CONSULTATION PAPER – EU ICT INDUSTRIAL POLICY: BREAKING THE CYCLE OF FAILURE

July 2019

In an increasingly inter-connected world, the European ICT sector should be strengthened and stimulated to improve its competitiveness.

This paper is put forward as a consultation paper with an aim to explore issues such as digital sovereignty, and the supply chain of cybersecurity products in Europe, as well as to present an overview of the relationship between the global ICT market and the cybersecurity market. The paper is presented by way of a consultation, where ENISA seeks the views of all relevant stakeholders (citizens, private stakeholders, and public stakeholders) on how the European market may be understood and improved. The outcomes of this consultation will serve as input for a further publication on the topic of ICT industrial policy in Europe and input into the discussions with the new Commission and European Parliament.

A number of questions are presented at the end of this paper. Your input in response to these questions would be welcomed before the 3th of September 2019.

Please respond to this consultation using the survey available at the following link: https://ec.europa.eu/ eusurvey/runner/2e3cf370-aa20-bd5c-1796-b89bf1599c6d

Figure 1: The EU sandwiched between the US and Asia

INTRODUCTION

In the last 20 years, the European ICT industry has begun to fall behind in the global competition race. Sandwiched between the giants of the ICT industry in the US and Asia, Europe is struggling to keep up and risks losing hold of its own digital sovereignty.

Surprisingly, this is happening while the EU and EU Member States are among the most digitally developed world economies[1]. Europe has created a number of successes such as Skype, Sailfish, F-Secure, AVG, Signal, and the re-emergence of Nokia mobile handsets. We also see in Switzerland a culture of promoting start-ups and supporting the financial sector and in particular the encouragement of blockchain with supporting regulatory

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1   European Commission, "I-DESI 2018", 26 October 2018. Available at: https://ec.europa.eu/digital-single-market/en/news/how-digital-europe-compared-other-major-world-economies

legislation to give effect to this encouragement.[2]

This short opinion paper looks at the strengths and shortcomings of the industrial policy in the EU with a view to how Europe can do better, and how the development of the EU ICT industry in the years to come can be rendered a success and not a failure.

Figure 1 portrays a traditional depiction of the current state of the global ICT market, where the EU is stuck in the middle between the US and Asia.

However, it is suggested that the marketplace is more complicated than the above diagram seems to indicate. In order to gain a better understanding of the marketplace, the first question that needs to be analysed is in what part/segment of the market do we intend to compete. Any market analysis will always clearly indicate that you cannot compete in every aspect of the market, that market segmentations are different and that any competitive advantage is only temporary. For example, if we take the 5G market, the hamburger could be seen from a different perspective, as illustrated in figure 2:
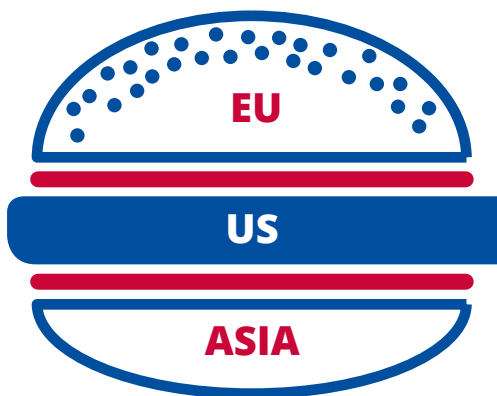
Figure 2: The 5G hamburger

This example clearly illustrates that Europe is in a traditionally strong position in respect of mobile communications. It is suggested that European policy has followed the approach of trying to be a master of everything. Clearly, this is not an ideal situation. Europe needs to identify its market, gather the necessary evidence to identify the correct market segment, and pursue a specific strategic approach. In this regard, do we need another European Facebook? Or a European TV screen manufacturer? Europe has a strong track record in developing key software, car manufacturing, and intellectual property in certain areas.

Further research should be carried out to clearly identify and focus on those market segments where Europe has the possibility to demonstrate competitive advantage.

Given the proposal for the development of cybersecurity competence centres, one of the initial tasks could be the gathering of evidence to support the decision-making process, as no report has been identified that addresses this aspect of the market research.

The US reportedly filed 56,142 international patents in 2018, closely followed by China with 53,345 patent filings[3]. Approximately one in ten of the Chinese applications came from Huawei Technologies, making it the leading filer of international patent applications for 2018[4]. At a European level, according to the European Patent Office (EPO) figures for 2018, Siemens had the highest number of patent applications and was ahead of Huawei by a narrow margin, with 2,493 applications compared with Huawei's 2,485[5].

ICT and cybersecurity are closely interlinked. While ENISA's mandate is to focus on cybersecurity, the importance and strategic aspect of cybersecurity underpins the ICT sector in relation to both hardware and software. Strengthening EU cybersecurity is key to securing European digital sovereignty and the EU ICT industry. Given the size of the European market in a global marketplace, Europe finds itself as an ICT taker rather than an ICT maker. Any solution to the European ICT problem will require an equivalent European cybersecurity solution, which should be seen as an opportunity rather than an insolvable problem.

This short consultation paper looks at the strengths and shortcomings of the ICT industrial policy in the EU with a view to how Europe can do better, and how the development of the EU ICT industry in the years to come can be rendered a success and not a failure.

If we sit in an average European office, the computers and printers are generally produced in Asia and the software is primarily developed in the US. When we turn on our computers, the operating system is generally of US origin. When we turn on our browsers, we generally select from Microsoft, Google, Apple or Firefox products. Other browsers, which had their origin in Europe such as Opera[6], are now owned by non-European entities.

Where Europe once led the world in the deployment of initially analogue and then mobile digital technology (such as GSM), in the network and in the handset

2   Global Legal Insights, "*Blockchain and Cryptocurrency Regulation 2019 | Switzerland*", 2019. Available at: https://www.globallegalinsights.com/practice-areas/blockchain-laws-and-regulations/switzerland

3   The Economist, "Briefing: Huawei", 27 April 2019.

4   World Intellectual Property Organisation (WIPO), "WIPO 2018 IP Services", 19 March 2019, PR/2019/830. Available at: https://www.wipo.int/pressroom/en/articles/2019/article_0004.html

5   Frankfurter Allgemeine, "Siemens holt sich den Titel im Erfinden zurück", 12 March 2019. Available at: https://www.faz.net/aktuell/wirtschaft/diginomics/siemens-stellt-in-europa-die-meisten-patentantraege-16084333.html

6   Reuters, "*BRIEF-Opera Software says has closed $575 mln with China's Golden Brick*", November 4, 2016. Available at: https://www.reuters.com/article/idUSObiJnNKLa

markets, Europe is now debating the appropriateness of the supply of 5G technology from non-European suppliers.[7] Traditional EU mobile handset manufacturers are struggling to compete with major Asian and US suppliers. Europe is dragging its feet with regard to investment in emerging technologies, attracting a mere 11 percent of the global corporate investment and venture capital in AI in 2016. This compares with 50 percent in the US and 39 percent in Asia.[8]

Back in the 1980s, the technology challenge between the EU standard Video 2000 developed by Grundig and Philips, the Japanese Betamax, and the US VHS for domestic video recording and watching was taking place.

