EUROPEAN
COMMISSION

Brussels, 25.5.2016
SWD(2016) 172 final

COMMISSION STAFF WORKING DOCUMENT

Online Platforms

Accompanying the document

Communication

on Online Platforms and the Digital Single Market

{COM(2016) 288 final}

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I. Introduction

The purpose of this Staff Working Document is limited to providing a factual overview of the main characteristics of online platforms and their social and economic contribution in Europe. As such this document does not provide a legal assessment or impact analysis of potential problems that may be associated with online platforms. It is part of a broader assessment conducted by the European Commission which included a public consultation, Eurobarometer studies, and scientific workshops focusing on the impact of online platforms.

Online platforms (e.g. search engines, social media, e-commerce platforms, app stores, price comparison websites, ad networks) play an ever more central role in the online world and hence in social and economic life. They enable consumers to find online information and they allow businesses to exploit the advantages offered by e-commerce. By 2015, the largest listed "online platform" companies worldwide had a market capitalization of USD 3.9 trillion.[1] Online platforms lead the list of the most accessed websites in the world[2], with search engines, social media and e-commerce as the most visited types of platforms. The growth and importance of online platforms has been widely recognised, and their role in society has been the subject of in-depth assessments by regulators across the European Union.[3]

In the Digital Single Market Strategy Communication, the Commission announced a comprehensive assessment of the role of platforms, including in the sharing economy, and of online intermediaries, covering issues such as (i) transparency e.g. in search results, (ii) platforms' usage of the information they collect, (iii) relations between platforms and users, (iv) constraints on the ability of individuals and businesses to move from one platform to another[4], and (v) how best to tackle illegal content on the Internet.

Effectively stimulating innovation in the Digital Single Market, while adequately protecting the legitimate interests of consumers and other users, is an important challenge that the EU faces today in terms of securing its future competitiveness in the world. The General Data Protection Regulation which modernises and provides technology neutral rules to protect the fundamental rights and legitimate interests of individuals and which at the same time reduces administrative burdens on business and promotes innovation, is an example of the type of balance that has to be achieved to create a favourable environment for platforms: it both ensures there is trust by consumers and promotes economic growth.

Chapter II of the Staff Working Document provides an overview of the characteristics of online platforms. Chapter III presents several of the most popular business models of online platforms in more detail. A summary with key takeaways follows at the end.

II. Characteristics of online platforms

2.1 Economics of online platforms

Platforms are generally known as "two-sided" or "multi-sided" markets where users are brought together by a platform operator in order to facilitate an interaction (exchange of information, a commercial transaction, etc.). In the context of digital markets, depending on a platform's business model, users can be buyers of products or services, sellers, advertisers, software developers, etc.

Multi-sided platforms are not exclusive to the online world and also exist in the off-line world. Throughout history businesses have organised themselves as platforms. The simplest examples are markets or newspapers: both gather sellers and buyers in a common space thereby facilitating contact between two sides that would otherwise be unlikely to interact. Nevertheless, 'real life' platforms were usually limited physically and geographically (the

merchandise had to be transported and stocked, a paper had limited circulation and advertisements had to be location specific etc.)

The Internet revolution and ubiquitous connectivity (better networks, connected devices, the smartphone revolution) has led to an unprecedented expansion of the platform business model.

As discussed in subsequent sections and in the JRC report[5], there is no consensus on a single definition of online platforms as a clear-cut definition would likely be too narrow, or conversely apply to a very wide range of Internet services. However, many online platforms share the following important characteristics:

- capacity to facilitate, and extract value, from direct interactions or transactions between users;
- ability to collect, use and process a large amount of personal and non-personal data in order to optimize, *inter alia*, the service and experience of each user. This data aggregation capacity ("economies of scope") gives platforms an informational advantage over individual platform users and causes information asymmetry;
- capacity to build networks where any additional user will enhance the experience of all existing users – so-called "network effects";
- ability to create and shape new markets into more efficient arrangements that bring benefits to users but may also disrupt traditional ones. The ability to organise new forms of civil participation based on collecting, processing, altering and editing information; and
- reliance on information technology as the means to achieve all of the above.

2.1.1 Multi-sided markets

As opposed to the conventional "pipeline" business model where value is generated by the supplier of a product or a service, a large part of the value derived by users of an online platform's is created by other users. The effects that one user of a good or service has on their value to other users are known as "network effects". The concept of network effects in online platforms is further discussed in the section "Network effects".

A platform operator can facilitate transactions by reducing transaction costs. For instance, platform operators often provide a convenient way of matching the two sides of an interaction (e.g. search or recommendation function), a physical or virtual space to interact, a code of conduct, dispute resolution mechanisms, instruments that increase trust (e.g. reviews, identity checks), methods of payment or certain units of measurement to which both sides agree. Platforms' role as facilitators of interactions was brought to light in early literature on multisided markets which emphasised the role of an intermediary in the coordination of interests of the two sides of an interaction[6].

Certain authors propose a classification that distinguishes between three types of online platforms[7]: market makers, audience makers, and demand coordinators. Market-makers bring together two distinct groups that are interested in trading, increase the likelihood of a match, and reduce search costs. Audience makers match advertisers to audiences. Meanwhile demand coordinators, such as software platforms, operating systems, and payment systems coordinate demand between different user groups (for example card holders and merchants, developers and smartphone users).[8]

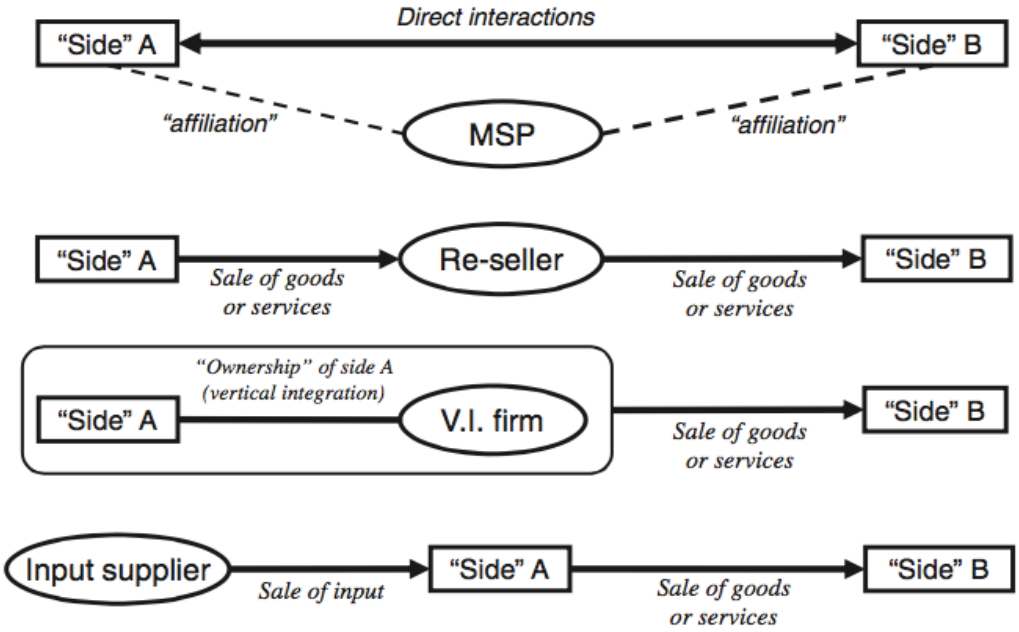
One can also distinguish between transaction and non-transaction platforms[9]. Some sides in the latter type of platform can participate without engaging in a transaction. Membership externalities in non-transaction markets arise from simply joining the platform, for instance by placing an advertisement in a newspaper, possessing a payment card, having a point-of-sale

terminal or attending an auction. Usage externalities arise from using the platform, for example by paying or accepting payment with a card, or selling or buying a product at an auction.

2.1.2 Platforms, resellers and service providers

Some experts[10] propose an additional factor to distinguish multi-sided platforms from other types of markets: direct interactions between two or more sides. A reseller buys products from the supplier and acquires control rights (over pricing, promotion campaign, sales conditions, etc.). By taking over control, the reseller also assumes the largest share of the risk in case the product is faulty.

Figure 1: Multi-sided platforms vs. alternative business models



Source: *Hagiu & Wright (2015)*

In its purest form, an online platform simply offers a (virtual) transaction space where suppliers and consumers can meet. The platform does not intervene in the transaction, except by asking for a fee from one or multiple sides of the transaction in order to make a profit. A platform does not take control over the object of the transaction, meaning that it cannot dictate a product's price, but, on the other hand, it bears less risk compared to a reseller.

Such differentiation significantly narrows down the scope of online platforms and excludes pure resellers and online service providers from the category of online platforms. However, the difficulty with basing the definition of online platforms on the degree of control companies have over the interaction is that there are various degrees of such control and it is difficult to measure. A definition limited to only those cases where no control at all is exercised by the platform operator would risk being too narrow.

It is also important to note that many companies adopt a hybrid business model, choosing to act as a platform operator mediating between different market participants in one area of activity and as a reseller, or a vertically integrated firm, in another. There is also a spectrum of business models that fall somewhere between these two categories depending on the extent of control they exert over transaction parameters and direct contact between users.

2.1.3 Economics of online platforms' business models

Most online platforms make money by recruiting one set of users and offering them access to

another set of users. In this context, users are the 'raw material' that the platform uses in its business model. For multi-sided platforms one group's demand for the platform's service depends on the other group's demand. By facilitating interaction between different user groups - who could engage in a valuable exchange - multi-sided platforms reduce transaction costs and create value for all sides involved.

Traditional business models are regarded as linear. In order to provide a product or a service to a customer, businesses go through R&D, manufacturing (in the case of goods), distribution and sales. A business model can be vertically integrated to complete all of these functions, or any of these functions could be sourced from other producers. In any case, it can be generalised that value is created upstream and is flowing downstream to be delivered to the consumer.[11]

Unlike traditional businesses, multi-sided businesses are not linear. Platforms provide a medium in which one set of platform users delivers value to another set of platform customers, as well as to the platform itself.

As a result, interdependencies may exist between platform customer groups such as (*inter alia*): (i) producers of complementary products (e.g. app developers) and end consumers (gamers), (ii) advertisers and readers, (iii) shoppers and sellers, (iv) job seekers and recruiters, (v) accommodation providers and accommodation seekers, (vi) transportation providers and passengers. The demand of the different customer groups for the platform is related to the supply of other platform customer groups and vice versa.

2.1.4 Network effects

In economics and business, a network effect is the effect that one user of a good or service has on the value of that product to other people.

When positive network effects are present, the value of a product or service increases with the increasing number of other users. Direct positive network effects apply to the same group of users (e.g. the more users join a telephone network, the more it makes it worthwhile for others to join). In the online world, this is the case with users of social networking platforms (e.g. Facebook). For users of those platforms, the value of using the platform grows as other participants with whom they can interact start joining.

Indirect positive network effects exist where users of one group benefit from an increased presence of users from a different group (e.g. sellers on an online marketplace benefit from a higher number of buyers). Economic models of platform markets or multi-sided markets emphasize that relatively strong indirect network effects are an important feature distinguishing platforms from one-sided markets.[12]

For example, the presence of more traders at an online marketplace increases the value of the online marketplace for shoppers. In that way, individual stores benefit indirectly by the addition of other stores due to increased website traffic. This process also works conversely: the presence of more shoppers increases the value of joining for sellers. Consequently, shoppers benefit indirectly from the interest of other shoppers in the marketplace as the increased number of potential customers attracts more sellers resulting in wider choice for each shopper. Similarly, the presence of a wide selection of hotels on a travel marketplace, for example, attracts more accommodation seekers to the platform. This then increases the value of the platform for hotels and leads to even more hotels joining, thereby resulting in higher customer interest.

Indirect network effects can have asymmetric intensities on the various sides of a platform. For example, a social media platform is at first interested in getting as wide a user base as possible. However, this does not translate to higher profits for the platform. In order to monetize its activity, the platform needs to attract advertisers to whom it can sell access to its

existing user base. Advertisers may be much more interested in accessing the users than users are in receiving advertisements (the indirect network effect generated by the users is bigger than the indirect network effect generated by the advertisers).

The asymmetry of indirect network effects is lower in the case of classical marketplaces (both sellers and buyers benefit) and higher, for example, in the case of advertising based platforms where both positive (supply of content) and negative indirect network effects (advertising) are present. A number of experts conclude that it is not necessary for the existence of a multi-sided market that indirect network effects be positive and act with equal strength in both directions.[13]

Cross-subsidization may lead to the growth of the overall number of platform users and benefit both sides. This explains why offering free services to some platform users might make perfect business sense, and why "free" services for consumers are a prevalent business model in the modern platform economy.[14]

Due to the presence of network effects, such as preferential attachment, and the benefits of customer aggregation for saving transaction costs, platforms need a critical mass[15] of customers on all sides to survive. Start-up platforms are faced with a "chicken and egg problem" - it is the presence of customers on side '1' that attracts customers on side '2', and the presence of customers on side '2' attracts customers on side '1'. Thus, each entrant platform, which usually has no customers on either side initially, needs to find ways of motivating both sides of the platform to join.

It is not only the number of customers that join that matters, but also attracting customers on both sides of the platform in the right proportions. If the platform attracts too many customers on side '1', without there being sufficient customers on side '2', then those on side '1' might choose to leave as using the platform would not bring them much value. Their exit would render the prospect of attracting customers on side '2' even more difficult, and could ultimately result in a negative feedback loop. If a platform cannot reach this critical mass both in terms of scale and balance between the different customer groups, it will not be able to survive in the long-run.

2.1.5 "Single-homing" and "Multi-homing"

Customers may use one or more platforms for the same purpose. Customers 'single-home' when they only use one platform and therefore restrict themselves to interacting with customers on the other side of that platform (e.g. most people use one operating system on a single device). Customers "multi-home" when they use two or more platforms and therefore can access customers on any of the platforms they use (e.g. most people have more than one payment card).

A platform aiming to develop a 'single-homing' business model will try to ensure that a customer spends as much time as possible on that platform. This is strongly related with the phenomenon of economies of scale and scope in data collection discussed in the next section. A platform operator has a strong incentive to adapt its service, through e.g. diversification, acquisition so that its offer goes beyond a simple service and becomes an 'experience' or 'ecosystem' encouraging the customer to stay on the platform as long as possible.

2.1.6 Economies of scope in data collection and analysis

As the number of users on a platform increases, the benefits for a user of a growing number of other users on the platform depend on the efficiency of matching mechanisms developed by the platform operator. The raison d'être of online platforms is their capability to efficiently match a large number of users in a market in order to facilitate an interaction[16]. The sheer volume of information available on the Internet and the constantly growing number of users

of platforms creates a matching challenge. Online marketplaces can carry many more products than off-line stores can ever manage. The indexes of search engines contain billions of web pages.

The key role of online platforms is to help users of different sides of the market (sellers, buyers, social media users, advertisers, software developers, etc.) to find what they are looking for.

The connected world is producing personal and non-personal data[17] at an ever increasing rate. Less than a decade ago, the International Data Corporation estimated that the size of 'the digital universe' was about 130 exabytes[18]. By 2013 that had grown to an estimate of 4.4 zettabytes[19] and accumulated data keeps growing 40% a year[20], expanding to include not only the increasing number of people and enterprises doing everything online, but also all the “things” – smart devices – connected to the Internet, unleashing a new wave of opportunities for businesses and people around the world. What differentiates data from other input factors is that data is virtually non-finite. It can be reused again and again without necessarily losing its value and it can be reused in multiple ways for achieving different results (personalisation, statistics, identifying trends, etc.). The EU has recently reformed its data protection rules, providing more control by individuals over their personal data and incorporating the principles of 'data protection by design' and 'data protection by default' which motivates architects of Big Data analytics to use techniques like anonymisation, pseudonymisation, encryption, and protocols for anonymous communications, so as to ensure appropriate data protection settings and safeguards.

This is also the rationale why online platforms have become some of the main actors in the emerging area of "Big Data"[21]. Big Data refers to extremely large, dis-aggregated datasets that may be analysed in order to reveal patters, trends and associations. Big Data is commonly described with three "Vs": volume (ever increasing), variety (every consumer is a data point, with data being collected on novel types of variable such as transactions, likes, searches, geolocation, messages, etc.) and velocity (data is acquired in real time and needs real time processing). Sometimes a fourth "V" is added for veracity referring to the trustworthiness of data.

Big data helps platforms adapt their services to better match the preferences of consumers, optimise their business processes, reduce costs and identify new market trends or opportunities. It has been referred to as a management revolution in business[22]. Big data has the potential to radically change our lives[23]. When open, it can be used for scientific research that allows deeper insight into economic or socio-demographic trends. Personalized information feeds, improved search results, and various recommendation engines are constantly improved based on data collected. This is achieved with the use of self-improving algorithms that are good at discovering complex patterns in relatively unstructured large datasets that are beyond the cognitive capacity of humans to handle. In general, when the appropriate processing tools are available, the larger the volume and variety of data, the more insight can be achieved into the consumers' behaviour and preferences[24]. Applying machine learning algorithms to smaller datasets separately may be more costly and would not produce the same quality of insights.

Certain online platforms are well placed to take advantage of Big Data due to significant economies of scope (variety of data) and scale (volume of data) associated with data collection and analysis. They facilitate and collect data about billions of interactions each day. As the number of users and functionalities of online platforms expands, it leads to a dramatic accumulation of data. For example, Facebook has nearly 1.6 billion active monthly users (more than 50% of all Internet users) and reached 1 billion daily active users in August 2015 (1 in 7 people on Earth)[25], each generating a considerable amount of personal data. Many online marketplaces are now able to track in real time what users look at, what options

they prefer or discard and what is purchased. Upstream, they are constantly monitoring the logistics chain, with real-time inventories and delivery. An extra layer of added value comes from combining the data around the sale itself with elements regarding customer preferences, demographics, advertising, credit history or social media interaction.

Online platforms are also among the most visited websites in the world. A small number of platforms are currently the main starting pages for browsing the Internet (in 2001, the top 10 websites accounted for 31 % of all U.S. page views, but by 2010 they accounted for 75 % of them.[26] Virtually all top 10 global websites by Alexa monthly online traffic operate online platforms[27]).

In addition to the scope and scale of data collected by online platforms, the main market players make significant investments in hardware, software and human resources. For example, Amazon has 28 total sets of data centres across the world, with a typical facility containing 50,000 to 80,000 servers (estimates range between 1.5 million and 2 million).[28] In 2013 both Google and Microsoft had data centres running more than 1 million servers.[29] The largest companies invest billions of USD each quarter in computer infrastructure.[30] This infrastructure can also be accessed by other companies through Amazon's, Google's and Microsoft's cloud services.[31]

2.1.7 Platforms and risk management

One of the major differences between platform business models and resellers relates to the management of ex-post risks associated with a transaction. While a reseller controls most aspects of the transaction (including the quality of the offered product or service), the role of many online platforms is to facilitate a transaction for others. When platforms match demand and supply bringing together consumers and suppliers but are not involved in the underlying provision of goods or services, certain risk factors arise which they do not control. However, in addition to the need to comply with all legislation that is applicable to them, also when they are not involved in the underlying provision of goods or services, operators of online platforms are aware that, in order to attract users, they need to provide a transaction environment that helps to mitigate ex-post risks associated with platform transactions. Most platforms and intermediaries described in section II internalise the management of some risks through self-regulation based on community codes of conduct, user reviews, ex-ante control of suppliers' credentials, dispute resolution, insurance schemes, etc.

