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**Smartphones, tablets, voice assistants... are devices the
weak link in achieving an open internet?**

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Are devices the weak link in achieving an open internet?

On 30 April 2016, the European Open Internet regulation 2015/2120 came into effect. It enshrines users' right to access a neutral, open and innovative internet, and to provide content. At the same time, it regulates network management practices that Internet Service Providers (ISP) are likely to use. As a result, while setting forth the broad objective of an open internet, the regulation focused on network neutrality.

In the report published in January 2016 which concluded its strategic review, Arcep underscored that, in addition to internet access networks, which were explicitly targeted by the regulation, open internet access depends on a complex technical chain and that certain players, which are not targeted by the regulation, had the ability to limit actual access to certain online applications and services, for both users and companies operating on the internet. For Arcep, these players were thus in a position to diminish the reach of the measures that guarantee net neutrality. Arcep noted that such was the case with the main online platforms (search engines, ranking tools, app stores, etc.), but also with devices and their operating systems.

Having concluded that the issues raised by devices were still poorly identified, Arcep thus undertook an analysis of users' ability, regardless of the device they employ, to access and publish diverse online content and applications. In May 2017, Arcep achieved the first milestone in this work with the publication of a report that delivers its initial diagnosis. In particular, Arcep mapped out for the first time the impediments to open internet access that could be attributed to devices. Here, it identified four main types of restriction: those resulting from the characteristics of the device being used (physical fixed or mobile device), those that can be attributed to software developments, those resulting from operating systems' and app stores' editorial policies and, lastly, those resulting from device suppliers' business models.

Since the report's publication, Arcep has continued to meet regularly with stakeholders (developers, equipment suppliers, users, etc.) to understand their different points of view. It has held a number of hearings and, over the course of October and November 2017, hosted a series of dedicated workshops:

- "Let's design the ideal app store!" – 9 October 2017 at Numa
- "Back to the future! Imagine tomorrow's devices, in light of past successes and failures" – 13 November 2017 at Tank
- "Are we being held hostage by our operating systems? A round-up of available solutions" – 24 November 2017 at Cap Digital

What follows are the main findings that Arcep drew from these encounters, and the possible courses of action to emerge, which it now wants to assess.

Theme 1: What would be the ideal way of making content and services available online?

To adapt as effectively as possible to the way that new smart devices are designed, content is being delivered more and more through applications, and in some cases is only available as an app. By providing end users with an increasingly streamlined access to the internet, and making it easy (provided the relevant application programming interfaces (or API) are made available to developers)

to use the device's other features (3D graphics, motion, detection, access to the camera, etc.) when communicating over the Web, applications provide more features than traditional websites. But this way of accessing content may sometimes limit how open user's access to the internet is: because they bypass web browsers, users will likely not have access to all of the content available online, while content developers encounter restrictions attached to the supply of their services (price of accessing app stores, technical conditions for deploying applications, content selection criteria).

Lessons learned from the workshop

It was around this theme that Arcep gathered content publishers, developers and designers, to work together on creating an "ideal" model for making their services available, as much with respect to financial terms and conditions as technical and contractual ones.

a) Choosing not to be listed on app stores

Several participants spoke about the technical and economic impediments to being listed on app stores: app development costs (each development needs to adapt to the specifics of the targeted app store), maintenance issues tied to operating system (OS) updates or to their terminal, growing number of standards, etc.

In addition to these issues, app stores each have their own set of editorial policies, which are not neutral with respect to how content is represented (certain content promoted over others, censorship, etc.). One solution was put forth during the workshop: putting power back in the hands of users by allowing them to configure their own selection criteria.

If app stores have several drawbacks, some participants nevertheless pointed out the positive role they play in enabling the emergence of innovative content and in the area of security, making things more convenient for all users (less maintenance to carry out).

b) Are progressive web apps the ideal model?

One alternative to native applications – which are installed by default or made available on app stores – that was lauded during the workshop were "progressive web apps". If they were supported by every OS in the same way that most Web standards are, problems tied to obsolescence and fragmentation would be resolved, since progressive web apps can run on any device. If they were allowed on every app store, exposure deficit for the corresponding content would also be reduced.

