

# The Strategy Behind Sovereign Mobile Operating Systems Adoption

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‘The greatest mistake ever is whatever mismanagement I engaged with, that cost Microsoft not to be what Android is’  
- Bill Gates

## Executive Summary

Android™ and iOS are not the first mobile operating systems, even for smartphones. Before them European companies had their own mobile operating systems for their products, Symbian for example, was the most popular one.

### Why is this market so strategic ?

In this paper the state of the art from past and current mobile operating systems (OS) is set up. Followed by the strategic importance of an operating system. The paper will conclude with an analysis on why past actors failed, and today solutions combined with a new approach regarding the adoption of new, existing and mature, sovereign mobile operating systems.

The beginning of mobile operating systems can be described as a strong European presence. Overtaken by Apple and Google (later Alphabet) which today share a duopoly position regarding the mobile operating system market. Europe shifted from being a leader in this domain to solely rely on alternative solutions.

The operating system is a product that when interacted with generates data, and **data is the new oil**. Where before countries had refineries to transform petrol in oil, today there are companies that gather data and transforms it in advertisement. And such a strategic market had repercussions on both sides, the European side, that adopted, what could be called at the time, alternative mobile OS (iOS and Android™). This adoption led to job losses when the European mobile OS was abandoned. And on the American side, which benefited from the adoption of its own mobile OS, which led to job creation on the same period. It is such a strategic market to be the bridge between end users and companies that even Huawei decided to build it's own mobile OS in case of a market or legal issues between China and the United States of America (USA or US). Today one knows that Huawei was right to prepare itself to today's economical war between the USA and China. An economical war that Europe could also face due to its data protective laws such as the General Data Protection Regulation (GDPR) which has been fining US companies. The European Union also funds solutions to not depend on foreign services such as the Cloud with GaiaX but one often forgets that **if one owns the operating system and the hardware, one's service proposal will always be superior to the one outsiders might propose**, so if European countries want to continue developing online services for its citizens, such as a cloud or online voting, not depending on someone else platform is an important step to take.

This sovereignty is put to the test regarding mobile OS, since today original equipment manufacturers or telecom companies, even European ones, cannot commercialise alternative Android solutions or will face lawsuits as it happened with Acer. Even mobile applications (apps) suffer from an American duopoly with no major social apps, no chatting apps nor professional apps ranking in the first 10 applications downloaded in Europe. The TikTok case is a perfect example of an application climbing the application stores rankings which is forced to sell part of its activities if it wants to continue operating. With spying allegations, the problem being that a lip sync dancing application is spying on US

soldiers and not the fact that US soldiers videotape themselves close to sensitive material. If TikTok had lost its licence to use Google Mobile Services (GMS) or to be downloaded on Apple's application store it would be the commercial end to the company as it would not be able to operate elsewhere in the world apart from China.

With China blocking most GMS the Chinese companies developed their own alternative mobile operating systems. But creating an alternative mobile OS is not an easy task. Past mobile OS failed because the market they targeted was the consumer one, a market that needs the latests trending applications. Those applications are developed by companies that need to make developing choices such as in which technologies the company must focus to attend the maximal number of consumers. Even though developed by Amazon, Amazon Fire OS did not have a huge consumer base due to the fact that very few trending applications were available in its mobile store. Developers had to re-code their applications for it to work with Amazon Fire OS. But **there is one market that does not need the latest trending application : the professional one**. A company employee or a government official does not need Snapchat in its professional mobile phone.

Alternative European mobile operating systems already exist, are adopted by public administrations outside Europe and provide the necessary applications for any professional. **The objective of this paper is not to tell European Union's representatives to make an invitation to tender for companies to build a fork or a mobile OS from the ground up**, since this would cost 833 millions euros. But rather to adopt in its administrations or companies, an European mobile operating system.

## Introduction

Today mobile phones are with us at all times, and inside them, there is the mobile operating system, an interface capable of making us interact with both the hardware and the online services.

Both mobile devices and operating systems have evolved overtime, providing more features such as the touch screen, finger scanner or the face recognition and on the software side, today one is able to do several tasks at the same time such as listening to music and playing games at the same moment, and perform the same actions a regular laptop would do.

These interactions one has with the mobile operating system generates data, the same data that can be used in many use cases such as studying how an user behaves with its device and the proposed services, publicity, among many others. This data confers to the company developing the operating system the strategic knowledge of how one likes or dislikes a proposed add, may it be a political one. By using these devices every day the company has the possibility to display any information, any day, at anytime, anywhere, to the consumer.

This strategic position behind operating systems is what will be demonstrated here, among the failures and solutions to adopt a sovereign solution.

## Part I

# Mapping of past and present mobile operating systems

## 1 Past European mobile operating systems

Before adopting Android™ (Sonic Ericsson Satio) and Microsoft OS (Nokia N96), major manufacturers such as Sony Ericsson and Nokia used Symbian OS on their handsets. Smaller smartphones manufacturers would instead use proprietary operating systems, such as Alcatel. In 2008 Nokia acquired Symbian Limited, the editor of the Symbian Operating System.

By the fourth quarter of 2006 Symbian OS had a 67% share in the global mobile devices market <sup>1</sup>, in part due to the emergence of Apple's iOS.

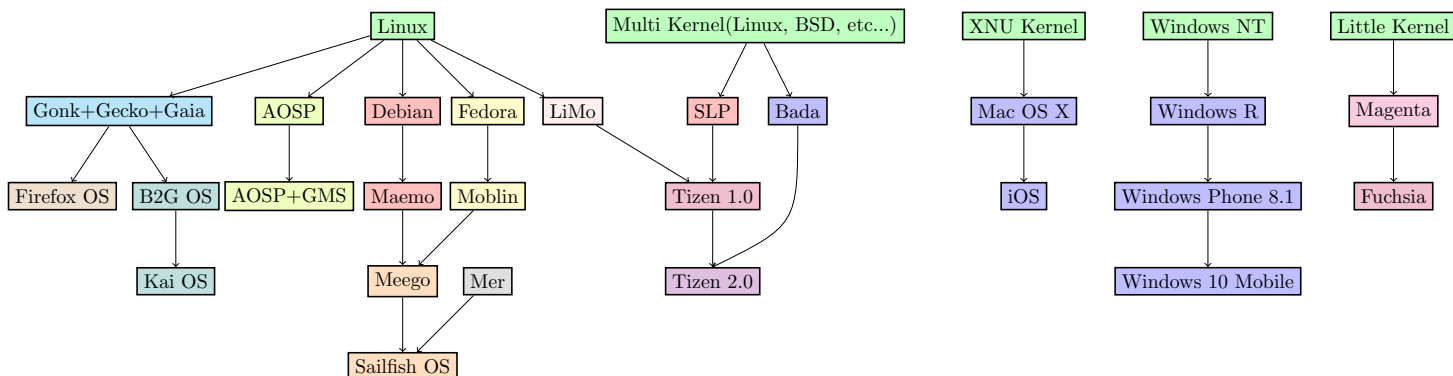
### 1.1 Here comes Apple and Google to take the lead

In January of 2007 Apple announces the iPhone and in September of 2008 T-Mobile announces the T-Mobile G1 : 'the First Phone Powered by Android'. In June 2009 Symbian OS began its fall in market share to iOS in Europe. By 2011 iOS, Android™ and BlackBerry had all surpassed the European giant: Symbian OS.

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<sup>1</sup>Canalys research- '64 million smart phones shipped worldwide in 2006' - 12/02/2007 - Read the 04/01/2021

## 2 Current mobile operating systems



**Figure 1:** Map of current mainstream mobile OS

Green=Kernel.

Each branch has it's own color, once two branches merge, so does the colors.

### 2.1 Investors in current mobile operating systems companies

#### 2.1.1 Kai OS

- Founded in 2016, first release in 2017.<sup>2</sup>
- 22 millions dollars Series A investment from Alphabet<sup>3</sup>.
- 50 millions dollars Series B investment from Cathay Innovation(leader), Alphabet, TLC Holdings and Orange<sup>4</sup>.
- Orange and Google ally to buy EMEA startups<sup>5</sup>.