Online platforms are well-placed to proactively reduce the amount of illegal content that passes through them. Many platforms have already voluntarily put in place some proactive measures which go beyond their legal obligations. Measures range from various filtering technologies (e.g. PhotoDNA hashing technology for child abuse content or fingerprinting technology for music files in course of upload, with their own tools such as Youtube's ContentID or with commercial solutions such as Audible Magic), blocking (e.g. URL blocking based on black-list of Internet Watch Foundation), moderation of content by algorithms, staff or community (e.g. manual checking of algorithmically flagged comments in the discussion forums), enforcement of termination policy (e.g. toward users who repeatedly infringed rights), implementation of terms of service or of community guidelines (e.g. quality standards for customers), improved notice submission systems (e.g. by establishing "trusted flaggers" or by allowing direct removal of counterfeiting offers), degradation of service to users or repeat infringers and voluntary agreements in the industry (e.g. Memoranda of Understanding regarding anti-counterfeiting efforts). In particular, such voluntary measures can prevent that the same illegal content which has been once notified is uploaded or indexed again after being removed.

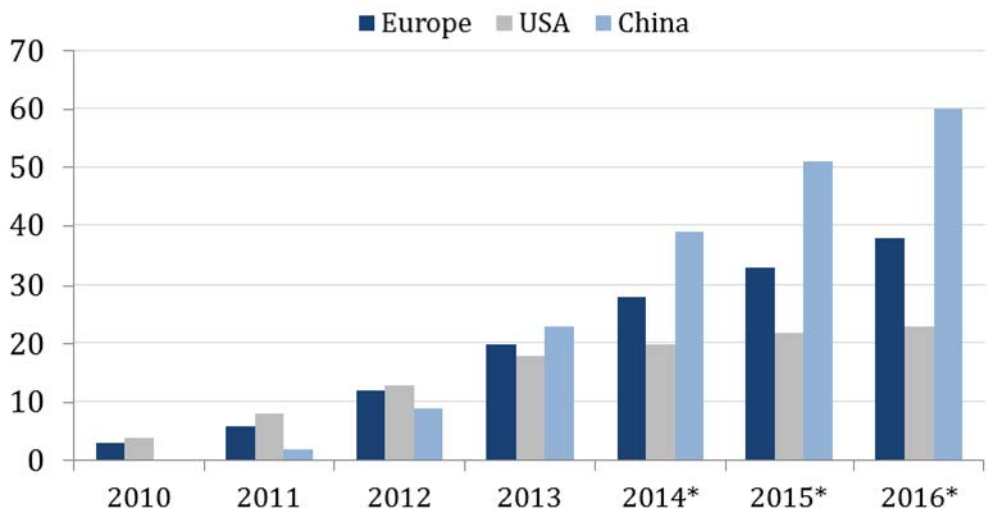
2.2 Europe's position in the platform economy

Europe has a potential to be a leading digital player in the world, benefiting from well-developed digital infrastructure, a well-educated population increasingly using the Internet, combined with a culture of creativity and innovation, as well as a solid industrial base. The EU has a strong competitive position[32], with many of the Member States ranking highly in the technological readiness index – i.e. economies that can easily adopt existing technologies to enhance the productivity of their industries. Europe has the highest percentage of individuals using the Internet worldwide, with over 77% of the population - significantly above the world average.[33] This translates to a strong European performance in key digital market indicators, such as percentage of e-commerce in total retail sales, social media usage, or the overall size of the app economy. E-commerce has experienced substantial growth in recent years.[34] EU companies made around 17.5% of their turnover from electronic sales in 2015, an increase by 2.5% compared to 2014.

In terms of social media, over 50% of European citizens have been participating in social networks as of 2015, with 29% of them uploading self-created content on such networks.[35] On the business side, 61% of European SMEs mentioned that they used social media in 2013, with the majority of them using social media for developing their company's image.[36]

In terms of the app economy, Europe is a significant global actor. It is estimated that in 2013 EU developers accounted for 42% of global consumer app revenue (before payment of fees due by app developers to platform providers on revenue earned).[37] EU developers earned EUR 17.5 billion in revenue in 2013 (including not only consumer app revenue comprising app sales, in-app purchases and advertisement, but also contract labour), and it is forecast that figure will increase to EUR 63 billion in five years.[38] On the consumer side, Europe comes second to China and before the US in terms of the number of app downloads.

Figure 2: Smartphone and Tablet App Downloads (billion)



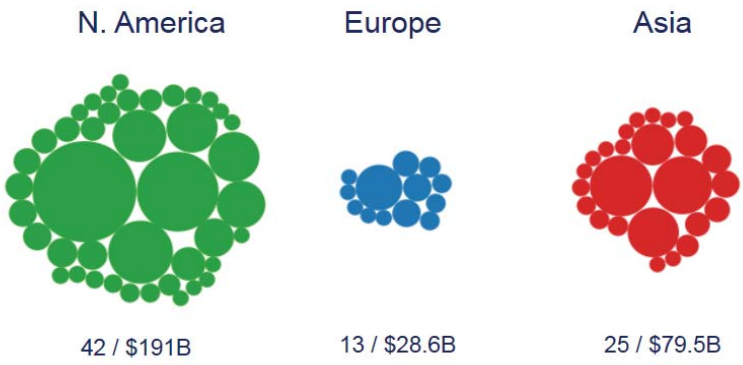
Source: *Digital Agenda Scoreboard 2015 – Use of Internet*[39]

While Europe is very good at inventing new technologies and digital concepts, it struggles with the commercial exploitation of these ideas, i.e. creating the necessary aggregates that combine these concepts in a usable form and extracts value out of the ideas. The clearest example is the creation of the World Wide Web, which was invented by Sir Tim Berners-Lee, a British computer scientist based at CERN in Switzerland, but it was only when the concept was taken up and commercialized in the US that the Web started being monetized.

The fact that Europe struggles with the commercialization of ideas, including in the area of

online platforms, is noticeable when looking at the number of European platforms compared to other parts of the world, especially North America and Asia.

Figure 3: Geographical distribution of start-up platforms



Source: *A. Gawer and P. Evans (2015). The rise of platform enterprises, CGE white paper, using CB Insights, Capital IQ and CrunchBase, 2015*

A study on the rise of the platform enterprise[40] highlights how out of the total 176 platforms[41] studied, only 25 (or 15%) were European, accounting for a little over 4% of market value. The study categorizes online platforms in transaction, innovation, investment and integrated platforms. Europe is absent from the integrated category and present with only one platform in the innovation group. The two categories are particularly important, as these are the types of platforms that attract the most value.

A 2012 Report for the European Commission Joint Research Centre on ICT innovation concludes that the EU is particularly poorly positioned in the area of platform providers. At the same time, the report finds that in ICT ecosystems power has shifted to platform providers and that platforms have significant potential to generate growth. The report highlights that "the lack of a large integrated digital market in Europe and poor capability and skills to commercialize technological innovations" are important impediments for European ICT firms to grow into world leading innovators.[42]

2.3 Increasing economic and social role of online platforms

Online platforms with their growing role in social and economic life are important to the functioning of the digital economy. By enabling consumers and businesses to make the most of the opportunities provided by the digital economy, they are key drivers of growth, innovation and competition.

The online platform business model continues to lead to the creation of high-value companies. Since the largest online platforms are some of the biggest companies in the world, one could argue that the online platform business model is the most successful one in the Internet economy. Moreover, 70% of the highest value start-up firms in 2015 (so-called "unicorn" companies with valuations of USD 1 billion or more) are online platforms.[43] Alphabet is valued at around EUR 475 billion, while Facebook is valued at close to EUR 300 billion. The chart below illustrates the geographical distribution of start-up platforms across three continents.

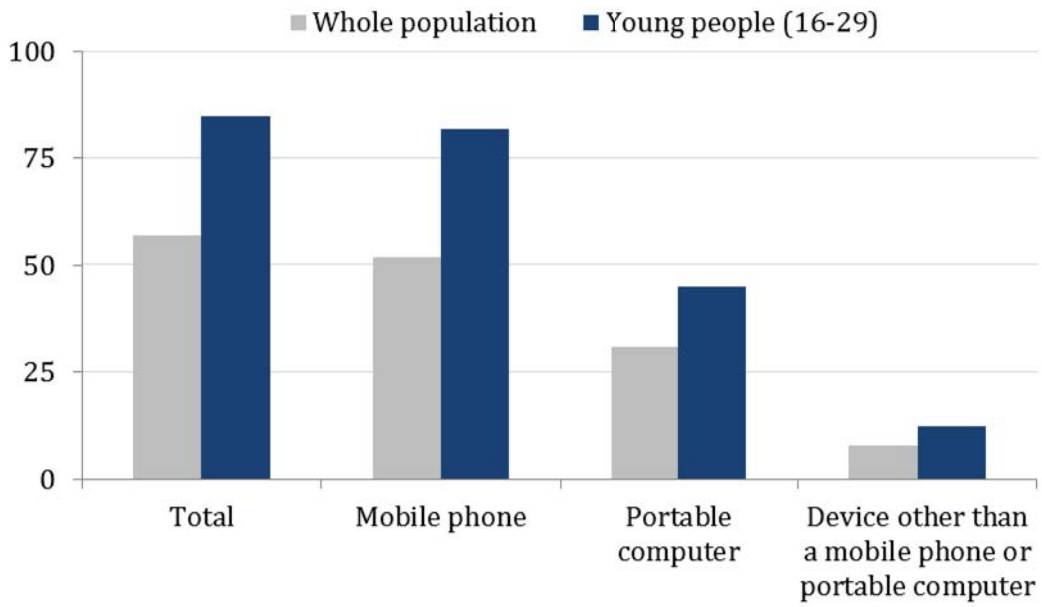
Online platforms are active in a wide array of sectors, offering or facilitating access to information, exchange of goods or services, as well as allowing users to communicate amongst themselves and with wide audiences. They play an active role in shaping the way the Internet works and are often the main portal to the Internet for a wide variety of users.

Furthermore, the role of online platforms in the economy and society will likely continue to

increase in the future. This growth is expected to come from increased mobile activity and B2B transactions gradually moving to open online platforms.[44] Amazon's B2B e-commerce marketplace is said to already today offer businesses access to "hundreds of millions of products".[45]

The number of global users of mobile phones is growing.[46] Worldwide mobile broadband subscriptions have quadrupled in the past five years to over 3.5 billion in 2015.[47] A larger proportion of the EU population now accesses the Internet via mobile phones than via laptops or other devices. This trend is particularly pronounced among the younger generation (aged 16-29) as can be seen from the chart below.

Figure 4: Use of mobile phone/tablet computer, EU28, 2015 (% of people aged 16-74)

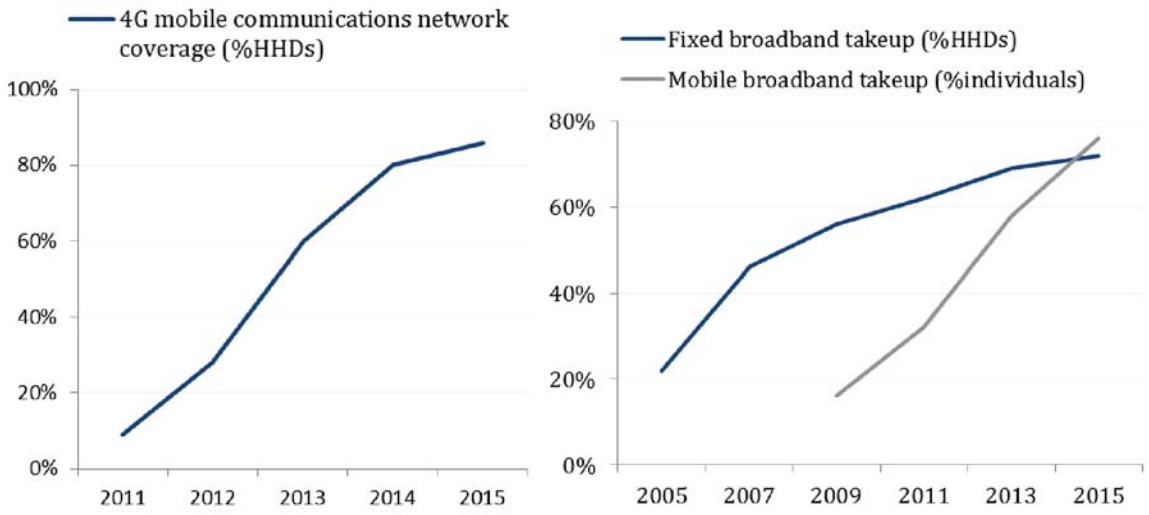


Source: Eurostat (online data code: isoc_ci_ifp_pu)[48]

Increased Internet and mobile activity of consumers is also reflected in business behaviour and revenues. For example, growth in advertising revenues in the EU is driven by the expansion of the online and mobile segments. Notably, mobile advertising revenue in the EU grew by 55% (EUR +1.4bn) in 2014, while online advertising revenue increased by 12.5% (EUR +2.7bn).[49] Advertising revenues are an important source of income for many online platform business models (as demonstrated in Chapter II).

Favourable trends in the growth of high-speed mobile Internet penetration are likely to further foster the growth in the use of online platforms in the EU.

Figure 5: EU 4G mobile communications network coverage, % of households (left), broadband penetration (right)

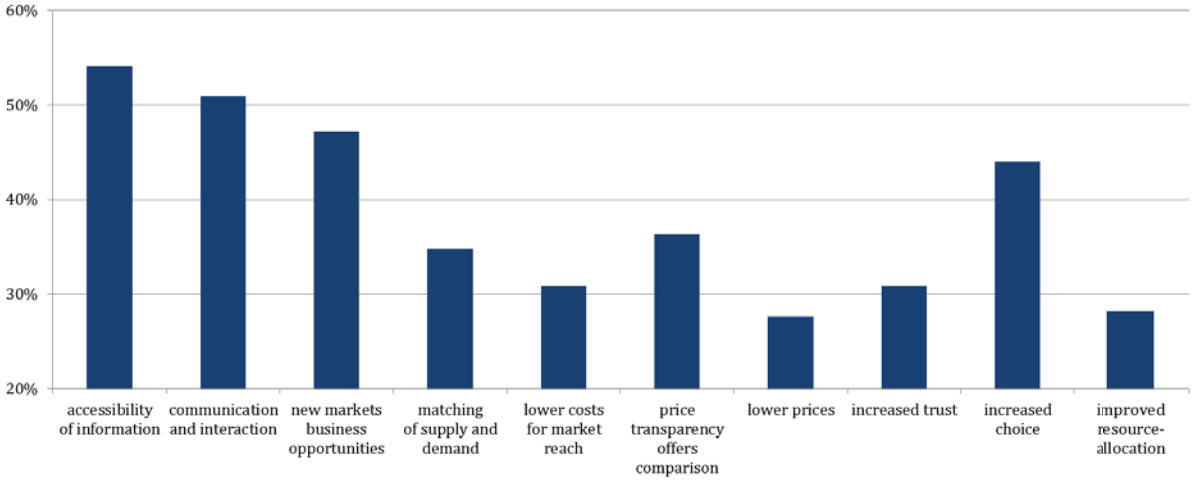


Source: *Digital Agenda, Eurostat (fixed broadband takeup)*

2.3.1 Benefits for consumers

Consumers value a wide range of benefits of online platforms. Platforms' potential to make information more accessible; make communication and interaction easier; create new markets or business opportunities; and increase choice of products and services are among the most often cited benefits.

Figure 6: Perceived benefits of online platforms[50]



Source: *Public Consultation: Regulatory environment for platforms, online intermediaries, data and cloud computing and the collaborative economy, 2015*

Online platforms enable consumers to easily compare competing offers based on price, quality, delivery or other attributes.[51]

Consumers draw concrete financial benefits from the advantages provided by platforms. Due to the complexity of both online platforms and the nature of the benefits, accurate figures of these financial benefits are hard to determine. Nevertheless, several estimates exist, such as the impact of online platforms on prices which was calculated at a total value of EUR 1 billion in reduced prices for European consumers.[52] Overall, the estimated value of purchases made by final consumers (i.e. households and public sector) is valued at EUR 270 billion, which corresponds to 2.5 per cent of the total final consumption in the EU28-countries.[53]

Looking more broadly at the benefits brought to consumers simply by making products available, an estimate for the niche book market showed that consumer benefits can reach EUR 4 to 5 billion.[54] Valuations of the consumer surplus (welfare gains from free products on

the Internet) vary from about EUR 1,100 per individual[55] to an overall benefit of EUR 135 billion.[56] Moreover, online search platforms bring an estimated EUR 140 billion in time saved for European consumers.[57]

In a nutshell, benefits for consumers arise from online platforms' offerings of a range of services that ensure:

- consumer convenience (time saving, accessible at any hour of the day, personalization, simplified transaction system, home delivery)
- reduced information asymmetry (through rating systems, comparison tools, simplified terms and conditions)
- improved awareness (ads promoting goods and services that the user was unaware of, more accessible product information)
- greater choice (diversity of products and sellers)
- monetary benefits (offering packages of goods and services, promoting deals, reducing costs of access to information)
- additional sources of income (consumers can sell their products on marketplaces, offer services through sharing economy platforms)

On the other hand, online platforms have also been shown to raise some concerns for consumers. As mentioned in the Digital Single Market Strategy Communication, issues that need to be assessed include transparency e.g. in search results (involving paid-for links and/or advertisement), platforms' usage of the information they collect, relations between platforms and suppliers, constraints on the ability of individuals and businesses to move from one platform to another and how best to tackle illegal content on the Internet.

Some of the above concerns are already covered by existing EU law. For example, EU consumer and marketing law deals with transparency of online platforms in order to assure they do not mislead consumers, for example as regards sponsored search results and online rating and review systems. Additionally, the EU's General Data Protection Regulation[58] requires online platforms to respond to privacy concerns by effectively informing users of what data is collected and how it is shared and used.

2.3.2 Benefits for businesses

In relation to the benefits online platforms bring to companies, the most important factors are cost reduction and the promotion of business opportunities, as these are the two main characteristics that lead to business growth.