While it was generally recognised that the Video 2000 was technologically superior, the VHS technology won the marketing game. This example illustrates the complexity of the marketplace and the need to address not only technical quality, but also price and marketing if the product is to succeed. Where telecommunication services revenues are concerned, the EU28 are falling behind the US, although the relative market share still remains greater than in Asian countries, as illustrated in figure 3

Telecom service revenues (EUR bn)
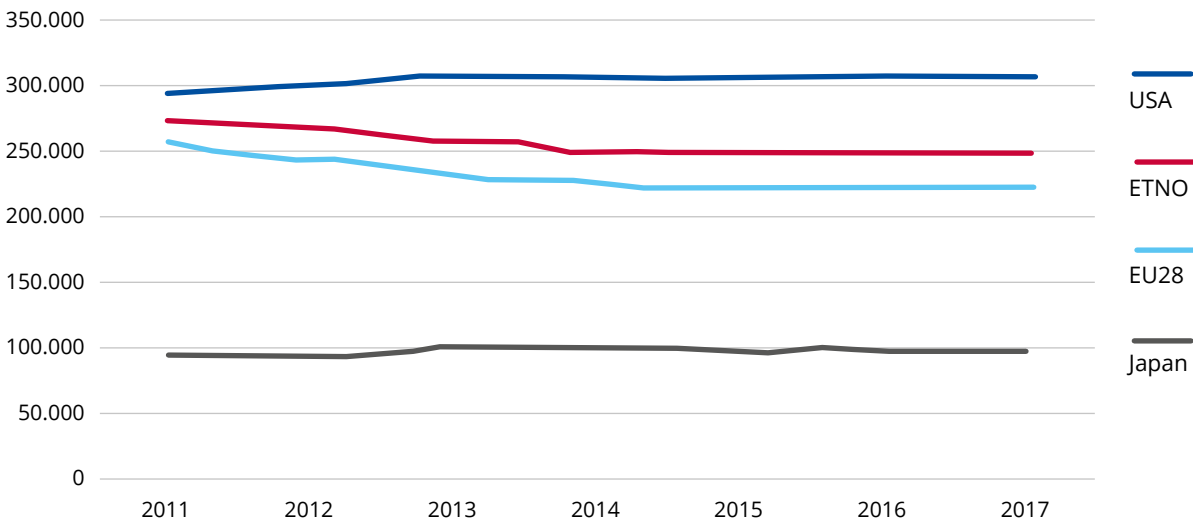
|	2011	2012	2013	2014	2015	2016	2017
ETNO	276.395	268.985	285.762	251.650	250.060	249.235	249.906
EU28	253.100	245.031	233.912	226.323	223.461	222.336	222.575
Japan	97.486	98.353	98.869	99.055	98.786	98.684	98.341
USA	291.915	303.934	307.524	308.402	312.511	310.830	309.595

Source: IDATE

Figure 3: Telecom service revenue in the EU28, Japan and US for 2011-2017 (IDATE)[9]

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7   European Parliament, "*Resolution of 12 March 2019 on security threats connected with the rising Chinese technological presence in the EU and possible action on the EU level to reduce them*", 12 March 2019. Available at: http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P8-TA-2019-0156+0+DOC+XML+V0//EN&language=EN

8   World Economic Forum, "*Innovate Europe: Competing for Global Innovation Leadership*", January 2019. Available at: http://www3.weforum.org/docs/WEF_Innovate_Europe_Report_2019.pdf

9   Retrieved from: European Telecommunications Network Operators' Association (ETNO), "*Annual Economic Report 2017*", at p. 17. Available at: https://etno.eu/datas/publications/annual-reports/ETNO%20Annual%20Economic%20Report%202017%20(final%20version%20web).pdf
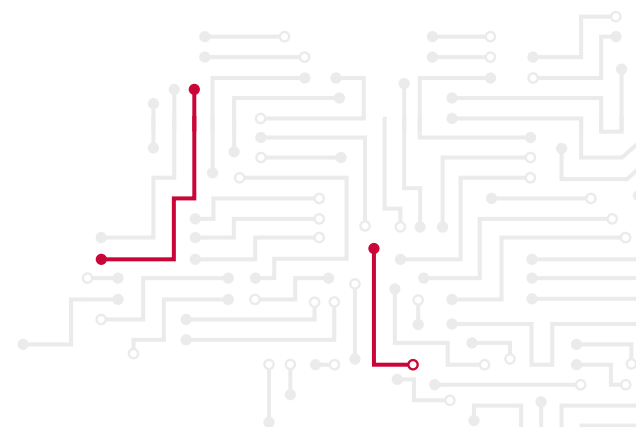
In an increasingly globalised world, Europe has often presented itself as a champion of values. However, the EU's normative power alone cannot guarantee the digital sovereignty of its citizens or its businesses. To regain its influence and shed its status as an ICT industry lightweight, Europe needs to deliver European champions in the ICT sector that succeed in the marketplace.

While the EU continues to engage in bilateral Free Trade Agreements as opposed to multilateral trade agreements, and the EU applies a strict interpretation of competition law, it can be argued that its competitors do not share the same values. Consequently, the EU may be suffering a serious competitive disadvantage.

While it is not proposed that Europe try and build a global PC company, but rather that it should focus on its existing strengths, consideration could be given to adopting a more flexible approach to mergers and acquisitions policy to allow European companies to expand further and compete effectively in the global marketplace. A revised strategic approach to the European ICT sector that targets the areas in which EU industry has the potential to excel, would enable European businesses to capitalise on comparative advantages that have remained untapped to date.

Interestingly, in 2016, key players in the European cybersecurity industry made a number of recommendations on cybersecurity for Europe. The recommendations of this group, which is known as the European Cybersecurity Industry Leaders (ECIL), include:[10]

1. Creating a level playing field for enterprises within the EU;

2. Establishing voluntary cybersecurity certification processes at the European level;

3. Promoting and enhancing cooperation between EU Member States;

4. Positively considering market consolidation and adapting merger rules accordingly ("Airbus approach"[11]).

IIn spite of this contribution, as well as subsequent efforts aimed at improving industrial policy in the EU, we

are still waiting for the new champions of the European ICT industry to emerge.

Securing, developing and keeping European intellectual property in the EU should be a priority, as should the creation of a flexible legal framework that can contribute to the scalability of European ICT businesses.

A review of ICT industrial policy in the EU should seek to revisit the core underlying business models that work in the marketplace, stimulate research, development and innovation, promote a flexible interpretation of competition law, and actively work towards safeguarding European intellectual property in the ICT sector

In an increasingly globalised world, Europe has often presented itself as a champion of values, however, the EU's normative power alone cannot guarantee the digital sovereignty of its citizens or its businesses. To regain its influence and shed its status as an ICT industry lightweight, Europe needs to deliver European champions in the ICT sector that succeed in the marketplace.

In an increasingly globalised world, Europe has often presented itself as a champion of values, however, the EU's normative power alone cannot guarantee the digital sovereignty of its citizens or its businesses.

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10 European Cybersecurity Industry Leaders, "*Recommendations on Cybersecurity for Europe*", January 2016. Available at: http://ec.europa.eu/newsroom/dae/document.cfm?action=display&doc_id=13326 See: Gordon, Sarah, "Airbus - the European Model", Financial Times, 23 May 2014. Available at: https://www.ft.com/content/c9a9a77c-db07-11e3-8273-00144feabdc0#comments-anchor

11 See: Gordon, Sarah, "Airbus - the European Model", Financial Times, 23 May 2014. Available at: https://www.ft.com/content/c9a9a77c-db07-11e3-8273-00144feabdc0#comments-anchor

1. MOBILE OPERATING SYSTEMS – A EUROPEAN COMPETITOR

In the mobile, as well as in the desktop operating system markets, US developers are dominant on the global market. All operating systems with more than five percent of the global market share are owned by US companies (Google, Microsoft or Apple):