#### 2.1.2 AOSP

- Founded in 2004, acquired by Alphabet in 2005.
- Open Headset Alliance (OHA) 'standardises' Android™, OHA is supposed to be an alliance of companies using the Android operating system, yet its clear it was only a disguise for Alphabet as seen in the lawsuit with Acer releasing Android forked phones. See Part III.
- There are several forks of Android developed by other companies but they are mostly based on Alphabet's code.

<sup>2</sup>S. Codeville - 'Meet KaiOS Technologies: The force behind 30 million phones and counting' - 20/12/2017 - Read the 29/01/2021 - kaiostehc.com

<sup>3</sup>S. Codeville - 'Google leads series a investment round in KaiOS to connect next billion users' - 27/06/2018 - Read the 9/08/2020 - kaiostech.com

<sup>4</sup>I. Lunden - 'KaiOS raises \$50M, hits 100M handsets powered by its feature phone OS' - 22/05/2019 - Read the 9/08/2020 - techcrunch.com

<sup>5</sup>I. Lunde - 'Orange and Google form new partnership to invest in and buy EMEA startups' - 31/05/2018 - Read the 9/08/2020 - techcrunch.com



### 2.1.3 Sailfish OS

- Developed by the Jolla company, founded in 2011, first release in 2013.<sup>6</sup>
- Jmobile Investment 20.9% share.<sup>7</sup>
- Sami Pienimäki 17.3% capital shares.
- Antti Saarnio 16.4% capital shares.
- Marc Dillonilla 16.4% capital shares.
- Stefano mosconi 16.4% capital shares.
- Jolla Boat 2.6% capital shares.
- Funded by the the Finnish Funding Agency for Technology and Innovation (Tekes), now called businessfinland<sup>8</sup> from 2012 to 2015 for a total of 7 961 963€.

### 2.1.4 Tizen

- Hosted by the Linux Foundation in 2011<sup>9</sup> as a successor to MeeGo. Today the operating system is owned by the Tizen Association, former LiMo Foundation, a part of the Linux Foundation.
- Open source governance.
- Technical Steering Group makes the decisions : Intel, Samsung, Huawei.
- Hyogun Lee, head of the Technical Steering Group.

### 2.1.5 iOS

- Released by Apple in 2007<sup>10</sup>.
- Apple is the sole owner of the operating system.

### 2.1.6 Fuchsia

- Created by Alphabet in 2016<sup>11</sup>
- Alphabet accepts community developers.

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<sup>6</sup>'About' - read the 29/01/2021 - jolla.com

<sup>7</sup>Markus Lehtiniitty' - 23.3.2014 - read the 13/08/2020 - mobiili.fi/2014/03/23/arvopaperi-jollan-suurimmat-omistajat-julki/

<sup>8</sup>Business Finland - 'Funding Paid' - read the 11/12/2020 - tietopankki.businessfinland.fi

<sup>9</sup>jzemlin - 'Welcome Tizen to The Linux Foundation' - 27/09/2011 - Read the 29/01/2021 - linuxfoundation.org - <https://web.archive.org/web/20110930160839/http://www.linuxfoundation.org/news-media/blogs/browse/2011/09/welcome-tizen-linux-foundation>

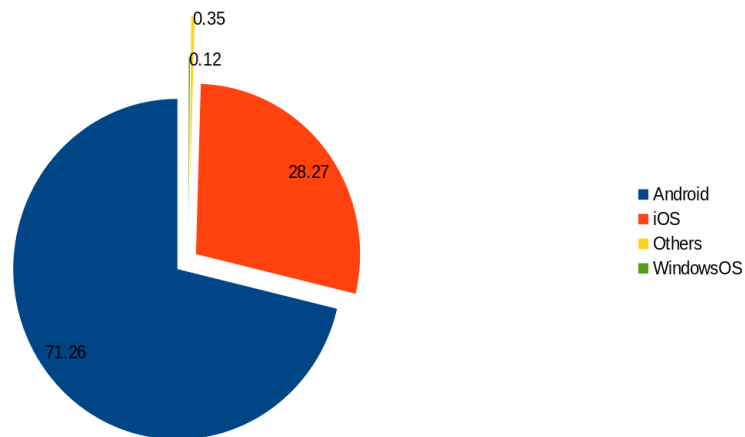
<sup>10</sup>S. Royal - 'iPhone OS 1: The Beginning of an Era' - 13/01/2017 - read the 29/01/2021 - lowendmac.com

<sup>11</sup>C. Davenport - 'Google is developing an OS called "Fuchsia," runs on All the Things' - 12/08/2016 - Read the 29/01/2021 - androidpolice.com

### 3 The current market size and its distribution in Europe

As we can see in the graphic below Android is the most represented mobile operating system for the year 2020:

Market Share Percentage of the Mobile OS Industry per Actor in Europe



Source : 'Mobile Operating System Market Share Europe Dec 2019 - Dec 2020' - Read the 30/01/2021 - statcounter.com

### 4 Conclusion of Part I

In this part we demonstrated that Europe had its own mobile operating system : Symbian OS, with an important market share. This mobile operating system was dethroned by two new actors: Apple and Google, who took a lead, which today can be considered as a duopoly in mobile operating systems. Today Europe depends entirely on foreign mobile operating systems and there is no major European actor standing up.

## Part II

# The strategic importance of mobile operating systems

The main task of an operating system is to be a layer between the applications and the hardware. Thus one who controls the operating system, controls how the applications will behave and the data they can or cannot access.

Smartphone acquirement is rising and so is their usage, it is proven by the fact that there are more Google searches using mobile devices than traditional computers. Forecasts are that, by 2025, 83%<sup>12</sup> of Europeans will adopt a smartphone and will connect to Internet using their smartphones rather than their computer. Which translates in more citizens connected to the internet all the time, sharing their data with third parties, a bigger market for application developers and smartphone manufacturers.

## 1 Jobs

An operating system without an application store and apps to interact with is just as useful as a cell phone : one can only make calls and send messages. For each application (app) there is at least one developer, sometimes it's a company, generating jobs and proposing developing services for companies who lack the know how. For example the Spanish company Rload Studio, who developed applications for optical clinics.

In 2017, the applications economy in the European Union (EU) generated 1.8 million jobs <sup>13</sup><sup>14</sup> the same calculation was used to estimate the EU's app economy in 2019, which generated around 2 millions jobs<sup>15</sup>. Since 2013 the European Union's app economy has been creating more qualified jobs such as mobile developers, user interface (UI) experts, user experience (UX) experts and quality testers among others specialists.

With an application marketplace and operating system duopoly the job creations remains limited since new actors have limited entry possibilities as it can be seen in the graphics below for the BlackBerry company :

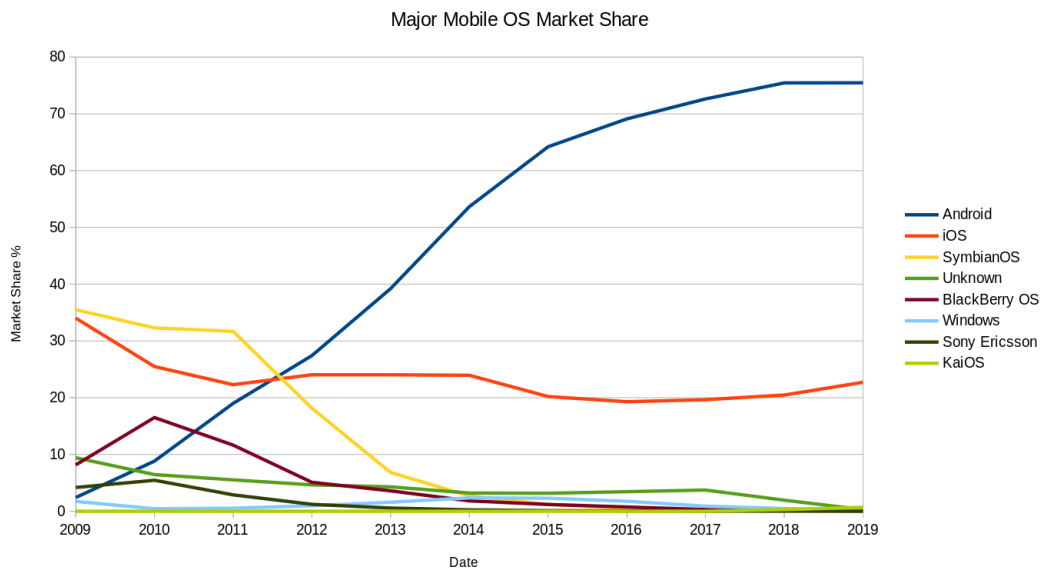
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<sup>12</sup>'GSMA - Mobile Economy 2020', 2020