In terms of cost reduction, one of the main impacts that online platforms have on companies is reducing transaction costs. Transaction costs are the costs associated with participating in a market place and can include the search or information costs incurred in identifying relevant opportunities, negotiation and transferring costs. Search engines have fundamentally changed the way that companies gather information, sort it, or adapt it to market trends. Additionally, companies benefit from the information about customers they received through online marketplaces. Results from a new Eurobarometer survey show that almost two thirds of the companies using online marketplaces agree that the information about the behaviour and preferences of their customers they receive through online marketplaces is useful for the development or improvement of their products or services (64%).[59]

With regard to online marketplaces, one of the most important benefits of online platforms is offering businesses access to a wider market than they would otherwise reach through their own websites. This is especially the case for smaller companies that can use marketplaces to target market segments or geographic markets otherwise out of reach. Moreover, some

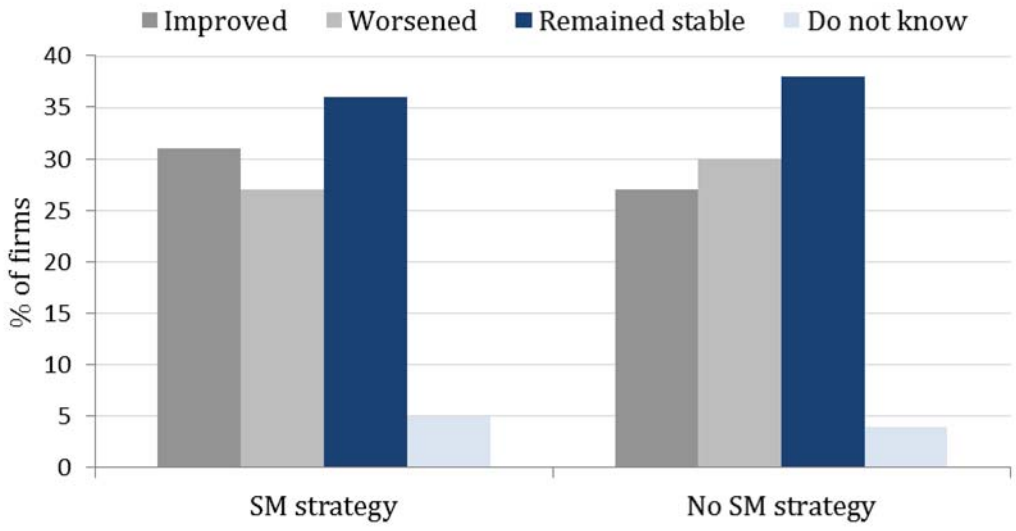
online marketplaces (for example Amazon and Etsy) assist their sellers in dealing with tax and other legal implications of exporting to EU member states. A report estimates that 93% of SMEs using eBay engage in exporting, compared to only 26% of traditional companies which engage in e-commerce without using the services of online marketplaces.[60] In the period 2010-2014 SMEs operating online have increased their cross-border sales in the EU four times faster than those without an online presence.[61]

Moreover, by analysing sales and looking at customer reviews, online platforms can help businesses better understand a market and adapt their products to consumers' needs. Depending on the platform, a company can personalize its marketplace presence and ensure a better consumer experience by attracting and retaining customers. In some cases, sellers can also use the logistic chains set up by marketplaces to dispatch their products - an essential characteristic for Europe where delivery costs can be significant.

Furthermore, social networks can be an important tool for companies to promote themselves and establish direct contact with their customers. Social media is an important tool for companies to raise awareness of their business and it enables them to create marketing campaigns at a fraction of the cost of traditional advertising. Social media also provides businesses with real-time feedback from customers that they can use in order to improve or adapt their goods and services, thereby improving customer retention and loyalty.

Considering these advantages, it would appear that SMEs stand to benefit significantly from social media tools, as social networks reduce the cost of customer interaction. European SMEs that use social media appear to be doing better than non-users, with 29% of SMEs that are social media users claiming that their situation has improved over the period of 2010 – 2013.[62]

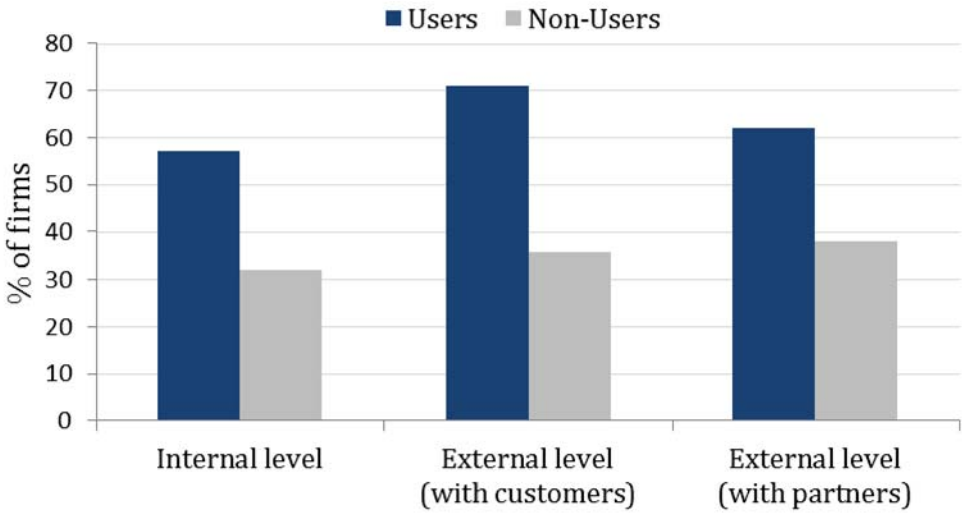
Figure 7: Financial position of users over last 3 years



Source: *Use of Social Media by European SMEs*

SMEs can also benefit from using social media in their external interactions with suppliers, collaborators and investors as it increases the speed of access to knowledge and experts, and reduces communication costs.

Figure 8: Benefits of using social media



Source: *Use of Social Media by European SMEs*

What is more, online platforms provide businesses with a range of productivity-enhancing applications with back-office functions. Examples include low-cost ways of processing payments, simple accounting software for small companies, and platforms that help businesses run events, among others.[63]

On the other hand, online platforms can also raise some issues referred to in the previous section as well as issues relating to competition and misleading marketing practices. Competition addresses issues of competition between market players, while other EU rules prohibit misleading B2B advertising[64].

2.3.3 General economic and social benefits

Much of the impact of online platforms is very difficult to quantify. Facebook estimated its global economic impact at over EUR 195 billion in 2014, deriving from its role as a catalyst for economic activity in ecosystems including marketers, app developers, and providers of connectivity.[65] Nevertheless, it remains unclear whether it is possible to calculate the economic impact of the role social networks play in ensuring freedom of expression in parts of the world where human rights are less observed.

On their part, search platforms have opened up research and access to knowledge on a global scale. Coupled with the increasing rate of smartphone penetration, this could lead to a worldwide educational boom and improved standards of living.

Furthermore, online platforms bring the additional benefit of facilitating employment. It is estimated that online platforms can reduce the search costs for employers by 75% compared to commissioning external recruiters. As many professional profiles are public, companies can reach out to people even when they are not actively seeking a new work opportunity. A McKinsey study shows that 75% of recruitment occurring through an online platform are passive recruits.[66]

Not only do online platforms facilitate employment but also they contribute to more equitable distribution among different groups. For example, although the typical offline entrepreneur in the UK is male in his late forties, 91% of UK-based Etsy sellers are women and 61% are under age of 45.[67]

Finally, over the past decade, we have seen established platforms expand into new economic sectors. For instance, Amazon started out as a book selling business, and then opened its platform to begin trading a wide range of goods, as well as establishing a

marketplace for third-party companies. Amazon realized the importance of market data in its success and continuously invested in acquiring, storing and processing large amounts of data. Over time, this has spun-off as a side company: Amazon Web Services which is currently the market leader in cloud computing. Similar developments happened with Google, which expanded in enough areas for Google's search engine to eventually become the component providing the revenue stream for a wider structure called Alphabet.

However, this tendency to move to new economic sectors is not limited to established platforms. Start-ups have historically tried to identify market inefficiencies and used the power of mobile connectivity, social media, algorithms detecting market trends, and adaptive pricing in order to take over traditional sectors, such as organized travel (Priceline, Expedia), tourism (Airbnb), transport (Uber, Lyft) and business communication (Slack). In addition to providing services at a lower cost, these online platforms, especially collaborative economy platforms, can potentially lead to better resource allocation and more sustainable consumption patterns.

2.3.4 International dimension

The global reach of the Internet makes it one of the most efficient and cost effective solutions for e-commerce and online platforms. Online platforms provide opportunities for companies of all sizes and customers in developing countries as much as developed ones, wherever Internet access is available. Online platforms are also used in international companies' production systems, as today's production is mainly done in fragmented and geographically dispersed global value chains (GVCs). This ability to split up production driven by ICT and access to the Internet is spreading across the world. However, for global value chains to operate fully, large quantities of data – from employment data and customer data, to technical product data and data produced during the usage of a product – must be moved across borders.

The whole process of producing goods from raw materials to finished products is increasingly carried out wherever the necessary skills and materials are available at competitive cost and quality. Similarly, trade in services is essential for the efficient functioning of GVCs, not only because services link activities across countries but also because they help companies to increase the value of their products.

The EU has recently levelled the playing field in respect of data protection rules, which are now applicable to organisations which offer their goods or services to individuals, or monitoring the behaviour of individuals in the EU. This means non-EU platforms targeting individuals in the EU will have to play by the same rules as EU based platforms. International trade flows depend on international and other agreements, like the negotiated EU-U.S. Privacy Shield, to guarantee that the Internet can be used safely as a means of communications when buying and selling online. The size of the data flows between the U.S. and the EU are the largest globally; approximately 55% larger than data flows between the U.S. and Asia and 40% larger than data flows between the U.S. and Latin America.[68]

The amount of data will grow as manufacturers move into more advanced production involving sensors and intelligent robotics, and the introduction of 3D printing into their processes. A significant part of the data being moved is personal data.

III. Online platform business models

3.1 Marketplaces and e-commerce platforms

3.1.1 General description

Online marketplaces can be defined as online platforms on which direct transactions between sellers and buyers of goods and/or services can take place. In particular, EU legislation regards online marketplaces as service providers which allow consumers and traders to conclude online sales and service contracts on online marketplaces' websites.[69]

Much like in the real world, an online marketplace is a central entity that offers 'virtual space' to third-party sellers of goods and services in exchange for a commission - with the marketplace offering tools to conduct the transaction. Clear examples of online marketplaces that would be encompassed by this definition are eBay, Amazon Marketplaces and Rakuten.

Online marketplaces allow transactions going beyond the sale of physical goods. Digital goods, such as computer games/software are sold on specialized platforms such as Steam, Unity, Origin or the marketplaces for the Xbox and Sony Playstation game consoles. Other types of marketplace platforms aim to facilitate the supply of goods and services between professionals (B2B), including online financial trading platforms, energy exchanges (e.g. virtual natural gas trading hubs) or data exchanges (e.g. Factual, DataMarket).

This section will focus on those online marketplaces that involve the provision of goods to consumers, since they are by far the largest category in terms of spending on online purchases (representing approximately 80% of average spending in different product categories in Europe).

For certain categories of resellers, marketplaces can reduce transaction costs with buyers beyond what could be achieved by the resellers themselves. The scale and efficiency offered by online platforms has moved both private and professional sellers to the online sphere.

Sometimes online marketplaces can be difficult to distinguish from online resellers.[70] Certain online marketplaces also exist where both the vertically-integrated platform operator as well as third-party sellers are active in the sale of goods. Amazon, Bol.com and Zalando are examples of such online marketplaces.[71]

3.1.2 Business models

The core function of online marketplaces is the provision of a single platform on which transactions between participating buyers and sellers can happen. For certain categories of participants, they lower transaction costs by, for example, bringing different sellers together in one place, providing recommendation functionality for customers, setting basic rules and codes of conduct, providing convenient payment methods, etc. In this respect, they share some of the characteristics of local weekly markets or shopping centres. However, due to the use of online technologies, they can operate at a completely different scale, collect much more valuable data and provide new and valuable services to both buyers and sellers.

Online marketplaces generally 'vet' third-party sellers in some way or another (e.g. by awarding certificates, displaying customer reviews or requiring authentication measures), and given that they intermediate in the payment process (e.g. by prohibiting certain payment methods that are susceptible to fraud) they may increase the level of trust for consumers.

Online marketplaces can offer additional functionalities to all sides using the platform. For consumers, a platform can have built-in auction mechanisms, improved consumer experience through suggestions and consumer engagement, increased trust and consumer awareness through review systems or mechanisms to report fraud. Given the involvement of an online marketplace as a professional intermediary in transactions between buyers and

third-party sellers, there is however a need for clarity on the precise responsibilities of the various actors involved, including in terms of ensuring respect for consumer rights. For businesses, an online marketplace can allow small companies to use the platform's logistic chain to ship products to consumers, provide user data allowing for targeted advertising, authentication and valuation services to third-party sellers or support for secure payment methods.

There is a wide variety of online marketplace business models. Many of them specialise in certain types of products or services. Some are relatively open with limited control over the type of offers (e.g. Craigslist) while others are relatively closed with the marketplace operator vetting the offer of the seller (e.g. Steam). In the former case the seller simply has to register; in the latter the operator decides who may or may not be included. Some online marketplaces are operated by a company which is also a merchant (Amazon, Alibaba, Pixmania, Zalando) while others are solely marketplaces (Allyouneed, eBay, Rakuten).

Online marketplaces can generate revenue in a variety of ways, principally through fees charged on third-party sales but also through the sale of online advertising space. Amazon charges a 'referral fee' for each item sold as a percentage of its total sale price. This fee is on average 15% but varies depending on the product category (e.g. for video game consoles the fee is 8% of sales price). This does not include the listing fee ($0.99) and a variable closing fee ($1.35 for media products but based on item weight and shipping for other products). Sellers using Amazon fulfilment services pay an additional 8-15% of the sale price of each item (on top of other Amazon fees) [72]. Etsy, a marketplace for crafts charge 3.5% of the selling price and a listing fee (minimum $0.20)[73]. Catawiki charges 12.5% commission on each winning bid.[74] EBay charges a 10% commission on the total cost for the buyer (including shipping cost) of each item sold as well as a monthly charge for listing items ('insertion fee').[75] Additionally, eBay offers advertising space on its website to third-parties including advertising networks.

Online marketplaces may principally compete for customers with bricks-and-mortar retail outlets. This is regardless of whether the online platform operates also as a reseller of goods or only as a mere intermediary marketplace.

3.1.3 Main players

Major examples of online marketplaces active within the European Economic Area ("EEA") include eBay, Amazon, Allegro, Spartoo[76], Zalando[77] (online marketplace for fashion on which both Zalando itself as well as third-party sellers are active), and Chrono24 (global online marketplace for luxury watches). The top 20 online marketplaces in Europe based on website traffic can be seen below.

Figure 9: Top 20 Online Marketplaces in Europe by Traffic[78]

Rank	URL	Country	Category	Run by seller / neutral	Owner	HQ
1	amazon.de	DE	Full range	S	Amazon	US
2	amazon.co.uk	UK	Full range	S	Amazon	US
3	ebay.de	DE	Full range	N	eBay	US
4	ebay.co.uk	UK	Full range	N	eBay	US
5	allegro.pl	PL	Full range	N	Allegro	PL
6	amazon.fr	FR	Full range	S	Amazon	US

7	leboncoin.fr	FR	Full range	N	Leboncoin	FR
8	amazon.it	IT	Full range	S	Amazon	US
9	ebay-kleinanzeigen.de	DE	Full range	N	eBay	US
10	amazon.es	ES	Full range	S	Amazon	US
11	ebay.it	IT	Full range	N	eBay	US
12	cdiscount.com	FR	Full range	S	Cdiscount	FR
13	mobile.de	DE	Automotive	N	eBay	US
14	ebay.fr	FR	Full range	N	eBay	US
15	subito.it	IT	Full range	N	Leboncoin	FR
16	otto.de	DE	Full range	S	Otto	DE
17	gittigidiyor.com	TR	Full range	N	eBay	US
18	fnac.com	FR	Full range	N	Fnac	FR
19	tesco.com[79]	UK	Full range	N	Tesco	UK
20	marktplaats.nl	NL	Full range	N	eBay	US

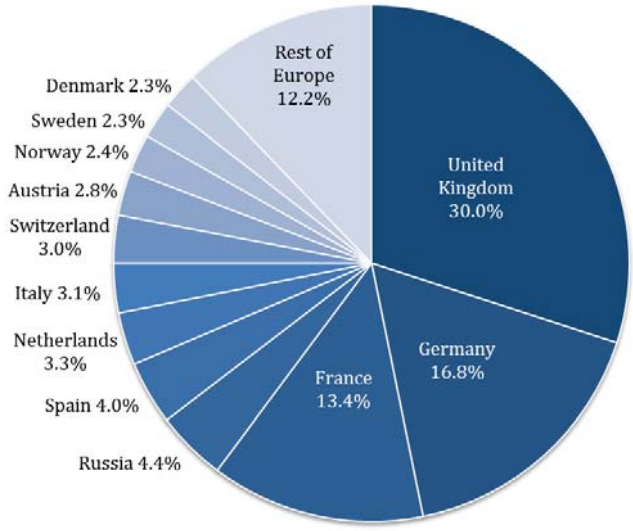
Source: *Bundesverband Onlinehandel, Top 100 Online marketplaces in Europe, 2016*

The increasing importance of these online marketplaces is underlined by their significant turnovers, growth rates and investor interest in their business. The successful regional Benelux marketplace Markplaats.nl was acquired by eBay already back in 2004 for EUR 225 million.[80] PriceMinister, an e-commerce site in France, was acquired by Rakuten Japan in 2010 for EUR 200 million[81]. EBay, in turn, reported significant global net revenues of around USD 8.8 billion for its marketplaces business in 2014[82] (up from around USD 7.4 billion in 2012[83]). This constitutes only a fraction of the volume of trades that occurred via its various online platforms. Even a specialised online marketplace like Chrono24.com reported EUR 500 million of luxury watches having been sold via its website in 2014.[84] Finally, Catawiki, an online auction marketplace for collectables that was founded only in 2008 was reported to have been the fastest growing technology firm in the EMEA-region in 2015.[85]

3.1.4 Impact

According to the European B2C eCommerce Report issued annually by Ecommerce Europe[86], the turnover of B2C e-commerce (online platforms and e-retailers included) in the EU28 is estimated to have grown by almost 14% from EUR 317.9 billion in 2013 to approximately EUR 370 billion in 2014.[87] While it is difficult to pinpoint how much of this turnover is generated by resellers and how much by platforms, it is clear that online platforms play a significant role in all national markets. For example, Amazon is market leader in both share and unique visitors in Germany, the United Kingdom and France, the three biggest e-commerce markets in Europe (Germany, France and the UK account for over 55% of e-commerce in Europe.)

Figure 10: Share of European B2C e-commerce market



Source: *Ecommerce Foundation, 2015*

A study commissioned by EDiMA (a European trade association representing online platforms) estimates that EU households and governments purchased 2.5% of their total consumption via online platforms in 2014, which according to the study amounts to EUR 270 billion.[88]

Currently in Europe there are over 50 companies which offer more than 335 online marketplaces – 60 in Germany, 30 in France, 24 in Italy and 18 in Netherlands and in Spain.[89] Although Amazon is the largest global marketplace with more than 2 million companies from over 100 countries selling via Amazon's market place[90], local players have spread out in Europe and have increased their footprint across other countries. In several European countries, online marketplaces on which a specific category of service or product is sold are significant market players at national level, such as Zalando (a marketplace for fashion items) and AutoScout24 (a car marketplace). Despite the rapid growth of e-commerce, overall its importance vis-à-vis bricks and mortar shops is still modest. However, some forecasts predict that by 2020, the main online marketplaces may account for up to 40% of the retail market globally.[91]

The impact of online platforms goes well beyond turnover. Online marketplaces have fundamentally changed entire retail sectors, such as media (books, movies, and music), tourism, fashion or consumer electronics. Clothes and sports goods are the most common category of online purchases and have seen remarkable growth in recent years. Six in ten online shoppers (60%) bought such products in 2015 compared to 47% in 2010. Slightly over half of online shoppers have bought travel and holiday accommodation (52%) while about four in ten have bought household goods (41%), tickets for events (37%) and books/magazines/e-learning material (36%)[92].

According to a 2015 Eurobarometer survey, among the EU companies that sell online, 35% rely on small online marketplaces, 33% on large online marketplaces and 80% on their own websites or apps[93].