operating system that is available for Japanese (Sony) mobile phones.[16] While the statistics for Sailfish are not publically available, it is believed that this operating system is being widely used in certain parts of the world.
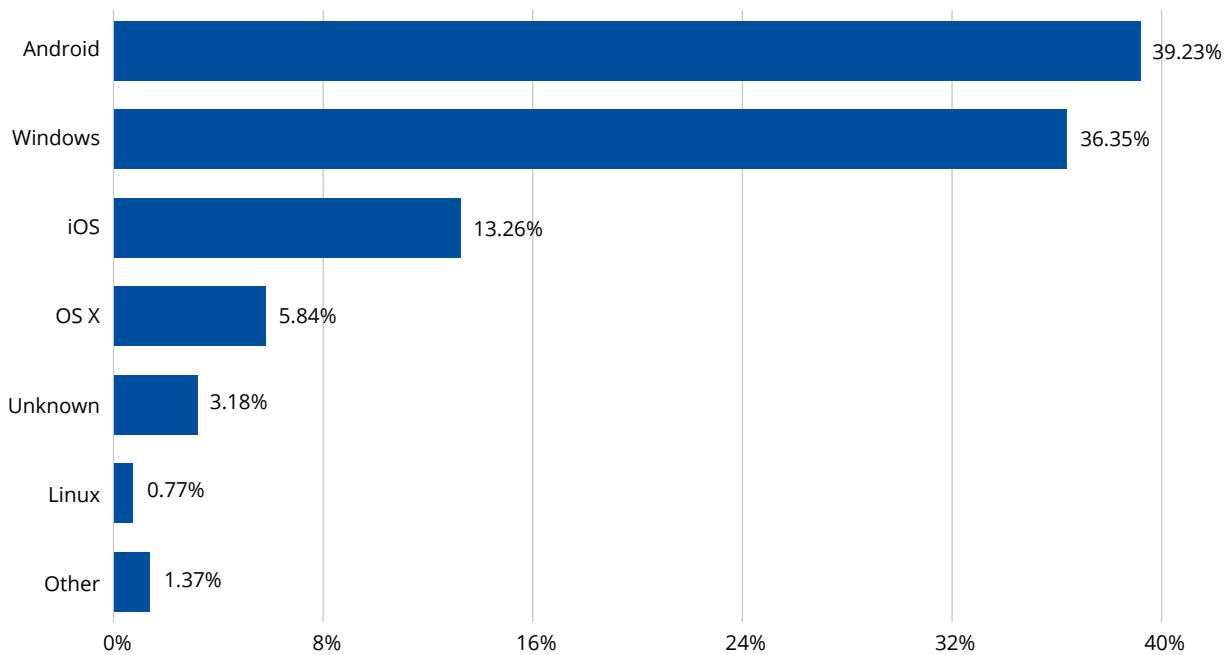
Figure 4: Operating System Market Share Worldwide - February 2019 (Statcounter)[12]

The open source European Sailfish OS constitutes an independent alternative operating system. Sailfish was developed by the Finnish company Jolla[13] as an evolution of the Linux MeeGo OS, which was previously developed by Nokia and Intel.[14] This operating system targets in particular corporate and governmental consumers who want a greater degree of control over the software.[15] Sailfish, which can be installed on Xperia phones, represents a rare example of a European

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12 According to data retrieved from Statcounter, four players dominate the operating systems market with a combined market share of approximately 95 percent of the global market. All of these four operating systems are of US origin. See: Statcounter, "*OS Market Share*", February 2019. Available at: http://gs.statcounter.com/os-market-share

13 Jolla website: https://jolla.com/

14 Sailfish OS website, "*Info: Sailfish OS History*". Available at: https://sailfishos.org/info/

15 Lomas, Natasha, "*The other smartphone business*", 9th March 2019. Available at: https://techcrunch.com/2019/03/09/the-other-smartphone-business/

16 Jolla website, "*Sailfish X – the downloadable Sailfish OS*". Available at: https://jolla.com/sailfishx/

2. THE CYCLE OF FAILURE IN EU ICT INDUSTRIAL POLICY

2.1 CHALLENGES OF THE EU ICT INDUSTRY

In 1991, the Global System for Mobile Communications (GSM) was first launched in the European markets. GSM technologies subsequently came to dominate the global marketplace. GSM is a classic example of a European success story. It illustrates the strength of European innovation, but also the strengths of European governance, which succeeded in handling the complexity and coordination of public and private stakeholders to support the rollout of GSM in Europe. In the years following the successes of GSM, examples of European leadership in the ICT industry begin to fade. This is illustrated by the absence of any European players in the top 15 digital companies worldwide. The question is why, and how can Europe get back on track?

can be seen in the following statement: "so sturdy and over-engineered that you could chuck the German handset across the room and still hear your boss screaming at you with perfect clarity"[18]. Despite the high quality and durability of these products, Siemens eventually sold its mobile branch to BenQ, a Taiwanese company.[19] An important aspect to the decline of Siemens mobile phone manufacturing was possible over-engineering and delays in bringing the products to market. Other missed marketing opportunities included the launching of new products after the Christmas market was finished.

European businesses with a high market potential are often acquired by companies from outside of the EU that see the strategic value of investing in Europe. For example, the German company Secusmart was founded in 2007 and quickly became an important player in
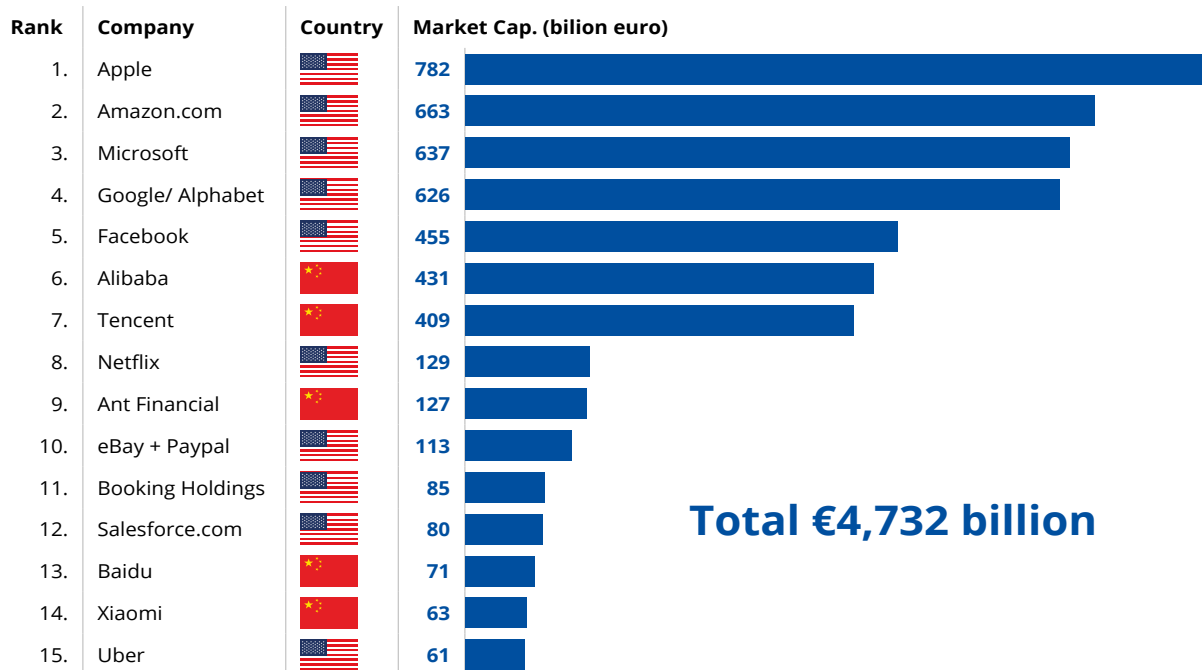
NO EUROPEAN COMPANY IN THE TOP DIGITAL 15

Rank	Company	Country	Market Cap. (bilion euro)
1.	Apple	USA	782
2.	Amazon.com	USA	663
3.	Microsoft	USA	637
4.	Google/ Alphabet	USA	626
5.	Facebook	USA	455
6.	Alibaba	China	431
7.	Tencent	China	409
8.	Netflix	USA	129
9.	Ant Financial	China	127
10.	eBay + Paypal	USA	113
11.	Booking Holdings	USA	85
12.	Salesforce.com	USA	80
13.	Baidu	China	71
14.	Xiaomi	China	63
15.	Uber	USA	61

Total €4,732 billion

Figure 5: Top 15 global digital companies[17]

In the ICT sector in particular, time to market can be equally important as delivering quality products. From the 1980s to the 2000s, Siemens sold mobile phones. A jovial expression that makes fun about the durability of Siemens phones

anti-eavesdropping solutions for mobile communications.[20] Recognising the vast potential of this rising star of ICT industry, Blackberry acquired ecusmart

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17 European Commission, "Europe in May 2019: Preparing for a more united, stronger and more democratic Union in an increasingly uncertain world", 30th April 2019. Available at: https://ec.europa.eu/commission/sites/beta-political/files/euco_sibiu_communication_en.pdf

18 See Siemens Belgium website: https://www.siemens.be/cmc/newsletters/index.aspx?id=13-613-17686

19 Deutsche Welle, "*Siemens sells cell phone unit*", 7th June 2006. Available at: https://www.dw.com/en/siemens-sells-cell-phone-unit/a-1607417

20 See Secusmart website: https://www.secusmart.com/de/home/

in 2014.[21] Unfortunately, European competitors did not move quickly enough and this promising venture moved abroad as a result.