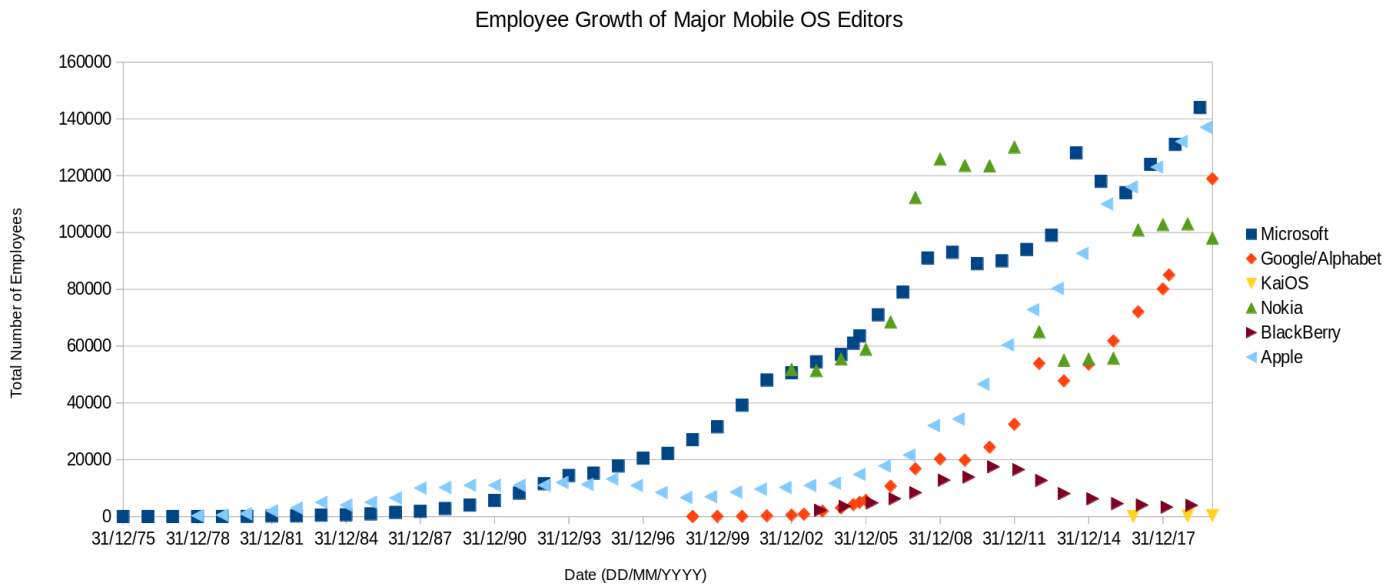
<sup>13</sup>direct, indirect and inducted jobs summed together

<sup>14</sup>Dr. Michael Mandel and Elliott Long, Progressive Policy Institute - 'The App Economy in Europe: Leading Countries and Cities, 2017' - 10/2017

<sup>15</sup>Michael Mandel - 'European App Economy Jobs Update, 2019' - 05/09/2019 - Read the 07/11/2020



Source : 'Mobile Operating System Market Share Worldwide 2009 - Dec 2019' - Read the 03/02/2021 - statcounter.com



Sources : 'For Alphabet/Google Inc, Microsoft and Apple the annual 10-K files, for BlackBerry the annual 40-F files, for Nokia the annual 20-F files, for Apple from its creation to 1993: "Apple Confidential 2.0 - Owen Linzmayer - 2004 - No Starch Press', for Microsoft from its creation to 1990 : "microsoft timeline from 1975 - 1990 - thocp.net - Read the 01/02/2021", for KaiOS : "About Us - kaios.com - Read the 01/02/2021"'

As shown in the graphics above, BlackBerry (brown color in both graphics) had a peak in both employee numbers and market share in 2010, and when the mobile operating system lost its competitiveness to Android and iOS the number of employees sunk.

A similar observation can be made regarding Nokia when Symbian lost its market share to Android and iOS in 2011: Nokia employees numbers also sunk. Microsoft's sudden growth and Nokia's sudden shrink in employee numbers from 2013 to 2014 is due to Microsoft's acquisition of Nokia Mobile for the development of Windows Mobile. In this deal Microsoft also acquired around 25 thousand employees from Nokia worldwide<sup>16</sup>.

But the graphic can also illustrate the growth in employee numbers for both Alphabet (Google Inc at the time) and Apple. iOS being released in 2007 and the first Android phone being released in 2008 a sudden faster growth is distinguishable in both companies employee numbers.

New operating systems means using different application stores rather than the popular ones<sup>17</sup>. Two popular options are available: either using third parties alternative application stores such as Aptoide and F-Droid, or hosting one's own application store.

- Third parties alternative application stores are stores that host application files such as 'apk'. Those files represent a desired application that can be installed in an operating system. These stores host applications available in official stores and applications not available in the official stores. They are often perceived as not secure but some have stronger security measures than the official store, for example the Portuguese's Aptoide alternative store. In this case scenario the job creation is limited since the programming language is the same, and the developer might only need to change certain Application Programming Interface (API) requests.
- Hosting your own application store means you control the applications hosted inside it and decide the policy behind it. This is the choice made by Amazon for its Fire Phones.

These two solutions can fit different types of mobile operating systems. For operating systems using Android both options are available, either using alternative application stores or hosting your own. For operating systems not based on Android, such as Firefox OS, one can't use Android based applications stores since the operating system is incompatible with the application's file format, therefore hosting its own application store is the most popular solution. A universal solution where 'apps' would be cross devices is to develop WebApps analogous Firefox OS applications.

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<sup>16</sup>'Mary Jo Foley - Microsoft takes control of Nokia's phone business; acquires 25,000 new employees - 25/04/2014 - Read the 05/02/2021 - zdnet.com'

<sup>17</sup>App Store and Play Store, since both of them can only be legally installed in their respective 'original' operating systems: iOS and Android™

## 2 The Huawei case

### 2.1 Why Huawei developed Harmony OS, an alternative mobile OS ?

After the House Permanent Select Committee on Intelligence investigations on Huawei and ZTE in 2012, Huawei decided to develop its own alternative mobile operating system: Harmony OS. This action was taken to prepare to a ‘worst case scenario’<sup>18</sup> where Huawei could see itself banned from using Google Mobile Services, which is the case today.

This act of resilience has been crucial for the survival of the company, if the same event were to happen in Europe we would not have any alternative solution but to choose ‘Chinese operating systems’<sup>19</sup>. If it seems an easy solution at first, it’s just moving the dependence towards an other actor.

## 3 Reasons for the European Union to adopt a mobile operating system resilience

### 3.1 Reducing Europe’s dependency and increasing its strategic autonomy

As seen in part I, iOS and Android are the leading mobile operating systems in European Union (EU)<sup>20</sup>. Keeping it that way is a resilience issue since our whole smartphone linked economy is dependent to our relationship with the United States of America (USA). This goes against Margrethe Vestager, Executive Vice-President of the European Commission, definition of digital sovereignty, where EU should not rely on a single supplier and be able to decide on it’s own. She adds: ‘If we don’t trust that we can communicate strongly secure among ourselves without foreign oversight or interference, well then we are not sovereign’<sup>21</sup>.

In 2014 the Working Group 3 at the NIS Platform concluded that the EU needed to support diversity in operating systems, arguing that ‘monocultures’<sup>22</sup> were vulnerable to attacks. Today an attack may not be a cyber one, but a legal or commercial one.

France’s president, Emmanuel Macron, acknowledges the need for an European technological sovereignty : ‘When it comes to technology, Europe needs to build it’s own solutions in order not to depend on American or Chinese technologies’<sup>23</sup>.