Given the existing scale of e-commerce in Europe and its potential for further growth[94], online marketplaces are bound to increasingly impact consumers and businesses alike. Consumers gain major advantages in the process; the ability to effectively shop cross-border online allows for a wider choice and/or lower prices. Online marketplaces allow consumers to overcome fundamental barriers to exploiting the full potential of the EU's internal market (including lack of trust and language barriers).[95] In order for this business model to develop in

the future, consumers' trust is likely necessary.[96]

Businesses, in turn, benefit from online B2C marketplaces that offer a wider target audience. Online marketplaces such as Amazon or Etsy provide support for sellers looking to sell in a different EU Member State. As a consequence, almost half of Amazon Germany's third-party retailers are foreign traders.[97]

Online marketplaces (C2C, B2C and B2B), therefore, have a crucial role to play in enabling growth and innovation, as the potential for efficiency gains combined with increased price competition will favour innovative firms and increase research and development spending.

3.1.4.1 Collection and processing of personal data and non-personal data

Online and e-commerce marketplaces rely on considerable amounts of personal and non-personal data in order to ensure that they provide a holistic shopping experience. For online platforms each user, whether company or customer, can be considered a very valuable data-generating source. Big data technology is then used to ensure personalization of offers, setting prices or maintaining inventories. This use of data fosters innovation and adds to the efficiency gains generated by online market places. Data can also better protect consumer rights by ensuring that consumers receive all the relevant product information and are better protected from unreliable traders.

Consumers are generally aware of the fact that their personal data is being gathered, processed and stored by online marketplaces, even though they might not be aware of the levels of data collection or how well websites can get to know a consumer's habits and preferences. Online marketplace platforms usually offer the possibility of downloading historic order histories which may go back to the date of registering on the platform. These types of reports may not contain all information that online marketplaces have on users. According to Privacy Notices published by major online marketplaces, in addition to order history, online marketplaces may collect, store and process data relating to the user's IP address, browser type, the full clickstream to and from the platform site, including date and time, product views and searches, location information when mobile apps are used (unless the location services on the mobile phone are disabled), and session information relating to user behaviour online, such as length of page visits, information about page interaction (such as scrolling, clicks, mouse-overs), and methods used to navigate away from the page.

A Special Eurobarometer Survey 431 from 2015 shows that only 20% of the respondents considered that they were always informed about the conditions of personal data collection and further uses of their personal data. Consumers are generally concerned about their personal data when buying online. According to the 2015 DSM consumer survey, over 30% of consumers indicate that they fear their personal data might be misused and 26% fear that their payment card details might be stolen. The new EU rules for personal data protection require better transparency and information to be provided to individuals, increases their control over their personal data while allowing data controllers to operate on a risk-based approach. Transparency and accountability can contribute to increasing individuals' trust in online services.

An online platform will always have more information than each of the sides using the platform, since it is the central point where all the data is gathered. Platforms can use all the information to better connect the sides (via ranking and recommendations), to attract new participants to the platform or to sell the gathered data to advertisers. Where this information consists of personal data, any processing must be in compliance with the EU data protection rules.

Online platforms may in specific cases make use of collected data to understand market trends, dynamics and the position of players. In particular, they may have an interest to do so

where vertical integration exists, i.e. where the platform directly competes with third-party companies selling through the platform.

Information asymmetry can also play a role in dealing with consumers. An online platform is able to determine where a customer comes from and depending on the operating system used history of purchase or type of payment and based on consumer trends understand what the financial bracket of a customer is. It can then differentiate among consumers and adapt pricing.

3.1.4.2 Dynamic pricing

Online marketplaces are able to apply dynamic pricing, prices adapted to the characteristics of an individual consumer. Each retailer has different practices when it comes to dynamic pricing.

Retailers (and implicitly online marketplaces) are free to set their own prices and the notion of dynamic prices is not illegal in itself. Nevertheless, there is a debate about how much consumers are aware of this practice and to what extent setting prices on the basis of customer information may lead to discrimination in particular when prices are established on the basis of factors like nationality which may not be seen as a justifiable means to distinguish prices. Under certain circumstances, which must be assessed on a case-by-case basis by national authorities and courts, dynamic pricing practices could also be contrary to EU consumer and marketing law.

3.1.4.3 Distribution of risk

Online marketplaces and e-commerce websites generate a significant amount of traffic and sales activities. This also means that they are becoming an important target for distributing counterfeit goods. At global level, the OECD estimated that in 2007, international trade in counterfeit and pirated goods could have accounted for up to USD 250 billion, which is an amount that is greater than the national GDPs of the bottom 150 economies in the world[98]. The International Chamber of Commerce estimated that the upper bound of the global value of counterfeit and pirated products could reach USD 1.77 trillion by 2015.

Statistics published on 27 October 2015 by the European Commission show an increase in Europe in the number of shipments suspected of violating intellectual property rights. In 2014, more than 95,000 detention cases were registered by customs. Small parcels and express and postal traffic resulting from Internet sales make up a significant proportion of detentions. As far as the over 35 million detained articles are concerned, the value of the equivalent genuine products is estimated to be just over EUR 617 million[99].

In response to that, major online platforms have set up programs to self-police their own respective marketplaces and take upon themselves the risk of potential third-party counterfeit goods. For example, Amazon's policy (A-to-Z Guarantee) ensures that consumers can replace products that are suspected to be counterfeit. Sellers on Amazon have the responsibility to source and sell authentic products or they will be removed from the platform. EBay runs the VeRO[100] system, a subscription service allowing IPR holders to check items being sold and notify eBay if they are counterfeit, in which case eBay will then remove the listing.

3.2 Mobile ecosystems and application distribution platforms

3.2.1 General description

In recent years a rapid shift of online activity patterns has taken place from PCs to smartphones. Applications ("apps") for smartphones and tablets play an important role in this regard. Today, Android and iOS smartphones alone are outselling PCs 5 to 1, not counting tablets, and this ratio is predicted to rise to 10 to 1 in the next few years.[101] Therefore, mobile

has become the key new market ecosystem and led to the development of important marketplaces for software and digital content. Whether looking at the rise of the "internet of things" (IoT), wearables, in-car systems, or the reinvention of the more traditional desktop, app stores will play a key role in the future.

App stores, such as Google Play (Android) and App Store (iOS) are important components of mobile ecosystems enabling users to download apps to mobile devices. It is estimated that there are more than 1.5 million different apps available to consumers in Google Play (Android) and App Store (iOS).[102] Whatever can be done using a mobile device, it is likely that "there is an app for that".

Between 2008 and 2015 the proportion of time spent online using mobile devices increased from 12.7 percent to 54.6%[103] and approximately 85% of that time is spent in native apps[104]. In Europe, it is estimated that the share of mobile commerce in online spending doubled between 2014 and 2015 and now reaches 25%.[105] Mobile is becoming the dominant revenue source for Internet-based service providers. For example, Facebook earned 78% of its global advertising revenue from mobile in 2015 Q3[106] compared with 14% in 2012 Q3.[107] These trends are expected to continue.[108]

3.2.1.1 Emergence of mobile ecosystems and application distribution platforms

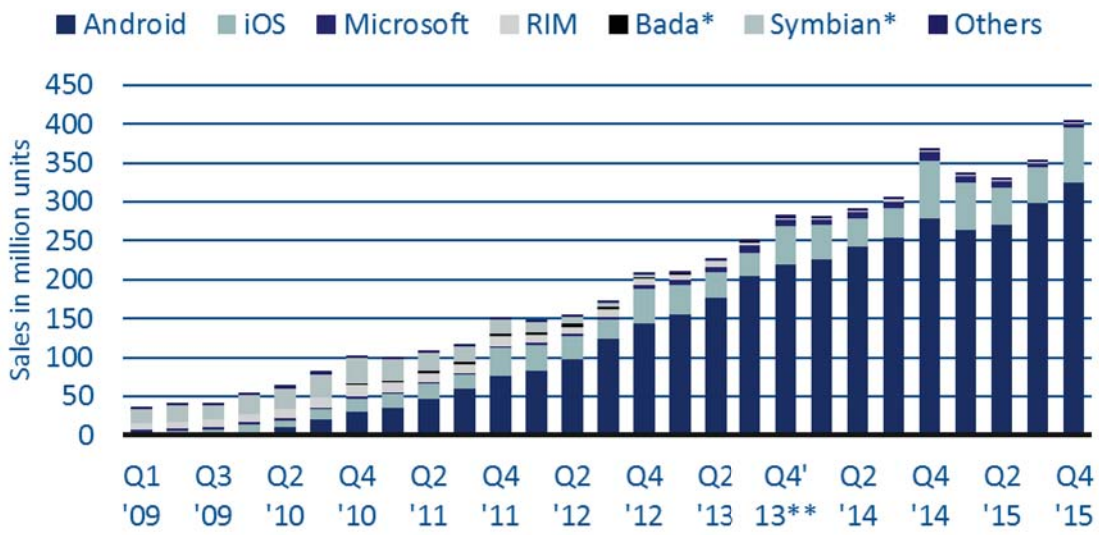
The advent of modern smartphones (with the introduction of Apple's iPhone in 2007) has revolutionized mobile phone design, transforming the mobile ecosystem structure and started the convergence of traditional mobile telephony, Internet services, and personal computing. New services have sprung up, transforming the very nature of ‘core services’ for carriers, as voice, text and later video communications got embedded into apps.

The evolution of devices has been accompanied by rapid improvements in wireless communication technology with expansions of cellular networks across Europe – 4G coverage continues to grow rapidly[109] - and computing power of mobile devices. These advances have opened a vast opportunity for mobile devices to become much more than simply a communication device and expanded the possibilities to download and install third-party software.

Mobile platform ecosystems created the conditions and incentives for third-party developers to come up with applications for the underlying technology and participate in a wide variety of value creation experiments.

Currently, Europe has a growing and globally successful community producing mobile apps, hardware and IoT devices. App store revenues attributable to European developers are 30% of the global total[110] and European app developer revenues are projected to reach EUR11 billion by 2020.[111] Additionally, there are a number of European businesses developing hardware extensions to mobile apps, including fitness and payment systems.[112]

Figure 11: Global smartphone sales to end users from 1st quarter 2009 to 4th quarter 2015, by operating system (in million units)[113]



Source: *Gartner; ID 266219*

3.2.1.2 Mobile ecosystems and the solutions stack

The solution stack encompasses the key elements of the mobile ecosystem. It has evolved along with the transition from basic mobile phones to smartphones and has grown progressively more complex with the addition of services, OS features and content. Its main elements are[114]:

- Hardware, which includes the sub-components that go into a mobile phone like display, camera, memory, microprocessors or a graphical processing unit (GPU).
- Device is the actual end-user equipment, which integrates the hardware components and the software components like the OS and apps.
- Software includes the OS and other capabilities that form the OS like the user interface.
- Services component includes the services available to the users that enhance the functionality of a mobile phone like cloud storage and backup, navigation, voice commands or natural language input and so forth.
- Content includes apps making use of the services.

The solution stack is currently highly complex, with the devices integrating more hardware components, such as faster microprocessors, near field communication (NFC) chips and the OS evolving to accommodate them. The OS vendors created some of these services and included them as a part of the platform, while other services were launched as apps but were later absorbed into the platform.

3.2.2 Business models

A mobile OS is responsible for identifying and defining mobile device features and functions. It primarily manages the wireless variations of local and broadband connections, access to cloud resources, mobile multimedia and various input methods.

The existing ecosystems in the mobile phone market are built on top of smartphone OS platform and provide the capability to run apps and services for the ecosystem participants. OS developers provide the supporting infrastructure like software development kits (SDKs), app stores, support forums and payment mechanisms, needed for development of these apps and services.

There are three main types of mobile operating systems:

I. Manufacturer-built proprietary operating systems where the operating system developer is also the hardware manufacturer. Examples include Apple's iOS and the BlackBerry OS.
II. Third-party proprietary operating systems where the operating system developer will license its operating system, usually for a fee, to third-party hardware manufacturers (Original Equipment Manufacturers or OEMs). An example of this model is Microsoft's Windows OS.
III. Open source operating systems where the operating system developer will release the operating system via the open source license method. Examples include Google Android and Symbian

Firms developing smartphone OSs include Google (Android), Apple (iOS), Microsoft (Windows Phone) and Blackberry (BlackBerry OS). While Apple and BlackBerry are vertically integrated with their own handsets, OSs, and app stores, Google and Microsoft focus on licensing their OSs to multiple partners.

3.2.2.1 Indirect network effects – the growth engine of mobile ecosystems

By connecting users to developers, ecosystems may create network effects. In other words, they may drive demand between users and developers: the more users, the more handsets, and therefore the more developers, the more apps and so the more users. It is a positive feedback loop resulting in nonlinear growth properties which outdo traditional linear economies of scale.

Successful ecosystems have managed to attract a large number of users, advertisers and app developers. Each group benefits from the presence and growth of the other. Users benefit from a growing choice of apps and developers benefit from a growing number of potential customers. These 'indirect network effects' make a mobile ecosystem viable when it has managed to attract a significant number of users and advertisers. It also contributes to a significant supply of apps.

The two main mobile ecosystems (Android and iOS) offer developers ways to monetize their apps. The app stores running on iOS and Android facilitate payments and transactions, collect feedback from users and reduce the search costs for consumers. Along with launching SDKs for developers, Apple and Google set up online mobile app stores, virtual marketplaces where the users could buy apps and content. They also provided a centralized, simplified monetization framework for the developers to charge the users for their apps, making transactions easier and increasing revenue potential for mobile app developers.

Figure 12: Monetisation of Apps

	iOS	Google Play
Store fee	$99 yearly fee	$25 one time fee
Sales commission*	30% excluding physical services external to any app	30%
Payout schedule **	More than 30 days after the month is over	Within a few days after the month is over
Payout threshold	$10 $150 EUR, CAD, CHF, GPB, other currencies HDK, JPY, SEK, SGD, USD currencies	
Other	Only specific price tiers are allowed (from $0.99 to $999.99)	
	* An unofficial industry standard for how much in-app stores take is 30% for app, in-app products, and subscription services. There are app stores that withhold less but usually they could not guarantee high traffic	
	** Many app markets pay within 30 days after the end of the month	

Sources: *Prepared by the European Commission*

Operators of mobile ecosystems exercise a varying degree of control over the apps and content sold through their app stores. However, they all require apps to be subject to some kind of a vetting process.

3.2.2.3 Direct network effects

Mobile ecosystems may also be characterized by direct network effects between actors at the same side of the market or at the same level in the value chain. Direct network effects between players at the same sides of the app ecosystems can materialize among handset manufacturers, network operators, end users and developers. For example, users of messaging apps gain directly from more widespread adoption of the app.

3.2.2.4 Application distribution platforms (app stores)

Apps are a key element of the mobile ecosystem solutions stack and, depending on the system, an app store is the only or main way for consumers to download apps on their devices.

App stores have simplified distribution issues previously faced by developers by reducing the overhead of managing user acquisition, payment, invoicing, after-sales service, etc. App stores are popular among developers for simultaneously reducing the time needed for making an app available for download from the moment of submission (time to shelf), and for reducing the time within which the payment of the customer reaches the developer (time to payment).[115] Moreover, apps have grown rapidly since the launch of app stores in 2008, with developer revenues reaching close to EUR 30 billion in 2015.[116]

Being a gateway to app discovery can create a competitive advantage. (Kincaid, J., 2011a). This explains why not only OS developers (Apple, Google, Microsoft), but also OEMs (LG, Samsung), as well as mobile carriers (Verizon, China Mobile, SFR) and content providers (Amazon) have rushed to create their own app stores.

3.2.3 Main players

Android is the most widespread mobile OS with an 82.8% share in Q2 2015. iOS comes second with 13.9% of the market, and Window Phones third with 2.6%. Google Play and the Apple App Store are the two main platforms for app distribution worldwide. Both platforms are in rapid expansion, whether measured in terms of app downloads or in revenues

therefrom.[117]

Along with the makers of the OS(s), there are numerous other players that may be involved at every level of the solution stack. Their role and freedom of action differs depending on the level of openness of the mobile ecosystem. Companies controlling the ecosystems made different choices as to which parts of the mobile solutions stack to keep full control of and which parts to open to third-party partners providing complementary products or services.

The two biggest players, Google and Apple, have adopted differing approaches to ecosystem openness, as well as different models of monetizing their operating systems and governing their app stores. Apple maintains full control over the solution stack including key hardware components, design of the device, operating system, app store, a number of apps and associated services (music, books, maps, mail, calendar, cloud storage, messaging, video calls). At the same time, although the Android operating system is free and open-source, much of the software that vendors have to install in order to sell smartphones certified by Google and containing Google's app store (including Google's own apps and vendor-installed software) is proprietary.

3.2.4 Impact

A study by Gigaom for the European Commission found that in 2013 EU developers took in EUR 17.5 billion in revenue and it was forecasted to increase to EUR 63 billion in 2018. In addition to EUR 6 billion from in app sales, in-app spending for virtual goods and advertising, EU developers recognized EUR 11.5 billion in 2013 from contract labour. However the overall EU trade balance of the app economy is negative (-EUR 128 million). This is mostly due to the app platform fees that EU developers pay on revenue earned.

The study estimated that the EU app-developer workforce would grow from 1 million in 2013 to 2.8 million in 2018 with additional support and marketing staff resulting in total app economy jobs of 1,8 million in 2013, growing to 4.8 million in 2018. By comparison, the European film industry employs over 373 000 people, and reached revenues of some EUR 60 billion in 2011. A recent study from Plum Consulting shows that App store revenues attributable to European developers are 30% of the global total.[118]

The industry is likely to experience further dynamic growth as app stores move beyond smartphones and mobile operating systems or their adapted versions are increasingly used to run other devices from smart TVs to in-car systems and smart wearable devices.

3.3 Internet Search Services

3.3.1 General description

Internet search engines are services that help internet users find the relevant answers to their search requests from among tens of billions of web pages on the internet. They facilitate direct interaction between internet users seeking information, website operators seeking an audience for their content, and online advertisers targeting potential customers. The fundamental purpose of a search engine is to make it easier for users to find information on the internet. Given the fact that the number of web pages is constantly increasing (approximately 46 billion indexed and searchable pages in March 2016[119]) and that the random assignment of web addresses (URLs) does not provide any practical way of identifying their contents, a search for information would be impossible without technical assistance.

Most modern search engines typically operate in three steps: crawling, indexing and serving results:[120]

"**Crawling**" is the process, by which a search engine automatically accesses a large amount of publicly available websites on the internet, collects and stores the information about each

website. In order to do so search engines use software programs called '**web crawlers**' to visit web pages and follow links on those pages

"**Indexing**" is the process by which a search engine archives the information found on the websites in a logically and analytically organized **index** which makes it possible to look up information on billions of websites within milliseconds.

"**Serving**" is the process by which the search service provides a user with a result from its index which best corresponds to the user's search query. When a user enters a search query, which consists out of a **search algorithm**, a set of computer processes and formulas is applied to select the most relevant websites stored in the search index in an appropriate sequence ("**ranking"**).

A large number of factors play a role in determining the ranking, meaning the order in which the results are shown is mouldable. The search algorithms of modern search engines rely on unique signals or 'clues' that attempt to match the URLs from the index with the information in the best way, according to what the user is looking for. These signals take into account, for example, the words used on websites, links with other websites, the publication date of content, location of the user, personal data such as search history and potentially other data available on the user.