These examples also illustrate the assertiveness of non-EU players and the lack of enthusiasm of European players when it comes to investing in new companies with growth potential. Perhaps the scale and differences across the EU Member States also form part of the challenge. The current population of over 500 million spread across 28 Member States (19 of which are in the Eurozone), as well as 24 official languages,can be seen as adding to the complexity of building strong ICT industry players in the EU.

mover advantages are realised. The greater use of pan-European standards, as is proposed for cybersecurity in the current EU Cybersecurity Act, can contribute to achieving this objective.

Europe is known for its numerous and innovative SMEs, but European ICT businesses typically neither grow by means of mergers nor acquisitions, nor do they succeed in achieving scale. These shortcomings can in part be traced back to a perceived overly burdensome regulatory environment that does not encourage growth and risk taking.

The EU also appears to lack a strong entrepreneurial culture, and conservative attitudes in European

Figure 6: Acquisitions of EU tech companies made by large US tech companies (Slush & Atomico)[22]

By comparison, a country like the US, with a population of roughly 300 million, a single currency, and one national language, appears to benefit from significant advantages. Diversity can also be the EU's strength, but only when cross-fertilisation of ideas and coordination of industrial efforts are successfully achieved and first

companies may lead to lower numbers of acquisitions. European businesses typically refrain from taking the risks that their overseas competitors take and accordingly do not reap the benefits that can be the outcome of calculated risk-taking behaviour. Even in the EU, there appears to be a high level of lobbying and representations by US companies.[23] Furthermore, successful European businesses are often acquired by larger companies from outside the EU.

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21 Broedersen, Bjoern, "*Blackberry kauft Sicherheits-Spezialisten Secusmart*", areamobile, 29th July 2014. Available at: http://www.areamobile.de/news/27981-blackberry-kauft-sicherheits-spezialisten-secusmart

22 Slush & Atomico, "*State of European Tech Report 2016*", November 2016. Available at: https://www.slideshare.net/AtomicoVentures/the-state-of-european-tech-2016-full-report

23 Of the top six lobbying companies and groups by meetings in the EU Transparency Register, four represent US tech companies: Google, Microsoft, Facebook, and IBM, See: Transparency International EU, "*EU Integrity Watch*". Available at: https://www.integritywatch.eu/lobbyist.html

Worldwide SP Equipment Market*
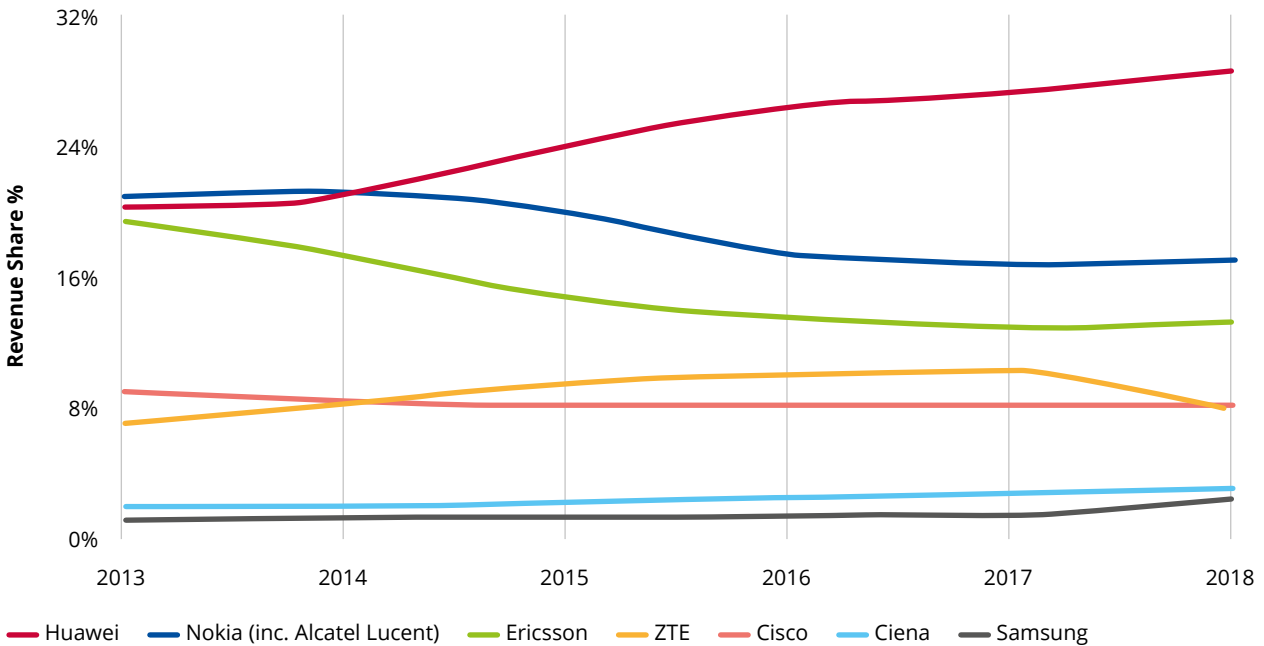
Source: Dell´Oro Group
*Equipment includes: Broadband Access, Carrier IP Telephony, Microwave, Mobile RAN, Optical, SP Router and CE Switch, Wireless Packet Core

Figure 7: Worldwide Telecom Equipment Market Shares 2013-2018 (Dell'Oro Group)[24]

The EU is a leader when it comes to competition law and intellectual property rights. However, if and when the same or similar standards are not being upheld abroad, it makes for an uneven playing field for European business. For example, as reported by the Commission, EU stakeholders claim that certain non-EU ICT companies widely use patented technologies without paying adequate royalties.[25]

It is also observed that non-EU market actors make attempts to dump their products on the European market at artificially low prices that do not accurately reflect the production costs.[26] Furthermore, another practice that can distort competition is unfair state subsidies in countries outside of the EU, to the competitive disadvantage of European ICT businesses.[27]

To address the new globalised landscape of competition politics, a Franco-German proposal has already been tabled for a review of the industrial strategy of the EU. This new approach would entail a revision of existing European competition rules.[28]

The challenges faced by European industry are for example reflected in the telecommunications equipment market, where the revenue share of major European players has declined in recent years.

2.2 CHALLENGES TO EU DIGITAL SOVEREIGNTY

EU digital sovereignty has become a major policy issue and challenge for the operators of digital services, the end users, policymakers, and academia/think tanks. Europe is increasingly importing ICT products and services in a globalised marketplace to a point where the value of cybersecurity has been diminished to a level that European digital service operators are no longer in a position to guarantee the cybersecurity aspects of their products and services. This approach runs contrary to the high standards of privacy and data protection set down in the General Data Protection Regulation (GDPR) where Europe is seen to be a leader in this area.

24 Dell'Oro Group, "*Key Takeaways – Worldwide Telecom Equipment Market 2018*", 4 March 2019. Available at: http://www.delloro.com/delloro-group/telecom-equipment-market-2018

25 European Commission, "*Report on the protection and enforcement of intellectual property rights in third Countries*", SWD(2018) 47, 21 February 2018, at p. 9. Available at: http://trade.ec.europa.eu/doclib/docs/2018/march/tradoc_156634.pdf

26 European Parliament, "*Dumping explained: definition and effects*", 27 June 2018. Available at: http://www.europarl.europa.eu/news/en/headlines/economy/20180621STO06336/

27 European Commission, "*Anti-subsidy*", 30 January 2019. Available at: http://ec.europa.eu/trade/policy/accessing-markets/trade-defence/actions-against-imports-into-the-eu/anti-subsidy/

28 Alipranti, Z, "*France and Germany set to tilt EU competition policy*", Open Europe, 6 March 2019. Available at: https://openeurope.org.uk/today/blog/france-and-germany-set-to-tilt-eu-competition-policy/

As manufacturing is mainly in the hands of non-EU entities, so is the control over data and many cybersecurity aspects of ICT products, which can undermine the digital sovereignty of European citizens..

It is difficult to explain this contradiction from a European perspective. Perhaps one of the reasons for this difficulty is insufficient coordination in relation to cybersecurity in the EU. Many Member States are actively working in the area of cybersecurity. However, this effort is being duplicated at high expense and reducing the efficient use of funds and resources.[29] Strengthening cooperation between Member States and avoiding duplication of both human and financial resources can contribute to addressing this issue.