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<sup>18</sup>Li Tao and Yingzhi Yang - ‘Huawei has been building its substitute to Android for a rainy day. Is that day looming?’ - 27/04/2018 - Read the 07/11/2020 - scmp.co

<sup>19</sup>AOSP forks made by Chinese manufacturers  
<sup>20</sup>and the world

<sup>21</sup>Forum Europe - ‘EU Digital Sovereignty Session’ At 8m45s - 11/06/2020 - youtube.com

<sup>22</sup>NIS PLATFORM WORKING GROUP 3(WG3) - ‘STATE-OF-THE-ART OF SECURE ICTLANDSCAPE(FINAL,VERSION1)’ - 06/2014

<sup>23</sup>Groupe d’études géopolitiques - ‘The Macron Doctrine’ - 16/11/2020 - geopolitique.eu

The Federal Ministry of the Interior, Building and Community of Germany<sup>24</sup> also acknowledges the need for a digital sovereignty for the public administration and made a proof of concept on "Strengthening Digital Sovereignty in Public Administration"<sup>25</sup>. The same Ministry of Interior also agrees on the fact that it must be done in close coordination with the EU and that Open Source solutions will play a significant role.

### 3.2 Data is the new oil, were are the refineries ?

'94% of data in the western world is stored in the U.S.' Andrea Renda, senior fellow at the CEPS think tank<sup>26</sup>

There is no need to emphasise the importance of data and how it will impact the economy, as the 'new oil'<sup>27</sup>. The European Commission made several studies on how connected are EU citizens<sup>28</sup> and has for a goal to develop the percentage of EU population with basic digital skills to 65%, between 2018 and 2020 :

- 39% of the EU's citizens have mobile internet access<sup>29</sup>
- 4% of EU's citizens don't know how to use a mobile phone<sup>30</sup> . These users could be led to choose default settings in an Android or iPhone, strengthening the position of Alphabet and Apple in data gathering.
- 8/10 EU's citizens used a mobile phone to connect to the internet<sup>31</sup>
- 28% of people employed in the EU were provided with a professional smartphone, in some countries it's above 50% and the numbers rose from 2018 to 2019<sup>32</sup>
- 28% of EU's citizens never refused access to data when installing an app on their smartphone and 7% did not even know they could restrict or refuse the access to personal data<sup>33</sup>

What these informations shows us is the extent of influence Alphabet and Apple may have in the EU, with users who do not have the knowledge or technical skills to protect their personal data. By expanding the digital skills in the EU's population without having a share of the cake, the EU will only strengthen Alphabet's and Apple's position.

<sup>24</sup>Bundesministerium des Innern, für Bau und Heimat

<sup>25</sup>Der Beauftragte der Bundesregierung für Informationstechnik - 'Stärkung der Digitalen Souveränität in der Öffentlichen Verwaltung' - 08/2020 - Read the 08/02/2021 - bund.de

<sup>26</sup>Silvia Amaro - 'Europe's dream to claim its 'digital sovereignty' could be the next big challenge for US tech giants' - 20/11/2019 - Read the 10/12/2020 - cnbc.com

<sup>27</sup>The Economist - 'The world's most valuable resource is no longer oil, but data' - 06/05/2017 - Read the 09/12/2020 - economists.com

<sup>28</sup>27 states

<sup>29</sup>Eurostat - 'Individuals - mobile internet access'(ISOC\_CI\_IM\_I) - Read the 10/12/2020 - ec.europa.eu

<sup>30</sup>Eurostat - 'Reasons for not using mobile internet'(ISOC\_CIMOB\_I\_RUX) - Read the 10/12/2020 - ec.europa.eu

<sup>31</sup>Eurostat - 'Almost 8 out of 10 internet users in the EU surfed via a mobile or smart phone in 2016...' - 20/12/2016 - ec.europa.eu

<sup>32</sup>Eurostat - 'Use of mobile connections to the internet by employees'(isoc\_cimobp\_use) - Read the 10/12/2020 - ec.europa.eu

<sup>33</sup>Eurostat - 'Trust, security and privacy - smartphones (2018)' (isoc\_cisci\_sp) - Read the 10/12/2020 - ec.europa.eu

This is a non exhaustive list of Android personal informations collecting policy<sup>34</sup> and iOS personal informations collecting policy<sup>3536</sup>, it's important to note that iOS uses Google services in it's operating system, therefore when accepting iOS's End User Licence Agreement (EULA) one also accepts Google's EULA.

- Android collected personal information and sharing policy:
  - People you communicate with
  - Telephony Logs
  - Purchase activity
  - Connected devices next to your device (by WiFi or Bluetooth)
  - Google shares this information with third parties
- iOS collected personal information :
  - Apple ID credentials
  - GPS
  - Apple shares your personal data with other service providers

One must note that, when using alternative stores<sup>37</sup>, an Android™ phone owner can download its country's COVID-19 related application without having to provide personal information to Google. On the other hand an iPhone owner cannot download its country's COVID-19 related application without providing personal information to create and Apple ID since alternative application stores are forbidden on iOS.

One can go a step further :

1. Smartphones control wearable tech like smartwatches
2. In order to be a player in the wearable tech market it helps if one already makes smartphones
3. If one makes wearable tech, it's that much easier to take a step into the consumer Internet of Things

A reasonable question would be : **What will happen when EU switches to online voting and starts using smartphones to do so ?**

Today Alphabet is able (and did it)<sup>38</sup> to share personal data to target LGBT+ voters during elections in Europe, such information that can be gathered by using Android™'s default browser: Chrome, and even when a 'sensible' research is done in the incognito mode, Google can still track the user. The difference here with Cambridge Analytica is the fact that one does not need a Facebook account to do so, just a Google Account, something mandatory if one wants to use it's Android™ device to its full extent.

<sup>34</sup><https://policies.google.com/privacy?hl=en>

<sup>35</sup>[https://www.apple.com/legal/sla/docs/iOS14\\_iPadOS14.pdf](https://www.apple.com/legal/sla/docs/iOS14_iPadOS14.pdf)

<sup>36</sup><https://www.apple.com/legal/privacy/en-ww/>

<sup>37</sup>by downloading the .apk file from the browser without creating a Google account and accepting third party apps in the phone settings

<sup>38</sup>Dr Johnny Ryan, Senior Fellow of the Irish Council for Civil Liberties - 'Two years on from complaint to the Irish Data Protection Commission, the RTB data breach is the largest ever recorded, and appears to have worsened.' (Page 5) - 21/09/2020 - Irish Council for Civil Liberties



### 3.3 US sees Europe as a ‘foe’

A very common mistake would be to think that the economic war between the USA and China is not possible between the EU and the USA. Yet the 45<sup>th</sup> President of the United States of America, Donald J. Trump, thinks different, and sees the EU as a ‘foe’<sup>39</sup>. And even if the 46<sup>th</sup> President of the United States of America, Joseph Robinette Biden Jr., said 10 years ago: ‘The United States needs Europe’<sup>40</sup> one cannot solely rely on these words, knowing that today, EU has strong data protection laws and is imposing heavy fines to the American tech giants : the GAFAM<sup>41</sup>. Ten years ago Edward Snowden hadn’t released top secret documents from the American National Security Agency (NSA) about how the agency was spying on EU presidents, chancellors, ministers or citizens during the Obama administration, a president to whom Joe Biden was vice.