The search results selected by the search algorithm are referred to as "organic results". It is worthwhile mentioning that search engines often employ various techniques to exclude certain URLs from the results pages, where the content of web pages does not comply with the ethical guidelines of the search engine or the law. Examples include: removing pirated content from results; removing web sites with information about individuals pursuant to the "right to be forgotten"; and removing websites, where operators apply "black hat" search engine optimization techniques.[121]

Historically search engines have covered the entirety of the internet. Due to the growing amount of information available and the increasing usage of internet these engines face certain challenges nowadays. For example, web crawlers (the software that brings back material to a database) do not crawl the Web in real time. Although the major search services are improving the turnaround on re-crawling and adding pages to the search, the process of indexation or updating of information may not be in a timely manner or at a in-depth level.

Besides general search engines that allow users to search for any type of information over the whole web, there are also specialised engines. These "specialized search services" can therefore also be described as vertical search engines.[122] Specialized search services may distinguish themselves from general search engines by employing subject specialists who actually gather, rank and annotate links, instead of using algorithms.[123]

A definition of "general search" and "vertical search" can be found below:

- **"General search"** engines provide search results covering any category of information on the web.
- **"Vertical search"** engines provide search results for specific categories of information on the web. For example, results may be limited to certain type of information (people, weather, news, shopping, flight information etc.) or format (photos, videos, map).

3.3.2 Business model

The first search engines were developed in an academic environment and used the concept of peer review to evaluate and determine the importance and relevance of the web pages. They did not have a profit motive and typically offered their services free of charge. As the

complexity and the amount of unorganized information on the World Wide Web increased, the hardware and software costs of operating a search engine (crawling, indexing and serving) grew rapidly.

One of the first commercial search engines, Alta Vista was created by the Digital Equipment Corporation in 1995. It was followed by other search engines developed by companies such as Excite, Infoseek, Goto, AOL, iWon, Inc., Looksmart, Ltd., Microsoft and Terra Lycos. At the time different commercial strategies were used to monetize search services. These included strategies based on the "pay for placement model", where sponsored links were included among organic search results, and where the ranking depended on the fee paid by the advertiser.[124]

In 1998 Google was launched, using a combination between the standard index identifying websites based on words and PageRank, an algorithm which ranked the importance of pages based on the number of other highly cited pages that cited them. Google initially earned revenue by licensing its search engine to other companies, such as Netscape and Yahoo, but later developed a strategy, which soon became the dominant business model for general search engines, consisting of the following elements: (i) search services were funded through advertising; (ii) paid links were displayed in different locations on the results page than organic search results; and (iii) advertisers paid when users clicked on their links (rather than just for number of views as was common before).

As of 2016, most of the main general search services are free of charge and general search services earn money through advertising. In the case of Google, the main search engine used in the EU, advertising has contributed to more than 90 percent of Google's total revenue within the last decade.

In a "pay per click" model adopted by the main general search engines advertisers pay each time a user clicks on the link to their web page. Advertised links can be displayed, for example, above or below organic search on the search results page. The price paid by advertisers in this model is the product of the number of times users click on the ad times the price per click, which is determined in a competitive bidding process.

Strong branding and partnerships with web portals or internet browsers also play an important factor in attracting users. Privacy and data protection has also emerged as a factor influencing users' choice of search engines.[125]

Search engines compete for advertisers by offering them better tools for reaching a large group of potential customers and controlling the parameters of their advertising campaign, allowing them to target their advertisements to a specific keyword, geographic location and demographic group, and providing a superior ROI ("return on investment") on their advertising spend.

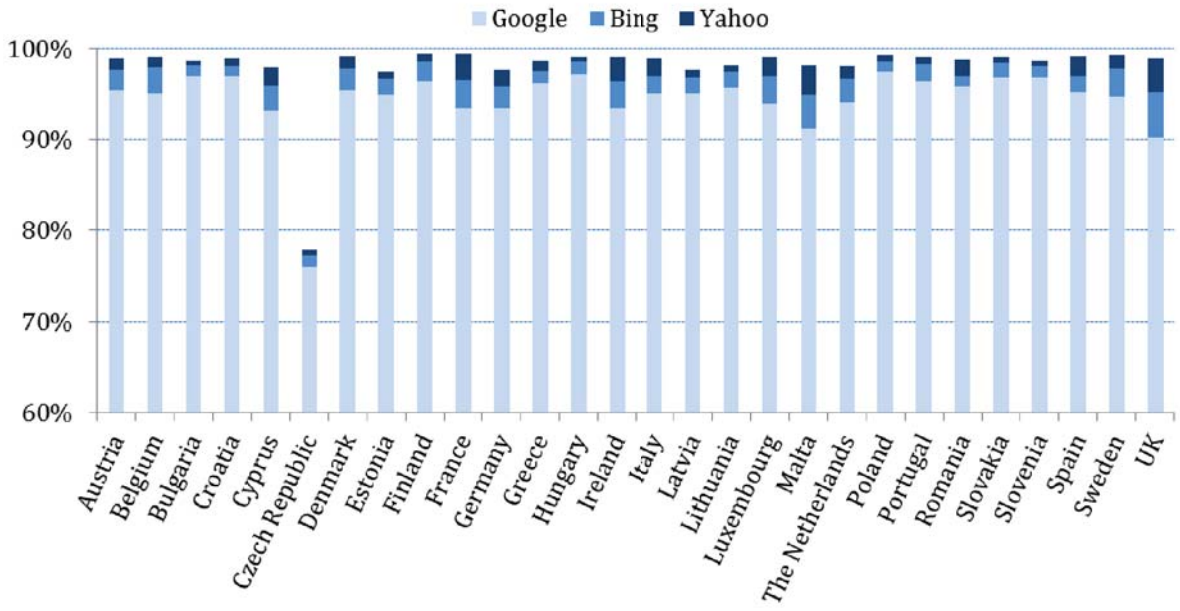
Search engines give content-providers visibility on the internet. Website operators are encouraged to improve the quality and structure of their websites by applying search engine optimization ("SEO") techniques to make them easier to crawl and index by specific search engines.

3.3.3 Main players

The graphs below represent distribution of search queries within the EU Member States (Figure 16) as well as in selected non-EU countries (Graph 2).[126] Furthermore, according to Alexa, a source of web statistics data, there are three search engines among the top five most visited web sites.[127] Google is the most visited site, followed by Yahoo, YouTube, Facebook, and Bing.

Figure 13: Distribution of search queries on Google, Bing and Yahoo within EU

Member States



***Source**: StatCounter Global Stats <gs.statcounter.com> for 2014*

Google is the most frequently used search engine in most EU countries where it handles about 90% of search queries.

3.3.3.1 Economies of scale

In the case of search services cost-related economies of scope and scale play a major role. The industry is characterized by significant costs for creating the web index, developing the search algorithm and building computing centres.[128] At its minimum, search engines are required to invest in a substantial server infrastructure to be able to crawl and index the internet in order to closely match results to search queries. Furthermore, finance-intensive R&D activities are required to maintain and constantly improve the quality of search and advertising tools.[129] Google being the market leader has spent nearly $11 billion[130] on real estate purchases, production equipment, and data centre construction and $10.5 billion[131] on research and development in 2014 alone. It operates more than a million servers to respond to more than a billion search requests per day.[132]

This allows search engine providers to extract actionable information from the large amounts of historical data from search queries submitted by users as well as other types of activity conducted by the users of the platform (email, use of maps, video, operating systems, internet browsers). This argument is applicable for targeted advertising as well.

3.3.3.2 Network effects

Network effects in the area of web search are also relevant to the economies of scale. From the point of view of users, advertising consumers, and content providers network effects are indirect and may differ in their nature. Users benefit from search engines being used by other users because search engines collect aggregate data about the relevance of search results to particular queries and use this information to improve results for subsequent queries.

Indirect network effects are most likely to arise given that the more users a search engine has, the more attractive it becomes from the point of view of content-providers and advertising customers. At the same time, advertising customers compete against each other in a bidding process for advertising space and for users' attention in a similar manner as content providers compete for users' attention. Higher revenues from advertising, the main revenue stream for search engines, result in higher investments in the infrastructure in order

to crawl and index an increasing number of pages[133] with increasing frequency and provide more pertinent search results to users with increasing speed.

3.3.4 Impact

Given the volume of information that is currently available on the internet, search engines have assumed a major role as an information intermediary. This function of search services to locate content on the internet is likely only to grow stronger as the internet evolves towards a ubiquitous communication and business medium containing a virtually limitless amount of information.[134]

To avoid misleading consumers, EU consumer and marketing law requires search engines and comparison tools to clearly distinguish a natural search result from advertising[135]. The purpose of such disclosures is to inform consumers when they are being solicited as opposed to being impartially informed.

3.3.4.1 Easier access to information

Search engines play an important role in several types of situations: (i) navigation-oriented search queries where the user already knows the website they want to access and typing its name in a search engine is more convenient than typing the entire URL in a browser, (ii) information-oriented search queries where the user seeks for general information, often in a sequence of searches targeting specific information and (iii) transaction-oriented search queries where the user looks for specific product, service or supplier.

Statistics also show that 86% of consumers learned something new or important from using a search engine, which in the end helped them increase their knowledge.[136] For local searches (involving the search for financial services and insurance, automotive, retailers, travel, casual dining, business services) nearly 40% of users start with a search engine.[137] It is therefore unsurprising that for the majority of internet users, a typical online session starts with a search query being sent throughout a search engine[138].

In addition, using a search engine may represent significant time savings. Researchers have found that an online search is on average three times faster and significantly more likely to produce a satisfactory reply to a general search query than an off-line search in a well-equipped university library.[139] It is difficult to associate an exact monetary value with the time saved. Nevertheless, researchers estimate a saving worth of EUR 130 billion.

3.3.4.2 Greater transparency

With the help of general and specialised search engines, such as price comparison platforms, consumers can easily compare products and services, and access reviews. Search engines, and price comparison platforms, in particular, bring transparency to the market. In comparison with a purely off-line shopping experience search engines bring concrete benefits in terms of improved matching of products and services with consumer preferences, wider choice, better quality and lower prices.

3.3.4.3 Convenience of reaching consumers

Search engines can bring significant benefits to companies. With the use of search engines companies can reach consumers with more precision and with greater convenience. Figuring prominently in organic search results is free of charge (not including the costs of search engine optimization). The ability to target paid-for advertising only to consumers interested in the advertised product or service can also mean significant savings when compared with advertising campaigns directed to the general public (traditional newspaper or TV advertisements). As a result, the cost-per-click ("CPC") in a number of popular segments is quickly rising, reaching as high as $60 for certain keywords. A budget of USD 300.000 per month for search engine advertising is not uncommon for large companies.[140]

3.3.4.4 Role in access to information about products / services / politics

Online search engines have specific and personalized data on individual users and they use the may use that information to tailor the order of display of search results. Some studies find that, as a consequence, search engines could even influence policy debates and voting (deliberately or not).[141]

To improve ranking and, thus, affect visibility of their site, businesses implement SEOs techniques. Many companies rely on Web visitors that arrive as a result of using search sites. The main search engine players are responsible for about three-quarters of the overall search engine traffic sent to Web sites. However, they regularly update their rankings to reflect changes in their methods or changes in the Web's link structure and content.[142]

3.3.4.5 Search Neutrality concept

The above-described effects have prompted some experts to advocate the concept of search neutrality. However, what exactly constitutes search neutrality remains a contentious issue. Many principles have been proposed by the literature on the topic as a potential basis for sound regulatory framework on search engine results. They include: equality; objectivity; relevance; transparency; non-distortion of information landscape and traffic; non-manipulation and pursuit of self-interest.[143] These principles are often broadly defined and if considered together may even contradict each other. For example: it is hard to say when a search result is objective and neutral. On the one hand, algorithms can never be neutral, because they are based on assumptions and involve a ranking. On the other, a completely neutral result would show links in an order that would not fit the interests of the searcher and thus render the search meaningless. Some argue useful search results have to be relevant. Although search is generally about relevance, it is also about user autonomy; users expect diversity so they can make their own choice about what's relevant or not.[144] Otherwise, search engines' algorithms unintentionally can act as filter bubbles that reinforce discrimination in some communities.[145]

3.3.4.6 Vertical integration of main players

Similar to ‘bricks-and-mortar firms’ search engine providers rely on vertical integration to improve efficiency and reduce transactional costs. The main players expand their businesses into areas that are at the different point of the “supply chain” - from writing operating systems and designing components, to building server computers, to acquiring specialized search and pricing systems.

3.3.4.7 Collection and use of data

Some search engines use data about users' online behaviour to improve their services. Aggregated data is used to improve search results in general, while disaggregated data at individual level is used, for instance, to provide more targeted advertising.[146] The instruments used to collect data are, among others, internet cookies - small text files that a Web browser places on a user's computer system for the purposes of tracking and recording that user's activities on a Web site. The use of cookies is regulated and they should only be placed on a user's device after consent has been given.

By providing their personal data search engine users gain more efficient and tailored services. On the other hand, they face the potential risks of inappropriate use of individuals' personal data.[147] Thus, users encounter a dilemma in the face of a trade-off between ex-ante information benefits and ex-post risks. Some users may prefer to give less personal information, thus, reducing the ex-post risks but facing higher search costs.[148] Irrespective of the dilemma offered to individuals, search engines should ensure the processing of personal data is in compliance with the EU data protection framework.

Many online search service companies are no longer pure search providers. Search engines have changed their underlying business model to include content aggregation as well as access to it, hence becoming an active player in the content market.

With the help of data from a wide array of areas a search engine can perform a market research, launch and refine its offerings, and react effectively to changing market trends. This trend sparks a bias-related and privacy concerns about monitoring in the commercial sector.[149]

3.3.4.8 Role of search engines in tackling illegal content

Search engines are naturally the usual "door of call" when reporting illegal content online, as they are also the main entrance door for that content. For instance, only in February 2016, Google received over 75 million copyright takedown requests (meaning over 100,000 links each hour).[150] In 2014, Google handled 345 million requests for the entire year. According to Google's transparency report, the company regularly receive requests from courts and government agencies around the world to remove information. These requests are most typically related to privacy and security, drugs abuse, defamation and other reasons.

3.4 Social media and content platforms

3.4.1 General description

Social media platforms ("SMPs") were first created in the late 1990s – by the likes of AOL, ICQ, classmates.com and sixdegrees.com. These SMPs were among the online meeting places that allowed users to communicate with a central system where they could download files or games and post messages to other users. Sixdegrees.com, created in 1997, was one of the very first SMPs to allow its users to create profiles, invite friends, organise groups and surf other user profiles. Friendster utilised this concept, refining user groups into 'circle of friends'. Within a year of Friendster's launch in 2002, the site boasted more than 3 million registered users, generating significant investment interest. Aimed at the young adult demographic with its feature-filled environment, mySpace was one of the leading SMPs in the mid-2000s. The platform was, however, usurped by the subsequent success of Facebook (as were local European SMPs like Hyves in the Netherlands, which at some point boasted 10 million users).

Launched in 2004 as a Harvard University-only exercise, Facebook quickly grew to a valuation of USD 328 billion by 2016[151] and remains the most popular SMP today. Crucially, 894 million of Facebook's global users[152] – more than 50% of the total – now access the service exclusively through mobile devices. The development towards mobile platforms has had a marked impact on social networking. Certain photo and video-sharing apps, such as Snapchat and Instagram, exist exclusively on mobile.

As regards the question of what precisely constitutes an SMP, it is noted that there are a plethora of definitions used in the literature on online platforms. Gebicka and Heinemann define SMPs as "web-based services that allow individuals to construct a public or semi-public profile within a limited forum, to articulate a list of other users with whom they share a connection (‘friends’ on Facebook), and to view and traverse their list of connections and those made by others within the system".[153] Gillespie argues that the capacity to interface and create relevance for a variety of actors and use practices is, in fact, the central characteristic of SMPs.[154] Kietzmann details key characteristics of SMPs, or functional building blocks. These include the notions of identity, conversations, sharing, presence, relationships, reputation and groups.[155]

While recognising that no general definition of SMPs exists, in Facebook/WhatsApp merger decision the Commission described social networking services as "services which enable users to connect, share, communicate and express themselves online or through a mobile

app".[156] This definition would cover both "private" and "professional" networking services such as, respectively, Facebook and LinkedIn.[157] Twitter also shares certain key characteristics of SMPs, in addition to those of micro-blogging websites. Unlike other SMPs, its service allows sharing of short text messages - 'tweets' - with anyone who decides to 'follow you', i.e. read what you post on your profile.

Certain online platforms that principally serve to publicly share user generated content such as opinions (Twitter), videos (Youtube), images (Flickr), video games (Electronic Arts' Origin) and music (Soundcloud) also incorporate a 'social network' element, and it should be noted that some of the key policy questions that have been associated with SMPs may also be relevant for "creative content outlets".

Indeed, many of today's app-based communications services, including Facebook Messenger, Whatsapp, LINE, WeChat, Hangouts and Snapchat, allow the sharing of text and video content between groups of users. In fact, even B2B and B2C e-commerce platforms can facilitate "social" interactions between communities (such as in the case of Etsy or Adobe's "Bēhance"). In contrast, whereas Facebook primarily qualifies as an SMP, its users also engage in the sharing of creative content, while certain public profiles can also be 'followed', meaning that it is also concerned with questions around, for example, the effective protection of copyright, or of minors from harmful content. Finally, although Wordpress' aim is to provide technical tools to ease direct access to the entire web for third-party pundits rather than to allow social interactions between members of a certain community, by providing the underlying platform it can also exercise editorial control over third-party content and therefore be concerned with the same aforementioned policy questions around liability for third-party hosted content.

In light of the fact that online platforms which allow social interactions between its users often offer a layer of services (including communications services, the sharing of user-generated content and the serving of advertisements), and given that these share certain key policy questions, SMPs and creative content outlets are treated together in this section. These services are understood to at least cover online platforms such as Facebook, Twitter, Instagram, Google+, Myspace, Pinterest, Snapchat, Youtube, Soundcloud, Origin, Wordpress and Whatsapp.

3.4.2 Business models

As covered previously, SMPs are generally available to users for "free", or under a "freemium" model (e.g. LinkedIn and YouTube use this model), their main revenue source being advertising income. The resale or internal re-use of user data can be another important source of value for the SMP. Twitter for example sells its public data, which can add up to about 500 million tweets each day.

The attractiveness of SMPs for advertisers derives from the richness of the personal data that these platforms hold on their individual users, as well as from their ability to derive trends and statistics from (processed) personal data. The size of SMPs' user bases combined with the extent to which they are able to collect personal user data are indeed key competitive parameters in these ad-driven markets.

The fact that "free" SMPs tend to rely on an extensive collection of personal data has sparked a wider debate on how to achieve a balance between the further development of so-called "big data" markets and adequate levels of data protection, privacy and consumer protection. Indeed, tailored SMP services offer huge benefits to consumers and the opportunities offered by the exploitation of "big data" are enormous. However, it is questionable to what extent users actually do consent to the use of they must accept SMPs' privacy policies have to be accepted in order to use SMP services.

Besides advertisement, big data and premium subscriptions, SMPs can also generate revenue from allowing access to certain software applications in return for a commission. On the Facebook platform, application developers which are verified by Facebook pay them an access fee and, potentially, additional advertising fees. In addition, Facebook charges a commission on in-app purchases which are processed through its proprietary payment service. These are important sources of income, as there are now 42 million Facebook pages, and 9 million apps and websites integrated on the SMP. With respect to Twitter, application developers are also the second largest potential group of users. To the extent that applications and content are used, application developers and content providers can charge the users and pay a share to the social network providers or the networks can collect the fees and distribute a percentage to the application or content providers. This same 'platformisation' can be observed in consumer communications services, particularly in Chinese platforms. Another "business model" is the strategy whereby SMPs try to gain significant user bases without monetizing the service, with the aim of ultimately being acquired by a competitor.