1. The data sovereignty over the personal data of EU citizens – the personal aspect;

2. The digital sovereignty of data-driven European industry – the industry aspect; and

3. The digital sovereignty of the EU and the EU Member States – the political aspect.

These three categories are interrelated as they all hinge on the ability of the EU to foster and maintain its strategic ICT sector. With the manufacturing and development of ICT products and services predominately in control of non-EU industry, the difficulty of working towards a digitally sovereign Europe is significantly increased.

Figure 8: If Europe fails, its ICT industry will be only history[30]

European digital sovereignty can be perceived as encompassing three categories:[31]

Cumulatively, the above factors could be interpreted as a failure of European ICT industrial policy. Beyond taking baby steps, tackling this perceived cycle of failure requires a paradigm shift in the way we think about the ICT industry in Europe and a radical break with current practice. The section below outlines possible approaches to support the future development of a more globally competitive EU ICT sector and thus reduce the dependency of EU Member States on ICT vendors outside the EU

29 European Commission, "*Proposal for a Regulation of the European Parliament and of the Council establishing the European Cybersecurity Industrial, Technology and Research Competence Centre and the Network of National Coordination Centres*", 12 September 2018, COM(2018) 630. Available at: https://ec.europa.eu/digital-single-market/en/news/proposal-regulation-establishing-european-cybersecurity-industrial-technology-and-research

30 Adapted from: "*Abandoned office – meat factory – East Berlin – by Ottsworld*". Available at: https://www.pinterest.com/pin/478507529128344375/

31 Gueham, F, "*Digital Sovereignty – Steps Towards a New System of Internet Governance*", Fondapol, January 2017. Available at: http://www.fondapol.org/wp-content/uploads/2017/02/F.GUEHAM-Digital-Sovereignty.pdf

3. HUAWEI AS A CHINESE ICT INDUSTRY SUCCESS STORY

According to figures from 2018, the biggest mobile phone exporters are in Asia (China and Vietnam).[32] One of the fastest growing businesses in this area is Huawei, which in 2018 surpassed Apple as the second largest smartphone company by market share.[33] Strategic investment decisions can be perceived as an important dimension of Huawei's ascent.

Microsoft completed its acquisition of the mobile phone manufacturing branch of Nokia in 2014, creating Microsoft Mobile. This acquisition was followed by the gradual divestment and eventual closure of the operation. Subsequently, HMD Global, a Finnish start-up, acquired the mobile phone branch of Nokia.[34]

With the decline of Nokia's mobile phone presence, Huawei made a strategic decision to invest in Finland and the engineers who used to work in Nokia[35] by establishing an R&D centre in Helsinki in 2012[36] and another R&D facility in Tampere in 2017[37]. These facilities leveraged the expertise in the camera technology and the antennas associated with mobile phones.

What this in effect means is that the supply chain is very complex and we see that European expertise is recognised by Asian manufacturers and that they are prepared to invest in this expertise to accelerate the bringing to market of European world class products and technology.

The disappointing part is that European mobile phone manufacturers were not prepared to make this strategic investment in European technology and people. An additional complexity is where large companies take over small companies with a view to eliminating their potential competition. Other differences that potentially make non-European and non-OECD companies more competitive are the diverging corporate social responsibility (CSR) norms, as well as looser regulatory compliance requirements.

Additionally, it is no coincidence that Huawei's first operation outside of China was in Kista, Sweden, which is the location of the Ericsson Headquarters, where European technology and expertise is world class.[38]

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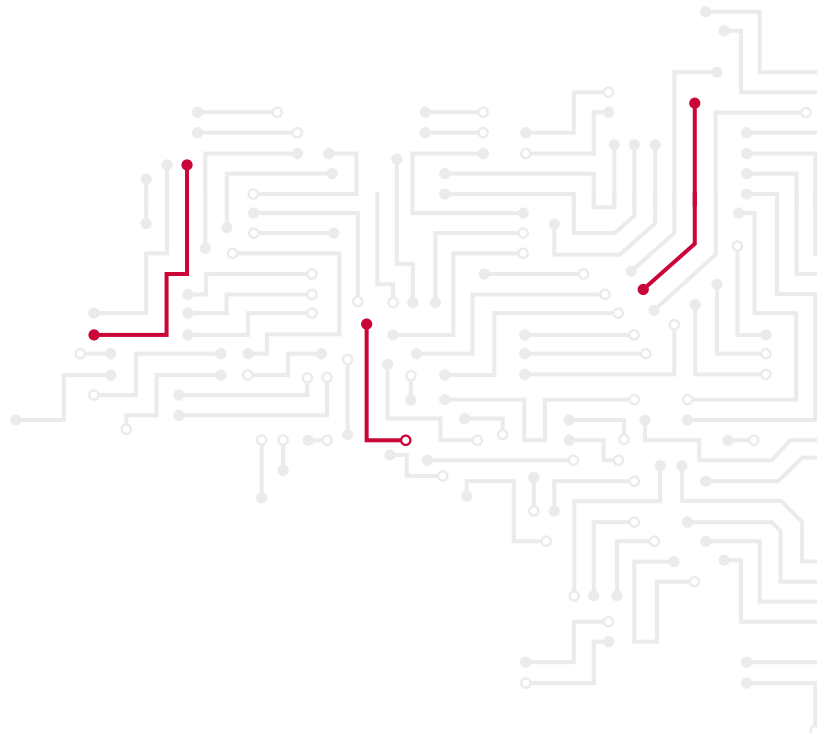
32 The Economist, "*China's grip on electronics manufacturing will be hard to break*", 11th October 2018. Available at: https://www.economist.com/business/2018/10/11/chinas-grip-on-electronics-manufacturing-will-be-hard-to-break

33 International Data Corporation, "*Smartphone Rankings Shaken Up Once Again as Huawei Surpasses Apple, Moving into Second Position While Overall Market Declined 1.8% in Q2 2018, According to IDC*", 31st July 2018. Available at: https://www.idc.com/getdoc.jsp?containerId=prUS44188018

34 See HMD Global website: https://www.hmdglobal.com/about

35 Invest in Finland, "*Huawei's Finnish R&D centre specializes in mobile technology*", 15th July 2014. Available at: https://www.investinfinland.fi/-/huawei-s-finnish-r-d-centre-specializes-in-mobile-technology

36 Ricknäs, Mikael, "*Huawei invests $90M in Finland to build better smartphones*", December 10th 2012. Available at: https://www.computerworld.com/article/2493682/huawei-invests--90m-in-finland-to-build-better-smartphones.html

37 Goodnewsfinland, "*Huawei opens new R&D centre in Finland*", September 15th 2016. Available at: http://www.goodnewsfinland.com/huawei-opens-new-r-d-centre-finland/

38 Scott, Jennifer, "*Huawei bets on European talent with mobile R&D*", 13th September 2013. Available at: https://www.computerweekly.com/news/2240205380/Huawei-bets-on-European-talent-with-mobile-RD

4. BREAKING THE CYCLE

4.1 THE EU ICT INDUSTRY AS A STRATEGIC SECTOR

While the EU has very strong competition rules in relation to commercial activity, the success of the Airbus project in the 1990s was based on the strategic realisation of the importance of the aircraft industry, a very close liaison between government and industry[39], and the recognition of the difficulty of competing in this area on a global scale. An alternative business model with regard to the EU ICT industry, taking into account the Airbus example, could replicate this success and contribute to the global competitiveness of European ICT products and services.

Consideration could be given to adopting a flexible interpretation of competition rules with an aim to creating a protected environment for local players identified as strategic on the European market and stimulating the growth potential of EU ICT businesses. It is noteworthy in this regard that a similar approach has already been adopted by non-European countries. At an EU level, the Common Agricultural Policy (CAP), which has been applied for the last few decades, forms an example of how strategic markets can be afforded special attention. Perhaps the time is now ripe to consider the European ICT industry for similar treatment.

Recognising that Europe is currently falling behind the US and Asia, a flexible approach to legislative and/or financial policies should be considered to facilitate and stimulate the EU ICT manufacturing and service sector. The support of this sector should not only stimulate financial investment but also generate human capital investment, where products and services could be delivered that represent European values and standards while positioning Europe well in the export market.

