing and diversifying the aerospace cluster, cultivating an aerospace workforce, fostering a culture of aerospace innovation and strengthening Washington's aerospace[118]. Besides commercial airplanes, the aerospace sector in Washington State includes Unmanned Aerial Vehicles/Systems, Maintenance, Repair & Overhaul (MRO), space exploration, military airplanes and rotorcraft, air travel and cargo aviation biofuel [115].

The State of Washington offers aviation and space companies a wide range of incentives, including reduced tax credits for preproduction development expenditures and property/leasehold taxes paid; sales and use tax exemptions for computer hardware and software; and construction of new facilities used to manufacture commercial airplanes, fuselages and wings. The aerospace industry is also supported by innovative public-private partnerships, such as the Center for Excellence for Aerospace & Advanced Manufacturing, the Washington Aerospace Training & Research Center and the Joint Center for Aerospace Technology Innovation[119].

In addition, the cluster has a strong R&D orientation, a favourable business climate and an advanced manufacturing infrastructure that keeps it at the forefront of the aerospace industry. Equally important, the cluster has a skilled workforce with the highest concentration of aerospace engineers in the world, which resulted in the high number of aerospace related patents produced (389 since 1998). The University of Washington (Seattle) has become one of

[114] http://cleantechsandiego.org/
[115] http://www.commerce.wa.gov/growing-the-economy/key-sectors/aerospace/
[116] http://choosewashingtonstate.com/why-washington/our-key-sectors/aerospace/
[117] http://www.edc-seaking.org/catalog/industry-clusters/aerospace-and-defense
[118] http://www.governor.wa.gov/sites/default/files/documents/Industry_Strategy.pdf
[119] http://choosewashingtonstate.com/why-washington/our-key-sectors/aerospace/

the leading public research universities in the USA in regards to new aerospace technologies. The Washington Aerospace & Advanced Materials Manufacturing Workforce Pipeline Committee[120] ensures all the training programmes around the state meet the needs of the industry. This focus on training and education guarantees a constant flow of highly trained specialists in avionics, robotics, logistics, production, interiors and advanced materials[121].

There are four specialised regions: the Puget Sound for efficient product delivery using just-in-time and lean manufacturing processes; the northwest part of the state which includes a manufacturing cluster producing next-generation composites and materials; the southwest of the state which is the centre of UAS manufacturing, avionics, engineering and a supply chain cluster that supports the aerospace industry with metal finishing, plastics and electronics; and the eastern region which offers low-cost, renewable energy, an established and growing cluster of suppliers and pre-permitted industrial sites that are ideally suited to aerospace companies[122].

Efforts to support the sector include the Aerospace Futures Alliance of Washington[123], a state-wide association launched to raise the visibility of the aerospace industry and to support policies conducive to future growth[124]. This alliance supports initiatives such as the Washington Aerospace Partnership[125], a collaboration of business, labour and government working together to ensure Washington State continues to be a thriving global leader in aerospace excellence; and the Joint Centre for Aerospace Technology Innovation (JCATI)[126], a partnership between industry and universities that facilitates the development of new technologies to keep Washington in the forefront of the aerospace industry.

Los Angeles, California

Los Angeles (LA) and the Southern California region (SoCal) are known for distinct comparative advantages in aerospace and related industries. The SoCal's rich, deep and strong ecosystem of large and small companies, research and educational partners, and an active defence sector, makes it one of the world's most competitive regions for aerospace innovation.

SoCal's leading position is reflected by the industry's figures. In 2016, the industry accounted for 90,100 jobs in Southern California, which represented 14% of the USA industry employment[127]. The total value of all products shipped by the aerospace industry in Southern California was $39.9 billion, of which aircraft accounted for almost one third of all output reaching $12.0 billion. In terms of specialisation, Southern California is becoming a powerhouse for guided missiles, space vehicles and parts[128].

The region is also home to numerous educational institutions that offer targeted programmes and training for aerospace-related positions such as University of California Los Angeles and

120 http://www.sbctc.edu/404-file-not-found.aspx?aspxerrorpath=/college/_e-workforce-aerospace-pipeline.aspx
121 http://choosewashingtonstate.com/why-washington/our-key-sectors/aerospace/
122 http://www.governor.wa.gov/sites/default/files/documents/Industry_Strategy.pdf
123 https://www.afa-wa.com/
124 http://www.edc-seaking.org/catalog/industry-clusters/aerospace-and-defense
125 http://washington-aerospace.com/
126 http://www.jcati.org/
127 https://laedc.org/wp-content/uploads/2017/12/LAEDC-Aerospace-OneSheet-Nov2017b.pdf
128 http://laedc.org/wp-content/uploads/2016/02/LAEDC-Aerospace-OneSheet-0229B.pdf

University of California San Diego. The academic offer includes bachelor and graduate degrees in aerospace, mechanic engineering, aviation safety and security programmes, aircraft fabrication and assembly, and aeronautics. This ensures an ongoing pipeline of skilled workers in the sector.

Currently, the LA County has around 50,000 people employed in the A&D industry. The County is one of the leaders in commercial spacecraft, which accounts for one third of sales in the aerospace industry and in the drone industry[129]. Other key market segments include aircraft manufacturing such as aircraft, engines, parts, search detection and navigation instruments, UAS and Cybersecurity.

Furthermore, the LA County is a catalyst for innovation and employs top engineering talent. Thus, LA is home for leading R&D Research Centres, such as: the Jet Propulsion Laboratory in Pasadena, which conducts planetary and space science including robotic missions to Mars; and the NASA Armstrong Flight Research Center in Palmdale, serving as NASA's key centre for atmospheric flight research and operations. The Space and Missile Systems Center, credited with development and operation of GPS and the constellation of GPS satellites that have become essential to many technologies worldwide, is also located in LA County[130].

The LA County is home to several offices or headquarters of leading aerospace companies, such as Northrop Grumman, Boeing, Lockheed, Raytheon SpaceX, Aerojet Rocketdyne, and Virgin Galactic. Therefore, the aerospace industry cluster provides the region with a basis for the advancement of technology and scientific discovery, connecting researchers with world leading companies[131].

Some of the organisations within the aerospace cluster are in the Southern California Aerospace Council[132], the Advanced Manufacturing Partnership for Southern California (AMP SoCal),[133] and the Los Angeles Economic Development Council (LAEDC)[134], which collaborate with organisations in both public and private sectors, across government, academia and industry, to strengthen the region's aerospace and defence manufacturing economy.