Finally, successful SMPs, such as Facebook, which started out as standalone content platforms, may also have an incentive to try to integrate both horizontally and vertically, in order to diversify and to protect their existing position. Their incentive to do so might be great in light of the particularly strong network effects that characterise the markets in which they operate (reference is in this regard often made to the example of MySpace being usurped by Facebook). Facebook has for example acquired a company producing a new hardware application (Oculus virtual reality headset) and has tried to introduce a layer on top of operating systems (the Facebook Home overlay). Moreover, data collection and analysis in online platforms is driven by economies of scope: as a general rule, the benefits of an aggregated dataset are higher than the sum of benefits of separate datasets. That birds' eye perspective on large datasets gives platforms an advantage over individual firms and users operating on the platform.

3.4.2.1 Social login – social networks as third-party identification providers

Many of the social networks (including Facebook, Google+, LinkedIn, Twitter, etc.) have built "social login" platforms around their login and authentication services. Social login is a single sign-on ("SSO") technology that allows users to authenticate themselves on various applications and sites by connecting through a social media site rather than typing a separate ID and password on each website.

When users navigate to a website offering social login, they can register in a conventional way by creating an ID, a password and other required information or log in through an interface that allows the website operator to access their data on the selected social network platform. The social login information is then exchanged based on common standards including OpenID[158], Connect and OAuth[159].

Social login allows users to provide websites their identification information in a quick and more convenient manner compared to a traditional login interface. Given that many potential users of websites are members of a social network and are already logged in on their browser (there is no need for logging in again to a social network), the procedure of creating an account can be reduced to a few clicks. Users can rely on a single social network account to create accounts on multiple other websites. At the same time, they can control what information stored by the social network is shared with the third-party website (name, age, photos, etc.).

Using social login can also allow users to verify their relations with other users. For example, in the case of collaborative platforms (car sharing, apartment rentals) or other social

networks (e.g. dating apps), verification of a user profile is often achieved through an association with an existing social network profile.

For social networks, the use of social login by users and websites brings valuable data that can be used for improved targeting of advertising or development of new products. Also, website developers who integrate a social network's social login functionality are more likely to use some of the other tools offered by that network, like advertising applications.[160] In addition, the use by consumers of their social network credentials for logging into numerous other websites reduces the odds that the user will switch away from that social network.

Website operators using social login along with the conventional login methods can increase user registration (thanks to greater convenience) and minimize barriers to site entry by reducing the need for usernames and passwords, allowing users to authenticate themselves through their existing social media identities and pre-verified accounts. Website operators relying exclusively on social login can avoid building their own login and authentication systems altogether. They can also rely on the security and data protection technologies implemented by the social login providers. In that case the username and password are only handled by the social login provider and not transmitted to the website during the third-party authentication process (only authorization token).

Social login can be used on websites and mobile applications. According to a survey conducted by an identity management provider, in 2015 88% of consumers have logged into a website or app using an existing social network account (up 11% from 2014).[161]

There are more than 35 global identity providers (including Facebook, PayPal, Microsoft, Yahoo, Amazon, Sina, Weibo, Tencent and others). The most widely used social login is the one offered by Facebook. More than 80% of the top 100 grossing apps on iOS and Android offer Facebook Login as a sign-in option. Based on a survey conducted by JanRain, an identity management provider, Facebook captured a 45% of social login usage in Q1 of 2015[162]. However, the figures differ depending on the segment. For example in the B2B context, the share of social login with LinkedIn rivals those of Facebook and Google.

3.4.2.2 Related communication services

Although only part of the different services that they offer, certain SMPs have the core function of facilitating consumer communications and are therefore perceived to compete with traditional electronic communications services providers. Although Facebook Messenger is for example transforming into a self-standing online platform as it now allows direct interactions between consumers and third-party businesses[163], its initial and core service is consumer communications.

3.4.3 Main players

Active user accounts on SMPs now equate to roughly 29% of the world's population. The average social media user spends 2 hours and 25 minutes per day using social networks and microblogs. At a global level, Facebook continues its market lead, claiming 1.65 billion active users (status 31 March 2016).[164] Tencent extended its market leadership of Chinese-language social networks, with Qzone's 629 million active accounts leading the pack. In addition, VKontakte retains the top social media spot in Russia – the latest data suggests the platform has around 100 million monthly active users.

Within the EEA, Facebook would similarly be the largest SMP, with 333 million users (status 31 March 2016).[165] Other major EEA players are creative content outlets such as Youtube

(which has over one billion users worldwide) and Wordpress (which is used by around 25% of all websites present on the worldwide web).

These SMPs and creative content outlets are, virtually without exception, 'free' to use and are therefore largely reliant on advertising income or on the re-sale or use of personal and other data (although premium memberships are sometimes also offered). In cases where, for example, the absence of advertising and the respect for user privacy are a key part of the service's attractiveness, it can therefore be difficult to effectively become profit-making (something that Facebook explicitly acknowledged with regard to Whatsapp in its annual report). This has not, however, prevented such services from being valued at high levels. Whatsapp, which generated around USD 16 million in revenue during the first half of 2014, was for example acquired by Facebook for USD 19 billion. This valuation would have resulted from a value-per-user ratio of around USD 42, in line with similar transactions (including Rakuten's acquisition of Viber, Microsoft's acquisition of Skype and Facebook's acquisition of Instagram).

3.4.4 Impact

Advancements in the Internet and the emergence of Web 2.0 along with SMPs have empowered customers. General availability of the Internet has given individuals the opportunity to use social media, from email to Twitter and Facebook, and to interact without the need for physical meetings. Consumers have social interactions through social media such as online forums, communities, rating, reviews and recommendations.

Researchers have highlighted the linkages between social media and e-commerce.[166] They argue that the emergence of online stores has turned users into consumers, with social media providing a new channel to acquire product information through peer communication. By using social media, consumers have the power to influence other buyers through reviews of products or services used. The ability of SMPs to allow businesses to directly interact with potential consumers and their immense popularity has revolutionised marketing practices such as advertising and promotion.

SMPs allow businesses to improve their international market presence and reach a far wider group of potential clients across the globe, which means that they are increasingly part of firms' internationalisation strategies. In 2015, 88% of Fortune Global 100 companies based in Europe used at least one social media platform to directly communicate with customers.[167] SMPs can also perform an important market-research function for firms providing detailed information about consumers preferences.[168]

The collection of user data is often part of the business model used by SMPs and an important source of insights. A recent study[169] has shown that social media "likes", can be used to automatically and accurately predict a range of personal attributes including: sexual orientation, ethnicity, religious and political views, personality traits, intelligence, happiness, use of addictive substances, parental separation, age, and gender.

Given their very significant user groups, SMPs also play an increasingly important role in society that goes beyond the provision of communication services. SMPs play a vital role in social interactions and expression, providing a platform that allows for the democratization of publishing content and information.[170] They can constitute authoritative sources of information, they effectively enhance oversight (human rights protections, fair elections, etc.) and they can be used to drive public opinion.

SMP's can significantly impact individuals' behaviour. A major SMP recently acknowledged that it manipulated users' emotions.[171] A recent study found that civic “go vote” messages that were targeted through users’ social networks resulted in a statistically significant increase in voter turnout among those targeted, compared with a similar “go vote” message

that came without being embedded in social ties.[172] The ability to impact behaviours coupled with profiling could be extended in other ways to affect the economy and society at large[173] in ways that could be undetectable.[174]

SMPs have the ability to command the attention of a great number of people, about whom they have highly specific, personalized information. As a consequence, they have become essential players in politics and policy debates.[175] Political campaign teams are also said to increasingly use (specifically in the US) the ability offered by SMPs to deliver targeted advertisements to selected lists of individual voters.[176]

3.4.4.1 Role of SMP in tackling illegal content

SMPs almost exclusively handle user-generated content, be it comments or audio-visual content. They are an increasingly important communications channel and allow users to exercise their right to freedom of expression.

SMPs are typically confronted with requests to remove content which can be considered illegal because it is considered hate speech, cyber-bullying, copyright infringements, defamation, or incitement to terrorism. For example, after Facebook's managing director based in Hamburg was subject to prosecution in Germany for the social platform's failure to remove hate speech Facebook, Twitter and Google agreed in Germany last 15th December 2015 to delete hate speech from their websites within 24 hours[177]. Similar calls for action are seen at an EU level, with the Joint Statement issued by the extraordinary Justice and Home Affairs Council of 24 March 2016 on the terrorist attacks in Brussels underlining that "the Commission will intensify work with IT companies, notably in the EU Internet Forum, to counter terrorist propaganda and to develop by June 2016 a code of conduct against hate speech online.

As regards incitement to terrorism, after a lawsuit being filed against Twitter in the U.S. District Court for the Northern District of California, Twitter informed in February 2016 that since the middle of 2015 alone, they had suspended over 125,000 accounts for threatening or promoting terrorist acts, primarily related to ISIS, and that they have increased the size of the teams that review reports, reducing our response time significantly and cooperate with law enforcement entities when appropriate[178]. Efforts in the same direction have been reported by Facebook[179]. Other social media platforms, such as Vkontakte ("the Russian Facebook"), defend a purely passive role without interferences with users' speech, be it legal or illegal.

3.4.4.2 Personal data portability voluntary solutions implemented by SMPs

While it is not the rule, some SMPs have implemented voluntary solutions for export of user data they hold. For example, Facebook offers a tool for downloading user information. Users are able to download not only the information that they have shared on their profile, but also other information that Facebook holds on them, including: 1) their activity log, which is visible to users when they log into their profiles, and 2) information that is generally not visible to users (such as ads clicked on, IP addresses used for log-in, ad topics, etc.). Users cannot select to download only certain elements of the information and need to download the information file in its entirety.[180]

3.5 Online advertising platforms

3.5.1 General description

Online advertising industry as a business model gained momentum by 2004 when a number of businesses launched their offerings to facilitate buying and selling of advertising space on web pages. What makes online advertising attractive is the wide range of new products and

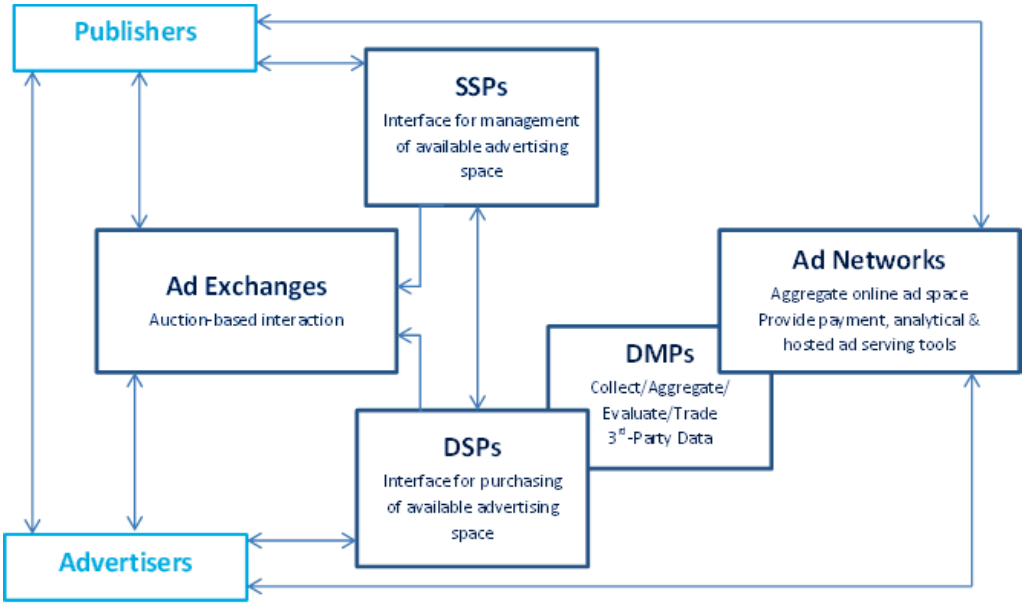
services it offers. Not only does it allow for behavioural targeting, but also for performance-based pricing.

In the online world every platform, blog, or a website can be used as a forum for advertising. The abundance of options, however, makes it difficult for companies to handle their marketing campaigns online without the help of an intermediary. Online advertising platforms, thus, emerge providing a business solution.

3.5.1.1 Types of advertising platforms

There is a great variety of types of advertising platforms and new business models continue to emerge.[181] Some of them offer solutions **to advertisers and publishers** with supply-side platforms ("SSP"), demand-side platforms ("DSP") and data-management platforms ("DMP"). SSPs provide publishers the tools needed to sell their advertising space via a single interface to multiple advertisers. SSPs are linked with several ad exchanges through which ad space is sold. DSPs offer a single interface to advertisers to manage their advertising campaigns across multiple publishers. DMPs collect user data from multiple sources and are used by advertisers to improve the targeting of their campaigns. DMPs are often integrated with DSPs. All of these tools, along with advertising networks and exchanges, make the highly automated, real-time audience targeting and advertising possible.

Figure 14: Network map of advertising platforms



Source: *Prepared by the European Commission on the basis of comprehensive assessment*

Advertising networks (Ad networks) can be described as "a two-sided platform serving (i) publishers (websites) that want to host advertisements, and (ii) advertisers that want to run ads on those sites".[182] Thus, Ad networks bring together at least two groups of users in an online environment and allow those user groups to benefit from network effects. The operators of ad networks tend to aggregate online advertising space and resell this to advertising clients and also provide additional services, for example by organising the payment for websites that publish advertising space and by providing advertisers with online tools to monitor the effectiveness of their campaigns. Finally, certain ad networks also provide so-called hosted ad serving tools to either publishers of online advertisement space or to advertisers, or both. These tools essentially allow the delivery of personalized ads to consumers within the correct advertisement space of a website, and the tracking of consumer behaviour in order to improve the accuracy of this targeted advertising.

By combining hosted ad-serving tools with the provision of intermediation services, ad networks are able to provide their different user groups with an integrated, seamless advertisement service. It should, however, be noted that **hosted ad-serving tools** can, in certain cases, also be deemed to constitute online platforms as certain of these tools allow online advertisement publishers to simultaneously target advertisers directly as well as via ad networks that can be accessed via the platform.[183]

Ad exchanges, in turn, constitute online marketplaces that facilitate auction-based direct transactions between publishers of online advertising space and acquirers thereof. Ad networks can be active both as buyers and sellers on these ad exchanges. They exist both in an open (i.e. accessible to all) and private form. The large ad exchanges seem to be closely integrated with their owners' ad networks. For example, Google and Microsoft previously acquired, respectively, the DoubleClick and AdECN ad exchanges.

Finally, certain firms engage in the provision of general media buying services to advertisers, which services tend to cover different types of media including the Internet.[184] Opposite to ad networks and ad exchanges, these firms cannot, as such, be considered to constitute online platforms.

3.5.2 Business models

Online platforms mostly use the traditional media broadcast model where they offer content and services for free and finance their operation by providing space for advertising or branding/co-branding messages. This model generally works best when the volume of viewer traffic is very large. Advertising platforms offer different types of ads. On the basis of the OECD Report on *The Economic and Social Role of Internet Intermediaries*, online ads can be categorized as follows:[185]

- **Search advertising** is based on advertiser bidding on keywords that affect the position of text ads on users' results page.
- **Display ads** are advertisements in text image or multimedia format (e.g. advertisement banners) placed on websites. In some cases, a process known as “programmatic” advertising is applied whereby ad servers analyse the content of websites and automatically deliver ads that they deem relevant to viewers.
- **Classified ads** consist of listings of products or services on a webpage (e.g. Craigslist)
- **E-mail advertising** uses different forms of advertisement delivered via electronic mail (e.g. links, banner ads or advertiser sponsorships placed within an e-mail message)
- **Referrals** are an advertising approach whereby advertisers pay fees to online companies which refer purchase requests or provide customer information.

Many online advertising platforms operate through pay-per-click advertising channels. Ad networks, for example, generate revenue by *arbitraging* the cost of advertisement space against the price that advertisers are willing to pay for efficient access to aggregated types of advertisement space. Ad networks generally offer publishers a fixed remuneration per thousand clicks/views of advertisements published on their website and sell access to this space to advertisers at a profit.[186]

In addition, publisher and advertiser ad-serving tools also tend to charge a commission to those publishers and advertisers that do not have in-house ad-serving capabilities and sales forces. For directly sold ads, these have been mentioned to usually amount to 5 cents per one thousand impressions served on the advertiser-side and to 7-8 cents per one thousand impressions served on the side of the publishers.[187] For those ad networks that offer ad-serving capabilities as part of one integrated service, these charges can be part of an overall intermediation fee charged to their clients.

Ad exchanges similarly derive their revenue from intermediation fees (in the form of commissions on concluded transactions or, hypothetically, based on fixed subscription fees). One ad exchange explained that it indeed charges a 20% commission on advertising revenue, which would be lower than the commission generally charged by ad networks.[188] The level of the intermediation fees charged by ad exchanges is likely closely related to the general cost of ad-serving tools and the 'commission' charged by ad networks, as publishers and advertisers tend to simultaneously use several channels, including ad exchanges, allowing them to induce competition. As with other exchanges, ad exchanges do require a certain minimum level of liquidity in order to be able to sustain themselves and several have failed in this respect.[189]

3.5.3 Market players

Internet advertising is rapidly growing, both in terms of total revenues and in terms of share of the total advertising market. EMarketer estimates that in 2015 digital advertising reached USD 170.17 billion or a 29.9% share of the total global advertising market.[190]

Since 2000s there has been a wave of acquisitions in the sector. Zanox was for example acquired by Axel Springer, AdLink Media was acquired by Hi-media and AOL unsuccessfully attempted to acquire TradeDoubler. Google, Yahoo!, Microsoft and AOL respectively have acquired DoubleClick, Right Media, AdECN and Millenial Media. Facebook has acquired LiveRail, a video advertising company.

The firms active in online advertising generally seem to distinguish their services based on (i) types of ads (search ads, classified ads, text ads, display ads, etc.), and (ii) means of connecting to the end consumer (mobile versus PC). As consumers spend more time online via their mobile phones, the mobile online advertising segment is experiencing particular strong growth. AIB, the relevant industry body, estimated the global online mobile advertising revenue at EUR 24 billion (USD 31.9 billion) in 2014, out of which EUR 4 billion would have been generated in Europe.[191] In this mobile segment, display ads would be the most commonly used type of advertisements and in 2014, the European mobile display advertising segment would furthermore have grown by 70%.[192] The future growth in the digital advertising market will be fuelled by mobile ads.[193]

3.5.4 Impact

3.5.5.1 Main benefits

From the point of view of the advertiser, online platforms offer an efficient mechanism for delivering ads to individual users and collecting information about these users to improve ad targeting. Online platforms have also improved the process of matching the ads with the available advertising space. This is done increasingly with the help of algorithms and automated exchanges. Google's keyword bidding system used for search and contextual advertising is the most mature example. Online advertising has led to economies of specialization: traditional publishers provide content for attracting viewers and sell advertising space to advertisers; online publishers are increasingly turning the selling of advertising space over to specialized advertising platforms.

Moreover, ad networks appear to play a key role in allowing websites and mobile applications with relatively small customer audiences (e.g. start-up companies that are still building up their audience or websites that target a very specific audience) to generate advertising revenue.[194] Targeting ads more accurately to the preferences of an individual user reduces the noise of irrelevant advertising.