Progressive web apps are developed like websites, but behave like native applications. They enable a full-screen experience; an icon can be installed on the device's home screen, and features are also available offline. It's the best of both worlds! That is, if we overlook the W3C standardisation process, which can take several years: web apps do not yet interact with all of a device's functionalities. And their widespread adoption could undermine the business models of operating systems based on monetising content or data.

c) "Scoring" app stores?

If some participants liked the idea of scoring app stores on their platform role, it was agreed that defining scoring criteria was a stickier issue.

Others underscored the advantages of having a neutral observatory for collecting usages statistics on the different operating systems, or tracking developments such as the obsolescence of applications.

Questions submitted for consultation

Question No. 1. What possibilities exist between applications and websites? What differences are there between these two approaches to delivering content? Which do users prefer? Does this differ according to the device being used?

- Question No. 2. To what extent do developers need to adapt their applications to the type of device, the web browser or app store being used?
- Question No. 3. Is it possible for a content provider to offer their products on every version of a device? At what cost (technical, financial, etc.)?
- Question No. 4. For developers, what are the pros and cons of the different methods used to make their products available (security, terms and conditions for sharing usage and browsing data, billing systems, exposure, etc.)?
- Question No. 5. Is there room for alternative app stores?
- Question No. 6. Do developers have sufficient guarantees for accessing the different functionalities of user devices?
- Question No. 7. What criteria would constitute the basis for an acceptable editorial policy?

Theme No. 2: What explains the past success or failure of devices and OS? What questions do future interfaces raise?

In the late 1990s, certain devices were almost fully controlled by operators. Which meant they offered only limited possibilities: some devices allowed users to make phone calls and send text messages, while others were used more to access the internet. At the same time, users could turn their computers into “customised” machines. Kicked off by the widespread adoption of smartphones in the late 2000s, dramatic changes occurred in how devices were used.

Today, a plethora of both fixed and mobile devices is available, and competition between hardware suppliers is lively. Which of the devices’ features (price, processor, screen size, display resolution, etc.) were decisive in winning over users and developers? At the same time, users’ choice is limited when it comes to the operating systems installed on these devices. Some players have proposed alternative systems that have failed to catch on. Why did they fail? Is there still room for new players?

Lessons learned from the workshop

The workshop held with hardware suppliers and OS developers provided an opportunity to look back at several milestone decisions, and to think about how we expect devices to evolve, about how connectivity systems will be transformed, about the future of specialised devices...

a) The golden age of the all-purpose device is coming to an end

According to some participants, the end of the golden age of the all-purpose device is near. The reason: the vast array of circumstances in which devices are used (at home, in the car, etc.) which, in future, will translate into multiple methods for accessing tomorrow’s internet... and a fragmentation of the physical device.

In future, technical, economic and competition issues will therefore move from the single physical device to the cloud.

b) Voice assistants, artificial intelligence... Tomorrow’s mainstays

Others spoke about the central role that will be occupied by personal assistants, “the future of devices”. More than a webification of applications, it is the shift to voice-controlled apps that they believe is imminent. Because “voice-controlled” equals fast and convenient. But, let there be no mistake: voice-controlled devices will serve to complete rather than replace today’s visual interface devices.

For now, voice assistants are still very basic: they do not pass the Turing test! If we can enthuse about the many services they will deliver with ease, we can also glimpse the concerns they are bound to generate: microphones... who is listening in? Are the responses to our questions and requests really neutral?

c) Are connected cars just another device?

Connected vehicles already exist – notably in the field of aeronautics: security, managing luggage, etc. But discussions in the workshop focused chiefly on car-related matters. Several paths are being explored simultaneously for how to connect cars even more: connecting cars to the smartphones being used inside the vehicle, rethinking emergency connectivity, truly improving safety.

But a commercial and contractual question remains: who chooses the ISP? As pointed out by several participants, this needs to be established contractually with the customer.

d) And what about 5G: how will it influence future devices?