Biotechnology clusters

San Francisco Bay Area, California

Led by Silicon Valley and San Francisco, the Bay Area is home of one of the largest biotech hubs in the USA. By the end of 2016, the Bay Area employed 67,798 workers in approximately 1,608 life sciences companies. Thus, the Bay Area comprises nearly 25% of all life sciences employees in the California[135, 136].

[129] http://www.dailybreeze.com/business/20160917/space-race-redux-despite-spacex-setback-a-wave-of-southern-california-rocket-makers-capitalize-on-new-economy
[130] https://laedc.org/industries/aerospace-analytical-instruments/
[131] https://laedc.org/industries/aerospace-analytical-instruments/
[132] http://laedc.org/our-services/socal-aerospace-council/
[133] http://ampsocal.usc.edu/
[134] https://laedc.org/
[135] http://sfced.org/why-san-francisco/sectors/life-sciences-biotech/sector-data/
[136] http://www.us.jll.com/united-states/en-us/Research/US-San-Francisco-Bay-Area-Life-Sciences-Outlook-2017-JLL.pdf?3fc2443a-dd90-47a2-9d90-a75041784d5d

For the Bay Area, the life sciences and biotech captured $947 million in venture capital investment, $3 million from venture capital funding and $944 million from the National Institutes of Health (NIH). The Bay Area's ability to attract funding has been a key factor for start-ups to establish in this region. A total of 25 venture-backed biotech companies were established in the Bay Area[137].

One of the bigger drivers for this success is the bond between industry and universities. There are biotech programmes at three major research universities, Stanford University, UC Berkeley, UC San Francisco, which receive nearly a quarter of all NIH funding in California. This joint effort aims at training a high skilled workforce that fulfils the needs of the biotechnology market in the area. Moreover, R&D is the largest category for employment within the Bay Area's life sciences sector, as research centres such as Lawrence Livermore Labs attract top researchers[138].

In order to maintain its competitive position, the government has made strong efforts to support the industry. The state enacted several laws to strengthen the life sciences competitive position that targeted investments.

The key segments within the biotech area are therapeutics, R&D services and biopharma[139]. Software driven healthcare, big data analytics for medical devices, and informatics in pharm technology are emerging technologies in the sector[140]. Among all the institutions existing in the Bay Area, the San Francisco Economic Development Center and the California Life Sciences Institute are two major players in the biotech sector.

Boston, Massachusetts

Boston is emerging incredibly fast to become the biggest, most connected, leading innovation biotech cluster in the world. The cluster comprises roughly 594 active companies[141] that employ more than 7,400 people within the pharmaceutical, medical device and biotechnology industries (mostly start-ups)[142]. The Boston metropolitan area has also become a global hub for biotech investments. In 2016, biopharma and life sciences companies in Massachusetts received $3.3 billion in venture capital, which represents a considerable increase when compared to 2015[143].

Boston has become a thriving ecosystem for biotech due to the easy access to a very well connected network of renowned universities such as Harvard, MIT and Boston University, research hospitals and institutions and world class service providers. This proximity has helped to foster a collaborative approach in the cluster with a high skilled workforce and companies sharing ideas and innovations[144].

[137] http://www.us.jll.com/united-states/en-us/Research/US-San-Francisco-Bay-Area-Life-Sciences-Outlook-2017-JLL.pdf?3fc2443a-dd90-47a2-9d90-a75041784d5d
[138] http://www.us.jll.com/united-states/en-us/Research/US-San-Francisco-Bay-Area-Life-Sciences-Outlook-2017-JLL.pdf?3fc2443a-dd90-47a2-9d90-a75041784d5d
[139] http://resourcecenter.venturevaluation.com/wp-content/uploads/2012/01/Biotech-Cluster-Bay-Area-and-Switzerland.pdf
[140] http://www.us.jll.com/united-states/en-us/Research/US-San-Francisco-Bay-Area-Life-Sciences-Outlook-2017-JLL.pdf?3fc2443a-dd90-47a2-9d90-a75041784d5d
[141] Source: Massachusetts Biotechnology Council.
[142] http://www.liftstream.com/boston-biotech-cluster.html#.WBHf3Pp97IU
[143] http://files.massbio.org/file/MassBio-Industry-Snapshot-2017.pdf
[144] http://www.cjrs-rcsr.org/archives/28-2/4-Breznitz-Anderson.pdf

Boston is also the principal recipient of NIH funding in the USA. The funding is shared between research institutions, universities and research hospitals that lead the global market in biotechnology research. As a logical consequence, the biotechnology related to medical sciences is the most prominent sector, being *gene editing* the current hot area.

In addition, there is a wide range of economic development programmes devoted to support large and small biotechnology companies. For example, the Life Sciences Initiative, valuing $1 billion, includes financial investments in life sciences research, development and commercialisation for public and private institutions. Moreover, the state of Massachusetts also promotes the biotechnology industry through an accelerator programme, cooperative research grants, a job creation tax incentive programme, and several general incentives[145].

Due to the increasing number of biotech companies relocating in the Boston area, biotech R&D employment grew by 9% in 2016[146]. As a result, the Massachusetts Biotechnology Council (MassBio) has developed the initiative Bioready Communities, which is focused on rating communities to help companies find the location that best suits them[147]. In this sense, it is important to note that the actual centre of the biotechnology and biopharmaceuticals within the cluster is the city of Cambridge (it belongs to the Boston metropolitan area)[148]. MassBio also has available a list of biotechnology companies and incubators.

San Diego, California

The San Diego biotechnology cluster is among the leading US clusters in the area. San Diego is home to approximately 1,225 life sciences companies and more than 80 independent and university-affiliated research institutes. Leading companies including Eli Lilly, Pfizer, GlaxoSmithKline, and Takeda are also located in the region due to its strong innovation ecosystem.

In 2016, San Diego's biotechnology industry raised approximately $445 million in venture capital and employed around 50,000 people. In addition, the region's life sciences activity accounted for $33.6 billion in total economic impact in 2015[149]. This strong expansion boosted biotech employment by 6.6% in 2015 and resulted in a flurry of leasing activity[150].

San Diego is also recognised by its innovation ecosystem. In 2015, the region was home to nearly 17 million square feet of lab space, mainly concentrated around the Torrey Pines, University Town Center, and Sorrento Mesa neighbourhoods. Moreover, San Diego County higher education institutions produce more than 7,000 science, technology, engineering and mathematics (STEM) graduates annually, which has been contributing to the success of the region's biotechnology industry[151].