Benefits for advertisers: reduced advertising wastage

Online advertising platforms allow businesses to market their products/services to selected audiences by enabling interest-based advertising that relies on users' personal data and demographic characteristics. These characteristics include, for example, users' age, gender, location and interests. Compared to traditional off-line advertising, the effectiveness of which was difficult to measure, online advertising provides advertisers accurate targeting and measurement methods. They increase the effectiveness of marketing spending ensuring that ads are shown to those users who are most likely to purchase the advertised product or service.

More sophisticated technologies are beginning to track not only whether individuals clicked on an advertisement but whether it actually translated into a sale. In addition, with the use of innovative tools, users' behaviour can be tracked across different types of devices.[195] Data collection companies can detect when the same user logs onto the Web from a PC, tablet or smartphone, or purchases a product in a retail store, based on their browsing habits and other clues. They can then sell that information to marketers who want to show the same person advertisements on different devices and measure efficacy.

Benefits for publishers: efficient monetization of content

Targeted Internet advertising in theory serves a useful informational role for consumers because they are able to see the ads that are related to their potentially unique interests. In other words, online platforms reduce the 'noise' of irrelevant advertising by enabling interest-based advertising that is based on users' personal data and demographic characteristics.[196]

In addition to direct advertisements many website owners use affiliate programs or revenue sharing programs offered by the online platforms to monetize their sites. For example, eBay link will get a 7 day cookie and the website will receive 50%-75% (for US traffic) of the final value fees of any product that the user buys from eBay within the next seven days. Similarly, Amazon gives the websites hosting the ad 4%-8% commission depending on quantity shipped on a 1 day cookie. iTunes affiliate program is run through LinkShare, meaning that the website gets 10% of anything that users purchase on iTunes for the next year.[197]

This provides a convenient way for website operators to monetize their content. Advertising networks and affiliate programs give publishers access to a wider pool of advertisers and often provide advanced ad serving solutions.

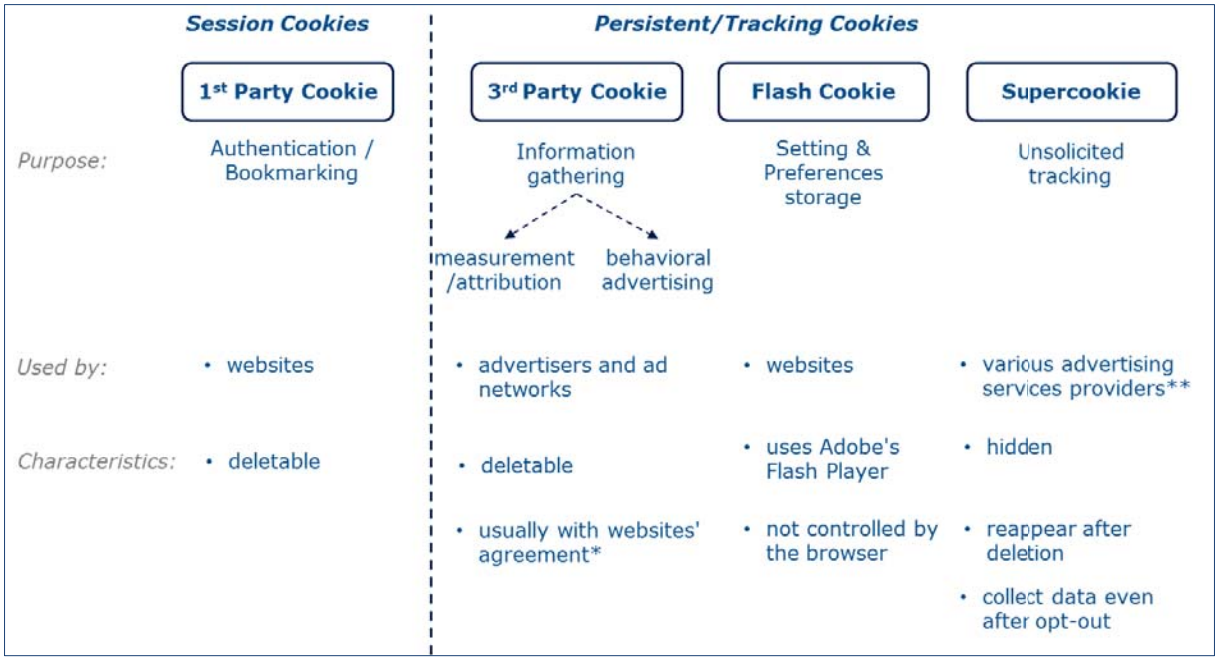
3.5.5.2 Collection and use of personal data

The more information advertising networks have about the audience, the better they can target their ads. Moreover, if they can offer better targeting, they can charge more for adverts and get more marketers using their service. In order to achieve this, advertising networks install cookies in users' browsers to record the types of pages that users' visit and associate users with certain interest or demographics, as a basis for targeted advertising. The use of 'cookies' is regulated under the ePrivacy Directive. Following the adoption of the General Data Protection Regulation, which includes provision regarding the right of individuals to object, including to direct marketing, there is a review of the ePrivacy directive, which must be in line with the new data protection rules. The value of personal data to online platforms is shown by advertising revenues per user (ARPU), which for Google in the first quarter of 2014 was as much as USD 45 on average. Google has consistently earned ARPU of more than USD 40 on average since the fourth quarter of 2012.[198] Facebook's worldwide ARPU was USD 9.45 in 2014[199], 39 % higher than in 2013.

It is important to look at the different types of cookies used by the websites and what their main characteristics are. At the same time it should be noted that irrespective of the type of

cookies used, there is a legal requirement to obtain the user consent before a cookie is placed on their device.

Figure 15: Characteristics of cookies



Source: *Prepared by the European Commission on the basis of comprehensive assessment*

Session Cookies (1st Party Cookies) are a useful connection between users and the websites they visit. The information gathered through 3rd Party Cookies is used as for behavioral targeting as for measurement and attribution across digital ecosystem silos. Banning third party cookies would give protection to the big web/app portals, such as Google, Bing, and Facebook through Graph Search. They will have the option to gather information through 1st party cookie, user data, ad inventory, and third-party ad server while advertisers will find it difficult to measure audiences and grow their media investment across all digital channels (display, search, video, and social).[200]

Flash cookies are a way to circumvent deletion of cookies by the user. They are a mechanism to store information about a user's preferences for websites that use Adobe Flash, a multimedia platform for viewing videos. By restoring the value of the original cookie they nullify the deletion of the HTML cookies. Currently, many sites use Flash cookies. The UC Berkeley study found that in the US market Flash cookies were used on 54 of the top 100 websites, including three of the six government websites analyzed.[201] Nevertheless, the latest versions of Google Chrome, Mozilla Firefox, and Microsoft Internet Explorer allows for control or deletion of Flash cookies through their browser's settings.[202]

Super cookies, also called zombie cookies, are tracking cookies that reappear after users have deleted them. An example of a company using this type of cookies is Turn, an online advertising clearinghouse relied on by Google, Yahoo, Facebook and others.[203] Some companies track computers of users without their consent, whether they are logged in to the service or not, and even if they are not registered users of the site, by using social plug-in content sharing cookies. Therefore, in Germany websites are required by law to warn users that 'liking' the website on Facebook grants permission for the website to record their customers' data and that they can withdraw their consent at any time.[204]

Different ways users rely on to avoid or manage cookies are often outpaced by the development of ever new and technologically more advanced cookies:

- Opt-out: To opt-out means the user will not receive targeted advertising. It does not mean that the website will cease the collection of data or ad displaying.[205] When opting out the user receives opt-out cookies from the website.
- Browsing sessions:
  - Private/incognito browsing sessions. Cookies set during private browsing are deleted when exiting the session or when switching back to normal browsing. However super-cookies could still track users online even if they've enabled a privacy-cookie setting.[206]
  - Browsers with a "do not track" privacy setting, which automatically restrict 3rd Party Cookies by default. However, some online advertising networks have been found to use a workaround to circumvent these privacy restrictions.[207]
- Websites and add-ons offering an option to see and block tracking 3rd parties, such as ghostery.com, and www.mozilla.org/en-US/lightbeam.
- Ad blocker: Nearly 200 million people worldwide regularly block ads and the number is growing fast, increasing 41% globally in the last year. Adobe and PageFair, an Irish start-up that tracks ad-blocking, estimated that blockers will cost publishers nearly $22 billion in revenue this year.[208] However, companies offering ad blocking services, such as PageFair, AdBlock Plus and Ghostery, are also developing innovative advertising mechanisms.[209]
- Cookie Clearinghouse Initiative by Mozilla and Stanford University – the project tested a tool that would restrict, by default, tracking files from companies that users didn't interact with.[210] However the project has been suspended.[211]

In recent years, privacy concerns have come to the fore as consumers, government agencies and the media started focusing on the massive amount of personal data that online advertising companies were storing and using.

Individuals were largely negative in relation to the degree of transparency that online platforms currently offer on their collection and use of personal and non-personal data. The sanctions provided for in the General Data Protection Regulation, which can be up to 4% of the worldwide annual turnover of the preceding financial year, should provide incentive for companies to ensure they are fully complying with the data protection rules. As mentioned in the previous sections, several companies have been found to track computers of users without their consent[212].

Data about Internet users can also be traded, in varying degrees depending on the jurisdiction. The third-party data marketplace has grown a lot in the recent years. Lotame and BlueKai (recently purchased by Oracle for 400 million USD), eXelate (acquired in 2015 by Nielsen for 200 USD million) are only some examples of companies built on trading 3rd party data (other big players are Acxiom, Experian, Neustar). These companies manage data exchanges bringing together 3rd party data vendors and companies willing to pay for that data, which can be used to improve products and service offerings and to improve targeting in marketing campaigns.

A recent OECD report discusses in detail the risk of price discrimination, which is a possible way of exploiting data as a strategic point of control.[213] Some respondents to the public consultation also raised this issue.

At the same time, respondents to the public consultation mentioned a variety of measures that could regulate the use of information by online platforms, such as introducing a requirement for online platforms to allow users to effectively 'opt-out' from data collection & use, developing rules to minimize data collection and retention, and introducing strict cyber security requirements.

3.5.5.3 High degree of automation

The unique features of online advertising include the use of Internet-based technologies and advanced data collection and evaluation mechanisms to target and track specific individuals and to automate the buying and selling of advertising inventory. Like modern finance, online advertising relies heavily on advanced economic and statistical methods. The decisions regarding which advertisement to display to which user are taken very quickly, in real-time with the use of advanced algorithms.

IV. Summary

4.1 Increasing role in the digital economy of online platforms

The Internet and ubiquitous connectivity (better networks and connected devices e.g. smartphones) have led to an unprecedented expansion of the online platform business model - one of the most successful business models of the Internet economy. Over the last two decades, online platforms have grown to become some of the biggest companies in the world. As consumer adoption of smartphones, connected devices and other types of mobile technology increases, online platforms are set to play an increasingly important economic and societal role. Having said this, the future Internet cannot succeed without trust of users in online platforms,[214] and without online platforms respecting all applicable legislation and the legitimate interests of consumers and other users.

Platforms bring a new dimension to more traditional models of firms, especially to SMEs. They help smaller companies achieve “big company” benefits from digitalisation, including easy entry to new markets at a fraction of the cost that they would incur without them. Additionally, the online platform business model continues to drive the creation of very strong and highly valued companies - so called "unicorn" start-ups. As such online platforms are powerful engines of growth. They are, thus, interesting and valuable for their contribution to productivity and competition in the wider economy. As illustrated in Chapter II, online platforms' characteristics as well as their social and economic impact are extremely diverse. For example, search platforms offer fast and organized access to the Internet's vast information store; advertising platforms allow companies to reach a wide audience, to target their advertising and to measure the effectiveness of ad campaigns through data analytics; e-commerce marketplaces offer scale, efficiency and additional functionalities to private and professional sellers; social media platforms allow users to interact and exchange information with each other and with a wider audiences; and App stores and mobile ecosystems offer app developers the opportunity to develop solutions meeting users' needs in terms of entertainment, productivity or communication, and to monetize their ideas through different strategies.

However, beyond these simple and intuitive benefits relating to platforms' primary business transactions, online platforms provide significant financial benefits, productivity and transparency gains. Financial benefits to consumers could result from online platforms' impact on prices, including welfare gains from free products as well as increasing product availability. For businesses, the most important benefits are cost reduction and the promotion of business opportunities, as these are the two main characteristics that lead to business growth. Moreover, online platforms bring the additional benefit of facilitating employment, education and knowledge sharing. It appears that online platforms contribute significantly to innovation, and notably reduce the time taken for innovation to reach end consumers. Lastly, online platforms, especially collaborative economy platforms, can potentially lead to better resource allocation and more sustainable consumption patterns.

Many online platforms are able to provide the above benefits to a large extent because of their data gathering capabilities. Gathering, analysing and interpreting data to more efficiently match supply and demand and guide decision making is at the heart of their activity. For these online platforms, each user - whether company or customer - is considered a valuable data generating source. By allowing for near frictionless participation that strengthens network effects, these online platforms are able to capture and analyse vast quantities of data.

Big data technology can help businesses better understand a market and adapt their products, prices, and inventories to consumers' needs. As the JRC report[215] points out, there is growing information asymmetry between large platforms with virtually unlimited data collection & processing capabilities and the limited cognitive capacity of human users[216]. Information overload and complex pricing or tariff structures, are a major factor in causing consumer harm and undermine real consumer empowerment and their rights to clear and adequate information.[217] On the other hand, as pointed out in the JRC report[218], this form of information asymmetry may also lead to important economic benefits by enabling individuals to specialize and increase their productivity.

Online platforms have also been shown to raise some concerns for consumers. As mentioned in the Digital Single Market Strategy Communication, issues that need to be assessed include transparency e.g. in search results (involving paid-for links and/or advertisement), platforms' usage of the information they collect, relations between platforms and suppliers, constraints on the ability of individuals and businesses to move from one platform to another and how best to tackle illegal content on the Internet.

4.2 Diversity of online platforms

Online platforms take various shapes and sizes and are continuously evolving. Unlike traditional 'real world' platforms, online platforms are not limited physically and geographically. Moreover, from a theoretical perspective, due to the existing asymmetry between the network effects on the platform's sides they are able to employ a strikingly different pricing model. A platform's decision on pricing structure involves cross-subsidization, where one group of users pay significantly more than the other or bears the total cost of the other group's participation. It does not follow the theory for traditional firms in which the long-run price is always greater than marginal cost.

However, there are other important characteristics which may distinguish online platforms from other businesses: their capacity to facilitate, and extract value, from direct interactions or transactions between users by building networks where "network effects" are at play; the ability to collect, use and process a large amount of data in order to optimize user experience or create and shape new markets. What is more, the combination of data collection and processing capacity with established network effects gives online platforms unprecedented scope and scale allowing them to expand into new economic sectors.

Therefore, "online platform" is a broad label for numerous types of multi-sided business models. Even at a theoretical level, depending on the definition, online platforms are a flexible concept.

Furthermore, online platforms are continuously changing and developing in new directions. They are at the forefront of developments in the emerging platforms of the future: virtual reality, connected and self-driving cars, Internet of Things, Big Data and Artificial Intelligence. Start-ups try to identify market inefficiencies and use the power of mobile connectivity, social media, algorithms detecting market trends, and adaptive pricing in order to take over traditional sectors. By bringing to the market innovative business models, they are having a

disruptive effect on many sectors such as transport, energy, banking, financial services, mobile health and smart cities.

These variations in platforms' business models and characteristics have important implications for a policy analysis of online platforms. It is challenging to set out a clear-cut definition of online platforms, especially from a legal perspective. Doubts have been raised during the stakeholder engagement process over whether any "one-size-fits-all" definition would be feasible. Such a definition is unlikely to be future-proof and it might overlap with other definitions, for example of an online intermediary and information society service provider.[219] JRC analysis supports this argument and states that a clear-cut definition would be likely to miss certain online platforms, or conversely to apply to a very wide range of Internet services.[220]

4.3 Promoting online platform innovation in Europe

As discussed in Chapter II, there are many important factors for the development of online platforms, such as access to finance and to IT and business skills, consumer trust, security, high speed Internet infrastructure, mobile connectivity, support for entrepreneurs, clear and predictable regulatory framework, free flow of data, and open standards. The key determinants of a platform's success are economies of scale and economies of scope related to network effects.

Platforms need a critical mass of customers on all market sides to survive. With a combined market of 500 million consumers, the European Union may offer a fertile ground for such a market, based on economies of scale. Thus, fragmentation of the EU market is one of the most important impediments to the scaling up of online platforms in Europe.

A 2012 Report for the European Commission Joint Research Centre on ICT innovation[221] highlights that "the lack of a large integrated digital market in Europe and poor capability and skills to commercialize technological innovations" are important impediments for European ICT firms to grow into world leading innovators. While Europe is very good at inventing new technologies and digital concepts, it struggles with the commercial exploitation of these ideas, i.e. creating the necessary aggregates that combine these concepts in a usable form and extracts value out of the ideas. Of particular importance, market fragmentation renders the EU less attractive for large players in the platform economy and poses an even bigger challenge for innovative small platforms than for larger global players.

The JRC report on the economic policy perspective of online platforms[222] points out that the economics of platforms has gradually moved away from a focus on network effects only to a wider picture of economies of scope of data collection and use. Platforms can collect data and aggregate them across all firms and consumers on the platform. The aggregated information has more value than the individual datasets that users can observe. From a societal perspective, economies of scope are a source of economic benefits because they generate cost savings (in data collection & analysis) and innovation.

The expansion of individuals' digital footprints by companies and government agencies has become a source of concern and has impacted the development and competitiveness of the market in which platforms operate.

Along with challenges associated with fragmentation of the EU market, legal uncertainty, and restrictions on data flow, online platforms are confronted with other difficulties limiting their growth in the EU. Lack of financing for promoting existing innovation and specific digital entrepreneurship skills are among them. These difficulties may provide an explanation of the fact, raised in Chapter I, that many European economies are performing below average in terms of how they employ digital technologies and innovation to drive growth.

The EU's strategic objective is to set the optimal innovation environment to create, attract, retain and grow new online platform innovators within Europe, while at the same time

creating a regulatory framework that respects the legitimate interests of consumers and other users.

Endnotes

[1] As shown by a recent survey including 69 worldwide public companies with a market capitalisation of over USD 1 billion Peter Evans and Anabelle Gawer, "The Emerging Platform Economy Series", Center for Global Enterprise (January 2016) p.13. Retrieved from: http://thecge.net/wp-content/uploads/2016/01/PDF-WEB-Platform-Survey_01_12.pdf, accessed on 11 April 2016

[2] Martens, B. (2016) "An economic policy perspective on online platforms". JRC/IPTS Digital Economy Working Paper 2016-05, p.22, available at https://ec.europa.eu/jrc/sites/default/files/JRC101501.pdf

[3] Besides the European Commission, these include the UK's House of Lords, Germany's Monopolkommission, France's Conseil National du Numérique and the Dutch Ministry of Economic Affairs.

[4] Article 20 of the recently adopted General Data Protection Regulation, provides for the right of data subjects to receive personal data which he or she has provided, in a structured commonly used and machine readable format and have the right to transmit that data to another controller without hindrance from the controller to which the personal data has been provided, where the processing is based on consent under Article 6(1)(a), Article 9(1)(a) or on a contract under Article 6(1)(b) and the processing is carried out by automated means.