Today part of Joe Biden’s cabinet and senior advisers are former Brookings Institution (BI) Fellows, an institution financed notably by Alphabet, Amazon, Facebook, Apple and Microsoft and this since 2008<sup>42</sup>, this list of cabinet and senior advisers personnel with a financial relation to a data gathering company is non exhaustive:

- Antony Blinken wrote for BI<sup>43</sup> and founded WestExec, a ‘strategic consultants’<sup>44</sup> company, creating relationships between the Pentagon or the US Department of Defence and Silicon Valley tech startups
- Avril Haines is cited by John Allen, President of BI, as a ‘longtime friend’ of the Institution<sup>45</sup>. She also consulted for Palantir<sup>46</sup> a company that has data at the heart of its business model
- Janet Yellen, former fellow at BI<sup>47</sup>
- John Kerry, its brother, Cameron Kerry, is a visiting fellow at BI<sup>48</sup>
- Jake Sullivan worked for BI<sup>49</sup>
- Susan Rice was a senior fellow at BI<sup>50</sup>

<sup>39</sup>The Telegraph - ‘Donald Trump: ‘I think the European Union is a foe’ - 16/07/2018 - youtube.com

<sup>40</sup>Euractiv - ‘Biden: America needs Europe’(32:01) - 07/05/2010 - youtube.com

<sup>41</sup>Google Apple Facebook Amazon Microsoft

<sup>42</sup>Kennedy Elliott, Tom Hamburger and Alexander Becker - ‘Who funds the new Brookings?’ - 30/10/2014 - Read the 10/01/2021 - washingtonpost.com

<sup>43</sup>‘Antony J. Blinken’ - Read the 10/01/2021 - brookings.edu

<sup>44</sup>BRYAN BENDER and THEODORIC MEYER - ‘The secretive consulting firm that’s become Biden’s Cabinet in waiting’ 23/11/2020 - Read the 10/01/2021 - politico.com

<sup>45</sup>Brookings Institution - ‘THE BROOKINGS INSTITUTION WEBINAR INSPIRED TO SERVE THE FUTURE OF PUBLIC SERVICE’ - 04/05/2020

<sup>46</sup>Spencer Ackerman - ‘The Proxy War Over a Top Biden Adviser’ - 06/07/2020 - Read the 10/01/2021 - thedailybeast.com

<sup>47</sup>‘Janet L. Yellen’ - brookings.edu

<sup>48</sup>‘Cameron F. Kerry’ - brookings.edu

<sup>49</sup>Josh Rogin - ‘Jake Sullivan to become State Department director of policy planning’ - 25/01/2011 - Read the 10/01/2021 - foreignpolicy.com

<sup>50</sup>‘Susan E. Rice’ - brookings.edu

To summarise, there are at least 6 cabinet and senior advisers from Joe Biden's administration that were somehow linked to an institution partially financed by the world's leading companies on data treatment. The same companies threatened by the EU laws on data treatment of its citizens.

### 3.3.1 The General Data Protection Regulation

Since 2018, launching date of the General Data Protection Regulation (GDPR), Google<sup>51</sup> has been fined 4 times<sup>52</sup> by different EU countries and fined by the European Commission for Antitrust behaviour. If in the future, the USA sees the GDPR as a threat to their companies, it could impose economic sanctions such as restricting commerce with Europe, with for example, the Countering America's Adversaries Through Sanctions Act. Used in August of 2020 against Fährhafen Sassnitz GmbH<sup>53</sup>, a German company operating the port of Mukran, which provides assistance to the Nord Stream 2 project, which seeks to increase the gaz distribution from Russia to Germany. This legal threat could be used more frequently, just like the Foreign Corruption Practices Act targeted more European companies than North-American ones, regarding the total amount of fines paid.

### 3.3.2 The Digital Services Act

The Digital Services Act (DSA) goes against the business model of many American<sup>54</sup> companies who deal with personal data, like Google or Facebook, Google even had a plan to destabilise Thierry Breton, European Commissioner for Internal Market, on this matter. The possibility of having commercial sanctions from the USA is likely and in this case, unlike China, the EU is not prepared to live without Google Mobile Services (GMS) or Apple services. The DSA is perceived as regulatory 'assault'<sup>55</sup> against American large online digital platforms.

### 3.3.3 Future European projects

The Europe Union has several projects to develop its digital sovereignty, for example the GaiaX cloud project. According to Johannes Hanh, European Commissioner for Budget and Administration, 134 billions euros will be invested in digital technologies such as 'fifth generation mobile networks (5G), Artificial Intelligence (AI), European Cloud, Super computers and quantum technology'<sup>56</sup>. These services (and other future ones) will compete directly against Alphabet's and Apple's future services. The main benefit of making your own hardware and/or software, is that you can tightly embed your own services and make them default options, making it harder for the EU to propose sovereign alternatives. This is maybe what meant Alan Kay with his sentence "People who are really

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<sup>51</sup>the fine was on the name of Google not Alphabet

<sup>52</sup>'GDPR Enforcement Tracker' - Read the 25/10/2020 - enforcementtracker.com

<sup>53</sup>Ted Cruz - 'Mukran Port Letter' - 05/08/2020 - cruz.senate.gov

<sup>54</sup>and Chinese

<sup>55</sup>Meredith Broadbent - 'The Digital Services Act, the Digital Markets Act, and the New Competition Tool' - 10/11/2020 - csis.org

<sup>56</sup>EuropaPunkt Bremen - 'Digitale Souveränität in Deutschland und Europa' (9:20) - youtube.com

serious about software should make their own hardware", used by Steve Jobs to present Apple's first iPhone<sup>57</sup>.

## 4 Conclusion of Part II

In this part it's firstly demonstrated how the world is shifting from using personal computers to adopt smartphones. Secondly one can see the positive impact in the creation of jobs an operating system has, due to the diversification of application stores. Thirdly it's demonstrated that an industry giant had predicted the need for resilience in the strategic market of operating systems : Huawei, and this, years before the economical confrontation between China and the United States of America. Fourthly the reasons for the European Union to invest in an alternative mobile operating system are addressed:

- The first reason is that, today, the European Union seeks autonomy and resilience in the digital world, yet proofs of foreign interference has been demonstrated and European countries are vulnerable to economical threats from non European countries. French and German leaders identified this weakness and are aware of it.
- The second reason is the strategic commercial value of data. Giant companies of data treatment understood it and did not refrain to get their hands on this new oil. This data can today be used against EU's citizens to influence elections, so a question remains : what could happen when European countries shift to online voting ?
- The third reason is a disproof towards the strong belief that a commercial war with the United States of America, such as it's happening with China, is impossible for the European Union. Yet the European Union is adopting laws to protect its citizens, such laws go against the business models of giant data treatment companies.

**If one owns the operating system and the hardware, one's service proposal will always be superior to the one outsiders might propose.**

If in the future the European Union continues to develop services for its citizens and companies, such as GaiaX, having mobile solutions is a must. Yet if an user is confronted to the choice of picking a service created by the same company that created it's mobile phone operating system, and a third party actor : the user usually picks what he sees as less risky and more familiar.

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<sup>57</sup>'iPhone 1 - Steve Jobs MacWorld keynote in 2007 - Full Presentation, 80 mins' - 16/05/2013 - 10:06 - youtube.com

## Part III

# Why having two mobile operating systems is an issue

## 1 Android is free as in freedom, but not that much

### 1.1 The Open Handset Alliance

The Android operating system started being developed in 2004 by Andy Rubin who then asked Andrew McFadden, Chris White, Nick Sears and Rich Miner to join the development. The previous company owned by Andy Rubin, Foto-Farm Inc, changed to Android Inc, and was acquired by Google (Alphabet) in 2005.

In November 2007 Google announces the Open Handset Alliance (OHA), a business alliance including technology and mobile industries.

The OHA has for a purpose to offer an unified Android™ operating system, that is, an operating system where apps working on smartphone X also work on smartphone Y. To check this compatibility one has to go thru the Android Compatibility Program (ACP).

Both, the OHA and the ACP are tools used by Alphabet to restrain the freedom of phone makers (Original Equipment Manufacturer, OEM). One can take as an example the event that occurred with a major OEM : Acer.

#### 1.1.1 The Acer case

In September 2012, Acer, a phone manufacturer (among other electronic devices), was supposed to hold a press conference to announce a new smartphone running Aliyun OS, an Android fork<sup>58</sup> developed by the Chinese e-commerce company Alibaba. Yet Google notified Acer that upon releasing such a smartphone with this specific mobile operating system, their partnership would be terminated. **Acer abandoned the project.**

It's important to point out that the smartphone was destined to the Chinese market, and that Google Mobile Services do not work in China, therefore, an alternative Android™ solution would be the proper way to deliver a functioning smartphone with it's expected services (e-mail, web searching, video browsing).

In conclusion, one can clearly see that Alphabet blocked a smartphone manufacturer from releasing a smartphone for it's own market (Acer is a Chinese company) where Alphabet isn't present.

Alphabet justified it's choice through Andy Rubin, the founder of Android, saying such measure is necessary so only one Android™ operating system is maintained and not 'a bunch of incompatible versions'<sup>59</sup>. What one can learn from this strategy is that, if a company, a country, or the European Union, wants to

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<sup>58</sup>a fork is a derivative from an original code

<sup>59</sup>Andy Rubin - 'The Benefits & Importance of Compatibility' - 14/09/2012 - Read the 14/12/2020 - android.googleblog.com

release a new operating system based on Android™, for example : more compliant with the General Data Protection Regulation (GDPR). No major OEM would be able to deliver such smartphone but also some telecommunication companies wouldn't be able so sell it, since they could be threatened by Alphabet, companies such as Bouygues Telecom or Telefonica because they are part of the OHA.