[145] https://www.massbio.org/why-massachusetts/incentives
[146] http://files.massbio.org/file/MassBio-Industry-Snapshot-2017.pdf
[147] Consult Bioready Communities in the following link: https://www.massbio.org/why-massachusetts/supercluster/bioready-communities
[148] http://news.mit.edu/2004/massimpact
[149] www.sandiegobusiness.org/our-economy/lifescience
[150] www.bisnow.com/san-diego/news/office/why-biotech-real-estate-development-is-booming-in-san-diegos-life-sciences-cluster-55455
[151] www.sandiegobusiness.org/our-economy/lifescience

Information and Communication Technologies (ICT) clusters

Silicon Valley, California

Worldwide known, Silicon Valley (San Francisco Bay Area) is the most important high tech hub of the world. Led by the ICT cluster, it enjoys a highly skilled pool of talent, a strong entrepreneurial culture, proximity to savvy costumers and access to capital, especially for the start-ups that are the driver of the region's economy[152].

The success of this ICT cluster resides in the continuous innovation of software and hardware applications. Academia and industry work together to keep this ecosystem evolving according with the new trends in the sector. Stanford University, the University of California Berkeley and many other institutions train professionals to meet the demands of an industry, which in 2017 employed around 1,600,000 people[153].

Silicon Valley continues to have the highest proportion of workers in innovation industries compared to other innovation regions. In 2017, employment in innovation industries represented 26.3% of the total employment in the region, with software (9%) and ICT product and component manufacturing (6.5%) leading the way[154]. In 2016, the Academic R&D expenditures in Silicon Valley reached $3.3 billion and Silicon Valley was granted 8,834 patents just in computers, data processing and information storage technologies (2015)[155, 156]. Silicon Valley also hosts the largest number of billionaire companies in the world, such as Apple, HP and EA.

Moreover, Silicon Valley benefits from easy access to venture capital. In 2017, Silicon Valley and San Francisco combined received around $24.9 billion in venture capital investment, accounting for 78.3% of California's total investment. In 2017, Internet companies received 37% of all venture capital funding in Silicon Valley, while Software (non-internet/mobile) companies only received around 5%[157]. Silicon Valley also had 22 venture capital megadeals (more than $100 million each) in 2017, which represented 5 more than in the previous year[158].

The European Institute of Innovation & Technology (EIT) opened a hub in Silicon Valley with the objective to build a bridge between Europe and the San Francisco Bay Area in the ICT sector[159].

Seattle, Washington

Enjoying the greater concentration of technology-based companies, including big names such as Microsoft and Amazon, Washington (more particularly Seattle) is consistently ranked among the best places for the technology industrial sector. In 2015, Washington was rated the top state in the USA for technology and innovation by CNBC. Thus, the available digital infrastructure, a high skilled workforce and the access to venture capital makes ICT one of the largest clusters in

[152] http://www.work2future.biz/images/documents/TechStudyFullReport_03.pdf
[153] https://jointventure.org/images/stories/pdf/index2018.pdf
[154] http://svcip.com/files/SVCIP_2018.pdf
[155] https://www.siliconvalleycf.org/sites/default/files/publications/svlg-report.pdf
[156] http://svcip.com/files/SVCIP_2018.pdf
[157] https://jointventure.org/images/stories/pdf/index2018.pdf
[158] https://jointventure.org/images/stories/pdf/index2018.pdf
[159] http://www.eitdigital.eu/about-us/overview/

Washington, supporting over 165,950 jobs and producing an estimated revenue of $50.7 billion[160].

Washington is at the forefront of the software development and publishing jobs; interactive media development and technologies; RFID; and wireless technologies and applications. Moreover, in recent years, several opportunities have emerged in the fields of cloud, big data/analytics, software, IoT, interactive media, e-commerce, mobile, social media, wearables, virtual reality, AI, 3D printing, and automotive IT. The Puget Sound region is also recognised as the reference hub for interactive media development[161, 162].

Washington is home to numerous top-level technology schools, such as the University of Washington, Lake Washington Institute of Technology, Bellevue College, and Cascadia College, which offer a pool of talented STEM students. The region is also a leader in cloud computing technology due to large investments by industry leading players such as Microsoft and Amazon[163].

In 2016, 5,794 ICT establishments were located in Seattle (King County) and more than 90% of those could be considered SMEs. Nearly every company was also less than 20 years old, making the State an ecosystem of start-ups where the constant innovation is a requirement for the business survival. Despite the competition, this ecosystem is relying on support organisations, entrepreneurial assistance and tech incubators. The financial support was particularly strong with nearly $70 million in 60 seed investments and nearly $700 million in 140 venture capital investments in 2015[164,165]. As a result, the sector has been a pioneer in the most successful new products and services including online retail, online gaming, cloud computing, and music and video streaming.

Water clusters

The Confluence Water Technology Innovation Cluster

In January 2011, the Confluence Water Technology Innovation Cluster (CWTIC) was initiated in Dayton, Cincinnati, northern Kentucky and southeast Indiana by the US Small Business Administration (SBA) and EPA. The goal of clustering public and private entities in the Ohio River Valley Region is to develop and commercialise innovative water technologies. Thus, the CWTIC main mission is to identify, educate, and facilitate solutions to current and emerging challenges in the water life cycle.

About 250 water-related companies are located in this region. CWTIC is a non-profit organisation consisting of a network of public and private companies (small or large) and supporting public organisations (local government, economic development agencies, universities, investors and others) that work together to promote economic growth and technological innovation. The

[160] http://www.edc-seaking.org/uploads/pdf/information-and-communications-technology-3.7.pdf
[161] http://www.edc-seaking.org/catalog/industry-clusters/information-and-communications-technology
[162] http://www.edc-seaking.org/uploads/pdf/information-and-communications-technology-3.7.pdf
[163] http://www.edc-seaking.org/uploads/pdf/information-and-communications-technology-3.7.pdf
[164] http://washingtontechnology.org/wp-content/uploads/2015/04/ICT-Economic-Report.pdf
[165] http://www.edc-seaking.org/uploads/pdf/information-and-communications-technology-3.7.pdf

Board Members represent all the organisations from across the Ohio River Valley Region that collaborate within CWTIC[166].

Cleveland Water Alliance

Abundant fresh water gives the Great Lakes region a unique, competitive advantage to attract new industries, promote economic development, and support growing communities. Within this context, the Great Lakes region has one of the biggest concentrations of water-related industry sectors in the world. In the region, demand is focused on several key growth areas including water treatment for the oil and gas industry, chemical spill containment and combined sewer overflow segments[167].