Additionally, the European public sector has the ability to encourage a more demand-driven market instead of the existing market, which is driven by the supply push principle alone. One option is to contribute to innovation in the ICT industry and to maximise public procurement in this area with an aim of stimulating the European market.

A prospective reinvigoration of the ICT industrial strategy in Europe would require an evidence-based strategic approach. This process starts with identifying and studying the market to clarify the strengths and weaknesses of the EU ICT sector, and weigh the opportunities for success, as well as the threats that may impede further development. In this manner, the EU can build a comparative advantage by targeting areas of relative strength that demonstrate a potential to compete in the global marketplace.

A degree of self-reflection on the European ICT industry may be needed to identify on what advantages Europe should compete in order to avoid getting lost in the middle (costs, quality, or customer relationship), as illustrated in the figure below.

Clearly, Europe cannot win in terms of costs in a global competitive environment given the standard of living and culture of government support for citizens. This model suggests that Europe's competitive advantage can or should be delivered by way of product leadership and quality and/or having in place a special relationship with customers.

Figure 10: Possible sources of competitive advantage

The power of the European market, given its size, should not be underestimated. The GDPR has extraterritorial effect in that third country companies who supply services on the European market are obliged to comply with this Regulation. A similar argument can be applied to the certification proposals contained in respect of cybersecurity in the EU Cybersecurity Act. In this regard, market decisions enforceable by European law can have an effect on third country markets and impose on them European values and cultures.

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39 Von Dohnanyi, Klaus, "*Dohnanyi: Die Lehren aus dem Airbus-Erfolg*", Hamburger Abendblatt, 3 February 2001. Available at: https://www.abendblatt.de/archiv/2001/article204759423/Dohnanyi-Die-Lehren-aus-dem-Airbus-Erfolg.html

Another way in which the EU is already making efforts to tackle low investment in the digital sector is through the Commission's Investment Plan for Europe. In particular, the European Fund for Strategic Investment (EFSI), a joint effort of the European Investment Bank, the European Investment Fund, and the Commission, can be used to finance digital projects and businesses including broadband investments, start-ups and scale-ups, IoT, cybersecurity, and emerging priorities (including 5G and automated driving). Current efforts within this framework are aimed primarily at contributing to digital infrastructure projects.[40] TThis positive initiative needs to focus more on the software that runs on digital platforms rather than the digital platforms themselves. A similar initiative can be seen in the proposal of the Commission aimed at encouraging a more focussed investment in cybersecurity by the creation of centres across the EU to focus on research and development in the area of cyber security, as well as an EU-level centre[41]

4.2 PROMOTING THE TRUST AND QUALITY OF EUROPEAN ICT PRODUCTS AND SERVICES

The comparative advantage of European products and services is the high level of trust and quality that is associated with the "made in the EU" label worldwide. Following the high standards that Europe has adopted in the GDPR, the EU should also capitalise on its ability to develop products and services that deliver trusted cybersecurity on a global scale.

The Cybersecurity Act[42], and the proposal for a European Cybersecurity Certification Framework contained therein, lay the groundwork for developing European cybersecurity trust labels that could boost the competitiveness of ICT products and services globally.

European businesses also have one of the largest consumer markets in the world, the EU, at their disposal, and the delivery of certified products and services can inspire the trust of consumers within the EU. The ICT technology in a typical European office space may change if the consumer perceives the choice as being between a better quality and more secure product manufactured in the EU versus a product manufactured outside the EU with lower standards.

4.3 MARKET FRAGMENTATION

In the European ICT context, the efforts both of industrial players and of research organisations frequently are fragmented, thereby hindering the attainment of optimal results for the EU Digital Single Market. This fragmentation of capabilities means that work may be duplicated and that otherwise valuable contributions to the European market are going to waste. In order to overcome the challenges of market fragmentation, it is necessary to coordinate and cooperate with regard to the research and industrial capacities in the area of ICT. Due regard should also be given to the effectiveness of funding opportunities, which at present do not always result in the most desirable outcomes.

The EU is taking steps aimed at facilitating the coordination of efforts between Member States, as well as cooperation at a European level. For example, in September 2018 the Commission proposed a Regulation establishing a European Cybersecurity Competence Centre, as well as a network of Coordination Centres in the Member States with a proposed Union contribution to its budget of approximately two billion euros.[43] This draft Regulation aims to contribute to the European Digital Single Market by creating a Europe-wide ecosystem with a view to investing in stronger and pioneering cybersecurity capacities in the EU. As follows, the proposed Cybersecurity Competence Centre and Network offers an opportunity to strengthen the coordination of the efforts of cybersecurity research and industry, and to make funding more accessible to regions and untapped areas in the EU.

In the prospective implementation of this draft Regulation, account should be taken of the effective and economical distribution of EU funding to prevent a repetition of past shortcomings, and to develop funding programmes that work for European research and industry. ENISA is already playing a role here by advising on research needs and priorities with regard to cybersecurity.

4.4 SUPPORTING SMALL AND MEDIUM-SIZED ENTERPRISES (SMES) IN THE EU ICT SECTOR

It is estimated that 99 percent of all businesses in the EU are SMEs.[44] With SMEs taking up such a significant portion of European business, it is no overstatement to say that SMEs form the backbone of the EU economy. It is therefore essential that the EU provide the necessary access to investment and support services to promote innovation and productivity among European

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40 European Commission, "*EFSI in the digital sector*". Available at: https://ec.europa.eu/commission/priorities/jobs-growth-and-investment/investment-plan-europe-juncker-plan/investment-plan-results/efsi-digital-sector_en

41 See note 28

42 European Commission, "*Proposal for a Regulation of the European Parliament and of the Council on ENISA, the "EU Cybersecurity Agency", and repealing Regulation (EU) 526/2013, and on Information and Communication Technology cybersecurity certification ("Cybersecurity Act")*", COM(2017) 477. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2017:477:FIN

43 See note 28

44 European Commission, "*What is an SME?*" Available at: https://ec.europa.eu/growth/smes/business-friendly-environment/sme-definition_en
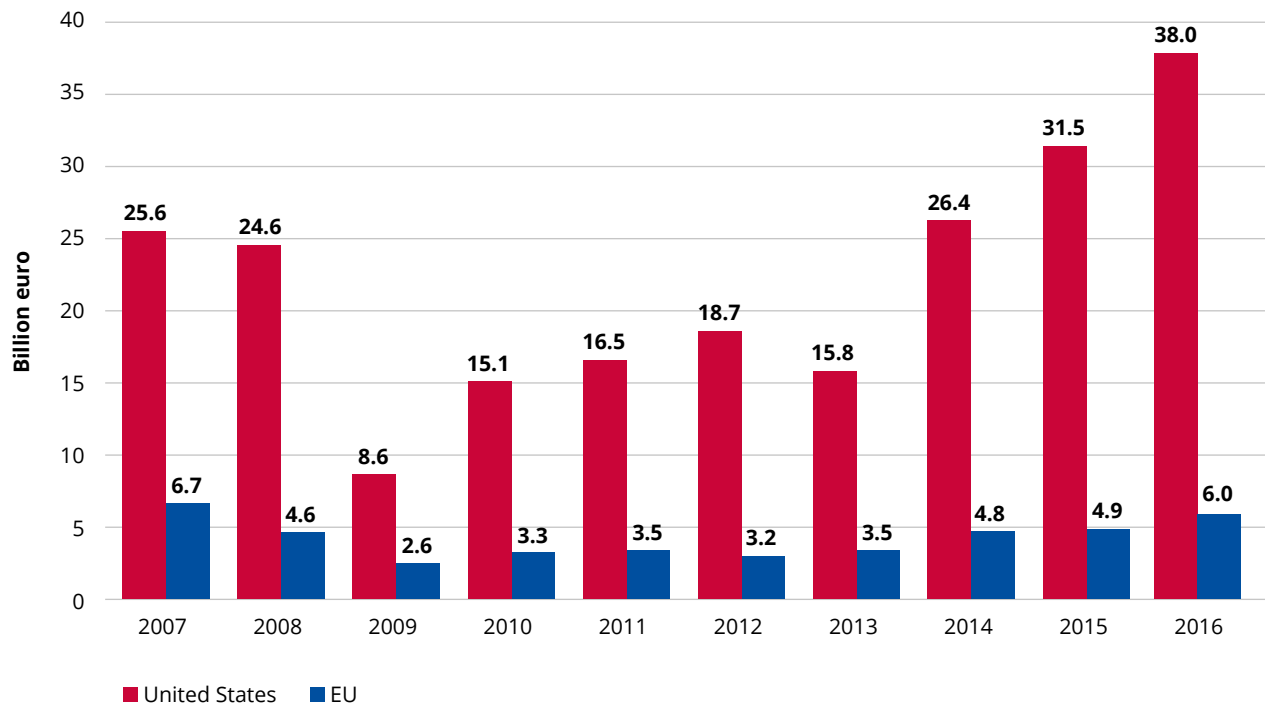
Figure 10: Venture capital funds raised (billion euro) in the EU (excl. HR, CY, MT, SI, SK) and US, 2007-2016 (European Commission)[45]