The next technical mobile connectivity standard, 5G, will enable the development of new uses thanks to unprecedented performances: ultra high-speed, ultra reliable and very low latency mobile communications, and a densely distributed Internet of Things. Depending on the use cases, the network will adapt to provide the device with the performance it needs to execute its task: this is what is known as network slicing.

Thanks to networks with guaranteed availability and that perform better under all circumstances (e.g. thanks to a guaranteed minimum bitrate), 5G could also be the catalyst for massive shift to the cloud for applications and data, with the device thus becoming merely a vehicle for viewing information.

Above all, 5G will allow smartphones and tablets to attain a new performance threshold, whether in terms of quality or service or thanks to the rise of applications such as virtual reality or wireless augmented reality.

Some fear that 5G will create new silos, for instance through partnerships between vertical market players and network operators for specialised applications (telemedicine, connected cars, security networks, etc.).

Questions submitted for consultation

Question No. 8. What is changing in the competitive conditions that shape the world of devices and operating systems?

Question No. 9. What role do ISPs play in the device universe?

Question No. 10. In future, will there still be a central device in the home? If so, what will it be?

Question No. 11. Do you think that tomorrow's devices will simply be cloud application players?

Question No. 12. 5G vs. devices: who influences who?

Question No. 13. Can open source software help improve devices?

Question No. 14. Could browsers replace OS?

Question No. 15. Augmented and virtual reality: will they give birth to brand new devices?

Question No. 16. Are connected cars just a device like any other?

Question No. 17. Where and how to place the slider between securing the device and opening it up to third parties?

Theme No. 3: What are the impediments to switching devices or OS?

Today's mobile operating system (OS) market is dominated by Google (Android) and Apple (iOS). When a user wants to switch smartphones, there are obstacles that may prevent them from choosing a different OS: problems with transferring their data (contacts, photos, calendar, mail, etc.), the loss of certain apps or services when switching to a new environment, the need to pay a second time to access apps they had already bought for their previous system.

Lessons learned from the workshop

With the help of the workshop's participants, Arcep was able to take stock of existing obstacles, but also of the solutions for making it easier to switch devices.

a) Transferring data to a new device: technically complex, if not impossible for certain "invisible" data

Transferring one's personal data from one operating system to another remains a major obstacle for users when switching devices. A distinction nevertheless needs to be made between several types of data housed on a mobile device:

- those that are relatively easy to transfer (generally: e-mails, contacts, photos, etc.);
- those that can be transferred provided the user continues to employ the same OS (paid apps, premium content from free apps, data tied to apps that are only available for that system, etc.), or if they created an account (data tied to advancing through a game, health data, etc.);
- those that cannot be recovered under any circumstances, as they are tied to the physical device (patterns learned by a smart keypad, local mail, decryption keys, digital fingerprints, etc.).

One thing that dismayed participants: users' lack of awareness of the different kinds of data. They have no understanding of the scope of their data, their specific nature or where they are located on the mobile device. Data's invisibility to users is also accentuated by the lack of standardised file formats, which one only becomes aware of in a fixed computing environment. This lack of awareness regarding data surreptitiously reinforces users' "captivity".

All of the participants agreed that the process of transferring data from one operating system to another was a technical undertaking, and one that was only within the purview of experienced users (and this despite the applications available in the marketplace). The vast majority of users will not switch... although is this perhaps a generational issue?

b) The difficult emergence of alternative switching tools

For an alternative switching service to emerge, operating systems would need to be obliged to make it possible to import and export data. There is a hardware-based challenge in providing access to data that comes from the OS, from the manufacturer and the app developer. A smartphone's software interface is also very complex: it is very difficult to access the source code's proprietary section.

c) Possible paths to user emancipation

The workshop's participants believe that users need to be re-empowered through choice.

As it stands today, it is impossible to choose a cloud back-up service that is independent of the OS being used. The participants suggested that the first step would be to make users more aware of this lack of choice. Beyond that, they believe users need to be given the choice of storage location for their data, i.e. locally or not.