The Cleveland Water Alliance is a non-profit organisation comprised of Northeast Ohio corporations, universities and government agencies, which aims to foster economic development through water innovation and promote the value of water to the region. The organisation's partners include Ohio Department of Natural Resources, First Energy, NASA, and the Great Lakes Science Center[168].

Milwaukee Water Council

The Water Council in Milwaukee, Wisconsin, was created by leaders in business and education in 2007 to bring the region's water technology companies and universities together. The goal of the Milwaukee Water Council is to build cross-sector and global research and business partnerships, develop training programmes and solve the local and global water challenges with newly developed and deployed innovative water technologies. It is established from a more business point of view and its goal is to become a water technology hub and attract businesses. More than 130 water technology companies are located in the Milwaukee area. These businesses manufacture equipment (e.g. pumps, valves and meters), solve water purification problems, address wastewater treatment problems and support the reuse of water.

The Milwaukee Water Council supports all stages of water technology companies in the Great Lakes Region, across the USA and around the world. The council understands that all levels of organisations within the water technology industry have specific needs. Thus, the council has several programmes to support freshwater research, innovation, education and business development, including the Alliance for Water Stewardship, the Brew Accelerator, the Energy Water Nexus, the Pilot Program, the Research & Commercialization Program and the Small Business Channel[169].

The BlueTechValley

The BlueTechValley is an initiative established in Fresno, California, in 2011. Fresno is home to numerous rural and urban communities, which leads to water scarcity problems. Therefore, the city is constantly seeking innovative solutions to promote extreme water efficiency, making it the ideal place to test, develop, and commercialize new water technologies. In this context,

166 https://www.watercluster.org/
167 https://www.glc.org/wp-content/uploads/2017/03/GLC-Water-Infrastructure-Priorities-for-the-Great-Lakes-030217.pdf
168 http://clevelandwateralliance.org/
169 http://thewatercouncil.com/

BlueTechValley's main goal is to promote growth and help turn innovative and entrepreneurial ideas into real solutions for water management.

The BlueTechValley Innovation Cluster programme represents an expansion and interconnection of multiple incubator and entrepreneurship programmes with services located at seven designated BlueTechValley Cluster Hubs (Fresno State, CSU Bakersfield, Chico State, Humboldt State University, CSU Monterey Bay, Sacramento State, and Sierra Small Business Development Center). In addition, the cluster team includes leading organisations, such as UC Berkeley, UC Davis, AgH2O, CleanTech Open, The Grant Farm, Kern County Economic Development Corporation, and Schatz Energy Research Center at Humboldt State University[170].

4. Cluster policies and programmes in the USA

4.1. Historic evolution of the cluster policy

A major development occurred back in the Obama Administration when several efforts were made in order to boost regional economic clusters across the country through different cluster policy measures. The Obama Administration supported growth strategies based on stronger regional clusters of innovation through funding from the DoC, EDA, SBA, the Department of Labour, the Department of Education, and the Department of Energy (DoE)[171]. In 2017, the EDA invested about $289.1 million in 815 locally-driven economic development projects, which demonstrates the country's continuous commitment to promote regional growth and innovation[172].

The US SBA had been investing in the development of regional innovation clusters throughout the country. Besides its contribution to the development of the Cluster Mapping project, the SBA has also set up the Regional Innovation Cluster (RIC), an initiative launched in 2010 to promote and support ten clusters across the United States. Since 2010, the RIC had enhanced the ability of these ten clusters in responding to shifting needs of the regional and industry contexts. It also supported these clusters efforts to grow their membership, scale their provided services, and strengthen their engagement with small businesses. The clusters supported by RIC are Advanced Power and Energy Cluster (Minnesota); Appalachian Ohio Wood Products Cluster (Ohio); BioSTL St. Louis Bioscience Cluster (Missouri); Enterprise for Innovative Geospatial Solutions Cluster (Mississippi); FlexMatters Cluster (Ohio); Illinois Smart Grid Cluster (Illinois); Marine Industries Science & Technology (MIST) Cluster (Mississippi); New Mexico Unmanned and Autonomous Systems Cluster (New Mexico); Northeast Electrochemical Energy Storage Cluster (Connecticut); Oklahoma-South Kansas Unmanned Aerial Systems Cluster (Oklahoma); Ozark Regional Innovation Cluster (Arkansas); San Diego Regional Defense Cluster (California);

[170] http://bluetechvalley.org/
[171] Farrell, Diana, and Thomas Kalil. *"Innovation Policy around the World: United States: A Strategy for Innovation."* Issues in Science and Technology 26, no. 3 (Spring 2010). http://issues.org/26-3/farrell-2/
[172] https://ssti.org/blog/regional-innovation-funding-and-economic-development-investments-highlighted-eda-report

TechRICH (Alabama); and The Milwaukee Water Council (Wisconsin)[173]. These participating clusters are improving their data-collection systems and exploring options for long-term sustainability as funding from SBA begins to decrease[174].

The EDA established several initiatives to advance innovation throughout the country. Among these initiatives, the Regional Innovation Strategies (RIS), Manufacturing Communities Partnership (IMCP) and the Americas Competitiveness Exchange on Innovation and Entrepreneurship (ACE) specifically aim to promote innovation within industrial clusters.

- The RIS Program awards grants that build regional capacity to translate innovations into jobs through proof-of-concept and commercialisation assistance to innovators and entrepreneurs; and through operational support for organisations which provide essential early-stage risk capital to innovators and entrepreneurs. This initiative includes the FY2018 Seed Fund Support Program, which provides funding for technical assistance to support the creation, launch, or expansion of equity-based, cluster-focused seed funds that invest regionally-managed risk capital in regionally-based start-ups with a potential for high growth[175].

- The IMCP initiative encourages clusters to develop comprehensive economic development strategies that will strengthen their competitiveness. It was established in 2013 to incentivize and facilitate collaboration among private and public sector stakeholders of USA manufacturing clusters. To receive support from IMCP, the clusters must propose strategies to target investments and achieve measurable progress in the following six areas: workforce and training; research and innovation; infrastructure and site development; supply chain support; trade and international investment; and operational improvement and capital access. To date, 24 communities have been granted IMCP designations: 12 communities were designated during the first round in 2014, and were re-designated for an additional two-year period in September 2016; 12 additional communities were designated during a second round in 2015[176].