the ICT sector. Over the past years, European ICT SMEs have been overburdened and underexploited and it is observed that initial success on the EU market does not easily translate into global competitiveness. Moreover, the companies that achieve a certain level of success often move their headquarters outside the EU to jurisdictions that are perceived as having a more favourable business climate.[46] Notwithstanding this, the potential of European ICT SMEs is boundless – SMEs are drivers of innovation and frequently offer high quality products and services.

When we look at the market value of the top 100 companies globally, the influence of digital companies can be clearly seen as they increase in value and displace the traditional brick and mortar companies. Many of these digital companies started off some twenty years ago as small SMEs with a vision.

In other sectors such as manufacturing, which is typically characterised by relatively low technology intensity, European players have been able to produce competitive SMEs that have developed into successful global players. It is unclear why such SME champions have succeeded in manufacturing, but not in ICT

Supporting European SMEs means facilitating access to capital thereby reducing barriers to much-needed funding for small businesses. It also means contributing to a strong culture of entrepreneurship with a supportive and constructive industrial policy. This policy should reflect European ambition, build on the strengths of European industry, including European SMEs, and stress the reputation of trustworthiness and security for which EU products have become known globally. ENISA contributes by providing a forum for discussion on how to better understand and improve the market for SMEs, e.g. through its Industry Events. In relation to supporting SMEs, consideration should be given to their future growth potential and the application of global best practices that exist for SME support.
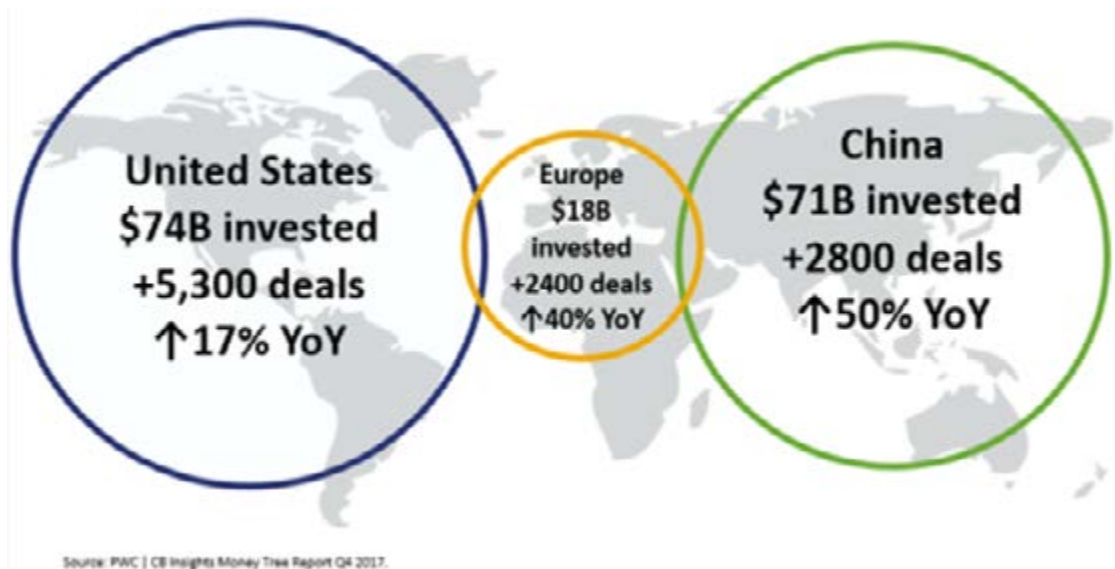
4.5 BUILDING A EUROPEAN START-UP CULTURE WHERE FAILURE IS NOT A STIGMA

A closely related issue is the need to nurture and encourage an entrepreneurial start-up culture across the EU. Nurturing the European start-up culture can help stimulate the building and the accelerating of start-ups, as well as their further development into scaled-up companies. European start-up unicorns[47] remain underrepresented in relative terms in comparison with their US and Asian counterparts.

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45 European Commission, "*Science, Research and Innovation Performance of the EU 2018*". Available at: https://ec.europa.eu/info/sites/info/files/rec-17-015-srip-report2018_mep-web-20180228.pdf

46 See: McGrath, Cornelius, "*Move to Silicon Valley vital for ambitious European tech groups*", Financial Times, 23 November 2017. Available at: https://www.ft.com/content/33a85426-6277-11e7-8814-0ac7eb84e5f1

47 Recognising the definition of a unicorn as a start-up company that reaches a value of $1 billion or more, see: CB Insights, "*The Global Unicorn Club*", 2019. Available at: https://www.cbinsights.com/research-unicorn-companies

Source: PWC | CB Insights Money Tree Report Q4 2017.

Figure 11: Venture capital markets in the United States, China, and Europe (Q4 2017)[48]

As of 2018, Europeanorns make up only about 11% of the global total.[49] The US and China, by contrast, account for a combined total of more than 80% of unicorns worldwide.[50] Additionally, start-ups show a tendency to move their HQ to locations outside of the EU once they reach ahhhhh certain size.[51] The relatively limited availability of venture capital in the EU in comparison with, e.g. the US, may contribute to this issue:

Perhaps the higher availability of venture capital from the US is in part attributable to the different perception of what attributes of a business are valuable in the US context. The risk appetite of US companies means that they appear to be more likely to look beyond the present revenue of a business, but to focus on the potential future value of investment opportunities.

The support of a risk-based entrepreneurial culture and the effective use of venture capital are key to addressing start-up culture in the EU. The market attractiveness for start-ups can also be boosted by reducing administrative burdens while providing the appropriate state assistance. From a business culture perspective, EU companies should not shy away from risk and factor in more the future potential of investment opportunities when making a valuation.