The Android Open Source Project (AOSP) is often mistaken as an open source project not linked to Google anyhow. Yet again Google by hosting the project is able of doing small manoeuvres such as adding it's different services in the code, for example : exchanging information with Google servers hard coded in the AOSP project.

## 1.2 The data monopoly war

When TikTok was accused of being used to spy on US soldiers <sup>60</sup> the application was almost banned from the United States of America (USA) but thanks to it's important market, the USA managed to have TikTok working with American companies.

### 1.2.1 Reasons to remove TikTok to keep an US monopoly on application stores

- 50% of the time spent on a smartphone is spent on social apps<sup>61</sup>
- 63% of the TikTok users are between the age of 10 and 29<sup>62</sup>
- Over 30% of all US TikTok users are adolescents<sup>63</sup>
- TikTok was ranked 6th in monthly active users (Android + iOS, worldwide, 2019)
- TikTok was ranked 4th in Downloads (Android + iOS, worldwide, 2019)
- Tiktok was ranked 2nd in Downloads in the United States (iOS + Android) and it's the tenth App company in the US, and the only foreign one (2019)<sup>64</sup>
- In 2018 TikTok was ranked first in global downloads, with WeeChat, the only non-US apps (iOS) <sup>65</sup>

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<sup>60</sup>the problem being with the app and not the fact that US soldiers were filming themselves doing lip sync while nearby confidential material

<sup>61</sup>Lexi Sydow - 'Social and Messaging Apps Grow as TikTok Takes Off' 05/03/2020 - Read the 15/12/2020 - appannie.com

<sup>62</sup>Mediakix - 'Top 20 TikTok Statistics: Key Facts, Figures & Data' 01/06/2020 - Read the 15/12/2020 - mediakix.com

<sup>63</sup>Mediakix - 'Top 20 TikTok Statistics: Key Facts, Figures & Data' 01/06/2020 - Read the 15/12/2020 - mediakix.com

<sup>64</sup>Lexi Sydow - 'The State of Mobile in 2020: Top App and Company Rankings' - 15/01/2020 - Read the 15/12/2020 - appannie.com

<sup>65</sup>App Annie - 'The Most Popular iOS Apps of All Time' - 02/07/2018 - Read the 15/12/2020 - appannie.com

- In 2018 TikTok was ranked 7th in global downloads (Android)<sup>66</sup>
- 1Billion monthly active users by 2021<sup>67</sup>
- 98% of Gen Z owns a smartphone and TikTok (with Snapchat) is the most over-indexed app among Gen Z<sup>68</sup>
- In 2017 there were no foreign apps in the top 10 monthly active users for the United States market<sup>69</sup>

Since 2018 TikTok has been challenging the USA's social network apps worldwide where they had a monopoly before. Just like American social networks, TikTok has access to the data of many citizens worldwide and as seen in section part II: **data is the new oil**. This market threat is a more plausible reason to ask for a ban or to relocate part of the activities. A question Europeans are in right to ask themselves is, what would happen if an European social network or message application is created and becomes famous across the North Atlantic ocean? **Should the company sell 20% of its shares to American companies in order to keep in business?**

### 1.2.2 Alphabet is reducing the concurrence

As seen in part I, Alphabet is investing in KaiOS, a low budget phone dedicated mobile OS. This mobile OS uses Google's API for maps or the vocal assistant (which is a heavily used technology in this particular device) on this handset. Thus, making the user dependent on Google mobile services. On the Android™ side, Alphabet made the alternative application stores less user interactive by removing AOSP core features and imposing its own apps such as Gmail.

## 2 Conclusion of Part III

Android™ is often perceived as Open Source and 'forkable' by anyone. These statements are only partially true.

Today's mobile operating systems and original equipment manufacturers seek to develop their communications with connected objects (IoT) to gather more data, since, as seen in part II, data is the new oil.

In order to do so, and as seen with TikTok and Acer, lawsuits and grotesque accusations are weapons that can be used: making the general public shift opinions regarding a company. **The final goal of these accusations is simple, keeping the monopoly over data gathering.** Europe does not have social apps, chatting apps or professional apps ranking in the first 10 apps downloaded even in Europe itself, and even if it did, the fact that the operating system is

<sup>66</sup>Donny Kristianto - 'The Most Popular Google Play Apps of All Time' - 15/10/2018 - Read the 15/12/2020 - appannie.com

<sup>67</sup>Lexi Sydow - 'The New Normal in 2021: Five Things You Need to Know in Mobile' - 10/11/2020 - Read the 15/12/2020 - appannie.com

<sup>68</sup>App Annie - 'App Annie Releases New Gen Z Report with Insights on Winning Over the Mobile Generation' - 21/10/2020 - Read the 15/12/2020 - appannie.com

<sup>69</sup>Lexi Sydow and Sam Cheney - '2017 Retrospective: A Monumental Year for the App Economy' - 17/01/2018 - Read the 15/12/2020 - appannie.com

owned by an other country with data gathering policies, options to limit the success of these apps are very simple: The developer can make a new app more responsive with the operating system or spying accusations.

And if Alphabet, Apple or even the government of the United States of America wanted to kill an application, simply forbidding it to use the OS's mobile services or access to the store would immediately ruin the company, because the company would not have an other market except for the Chinese one. In one sentence : **The European Union needs an alternative mobile operating system, in case of any major diplomatic or commercial incident with the United States of America. The European Union's companies who rely on mobile services would perish in case of any loss of the mobile services provided by the operating systems.**

## Part IV

# Why past alternative OS failed ?

Huawei's plan to develop it's mobile operating system is not different than Google's plan ten years ago, that is: **develop its application store by attracting developers** . In this part one shall see which actions were taken and lead other companies mobile operating systems to fail.

This table sums common points that past mobile OS did or did not meet:

	Open Source	Big OEM backed	Missing Popular Apps	Few Compatible Phones	Low Budget Market	No access to Google Services (Gmail/Youtube/etc.)
Firefox OS	X		X	X	X	
Windows Phone		X	X	X	X	X
Amazon Fire OS	X		X	X		X

**Table 1:** Common points failed past mobile OS had

## 1 Their negative points

### 1.1 Firefox OS

- Multi established OSes and app stores made FOS play catch-up
- Few compatibles phones for evangelists
- Missing popular apps
- An Open Source OS is not a valid attracting point for the majority of the clients
- Google had a 10 millions dollars incentive for developers<sup>70</sup>
- 2/3 of the apps on the Play Store in 2008 where from outside the US

<sup>70</sup>Charles Arthur - 'Firefox OS won't magically succeed just because it's open source - see webOS' - 26/02/2013 - theguardian.com

- Web Developers had to choose between two web rendering engines : WebKit (Chrome/Safari/Opera/BlackBerry) and FirefoxGecko (Firefox OS and Firefox browser)

## 1.2 Windows Phone

- Developers did not choose it
- Alphabet stopped developing its applications (Youtube, Gmail, Maps) on Windows Phones
- Microsoft released some of its professional software (Outlook, Teams, Windows Office suite) on Android™ and iOS, giving less reason to buy a Windows Phone
- Steve Ranger : ‘The benefit of making your own hardware is that you can tightly embed your own software and services, making them the default options.’<sup>71</sup> Leading users from the other OSes no longer in need for Microsoft software.
- Janet I. Tu : ‘Smartphones control wearable tech like smartwatches. So to be a player in the wearable market it helps if you already make smartphones. And if you make wearables, it’s that much easier to make a step into the consumer Internet of Things.’<sup>72</sup>
- Janet I. Tu : ‘Nobody made any money in Windows Phone ’<sup>73</sup>

## 1.3 Amazon Fire OS

- Out dated Android
- No access to GMS most used apps (Youtube, Maps, Gmail) or API
- Premium features don’t appear as being vital to the macro-level experience of using a smartphone, such as an embedded Amazon shopping experience
- Developers had to use Amazon’s API instead of Google’s one, that means, they had to recode their applications specifically for Amazon devices
- Because released by an e-commerce company, consumers associate it to extension of the e-commerce website, therefore destined to the heavy users of amazon.com

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<sup>71</sup>Steve Ranger - ‘Microsoft and Windows Phone: What went wrong, and where can they go from here?’ - 09/07/2015 - Read the 20/12/2020 - zdnet.com

<sup>72</sup>Janet I. Tu - ‘Huawei Technologies has big plans, faces big questions’ - 30/11/2014 - Read the 20/12/2020 - seattletimes.com

<sup>73</sup>Janet I. Tu - ‘Huawei Technologies has big plans, faces big questions’ - 30/11/2014 - Read the 20/12/2020 - seattletimes.com



## 2 Why Knox and other 'sub-os' are not an answer

Knox is a hardware and software solution provided by Samsung to isolate sets of the Android™ operating system on Samsung's smartphones. Some European Union (EU) cyber-security agencies<sup>74</sup> have certified Knox as a secure solution to isolate the user's information. Knox is a protective measure on top of an Android™ system, it solves only a part of the problem: the spying one.