- The ACE initiative brings together 50 government, business, policy, and economic decision makers from across the USA to experience the wide range of projects, strategic investments, public-private partnerships, and best practices from a particular region's innovation and entrepreneurship ecosystems. This week-long programme includes visits to innovation hubs, advanced technology centres, leading firms, and educational and research institutions, to explore economic development models, share experiences and knowledge, and build networks among the local and visiting stakeholders to enhance innovation and competitiveness[177].

Under the Trump Administration, EDA is focused on achieving three main goals, namely: (1) make it easier for businesses to start and grow in the USA; (2) promote matching grants that start with local business conditions and needs; and (3) drive innovation and entrepreneurship

[173] https://www.sba.gov/tools/local-assistance/ric
[174] https://www.sba.gov/sites/default/files/aboutsbaarticle/SBAClusters_Year3_Report.pdf
[175] https://www.eda.gov/oie/ris/
[176] https://www.eda.gov/imcp/
[177] https://www.eda.gov/programs/multi-agency/ace/

throughout the USA, especially in the manufacturing sector in order to support USA workers and businesses to compete globally[178]. In this context, EDA works directly with communities and regions to support them in building the capacity for economic development based on local business conditions and needs[179].

EU-USA cluster cooperation initiatives

To develop and promote cooperation between USA and EU clusters, the US DoC has signed an EU-USA Cooperation Arrangement on Clusters with the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) on the 22nd of April 2015. The objective of this agreement is to facilitate transatlantic linkages between clusters in the EU and the USA, and to help SMEs find strategic partners[180]. The USA involvement and interest in cooperating with the EU is a clear sign of mutual interest to work on common thematic areas, boost exchange of knowledge and increase the growth opportunities between clusters of the two regions. Furthermore, the DoC had initially been very active in supporting cluster matchmaking missions and took an active part in the Washington cluster workshop in November 2015[181], and the EU-US Cluster to Cluster matchmaking missions organised by the ECCP in April 2016 (in the context of the Hannover Messe[182]) and May 2017 (in the context of the TechConnect World Innovation in Washington, D.C.[183]) The EU-USA Cluster matchmaking event was complemented by a high level cluster policy seminar on "Clusters in the EU and the USA: Opportunities for Collaboration and Growth". (More information is provided in the document "Discussion Paper" from the ECCP). Nevertheless, the extension of bilateral cluster cooperation activity under this Arrangement is being re-calibrated at this point in time.

Other EU DG's such as DG Research and Innovation (DG RTD) have implemented BILAT projects with the USA and recognise the importance of using and channelling support through clusters to promote RDI international cooperation. The project BILAT USA 4.0[184] funded by the European Framework Programme Horizon 2020 was launched in February 2016 and will last three years with the aim to develop RDI cooperation between the EU and the USA, including industry and cluster cooperation. Moreover, the ENRICH in the USA[185] project, which was also funded by the Horizon 2020 programme, aims to provide standardised and tailor-made, research & innovation internationalisation support services to European researchers and innovators, to accelerate access to the US market, and maximise chances of success. It can serve EU clusters including COSME cluster projects (European Strategic Cluster Partnerships Going International).

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178 www.eda.gov/about/Value-Proposition.htm
179 www.eda.gov/about/
180 EC DG Grow, http://ec.europa.eu/growth/tools-databases/newsroom/cf/itemdetail.cfm?item_id=8240&lang=en&title=Cooperation-Arrangement-on-Clusters-signed-in-Washington-D%2EC%2E)
181 More information about the event : http://www.clustercollaboration.eu/news/united-states-european-union-workshop-cluster-mapping-and-cluster-based
182 More information about the event: http://www.clustercollaboration.eu/news/european-cluster-matchmaking-event-organised-context-hannover-messe-13th-14th-april-2015
183 http://www.euussciencetechnology.eu/event/45/high-level-eu-cluster-mission-to-the-usa
184 http://www.euussciencetechnology.eu/
185 https://usa.enrichcentres.eu/

4.2. Agro food policies and programmes

In the USA, the Farm Bill is the main agro food policy tool of the federal government. The USA Department of Agriculture (USDA) renews the Farm Bill every five years in order to ensure that the bill takes into account the country's needs in terms of agro food policy. The Farm Bill authorises programmes in two categories: mandatory and discretionary. The mandatory spending programmes often operate as entitlements; while discretionary spending programmes are authorized for their scope but are not funded in the Farm Bill[186].

- 2018 Farm Bill: The USDA developed a set of principles to share with Congress for consideration during the development of the 2018 Farm Bill. The USDA supports legislation that will take into account the country's needs in Farm Production and Conservation; Trade and Foreign Agricultural Affairs; Food, Nutrition and Consumer Services; Marketing and Regulatory Programmes; Food Safety and Inspection Services; Research, Education and Economics; Rural Development; Natural Resources and Environment; and Management[187]. The 2018 Farm Bill is expected to be launched by the end of 2018[188].

In 2018, the Trump Administration approved a $12 billion aid package for farmers affected by tariffs imposed by other countries. The support is delivered through the following support programmes:

- Market Facilitation Program: Promoted by USDA, the programme aims to provide payments incrementally to producers of soybeans, sorghum, corn, wheat, cotton, dairy, and hogs.
- Food Purchase and Distribution Program: Under this programme, the USDA aims to purchase unexpected surplus of affected commodities such as fruits, nuts, rice, legumes, beef, pork, and mil for distribution to food banks and other nutrition programmes.
- Trade Promotion Program: Under this programme, the USDA in coordination with private sector organisations aims to support the development of new export markets for farm products[189].

Regarding environment issues, the USA agricultural-environmental policy addresses a wide range of environmental issues including soil quality, water quality, wildlife habitat, and air quality. The federal government provides financial and technical assistance to agricultural producers who agree to adopt practices focused on improving their environmental impact. Thus, the financial and technical assistance is designed to support conservation activities such as land retirement, practices on land in production, protection of wetlands and grasslands, and preservation of productive farmland at risk of residential or commercial development. Key programmes include the Conservation Reserve Program (CRP), Environmental Quality Incentives

[186] https://fas.org/sgp/crs/misc/RS22131.pdf
[187] www.usda.gov/sites/default/files/documents/2018-farm-bill-and-legislative-principles.pdf
[188] https://agriculture.house.gov/news/documentsingle.aspx?DocumentID=4464
[189] https://ballotpedia.org/Federal_policy_on_agriculture_and_food,_2017-2020

Program (EQIP), Conservation Stewardship Program (CSP), Agricultural Conservation Easement Program (ACEP), and the Regional Conservation Partnership Program (RCPP)[190].