On the matter of app stores, as a general rule users should be able to choose their store. At the very least, they should be able to download apps without having to go through an app store, i.e. by using a web browser.

Questions submitted for consultation

- Question No. 18. What are the difficulties encountered when switching OS? Are the problems identical on fixed and mobile devices?
- Question No. 19. Are available tools for making it easier to switch from one OS to another proficient?
- Question No. 20. What difficulties do players wanting to design alternative switching tools encounter?
- Question No. 21. Do some impediments to switching platforms derive from proprietary formats and DRM?
- Question No. 22. Is data portability via the cloud a good solution? How could it be organised efficiently?
- Question No. 23. Would the widespread adoption of a monthly app subscription model lessen the issues inherent in switching OS? Would this not mean that users would be tied more to their content provider than to their device?
- Question No. 24. Are the physical incompatibilities between devices operating in different universes still critical?

Courses of action considered

A number of courses of action were discussed during this investigation into devices, with the aim of ensuring that devices not undermine the sustainability of an open internet.

Two possible forms of intervention

Because of the international dimension of digital economy players, the relevant scale for any course of action would be European (and ideally international), whether for reasons of legal certainty or economic efficiency. However, national initiatives can, in practice, help spur actions at the European level.

It is in this spirit that Arcep has begun its investigation into solutions that could be brought to remedy potential impediments to an open internet caused by user devices: it seeks to provide a common solution to shared issues.

At this stage, Arcep is looking to obtain stakeholders' analysis of a wide range of possible measures, moving upwards in the intensity of the restrictions imposed on targeted players.

- a) Using data to make clear the influence that devices have on an open internet

Public authorities and users today lack quantitative data on devices. This lack of clarity limits public powers' ability to deliver an objective diagnosis of the situation, and users' ability to choose their services by leveraging competition.

By applying data-driven regulation tools to devices, the information available to both public authorities and users could be improved. This would involve collecting, but also rendering data collected from several complementary sources:

- data collected directly by public authorities, e.g. through “**observatories**”;
- gathering feedback from users, through a “**reporting platform**”;
- supporting third parties specialised in **crowdsourcing**, which can amass data for the development of rating tools for devices.

Moreover, if the adoption of the Digital Republic Act in France amended the legal and regulatory framework governing consumer protection with respect to platforms, no measure was planned in support of enterprises whose business relies on these platforms. App stores are platforms on which new legal provisions could be imposed, to satisfy requests for information on the systems they use to rank content: the purpose would be to ensure a form of **fairness from app stores that meets content developers’ requirements**. Providing greater transparency could indeed help in the fight against possible discriminatory practices.

b) Create the ability to challenge competitive positions, to keep the internet open

In cases where certain devices in particular undermine the internet’s openness, measures could be taken to make it easier for users to switch devices.

To wit, actions in support of **better data and content portability** could be considered, for instance by allowing users to choose where their data is stored, regardless of the device they use.

By the same token, measures in support of greater compatibility between devices and the different complementary services would make it easier for users to switch devices:

- device manufacturers could be encouraged to support solutions that are likely to be compatible with all devices, such as **progressive web apps**;
- while being careful not to hinder innovation, it could be beneficial to promote **greater hardware compatibility** for devices operating in different universes;
- for some device suppliers and OS developers that enjoy strong market power, it would be conceivable to **forbid their having exclusive rights to certain content**.

Measures could also be designed to remedy any possible blockages directly:

- the use of **alternative app stores** could be encouraged, notably by lifting the obstacles to users’ ability to install them;
- OS developers could be required to **open their API**, to put all developers on an equal footing.

Questions submitted for consultation

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| Question No. 25. | Would it be beneficial for users and public authorities to be better informed about device manufacturers’ and OS developers’ practices? |
| Question No. 26. | Do the tools proposed above seem relevant? |
| Question No. 27. | Do users have enough choice in terms of devices and operating systems? How could this be measured? |
| Question No. 28. | Do the tools proposed above seem suitable? |