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Connecting competition law standards to the Internet of things

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ABSTRACT

The advent of the Internet of Things will entail a new Internet revolution and bring about profound changes that will rival the first wave of Internet innovation. This paper explores the competition law implications raised by this upcoming revolution. Starting by discussing the merits of open ecosystems as opposed to closed ecosystems (and the Commission policy in this respect), it moves on to address the legal tools at the disposal of litigants to unlock flawed ecosystems, be it through competition law (i.e. essential facilities theory and FRAND claims) or the new data portability right, before presenting the regulatory issues likely to arise from the rolling out of the IoT, that is, protection of privacy and practices committed by "things" (i.e. robots).

L'Internet des objets entraînera une nouvelle révolution de l'Internet et conduira à des profonds changements qui équivaudront à ceux que nous avons connus avec la première vague d'innovation dans l'Internet. Cet article explore les implications, en droit de la concurrence, de cette révolution. S'ouvrant par une discussion sur le mérite des écosystèmes ouverts par opposition aux écosystèmes fermés et de la politique de la Commission à cet égard, il aborde ensuite la question des outils juridiques aux mains des requérants pour "déverrouiller" des écosystèmes dysfonctionnels, que cela soit par le biais du droit de la concurrence (théorie des facilités essentielles ou demande de licence FRAND) ou par le nouveau droit à la portabilité des données. L'article conclut en présentant les problèmes réglementaires susceptibles de survenir avec le développement de l'Internet des objets, qu'ils soient afférents au respect de la vie privée ou au traitement des pratiques commises par les "choses" elles-mêmes.

1. Originally, the Internet was conceived to interconnect computers and transmit messages. With the advent of web technologies, a first revolution took place enabling the linking of documents and the creation of a worldwide web of information (web 1.0). In the early years of this century, the Internet evolved towards a universal communication technology making it possible to carry all voice, video, or information content, with social media enabling user-generated content (web 2.0). Based on existing communication technologies like the Internet, the Internet of Things represents the next step towards digitisation.[1]

2. This so-called Internet of Things ("IoT"), or machine-to-machine connectivity and communications, promises to usher in "*a third computing revolution*" and bring about profound changes that will rival the first wave of Internet innovation.[2] Market research estimates that 20 billion connected devices will be in use by 2020.[3] The EU IoT market is expected to be higher than one trillion euros in 2020.[4] As a result, many industries will be introducing the IoT into their operations, effectively "*changing the way we do business and experience life*."[5]

3. The IoT (sometimes called the "Internet of Everything") is a term used to describe a series of devices (or "things") that are connected to each other by a network. These devices use the network to communicate. As the devices communicate, they send data across this network and use the data to execute their specific functions.[6] A complete IoT system integrates four distinct components: sensors/devices, connectivity, data processing, and a user interface.[7]

4. The applications of the IoT result in many concrete uses. A survey suggested that IoT devices fall into as many as fourteen different categories. Of these categories, several have been identified as being among the most important for people: healthcare, transportation, smart environment (e.g., home and workplace

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1 Communication of the Commission, Digitising European Industry – Reaping the Full Benefits of a Digital Single Market, 19 April 2016 (the "Communication of 19 April 2016"), p. 5, https://eur-lex.europa.eu/legal-content/GA/ALL/?uri=CELEX%3A52016SC0110.

2 A. D. Thierer, the Internet of Things and Wearable Technology: Addressing Privacy and Security Concerns without Derailing Innovation, 21 *Rich. J.L. & Tech.* 1 (2014), para. 10.

3 *See* Gartner Says 8.4 Billion Connected "Things" Will Be in Use in 2017, Up 31 Percent From 2016, 7 February 2017, https://www.gartner.com/en/newsroom/press-releases/2017-02-07-gartner-says-8-billion-connected-things-will-be-in-use-in-2017-up-31-percent-from-2016.

4 Communication of 19 April 2016, *supra* note 1, p. 7.

5 C. Neiger, 3 Industries Being Overhauled by the Internet of Things, 3 July 2018, https://www.fool.com/investing/general/2014/11/03/3-industries-being-overhauled-by-the-internet-of-t.aspx.

6 M. W. Bailey, Seduction by Technology: Why Consumers Opt out of Privacy by Buying into the Internet of Things, 94 *Tex. L. Rev.* 1023 (2016), pp.1027–1028, http://texaslawreview.org/wp-content/uploads/2016/04/Bailey.FinalPDF.pdf.

7 C. McClelland, IoT Explained – How Does an IoT System Actually Work? October 29, 2016, https://www.iotforall.com/iot-explained-how-does-an-iot-system-actually-work.

monitoring) and the personal and social domain.[8] Within these categories, smartphones can connect to everything from televisions and computers to sensors that can track a user's heart rate.[9]

5. The scope of the IoT revolution is better illustrated by examples than definitions. Imagine you arrive home after a busy day at work, your personal assistant (e.g., Siri) detects the arrival of your car, opens the garage, turns on the lights of your house, and asks the heater to turn on and the stereo to play your favourite song. Imagine if, in the morning, you go for a jog, your connected watch records your heart rate and level of hydration, transmits this information directly to your smart scale which, in turn, communicates with your fridge to propose appropriate food for you and to automatically make an order to a smart taxi, if you run short. Finally, on Sunday, you pay a visit to your parents; you take your brand new connected car; you slip easily into the traffic; your car is connected with the traffic lights, the road and other connected cars; you readily find a connected parking place, in front of your parents' house.