Moreover, the Environmental Protection Agency (EPA) promotes specific laws and regulations that apply to aquaculture; livestock and poultry including beef, dairy, swine, poultry; crop production including nurseries, greenhouses, forestry; provision of drinking water; farm facilities, fuel and equipment; buildings, construction, and renovation; chemical handling; air emissions/releases; and wastes. Several USA states may have similar laws and regulations with specific environmental requirements[191].

4.3. Energy policies and programmes

Through a variety of cross-cutting initiatives, the Office of International Affairs (IA) of the Department of Energy (DoE) responds to the most pressing global energy challenges, ranging from energy security and market volatility to long-term efforts to reduce carbon pollution and the impacts of climate change[192]. Initiatives under the responsibility of the IA of the DOE include:

- The America First Energy Plan was launched by the Trump Administration with the aim of producing low-cost energy and creating jobs. This plan is focused on reducing regulations on domestic fossil fuel extraction and promoting the expansion of oil, gas, and coal production in order to generate more job opportunities. The America First Energy Plan was launched to replace the Clean Power Plan, which was implemented by the Obama Administration[193].

- The Energy and Climate Partnership of the Americas (ECPA) is a key multilateral mechanism to advance energy security, accelerate clean energy deployment, and reduce the climate change impacts of energy use in the Western Hemisphere. ECPA provides a platform for governments in the Western Hemisphere to lead multi-country or bilateral initiatives on a voluntary basis[194].

- The US-EU Energy Council is a body launched in 2009 with the aim of deepening coordination on strategic energy issues of mutual interest and R&D cooperation. The US-EU Energy Council is supported by three working groups, namely Energy Technology Working Group, Energy Policy Working Group, and Energy Security Working Group[195]. The eighth Energy Council took place in July 2018 and was focused on energy security issues, including diversification of energy sources, suppliers and routes, as well as clean energy innovation and other technology cooperation[196].

- The North American Energy Cooperation is a cooperation agreement between the USA, Canada and Mexico that includes several topics of mutual interest. The US DoE's primary government partners are Natural Resources Canada (NRCan) and Mexico's Secretariat

[190] www.ers.usda.gov/faqs/
[191] www.epa.gov/agriculture/laws-and-regulations-apply-your-agricultural-operation-farm-activity
[192] https://energy.gov/ia/initiatives
[193] https://svbweb.s3.amazonaws.com/media/new_release/The_America_First_Energy_Plan_web_0817.pdf
[194] https://www.energy.gov/ia/initiatives/energy-and-climate-partnership-americas
[195] https://www.energy.gov/ia/international-affairs-initiatives/us-eu-energy-council
[196] https://ec.europa.eu/info/news/8th-eu-us-energy-council-brussels-2018-jul-12_en

of Energy (SENER). The main areas of cooperation are: unconventional oil and gas; clean coal cooperation, including carbon capture, utilisation, and storage; and electricity grid reliability, resilience, and security[197].

The DoE also promotes state and local energy advances through numerous policies and programmes designed and implemented to maximise effectiveness within organisations across the USA. This includes programmes in energy efficiency[198], renewable energy (distributed generation[199] and utility-scale[200]), and transportation[201].

4.4. Aerospace policies and programmes

Aerospace is one of the priority sectors for the US Government and, therefore, several policies and programmes have been implemented in this sector. The National Space Policy was launched in 2010 by the Obama Administration in order to provide comprehensive guidance for all government activities in space, including the commercial, civil, and national security space sectors[202]. In March 2018, the Trump Administration launched the fact sheet "President Donald J. Trump Is Unveiling an America First National Space Strategy", which includes a brief summary of the new National Space Strategy. According to this fact sheet, the new strategy will be more focused on dynamic and cooperative interaction between the national security, commercial, and civil space sectors, emphasizing peace through strength in the space domain[203].

The Next Generation Air Transportation System (NextGen)[204] is one of the most ambitious programmes within the aerospace sector. This programme was implemented in 2012 and is foreseen to end by 2025. Its objective is to increase the safety, efficiency, capacity, predictability, and resiliency of the American aviation. Thus, the programme's portfolio comprises planning and implementation of innovative new technologies and airspace procedures after testing for safety. Through research, innovation, and collaboration, the NextGen aims to set standards and further establishing the USA's leading position in the aviation sector[205].

The Unmanned Aircraft System (UAS) Integration Pilot Program (IPP) is an opportunity for state and local governments to partner with private sector entities, such as UAS operators or manufacturers, in order to accelerate safe UAS integration. This programme is expected to promote dialogue on the balance between local and national interests related to UAS integration, and provide actionable information to the Department of Transportation on expanded and universal integration of UAS into the National Airspace System[206].

In order to finance initiatives and policies in the aerospace sector, NASA requested a budget for 2019 which includes Science; Aeronautics; Exploration Research and Technology; Deep Space

[197] https://www.energy.gov/ia/international-affairs-initiatives/north-american-energy-cooperation
[198] https://www.energy.gov/eere/slsc/energy-efficiency-policies-and-programs
[199] https://www.energy.gov/eere/slsc/renewable-energy-distributed-generation-policies-and-programs
[200] https://www.energy.gov/eere/slsc/renewable-energy-utility-scale-policies-and-programs
[201] https://www.energy.gov/eere/slsc/transportation-policies-and-programs
[202] http://www.space.commerce.gov/policy/national-space-policy/
[203] https://spacepolicyonline.com/news/white-house-releases-fact-sheet-on-new-national-space-strategy/
[204] https://www.faa.gov/nextgen/
[205] https://www.faa.gov/nextgen/
[206] https://www.faa.gov/uas/programs_partnerships/uas_integration_pilot_program/

Exploration Systems; Commercial Crew; Commercial Low Earth Orbit; and Space Operations. NASA's request for R&D is $5.895 billion, which represents an increase of 2.3% when compared to Fiscal Year 2017[207].

Finally, there are several organisations and agencies related to different aspects of the aerospace industry:

- Aerospace Industries Association (AIA)[208]: is the most relevant trade association representing major aerospace and defence manufacturers and suppliers in the USA. It often offers advice services to the government.
- FAA[209]: is the federal agency in charge of regulating the aerospace system in order to ensure safety. It develops initiatives regarding several topics such as the integration of drones in the National Space System (NAS) and the implementation of NexGen. It is also responsible for the bilateral agreements concerning aerospace.
- NASA[210]: it is an independent agency of the federal government in the USA responsible for the civilian space programmes and aerospace research.
- International Trade Administration (ITA)[211]: contributes to US trade policy development, evaluates the impact of the policies, ensures the fairness in trade etc.