## 3 Why is this different from 'We need a European OS' (laptop/desktop)

Creating an alternative laptop/desktop operating system from the ground up could cost the EU 833 millions euros over 5 years<sup>75</sup> and could become a certain political fiasco if it's not adopted. More over, European telecommunication companies already tried to create an European mobile operating system back in 2010<sup>76</sup>, and due to the lack of communication on it, one can assume it was a failure.

The point here is not to tell EU representatives to make an invitation to tender for companies to build a fork or an operating system from the ground up: this would be a waste of time, money and a proof that the European Union is unable to use what already exists and works. But rather to help financially the companies already doing it by using alternative solutions in EU's administrations and state owned companies. **Setting the example: adopting European solutions.**

## 4 Conclusion of Part IV

Today's alternative mobile operating systems target skilled people. New companies diving into this market start by selling smartphones online, but as Google experienced it with its Nexus phones: selling smartphones online is difficult. An other common point failed mobile OS have in common: **application developers had to create a third application or use an other technology than the ones used for the two most popular operating systems.** A startup creating a new application has to think about costs, and between creating the application for each mobile operating system out there or only for the most popular ones, the choice is quickly made. This is why an alternative mobile operating system has to have a compatibility with Android™ applications.

Thinking that a new mobile operating system can only be addressed to the public thru sales in stores across **Europe is missing the other markets, less prone to a duopoly: the professional market.** The general public market needs massive investments in communication to shift users from using their usual smartphones for a new one, it also needs to meet the exigences from

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<sup>74</sup>Holland's AIVD, French ANSSI, German BSI, Spanish CCN and Finish Traficom

<sup>75</sup>Romain Péchard - 'Développer un OS souverain made in France, combien cela coûte ?' 20/01/2016 - Read the 20/12/2020 - numerama.com

<sup>76</sup>Marie-Cécile Renault et Enguérand Renault - 'Social : le patron de France Télécom s'explique' - 15/09/2010 - Read the 20/12/2020 - lefigaro.fr

the general public by having a vast proposal for applications in it's application store, this can be verified by watching the many videos explaining the reasons behind why a specific 'influencer' switched from an Android™ phone to an iOS one. Whereas the professional sector uses less applications than those used by the general public, for example : A professional employee can do its professional tasks without Snapchat<sup>77</sup> installed on its phone, but the employee will always need the 'phone' and 'messages' applications.

**There is no necessity to invest in the creation of a new mobile operating system when existing ones already exist**, the only need is to adopt them. This approach where EU institutions and state owned companies could be **adopting alternative mobile operating systems as professional smartphones shortcuts many costs** to both the company and the EU, such as communication and stock costs, since the communication can be done by word of mouth and stocks can be precise thanks to orders.

## Part V

# Alternative mobile OS are not shadowy and insecure

Different forks from AOSP (also called ROMs) are available in a stable release targeting different categories of users. Some like 'Replicant' are fully open source, others like Emotion UI (EMUI) have been developed by constructors for their phones, in this case Huawei.

In the sections 'One Plus' and '/e/' it will be presented forks from a ROM called Lineage OS. Lineage OS is a fork of CyanogenMod, itself an AOSP fork. In this part, the only alternative operating system as in 'not AOSP' is Sailfish OS.

## 1 One plus

One Plus is a phone manufacturer founded in 2013, daughter company of BBK Electronics, world's second largest phone manufacturer.

Their first phone does not run stock Android™ but a ROM (CyanogenMod) with Google Mobile Services (GMS). Today One Plus phones shifted from CyanogenMod to OxygenOS, which is also an AOSP ROM with GMS. And although not being the stock Android™ solution, it raised to the first smartphone brand for 5G phones in Finland, third largest smartphone brand for the mid-tier solutions in the Netherlands and second largest smartphone brand for 5G in Denmark<sup>78</sup>. The point to be proven here is : **Non stock Android solutions work too**, and that's excluding the fact that One Plus was the first smartphone brand for

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<sup>77</sup>a social network based on sharing pictures with one an other

<sup>78</sup>Jan Stryjak - 'OnePlus targets upper mid-tier for record quarterly smartphone shipments in Denmark, Finland and the Netherlands' 30/11/2020 - Read the 27/12/2020 - counterpointresearch.com

premium smartphones in India<sup>79</sup>.

## 2 The Sailfish OS example

Jolla, the company that edits Sailfish OS, was created in 2011, in Finland by former Nokia employees. The operating system is not a fork of AOSP but an evolution of Nokia's MeeGo operating system (as seen in Figure 1, part I), before Nokia Mobile division was bought by Microsoft. Sailfish OS also integrates the equivalent of a virtual machine for smartphones: Myriad's 'Alien Dalvik', which allows Sailfish OS to run both native applications and Android ones.

The OS is mature enough to be used in Russia as a sovereign solution and was a possible solution for Huawei's issues with Android. Therefore there are two consortiums: one in China and one in Russia.

Russia has its own fork of the OS, called 'Aurora OS' which is currently deployed in <sup>80</sup> :

- The Russian Post Offices
- Rostelecom
- Russian Railways (RJD)
- The Federal State Statistics Service (Rostat)

And will be deployed in schools and in hospitals in the near future according to the Kremlin <sup>81</sup> .

The operating system received accreditation from the Russian FSB and the Russian FSTEC as a phone secure enough for 'non state secret communications' <sup>82</sup>. Jolla has developed specific use cases for companies or states willing to use Sailfish OS with their shared mobile devices and licensing model. Sailfish OS has enthusiast across the Europe<sup>838485868788</sup> and keeps updating 7 years old phones<sup>89</sup> whereas Google Pixel devices security updates have a three years life expectancy<sup>90</sup>.

Currently Sailfish OS officially works only on Sony Xperia 10, Sony XA2, Sony X and the Gemini PDA.

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<sup>79</sup>Jeet - 'OnePlus Grabs 48 Percent Premium Smartphone Market Share In India' - 25/02/2018 - Read the 27/12/2020 - gizmochina.com

<sup>80</sup>'Аврора — первая российская мобильная операционная система' - Read the 21/11/2020 - auroaos.ru

<sup>81</sup>The Kremlin - 'Перечень поручений по итогам встречи с членами правления РСПП' 25/11/2020 - Read the 25/11/2020 - kremlin.ru

<sup>82</sup>'ОМП — Открытая мобильная платформа ОС Аврора' - Read the 25/11/2020 - omprussia.ru

<sup>83</sup>[https://jollacommunity.it/?doing\\_wp\\_cron=1607538774.5624089241027832031250](https://jollacommunity.it/?doing_wp_cron=1607538774.5624089241027832031250)

<sup>84</sup><https://www.jollanl.org/>

<sup>85</sup><https://jollasitecz.wordpress.com/>

<sup>86</sup><https://sailfishmods.de/>

<sup>87</sup><https://www.jollaes.com/blog/>

<sup>88</sup><https://jollafr.org/>

<sup>89</sup>Sami Pienimäki - 'The Original Jolla Phone turns 7 today' - 26/11/2020 - Read the 26/11/2020 - blog.jolla.com