[5] For a detailed discussion of different approaches to defining online platforms, see: Martens, B. (2016) "An economic policy perspective on online platforms". JRC/IPTS Digital Economy Working Paper 2016-05, available at https://ec.europa.eu/jrc/sites/default/files/JRC101501.pdf

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[7] Evans, D. (2003), "Some Empirical Aspects of Multi-sided Platform Industries", Review of Network Economics, 2(3), 2194-5993 and Evans, D., & Schmalensee, R. (2007). The Industrial Organization of Markets with Two-Sided Platforms Competition Policy International, 3(1), 151-179

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[13] Wilbur, K. C. (2008). A Two-Sided, Empirical Model of Television Advertising and Viewing Markets. Marketing Science, 27(3), 356-378; Filistrucchi, L., Geradin, D., & Van Damme, E. (2013). Identifying Two-Sided Markets. World Competition: Law & Economics Review, 36(1), 33-60. According to Li, J. (Li, J. (2015). Is online media a two-sided market? Computer Law & Security Review: The International Journal of Technology Law and Practice, 31(1), 99-111), it is crucial for advertising-supported media to qualify as MSM. Platforms monetizing content through advertising would not qualify as two-sided if two-way indirect effects are needed.

[14] Users pay for these services in non-monetary ways, for example by giving the other side of the platform access to their data or attention.

[15] Critical mass can be defined as a minimal set of customers on each side that is large enough to attract more customers and result in sustainable positive feedback (Evans, D.S. and R. Schmalensee (2009) “Failure To Launch: Critical Mass in Platform Businesses” Review of Network Economics 9.4 (2010))

[16] Martens, B. (2016) "An economic policy perspective on online platforms". JRC/IPTS Digital Economy Working Paper 2016-05, chapter 3. https://ec.europa.eu/jrc/sites/default/files/JRC101501.pdf

[17] According to ISO/IEC 2382-1, data are "a reinterpretable representation of information in a formalized manner, suitable for communication, interpretation or processing". Data can either be created/authored by people or generated by machines/sensors. Often, it is generated as a "by-product" of other processes.

[18] 1 exabyte = 1 billion GB

[19] A zettabyte is equal to one trillion gigabytes

[20] Raconteur (2014). *The Data Economy* (Edition No.0272). Retrieved from: http://np.netpublicator.com/netpublication/n05031451, accessed on 3 May 2016

[21] Dumbill, Edd (January 2012), "What is big data? An introduction to the big data landscape". *O'Reilly.* Retrieved from: https://www.oreilly.com/ideas/what-is-big-data, accessed on 3 May 2016

[22] McAfee, Andrew, et al. "Big data." The management revolution. Harvard Bus Rev 90.10 (2012): 61-67.

[23] Mayer-Schönberger, Viktor, and Kenneth Cukier. Big data: A revolution that will transform how we live, work, and think. Houghton Mifflin Harcourt, 2013.

[24]Martens, B. (2016) "An economic policy perspective on online platforms". JRC/IPTS Digital Economy Working Paper 2016-05, section 4.1, https://ec.europa.eu/jrc/sites/default/files/JRC101501.pdf

[25] "Facebook has a billion users in a single day, says Mark Zuckerberg" (August 2015), *BBC News.* Retrieved from: http://www.bbc.com/news/world-us-canada-34082393, accessed on 3 May 2016; according to Facebook's official web page in March 2016 Facebook has 1.09 billion daily active users on average. Retrieved from: http://newsroom.fb.com/company-info/, accessed on 3 May 2016

[26] Brooks David (October 2014), Our Machine Masters, *The New York Times.* Retrieved from: http://www.nytimes.com/2014/10/31/opinion/david-brooks-our-machine-masters.html

[27] Top 10 websites according to Alexa, "The top 500 sites on the web". Retrieved from: http://www.alexa.com/topsites, accessed on 4 May 2016 (Alexa orders the sites in accordance with their 1 month Alexa traffic. The 1 month rank is based on a combination of average daily visitors and page views over the past month. The site with the highest combination of visitors and page views is ranked first).

[28] Clark Jack (November 2014), "5 Numbers that Illustrate the Mind-Bending Size of Amazon's Cloud", *Bloomberg.* Retrieved from: http://www.bloomberg.com/news/2014-11-14/5-numbers-that-illustrate-the-mind-bending-size-of-amazon-s-cloud.html

[29] http://www.zdnet.com/article/microsoft-million-server-datacenters/ accessed on 10 April 2016

[30] Harris Derrick (February 2015), "Google had its biggest quarter ever for data center spending. Again", *Gigaom.* Retrieved from: https://gigaom.com/2015/02/04/google-had-its-biggest-quarter-ever-for-data-center-spending-again/, accessed on 4 May 2016

[31] See for example: https://aws.amazon.com/big-data/, https://cloud.google.com/bigquery/, https://www.microsoft.com/en-us/server-cloud/solutions/data-warehouse-big-data.aspx

[32] The EU has 10 (out of 15) most competitive countries in terms of technological readiness. Source: World Economic Forum – Global Competitiveness Index

[33] ITU, "ICT Facts and Figures – The world in 2015", p.3. Retrieved from: https://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2015.pdf, accessed on 3 May 2016

[34] Publicly available data on the exact volume of sales is not consistent due to use of different sources of data, different methodologies and different groups of products considered. For illustrative purposes, the following sources give an indication of the growth in e-commerce: see for e.g. Ecommerce Europe "The European B2C E-commerce Report 2015", http://www.ecommerce-europe.eu/press/2015/european-e-commerce-turnover-grew-by-14.3-to-reach-423.8bn-in-2014, Statista, "B2C e-commerce revenue in Europe from 2012 to 2018", http://www.statista.com/statistics/435843/b2c-e-commerce-revenue-europe/

[35] Digital Scoreboard: https://ec.europa.eu/digital-single-market/en/digital-scoreboard

[36] Use of Social Media by European SMEs, 2013

[37] Breslin, J, Card, D., Dabrowski, M., and Mulligan, M., "Sizing the EU App Economy", Final Report Prepared for the European Commission, 2014. Retrieved from: http://eurapp.eu/2014/07/07/eurapp-final-report-published-eu-bookshop-0, accessed on 12 April 2016, p.12

[38] Breslin,J, Card, D., Dabrowski, M., and Mulligan, M, op. cit., p. 4.

[39] Digital Scoreboard: https://ec.europa.eu/digital-single-market/en/download-scoreboard-reports

[40] Peter Evans and Anabelle Gawer, "The Rise of the Platform Enterprise" (The Center for Global Enterprise, 2016). Retrieved from: http://thecge.net/wp-content/uploads/2016/01/PDF-WEB-Platform-Survey_01_12.pdf, accessed on 4 May 2016

[41] Evans & Gawer (2016) ibid. distinguish between four different types of platforms based on their key functions (transaction, innovation, investment and integrated), and the list of platforms in the study include a wide range of companies, such as Uber, Airbnb, iTunes, Netflix etc.

[42] Reinhilde Veugelers, Bruno van Pottelsberghe, and Nicolas Véron, Joint Research Centre, Institute for Prospective Technological Studies, "Lessons for ICT Innovative Industries: Three Experts' Positions on Financing, IPR and Industrial Ecosystems", JRC Technical Reports, 2012, pp. 45-56, available at <http://ftp.jrc.es/EURdoc/JRC76458.pdf> accessed on 7 April 2016; Reinhilde Veugelers, "New ICT Sectors: Platforms For European Growth?", Bruegel Policy Contribution, Issue 2012/14 August 2012

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[45] See: Official Amazon Webpage, "About Amazon Business". Retrieved from: http://www.amazon.com/b?node=11261610011, accessed on 4 May 2016

[46] See, for example, the 2015 *Mobile Economy Report* by GSMA which shows that at the end of 2013 about half of the world's population had at least one mobile subscription.

[47] ITU annual global ICT data and ICT development index, Retrieved from:http://www.itu.int/net/pressoffice/press_releases/2015/57.aspx#.VmgDGf7luUn

[48] Retrieved from: http://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Proportion_of_people_who_used_mobile_devices_to_access_the_internet_away_from_ho

me_or_work,_EU-28,_2014_(%25)_BYIE15.png&oldid=228781#file, accessed on 4 May 2016. The total is more than 100% since respondents were able to select more than one benefit.
[49] Digital Agenda Scoreboard 2015 – Use of Internet
[50] The total is more than 100% since respondents were able to select more than one benefit.
[51] Select Committee on European Union, *Online Platforms and the Digital Single Market,* 20 April 2016, HL 129,
[52] EDiMA and Copenhagen institute (2015), *Online intermediaries – Impact on the EU economy*. Retrieved from: http://www.europeandigitalmediaassociation.org/pdfs/EDiMA%20-%20Online%20intermediaries%20-%20EU%20Growth%20Engines.pdf
[53] Ibid.
[54] Brynjolfsson et al: *"The changing shape of Amazon's sales distribution curve",* 2010
[55] Select Committee on European Union, *Online Platforms and the Digital Single Market,* 20 April 2016, HL 129,
[56] Brynjolfsson and Oh: "The attention economy: measuring the value of free digital services on the Internet", 2012
[57] EDiMA and Copenhagen institute (2015), *Online intermediaries – Impact on the EU economy*. Retrieved from: http://www.europeandigitalmediaassociation.org/pdfs/EDiMA%20-%20Online%20intermediaries%20-%20EU%20Growth%20Engines.pdf
[58] The GDPR was adopted in April 2016 together with the revised data protection Directive by Council and Parliament, and together they will form the EU's data protection framework.
[59] Flash Eurobarometer 439, Survey conducted by TNS Political & Social at the request of the European Commission, Directorate-General for Communications Networks, Content & Technology, April 2016
[60] EDiMA and Copenhagen institute (2015), *Online intermediaries – Impact on the EU economy*. Retrieved from: http://www.europeandigitalmediaassociation.org/pdfs/EDiMA%20-%20Online%20intermediaries%20-%20EU%20Growth%20Engines.pdf
[61] Select Committee on European Union, *Online Platforms and the Digital Single Market,* 20 April 2016, HL 129,
[62] Use of social media by European SMEs, 2013
[63] Select Committee on European Union, *Online Platforms and the Digital Single Market,* 20 April 2016, HL 129,
[64] Directive 2006/114/EC on Misleading and Comparative Advertising
[65] Deloitte, "The global economic impact of Facebook" (2015). Retrieved from: http://www2.deloitte.com/uk/en/pages/technology-media-and-telecommunications/articles/the-global-economic-impact-of-facebook.html, accessed on 4 May 2016
[66]McKinsey & Company, "A labour market that works: connecting talent with opportunity in the digital age" (McKinsey Global Institute, June 2015)
[67] Select Committee on European Union, *Online Platforms and the Digital Single Market,* 20 April 2016, HL 129,
[68] This figure is based on data over submarine cables. This figure does not necessarily only capture the end-uses of the data, as data often transits though the U.S. and Europe. For instance, data from Latin America can transit the U.S. on its way to Europe and data from Africa can transit through Europe on its way to the U.S. Source: www.brookings.edu
[69] Regulation 524/2013 on online dispute resolution for consumer disputes
[70] See: Hagiu, A., & Wright, J., "Marketplace or Reseller?", (2015) *Management Science, 61*(1), 184-203.
[71] To illustrate this further, Zalando, for instance, operates a partner program which allows third-party sellers (in return for a commission fee) to transact directly with customers via the Zalando website and mobile application. At the same time, Zalando also engages in direct sales and owns an inventory of goods for sale. For more info, see the Official Zalando Webpage, "Corporate Startegy", Zalando SE Annual Report 2015, pp. 12-13. Retrieved from: http://annual-report.zalando.com/2015/assets/downloads/company/zalando_strategy.pdf, accessed on 6 April 2016.
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[73] Official Etsy Webpage, "Fees for Selling on Etsy". https://www.etsy.com/help/article/136, accessed on 4 April 2016
[74] Official Catawiki Wepbage, "Using our auctions". Retrieved from: http://www.catawiki.com/help/selling
[75] Official eBay Wepabge, "Standard selling fees". Retrieved from http://pages.ebay.com/help/sell/fees.html
[76] Spartoo marketplace – see: https://www.spartoo.com/marketplace_mentions.php
[77] Zalando marketplace – see: https://m.zalando.de/faq/partnerprogramm/
[78] Table by Bundesverband Onlinehandel e.V. (BVOH), based on Traffic-Ranking by alexa.com and SimilarWeb (calculated by p.digital) February, 1st 2016; updated Feb, 21st 2016. Retrieved from: http://www.bvoh.de/ranking-335-marketplaces-throughout-europe-online-means-diversity/, accessed on 28 April 2016
[79] Sellers at Tesco marketplace – see: http://www.tesco.com/direct/help/seller-terms-conditions.page
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[82] Official Ebay Investor Webpage, "eBay Inc. Reports Fourth Quarter and Full Year Results" (January 2015). Retrieved from: https://investors.ebayinc.com/releasedetail.cfm?ReleaseID=892350, accessed on 4 May 2016
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to Fuel International Growth". Retrieved from: https://about.chrono24.com/chrono24-secures-21-million-eur-investment-from-insight-venture-partners-to-fuel-international-growth/, accessed on 4 May 2016

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[87] Ecommerce Europe, "European B2C eCommerce Report 2015" (2015). Retrieved from:,http://www.ecommerce-europe.eu/press/2015/european-e-commerce-turnover-grew-by-14.3-to-reach-423.8bn-in-2014

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[92] Eurostat (2015 ICT usage survey in households and by individuals)

[93] Flash Eurobarometer 413,(Q1May 2015) 4

[94] The Commission previously noted that only 15% of consumers were reported to have bought online from other EU Member States in 2014, while 44% did so domestically, leaving the EU's Digital Single Market underexploited. See: Commission Staff Working Document "A Digital Single Market Strategy for Europe – Analysis and Evidence" SWD (2015) 100, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015SC0100

[95] See in this respect also the Commission Staff Working Document "A Digital Single Market Strategy for Europe – Analysis and Evidence" SWD (2015) 100, section 2.2,, available at: http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015SC0100 [accessed at December 2015].

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[106] Facebook Inc., "10-Q for Period Ending September 30, 2015," p. 40

[107] Facebook Inc., "10-Q for Period Ending September 30, 2012," p. 27

[108] Tode Chantal, "M-Commerce Sales to Reach $142B in 2016" (October 2015). Forrester Mobile Commerce Daily. Retrieved from: http://www.mobilecommercedaily.com/mcommerce-sales-to-reach-142b-in-2016-forrester

[109] Williamson Brian, Chan Yi Shen, Wood Sam, "A policy toolkit for the app economy – where online meets off-line" (Lisbon Council, 2016),. Retrieved from: http://www.lisboncouncil.net/index.php?option=com_downloads&id=1245

[110] Ibid, p.7

[111] Ibid, p.11

[112] Ibid, p.7

[113] Worldwide; 1st quarter 2009 to 4th quarter 2015**.** Source: Gartner; ID 266219

[114] Manchiganti, Rutu,"On emerging business ecosystems in the mobile device industry; Evaluation of current and emerging mobile phone ecosystems", (2013) Massachusetts Institute of Technology. Retrieved from: https://dspace.mit.edu/handle/1721.1/90694

[115] As the report from Mobile Developer Economics 2010 suggests, time to shelf came down from 68 days to 22 days, on an average. In terms of time-to-shelf, according to app developers it is 24 days for iOS, a week for Android and 58 days for Symbian. The difference provides a potential reason for Symbian losing market share so quickly.

[116] Williamson Brian, Chan Yi Shen, Wood Sam,"A policy toolkit for the app economy – where online meets off-line" (Lisbon Council, 2016). Retrieved from: http://www.lisboncouncil.net/index.php?option=com_downloads&id=1245
[117] The Apple App Store grew 45% in terms of downloads and 75% in terms of revenues in 2013. Google Play nearly doubled in number of downloads and saw a near 4-fold increase in revenue.EU Commission Press release, "A Digital Single Market for Europe" (May 2015). Retrieved from: http://eculture.zone/category/egovernment/digital-agenda-europe/
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[119]Official WorldWideWebSize Webpage, "The size of the World Wide Web (The Internet)" (March 2016). Retrieved from: http://www.worldwidewebsize.com, accessed on 14 March 2016
[120] See for instance Google's explanation on "How Google Search Works". Official Google Webpage "How Google Search Works". Retrieved from: https://support.google.com/webmasters/answer/70897?hl=en#1.
[121] "Black hat" search engine optimization ("SEO") refers to strategies, techniques and tactics that focus only on increasing ranking by search engines and not improving quality of content for a human audience, and usually do not obey search engines guidelines. Some examples of black hat SEO techniques include keyword stuffing, invisible text, doorway pages, and adding unrelated keywords to the page content or page swapping (changing the webpage entirely after it has been ranked by search engines). When these measures are discovered by the operator of a search engine, they may result in a negative adjustment of the site's ranking in the overview of results, or even the removal of the site from the index.
[122] Official PC Mag Webpage, "Definition of vertical search engine". Retrieved from: http://www.pcmag.com/encyclopedia/term/57892/vertical-search-engine.
[123]Official webpage from the Department of Computer Science and Statistics of the University of Rhode Island, "Searching The Web" (Retrieved from: http://homepage.cs.uri.edu/faculty/wolfe/book/Readings/R10%20Links/search1.htm
[124] The "pay for placement model" was first introduced by Goto in 1998. Goto, which was later acquired by Yahoo, was a search engine where the results were all advertising. Sites bid for the top spot in any given search term, with the top bidder being listed first in the search results. There was no distinction between displaying paid and organic search results. But advertisers paid only if a user clicked on their ad. The concept of auctions for the first listings of any particular search terms became a standard element of general search business model at the end of the 1990s.
[125] However, as evidenced in social experiments, the users' concerns about privacy do not always translate into thought-out choices. This is known as the "privacy paradox". See: Benjamin Wittes and Jodie C. Liu , "The privacy paradox: The privacy benefits of privacy threats" (Brookings May 2015)
[126] The figures are rounded off and often do not add to 100% as the share of other smaller online search providers is not shown. They are estimated in relation to search queries on desktop, mobile, tablet and console and are based on page views (and not unique visitors) to over 3 million global websites.
[127] Official Alexa Webpage, "The top 500 sites on the web". Retrieved from: http://www.alexa.com/topsites. It must be noted that Alexa does not include mobile app traffic which may alter the ranking of most visited websites.
[128] Pollock, R, "Is Google the Next Microsoft?" Competition, Regulation in Internet Search, Re-view of Network Economics (2010) 9 (4) pp. 24
[129] In 2007, Google invested 2.12 billion USD, equivalent to 12.8 percent of its revenue, in R&D (Google, 2008, p.36) while its closest competitor Yahoo! invested 1.08 billion USD or 15.6 percent of its revenues (Yahoo!, 2008, p.60). These figures are high by international standards. In the G7 countries for example, an average company in manufacturing allocated only 2.7 percent of its annual production value to R&D in 2002 while the respective share for medical, precision and optical instruments – the sector with the highest relative R&D expenditures – amounted to 13.2 percent (OECD, 2005). See: DIW Berlin, "Competition in the web search market – A report for Microsoft" (July 2009). Retrieved from: http://diw-econ.de/wp-content/uploads/2014/01/Bericht_Suchmaschinen_DIWecon_v2.0.pdf
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[135] Directive 2005/29/EC on Unfair Commercial Practices
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[138] German Monopolkommission, "Special Report 68: Competition policy: The challenge of digital markets" (June 2015) 51
[139] An online search takes significantly less time than an off-line search. In a study conducted by Chen, Jeon and Kim, using random questions, an online search takes on average 7 minutes, whereas the corresponding off-line search takes 22

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