Furthermore, Europe's leading universities and technical colleges can drive innovation and contribute to the development of industry. Survey results indicate that the proportion of start-ups founded from a university or a university project (spin-offs) is lower in the selected EU Member States than in neighbouring Switzerland. In fact, in Switzerland the number was 18.1 percent, whereas the next highest-ranking EU Member State had only 13.5 percentt.[52] Encouraging and investing more in the academic spin-off model can play an important role in harnessing Europe's innovative capacities and supporting young entrepreneurial talent in the EU.
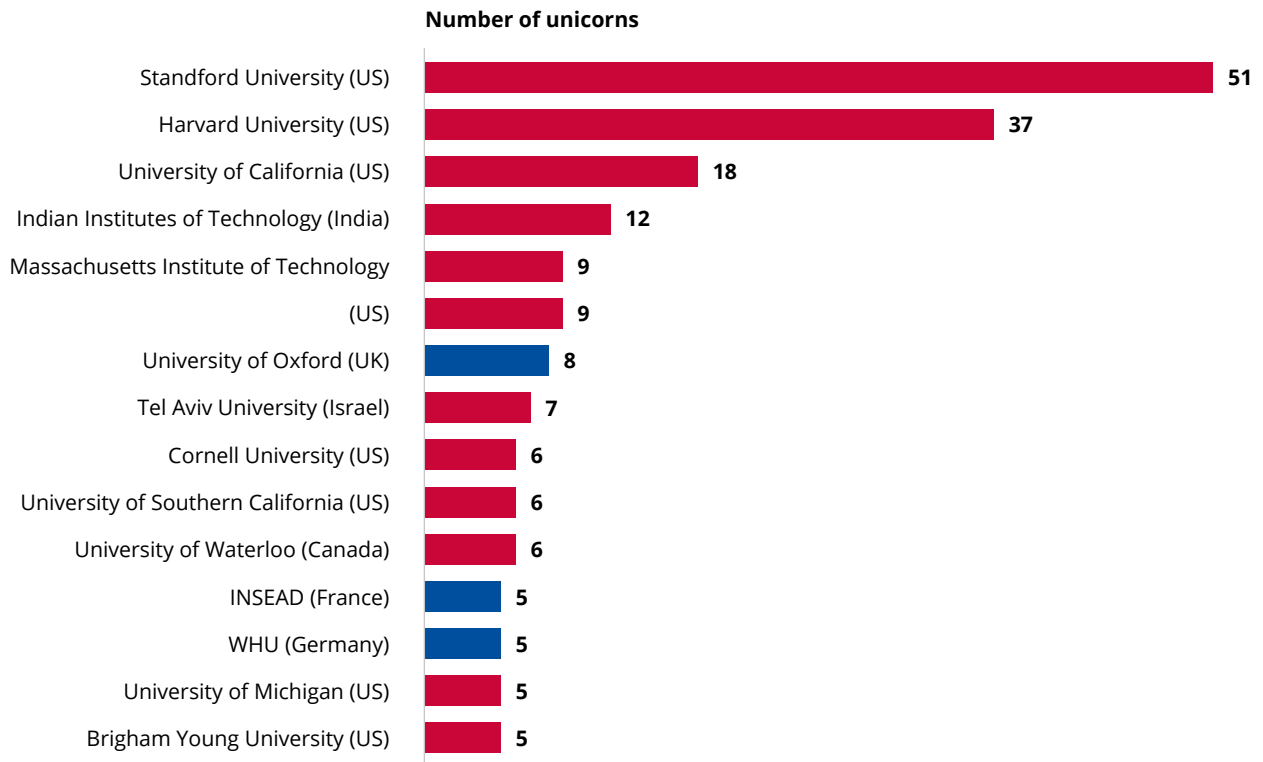
4.6 CYBERSECURITY SKILLS AND TRAINING

A prerequisite for a booming European ICT sector is to support a strong cybersecurity skills base across the EU. In this regard, the challenge faced by the European market is two-fold. Firstly, there is a cybersecurity skills shortage in the EU and, secondly, the skills available are not being used in the most effective and efficient manner possible. A 2017 estimate suggested that Europe will have 350,000 more cybersecurity jobs than it has skilled workers in this area by 2022.[53]

A number of options exist to contribute to the development of cybersecurity skills, including the development of awareness raising campaigns, support to lifelong learning and training initiatives, as well as

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47 European Commission, "Science, Research and Innovation Performance of the EU 2018". Available at: https://ec.europa.eu/info/sites/info/files/rec-17-015-srip-report2018_mep-web-20180228.pdf

48 CB Insights, "*The 31 European Unicorns Ranked by Valuation*", November 6 2018. Available at: https://www.cbinsights.com/research/european-unicorns-valuation/

49 Crunchbase, "*VCs Are On Track To Make 2018 A Record Year For Unicorns*", August 9 2018. Available at: https://news.crunchbase.com/news/vcs-are-on-track-to-make-2018-a-record-year-for-unicorns/

50 Supra note 45.

51 Statista, "*Percentage of startups founded from a university, or university project spin-off in selected European countries as of 2016*", 2016. Available at: https://www.statista.com/statistics/878922/startups-founded-from-universities-in-europe/

52 Frost & Sullivan, "*2017 Global Information Security Workforce Study*", 2017. Available at: https://iamcybersafe.org/wp-content/uploads/2017/06/Europe-GISWS-Report.pdf

Number of unicorns

University	Number of unicorns
Standford University (US)	51
Harvard University (US)	37
University of California (US)	18
Indian Institutes of Technology (India)	12
Massachusetts Institute of Technology	9
(US)	9
University of Oxford (UK)	8
Tel Aviv University (Israel)	7
Cornell University (US)	6
University of Southern California (US)	6
University of Waterloo (Canada)	6
INSEAD (France)	5
WHU (Germany)	5
University of Michigan (US)	5
Brigham Young University (US)	5

Figure 12: Alma mater of unicorn founders (Atlas)[1]
The blue stripes indicate the Universities that are based in EU Member States

For example, a "Get Cyber Skilled" campaign was launched as part of the European Cybersecurity Month in 2018.[2] Opportunities can also be explored in the context of the aforementioned European Cybersecurity Competence Centre and Network proposal. Incorporating cybersecurity as part of the standard curriculum for all students should be a priority. Additionally, the development of a core cybersecurity curriculum for professionals in both the public and private sector should be considered.

ENISA could cooperate with the proposed European Cybersecurity Competence Centre and Network on this topic. The efforts in the area of cyber skills should be based on a long-term strategy that tackles the cybersecurity skills needs across the EU.

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53 Atlas, "*Alma mater of unicorn founders*", 2017. Available at: https://www.theatlas.com/charts/HJSgAUdPx

54 European Cybersecurity Month, "*Get Cyber Skilled*". Available at: https://cybersecuritymonth.eu/get-cyber-skilled/get-cyber-skilled

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

Digital development policy should work for and not against the European market. While a progressive scenario would see the adoption of a positive and collaborative policy that builds on the complementary strengths of various global players, the present reality requires a more pragmatic approach.

Success requires risk. New business and regulatory models need to be produced that anticipate the evolution of the market over the next 5 to 10 years and lay the groundwork for the success of the European ICT industry. Government needs to act as a stimulus and not an inhibitor to this progress.

In an increasingly inter-connected world, the European ICT sector should be strengthened and stimulated to improve its competitiveness in the global marketplace, as well as in the domestic marketplace. A number of recommendations can contribute to this goal:

1. The EU should revisit its ICT industrial policy by recognising it as strategic, while also supporting its ICT sector.

2. Building on the Airbus success story, competition law should be interpreted flexibly and in a manner that supports and incentivises the European ICT industry;

3. The EU and Member States should reduce regulatory barriers and administrative burdens for EU ICT businesses;

4. European IP needs to be protected. The EU and Member States should consider identifying European IP developed with public funds as strategic and subjecting it to pre-export regulatory approval;

5. Public procurement in the Member States should be used to stimulate the EU ICT industry;

6. The EU needs a long-term strategy for building and maintaining a cyber-skilled Europe;

7. The EU should embrace and encourage a more risk-based entrepreneurial culture. Venture capital should be more readily accessible to European ICT businesses with strong growth potential.

5.2 QUESTIONS FOR CONSULTATION

1. Do you agree with the principles outlined in this paper? Please outline where you agree or disagree.

2. Do you think Europe should focus on developing the cybersecurity market? If yes what do you think are Europe's competitive advantages and how do you envisage that these advantages will develop?

3. Do you think competition policy and/or legislation or the interpretation thereof needs to be changed in respect of the European ICT and cybersecurity markets? Please explain.

4. Do you agree a more thorough market analysis needs to be carried out to identify where Europe has a competitive advantage in cybersecurity/ICT?

5. Which body or bodies do you think would be most appropriate to carry out this market analysis? Please explain.

6. What do you think could be done to improve the financial standing and ability to grow/expand of European cybersecurity undertakings?

7. Are there any other initiatives that could be put in place to stimulate the European cybersecurity/ICT market?

8. Are there any other issues that you would like to raise to contribute to this debate?

ABOUT ENISA

The European Union Agency for Cybersecurity (ENISA) is working to make Europe cyber secure since 2004. ENISA works with the EU, its member states, the private sector and Europe's citizens to develop advice and recommendations on good practice in information security. It assists EU member states in implementing relevant EU legislation and works to improve the resilience of Europe's critical information infrastructure and networks. ENISA seeks to enhance existing expertise in EU member states by supporting the development of cross-border communities committed to improving network and information security throughout the EU. Since 2019, it draws up cybersecurity certification schemes. More information about ENISA and its work can be found at www.enisa.europa.eu.

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