<sup>90</sup>C. Scott Brown - 'Google Pixel 2 updates will end in December as the phone rides into the sunset' - 05/10/2020 - Read the 27/11/2020 - androidauthority.com

What conclusion can be taken here ? That **there is an alternative solution** ! And the solution is not from a teenager in his parents garage but an European company that with proper financial and communication help can be a long term viable solution for EU's mobile operating system dependency problem.  
SWOT:

- Strength
  - European made, different user interface, not threatened by anti trust law suits, only non-beta smartphone solution that is not Android, compatibles phones don't have premium phone's price, android support
- Weakness
  - unknown to the general public, weak communication, no financial back up as solid as Alphabet or Apple, leading to weaker development possibilities, few phones options, no major alliance or phone manufacturer, strong dependency on the 'Android virtual machine' until developers don't make native apps
- Opportunities
  - head of countries/companies/citizens seek European autonomy and resilience, Alphabet and Apple accused of anti trust behaviour, Chinese phone manufacturers will weak Google's and Apple's dominance - changing customers perception on alt OSes, end users are starting to avoid GAFAM related applications, such as WhatsApp with their recent data policy update with Facebook
- Threats
  - loosing major financial supports, debts due to a tablet product issue, aggressive behaviour from major apps developers : forbidden any native unofficial app

### 3 The /e/ example

Formerly called eelo, /e/ is a Lineage OS fork <sup>91</sup> being developed by the 'e foundation' witch has as a founder Gaël Duval, former Linux Mandriva creator. e Foundation's goal is to offer an operating system that does not send any data to Alphabet's services.

**A natural question would be, why chose /e/ instead of LineageOS or Replicant ?**

It's true that /e/ being only a fork from Lineage OS, it's possible for a skilled developer to remove Alphabet's code from their mobile OS. The same goes for Replicant that takes a step further and has no proprietary libraries inside the OS. Yet /e/ makes it simpler and targets 'non-technical communities', as stated by it's founder<sup>92</sup>, it can be seen as a mix of Replicant and Lineage OS: no

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<sup>91</sup>so an AOSP ROM

<sup>92</sup>gael - '[UPDATE] 22-Nov '18: 6 new supported devices (enabled by Oreo branch)' - 18/11/2018 - Read the 06/10/2020 - community.e.foundation

dependency towards Google but the user is still able to download his favourite applications. /e/ uses microG, an open source solution, to support Google Mobile Services.

Currently /e/ is sold by the e Foundation installed on Samsung Galaxy phones from Galaxy S7 to Galaxy S9+ and the Fairphone 3 and 3+ but is available for user installation on 111 devices<sup>93</sup>.

SWOT:

- Strength
  - ‘unGoogled’ phones, a variety of compatible phones, buying straight from the developer: with a guarantee, easy to use, Android phone : so compatible with all apps from the Play Store
- Weakness
  - no direct play store, no official manufacturers, finances since it’s a non profit organisation, Android™ phone users may not see why they would need to change from their Android™ to /e/
- Opportunities
  - head of countries/companies/citizens seek European autonomy and resilience, Alphabet and Apple accused of anti trust behaviour, Chinese phone manufacturers will weak Google’s and Apple’s dominance - changing customers perception on alternative OS
- Threats
  - voluntaries loosing interest in participating, loosing financial support

## 4 Conclusion of Part V

There are existing, stable and mature solutions for European Union’s dependency. These solutions and examples can bust the myth of : ‘alternative mobile operating systems are not stable’. The alternative mobile operating systems are yet unable to answer a hardware demand if all European citizens were to ask, tomorrow, for a new phone. But this is neither realistic nor the goal of this study. Each one of them has strengths and weaknesses but are able thanks to the current changing perception of owning one’s data to overcome them. Both Sailfish OS and /e/ solve past alternative operating systems failure, such as not having a vast choice in the application store.

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<sup>93</sup>‘Get Support - e Foundation - deGoogled unGoogled smartphone operating systems and online services - your data is your data’ - Read the 06/10/2020 - e.foundation

## Part VI

# Conclusion

Europe had world leaders in mobile phones constructors and mobile operating systems sectors. These leaders quickly lost to the concurrence who managed to create commercial alliances or had a strong user environment created around them. This concurrence is formerly Google and Apple. Both companies had strong financial incentives behind them to propel their mobile operating systems, since Google is the most used operating system worldwide and Apple commercialises laptops among other devices. Today a duopoly is in place and the European Union solely relies on these two companies in terms of mobile operating systems.

This duopoly has a very strategic position, it creates jobs and has access to the most valuable resources of the XXI century : Data. Investing in a mobile operating system results in job creation since there is a need for new developers and testers for such operating system. This strategic market was foreseen by Huawei who long before the commercial war between China and the United States of America decided to create it's own autonomous mobile operating system. This decision to have an autonomous solution was not in vain, with the EU's dependence to USA's solutions, its strategic autonomy is decreasing and the negotiating power is automatically weakened if the vast majority of one's population depends on a foreign's service. One could think that a commercial war between the US and Europe is impossible, but history has shown that the European Union is not seen as a friend and that its new data protective laws go against American and Chinese companies business model: gathering data. The strategic position of data in today's world cannot be minimised with it's power to even influence elections. Yet today's European Citizens data does not belong to them.

The European Union plans to invest vast amounts of euros in the development of new sovereign solutions for Europe, such as GaiaX, the European cloud. But when confronted to two or more solutions, one by the same company that develops its mobile operating system, with the possibility to transfer data across devices with a flawless environment created just for the user, and a solution created by a third party that will never be able to create the same environment, the customer will pick the one he's most familiar with and feels less complicated to use. Because the company who develops the operating system can make it behave just as wanted, whereas the company that depends on the operating system to provide a service will always be a step behind, and the operating system, is the interface that communicates between applications and the hardware.

Android™ is often perceived as open source but major phone manufacturers are part of the Open Handset alliance, which, in case the manufacturer delivers a modified version of Android™ not approved by Alphabet, may result in a law suit, as it happened with Acer. Even Amazon could not convince major manufacturers to produce it's alternative Android solution.

The monopoly for top positions in the applications stores is a working strategy to keep having access to an user's data, this has been seen with the TikTok

case: the app was accused of spying on soldiers although a vast majority of the users is below 30 years old. But the app was also in the top 10 most downloaded applications worldwide and the only non American application. Today, there is no European social or messaging application in the top 10 most downloaded applications even in Europe. And European developers depend blindly on mobile services provided to them by the operating system developers. In case of any commercial or diplomatic tension the risks of loosing access to these services can kill the applications and therefore the companies.

Past alternative mobile operating system solutions have existed and some failed, this mostly due to two main factors : the lack of applications in their store and expecting a quick adoption from the general public in a duopoly without any major breakthrough. Being called Amazon or Microsoft does not ease the task if there is no applications in your application store, both failed. Past operating systems targeted the general end user who already adopted an Android™ or iOS phone and does not see the need or reason to switch. On the other side, a professional user, who uses very few different applications can see a real benefit in switching phones if the latter option provides data privacy, for the phone owner, and it's clients. Solutions already exist, so there is no need for the European Union to start developing an operating system from the ground up, some states companies are owned by European countries that can decide to adopt a more resilient solution.

Those solutions are not unstable or graphic-less with only a terminal to communicate with the hardware as it's the common belief. Some of them are even on the podium for European markets, but keep using Google mobile services. Yet the current perception of the general public to own its data is rising as one could see it with the more frequent adoption of alternative messaging services. That's an opportunity for truly alternative mobile operating systems, with citizens seeking more often European solutions with more protective data privacy laws. But even today, there is no incentive from the European Union to adopt a new solution.

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# Appendices

## A Appendix

A mobile phone makes reference to a phone only able to make calls and send messages.

A cell phone is a mobile phone able to connect to the internet.

A smartphone is a cell phone able to do tasks one could do on a computer, such as editing a document.

Android™ is here referenced as Android Open Source Project (AOSP)+ Google Mobile Services.

Android and AOSP are here referenced as the open source project without the Google Mobile Services.

Although any device having calculation capacities is a computer, for the sake of clarity, in this text the word computer makes reference to personal computer laptops and desktops.

The words "Europe" and "European Union" make reference to the 27 states inside the European Union, when making reference to the European continent, the words "European continent" are specified.

The word "American" makes reference to the United States of America.