4.5. Biotechnology policies and programmes

In 1986, the White House Office of Science and Technology Policy through the Domestic Policy Council Working Group on Biotechnology promoted the Coordinated Framework for the Regulation of Biotechnology[212], which established the basic federal policy for regulating the development and introduction of products derived from biotechnology. In 2017, the Coordinated Framework for the Regulation of Biotechnology was updated in order to modernise the federal regulatory system for biotechnology products, as well as clarify the roles of the EPA, Food and Drug Administration (FDA) and Department of Agriculture (USDA) in evaluating new biotechnologies[213]. Furthermore, the accompanying National Strategy for Modernizing the Regulatory System for Biotechnology Products, which was published in September 2016, identifies future steps to ensure the regulatory system addresses novel types of products developed through advances in science and technology appropriately[214].

The US Government agencies responsible for oversight of the products of modern biotechnology are the USDA's Animal and Plant Health Inspection Service (USDA-APHIS), the US Environmental Protection Agency (EPA), and the Department of Health and Human Services' Food and Drug Administration (FDA). Depending on its characteristics, a product may be subject to the jurisdiction of one or more of these agencies.

[207] https://fas.org/sgp/crs/misc/R45150.pdf
[208] http://www.aia-aerospace.org/about-aia/
[209] http://www.faa.gov/
[210] https://www.nasa.gov/about/highlights/what_does_nasa_do.html
[211] https://www.trade.gov/
[212] https://www.aphis.usda.gov/brs/fedregister/coordinated_framework.pdf
[213] https://www.epa.gov/regulation-biotechnology-under-tsca-and-fifra/modernizing-regulatory-system-biotechnology-products
[214] www.aphis.usda.gov/biotechnology/downloads/2017_coordinated_framework_update.pdf

- FDA[215] – The FDA is responsible for ensuring the safety and proper labelling of all plant-derived food and feed, including those developed through genetic engineering. Under the Federal Food, Drug, and Cosmetic Act, it is the responsibility of food and feed manufacturers to ensure the products they market are safe and properly labelled.

- EPA[216] – The EPA regulates the sale, distribution and use of pesticides in order to protect health, and the environment, regardless of how the pesticide was made or its mode of action. This includes regulating those pesticides that are produced by an organism through techniques of modern biotechnology. The Biopesticides and Pollution Prevention Division of the Office of Pesticide Programs, under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), regulates the distribution, sale, use and testing of pesticide substances produced in plants and microbes.

- USDA: Animal and Plant Health and Inspection Service (APHIS)[217] – APHIS evaluates a variety of issues including the potential for plant pest risk; disease and pest susceptibilities; the expression of gene products, new enzymes, or changes to plant metabolism; weeding and impact on sexually compatible plants; agricultural or cultivation practices; effects on non-target organisms; and the potential for gene transfer to other types of organisms.

In 2017, the Trump Administration articulated its policy initiative through an executive order to reduce drug prices. Moreover, the FDA confirmed its promise to speed up the drug approval process for generics and novel therapeutics. This new policy aims to decrease the drug development timeline, and encourage the development of new targeted therapies that will mainly benefit oncology companies[218]

4.6. ICT policies and programmes

The Trump Administration has been highly committed to advancing technological development and conducting R&D activities to ensure national security, grow the economy, create well-paying jobs, and improve the country's living standards. Thus, the Office of Science and Technology Policy (OSTP) has been coordinating the Administration's efforts to promote ICT innovation[219]. In this context, several policies and programmes aim to promote the advancement of the USA ICT sector.

- Internet Policy Task Force[220] – The Commerce Department Office of the Secretary, leveraging the expertise of the National Telecommunications and Information Administration (NTIA), the Patent and Trademark Office (PTO), the National Institute of Standards and Technology (NIST), and ITA created an Internet Policy Task Force to

[215] www.fda.gov
[216] www.epa.gov
[217] https://www.aphis.usda.gov/aphis/ourfocus/biotechnology
[218] www.pharmaceutical-technology.com/comment/key-biotechnology-drivers-2018-will-surge-continue/
[219] https://www.whitehouse.gov/wp-content/uploads/2018/03/Science-and-Technology-Highlights-Report-from-the-1st-Year-of-the-Trump-Administration.pdf
[220] https://www.ntia.doc.gov/category/internet-policy-task-force

conduct a comprehensive review of the connection between privacy policy, copyright, global free flow of information, cybersecurity, and innovation in the Internet economy.

- America Invents Act[221] – a patent reform law that helps companies and inventors avoid costly delays and unnecessary litigation. Many key industries in which the United States leads, such as biotechnology, medical devices, telecommunications, the Internet, and advanced manufacturing, depend on a strong and healthy intellectual property system. The US Patent Trade Office (USPTO) has also launched Track One that allows patent applications to be processed to completion in 12 months and offers small businesses a 50% discount on this option. The new law also harmonizes the American patent process with the rest of the world.

- Advanced Manufacturing Partnership (AMP) – a national initiative that brings efforts from industry, universities, and the Federal government to invest in the emerging technologies that will create high-quality manufacturing jobs and enhance our global competitiveness. The National Robotics Initiative is part of this effort. It focuses on developing robots that work with or beside people to extend or augment human capabilities, taking advantage of the different strengths of humans and robots for example, increasing the productivity of workers, assisting astronauts, improve food safety or accelerate the discovery of new drugs[222].

- Manufacturing USA[223]– a network of regional institutes that have a specialized ICT focus, such as AI, automation, electronics, sensors, or robotics. Manufacturing USA has established 14 manufacturing innovation institutes that promote cooperation between private industry, non-profit, academia and government entities.

- Digital Promise[224] – a national centre for advancing learning technologies that will harness the efforts of everyone from educators to entrepreneurs to spur the research, development, and adoption of breakthrough technologies that can help transform the way teachers teach and students learn.

- TechHire Initiative[225] – a national network of communities, educators and employers that aims to have more Americans rapidly trained for well-paying technology jobs.

In addition, the DoC ITA Global Tech & Cybersecurity Team provides international market research on developing trends and business opportunities, procurement leads, and promotional events tailored to innovative technology companies. The programme team aims to support USA product and service exporters in fields such as AI, Apps & Mobile Tech, Blockchain, Cloud Computing and Data Analytics, Cybersecurity, IoT, and Smart Cities[226].

There are also several initiatives that directly affect the federal government, such as: the 25-Point Implementation Plan, which provides recommendations for IT reform in the areas of

[221] https://www.uspto.gov/sites/default/files/aia_implementation/20110916-pub-l112-29.pdf
[222] http://iepd.iipnetwork.org/policy/advanced-manufacturing-partnership
[223] https://www.manufacturingusa.com/
[224] https://digitalpromise.org/contact-us/
[225] https://techhire.org/
[226] https://2016.export.gov/industry/infocomm/index.asp

operational efficiency and large-scale IT programme management[227]; or the Open Data Initiatives that seek to "liberate" government data and voluntarily-contribute corporate data as fuel to spur entrepreneurship, create value, and create jobs[228].

4.7. Water policies and programmes

In 2017, the USA Federal Government launched the Global Water Strategy which aims to: increase access to sustainable safe drinking water and sanitation services and promoting key hygiene behaviours; protect freshwater resources; promote cooperation on shared waters; and strengthen water governance and financing. This Strategy foresees the involvement of partner countries, the private sector, and other stakeholders to advance the interrelated strategic objectives. Thus, in order to accomplish its goals the US Government has established water technology initiatives focused on the development and commercialisation of new and innovative technologies[229]. These initiatives include:

- National Institute of Standards and Technology (NIST) programmes – the NIST technical programmes are focused on water quality, water treatment and infrastructure, and community resilience. These technical programmes support water and energy efficiency and consumption estimation for marketed technologies, water flow meter calibration services, critically evaluated thermophysical property data, as well as reference material standards for water quality measurements. Moreover, NIST manages a multi-faceted programme, supporting communities and stakeholders on issues related to buildings and the interdependencies of physical infrastructure systems[230].

- NASA's Water Resources and Capacity Building programmes – these programmes use NASA's free and openly available satellite data for advanced hydrologic modelling and risk assessments for improved water management by governmental agencies in various countries[231].

- The Safe Drinking Water Act[232] and the Clean Water Acts[233] - These are the most important federal policy initiatives within the American water sector. These initiatives, coordinated by the Environmental Protection Agency (EPA), provide treatment and discharge regulations, and fund programmes and frameworks for operating and applying innovative water and wastewater treatment technologies.

Furthermore, the Water Environment Federation (WEF) and the Water Research Foundation (WRF) created the Leaders Innovation Forum for Technology (LIFT) programme, which aims to facilitate the adoption of water technologies and to turn innovation into practice. This programme consists of four components, namely Technology Evaluations, People and Policy, Communication, and Informal Forum for R&D[234]. In the 2018 edition, WEF coordinated a

[227] https://community.rsa.com/docs/DOC-93330
[228] https://www.data.gov/energy/energy-data-initiative
[229] https://www.usaid.gov/sites/default/files/documents/1865/Global_Water_Strategy_2017_final_508v2.pdf
[230] https://www.usaid.gov/sites/default/files/documents/1865/Global_Water_Strategy_2017_final_508v2.pdf
[231] https://www.usaid.gov/sites/default/files/documents/1865/Global_Water_Strategy_2017_final_508v2.pdf
[232] https://www.epa.gov/sdwa
[233] https://www.epa.gov/laws-regulations/summary-clean-water-act
[234] http://www.werf.org/lift

nationwide network of Water Technology Innovation Clusters, which were originally developed by the EPA. The Clusters Programme is focused on disseminating best practices in cluster development, connecting clusters to relevant WEF programmes, and developing an inventory of existing USA water clusters[235].

5. Conclusions

In recent years the USA economy has been growing at steady rates. Several sectors present important opportunities for European stakeholders, including sectors where both regions are leaders, such as the agro food, energy, aerospace, biotechnology, ICT and water sectors.

The agro food, energy, aerospace, biotechnology, ICT and water sectors are constantly evolving and increasing their long-term relevance for the future economy. This favours the appearance of an array of opportunities for USA and European clusters regarding technology transfer, innovation and business cooperation that can build on the well-established foundations between both regions.

Currently, there are 11 second generation European Strategic Cluster Partnerships – Going International (ESCPs-4i) that target the USA for the development of international cooperation activities, such as missions, events, study visits and fairs. The second generation ESCPs-4i targeting the USA are highly focused on the sectors covered in this report as demonstrated by the following:

- Agro food: European Strategic Cluster Partnership for Advanced Smart Packaging (AdPack²) and New Frontiers in Food Fast Forward (NF4);
- Energy: Europe Leading Blue Energy (ELBE) and Geo-Energy for the XXIst Century (GEO-ENERGY EUROPE);
- Biotechnology: European Cluster Partnership in Photonics for Health (LASER-GO GLOBAL);
- Aerospace: Alliance for international business development of advanced materials and connectivity for defence and security markets (ALLIANCE); and
- ICT: PIMAP Partnership – Photonics for International Markets and Applications, European SmartCityTech Go Global (ESCT Go Global), and Mobility Goes International - In Action (MobiGoIn-Action)[236].

Nine of the 11 ESCPs-4i targeting the USA are focused on the sectors covered in this report, which demonstrates the importance of these sectors in respect to EU-USA cooperation. Taking into account the abovementioned ESCPs-4i's target sectors, smart cities, smart mobility and clean energy can be considered the areas with the highest potential for EU-USA cluster cooperation.

Furthermore, smart cities, smart mobility and clean energy are areas deeply grounded in advanced technologies and innovation, which indicates the EU-USA cooperation should be

[235] https://www.wef.org/resources/water-technology-innovation-clusters/
[236] www.clustercollaboration.eu/eu-cluster-partnerships/escp-4i/profiles?generation=2

focused on higher value areas. Therefore, this can be considered an important opportunity for technological clusters from both regions.

R&D and innovation have an important role in the USA clusters. In this context, the ENRICH in the USA hubs (San Francisco, Boston, and five Associate Hubs across the USA) represent a key opportunity for EU innovation stakeholders to enter/cooperate with USA organisations. The ENRICH in the USA's services target a wide range of EU innovation stakeholders, such as accelerators, incubators, research parks, businesses, networks, clusters, entrepreneurs, start-ups, SMEs, universities and funding agencies. In this context, ENRICH in the USA represents the most promising platform for EU and USA stakeholders to cooperate in diverse science and technology fields.

Moreover, the EU-US Cooperation Arrangement on Clusters was signed in Washington DC in 2015 between the US DoC and DG Growth of the European Commission, paving the way for both government bodies to collaborate in RDI and business initiatives.

Finally, as trade challenges surface all around the world using cluster cooperation can prove a most effective approach to secure EU SMEs access to high value business and innovation opportunity in selected value-chains of the USA and EU economies.