6. With the IoT, a lot is changing—not only the daily life of the individuals, but also the economy of platforms,[10] whoever controls the platform will rule the future.[11] As shown by Nobel Prize Laureate Jean Tirole, platforms overhaul traditional competition rationales.[12]

7. The debate and literature on how and whether competition policy should react to the advent of the digital economy have erupted in an incredibly short period of time, drawing the attention of the competition law community. There is, in fact, growing awareness that control over big data should play a more prominent role in assessing market power and dominance.[13]

8. However, it seems that another important question has drawn less consideration—namely, what can be done in order to promote the digital economy.[14] This question is all the more relevant within the European Commission's free flow of data initiative[15] and the emergence of the IoT.

9. To this respect, the development of the IoT may be hindered by the emergence of dominant ecosystems stifling competition to the detriment of consumers and undertakings. Indeed, in IoT ecosystems there is typically a "winner takes all" phenomenon due to network effects and economies of scale.[16] For fewer products, there is also a risk of fragmentation of the market in a myriad of ecosystems bearing their own standards.[17] This is particularly true for "things" less prone to network effects.[18]

10. Both market pathologies may be remedied by interoperability. Interoperability can be broadly defined as the ability of a system, product or service to communicate and function with other (technically different) systems, products or services.[19] Interoperability enables things to "talk" together, that is, to speak the same "language," in particular through common standards. The major risks identified by the Commission with respect to the development of the IoT are notably the lack of common standards and interoperable solutions and a risk of lock-in in proprietary ecosystems.[20] Concretely, to revert to the above-mentioned examples, your personal assistant could not activate your music, your smart scale could not communicate with your fridge and your car could not communicate with other cars and with the parking, due to different technical standards or specifications.

11. Lack of interoperability reduces consumer welfare. This would be typically the case of consumers being "locked in" to a platform because they cannot transfer the product they have bought to other platforms (smart watches or smart lights). Lack of interoperability can also entail firms getting "locked in" into a standard where they have to make a standard specific investment in order to use the standard for their products and services. The problem appears through, notably, so-called patent "hold up" and "royalty stacking"[21] with regard to standard-essential patents (SEPs),[22] as well as specific

8 For other categories, *see* Communication of 19 April 2016, *supra* note 1, pp. 31–38.

9 M. W. Bailey, *supra* note 6, p. 1028.

10 IoT platforms are the support software that connects everything in an IoT system. An IoT platform facilitates communication, data flow, device management, and the functionality of applications. *See* C. McClelland, What is an IoT Platform? August 17, 2018, https://www.iotforall.com/what-is-an-iot-platform.

11 Study prepared for the European Commission by PwC, 14 February 2018, Cross-cutting Business Models for Internet of Things (IoT) (hereafter, "PwC-Commission study"), p. 42, https://ec.europa.eu/digital-single-market/en/news/cross-cutting-business-models-internet-things-iot.

12 J. Tirole, *Économie du bien commun*, PUF, 2018, p. 526.

13 J. Drexl, Designing Competitive Markets for Industrial Data, 8 *J. Intell. Prop. Info. Tech. & Elec. Com. L.* 257 (2017), para. 117, https://www.jipitec.eu/issues/jipitec-8-4-2017/4636/JIPITEC_8_4_2017_257_Drexl.

14 Ibid., para. 119.

15 Ibid.

16 *See* J. Tirole, *supra* note 12, pp. 532 and 533.

17 *See* PwC-Commission study, *supra* note 11, p. 235 and Communication of the Commission of 19 April 2016, *supra* note 1, p. 10.

18 *See* G. Wrobel, Connecting Antitrust Standards to the Internet of Things, *Antitrust*, Vol. 29, No. 1, Fall 2014, p. 63 https://www.vedderprice.com/-/media/files/vedder-thinking/publications/2014/09/connecting-antitrust-standards-to-the-internet-of/files/aba-antitrustconnecting-antitrust-standards-to-the/fileattachment/aba-antitrustconnecting-antitrust-standards-to-the.pdf.

19 *See*, for a more complete definition, W. Kerber and H. Schweitzer, Interoperability in the Digital Economy, 8 (2017), JIPITEC 39, para. 5, https://www.jipitec.eu/issues/jipitec-8-1-2017/4531.

20 Communication of the Commission of 19 April 2016, *supra* note 1, p. 10.

21 "Patent hold-up" refers to the situation where the individual patent owner abuses its bargaining power to extract excessive royalty rates from its standard-essential patents ("SEPs"). This problem is amplified if SEPs are held by a multitude of owners. In such a situation, every owner of an SEP can try to charge a monopoly price for the whole standardised technology. This situation is called "royalty sacking." *See* J. Drexl, Standard-setting organizations and processes: Challenges and opportunities for competition and innovation, *Concurrences* n° 3-2015, para. 26. Royalty sacking could arise within the context of the advent of the 5G and hinder the development of the IoT. See Brevet et royalties: la 5G s'annonce très chère pour les fabricants, 26 August 2018, https://www.lesnumeriques.com/mobilite/brevets-royalties-5g-annonce-tres-chere-pour-fabricants-n77403.html.

22 An essential patent or standard-essential patent (SEP) is a patent that claims an invention that must be used to comply with a technical standard.

investments required to join a platform.[23] According to a McKinsey report, situations in which two or more IoT systems must work together can account for 40% of the total potential economic value of the IoT.[24]

12. In this article, we intend to explore, first, which market models may be best for the development of the IoT, from a competition standpoint. This question relates to the choice of the Commission to promote open or closed ecosystems and, in turn, industry-wide collective standard setting (I.). We then assess the tools provided for, by competition law, to ensure interoperability in the case of market failure—that is dominance of an ecosystem impairing competition or market fragmentation (II). We finish by wondering whether and how competition law may address new privacy and legal issues raised by the IoT, once the IoT will have reached its expected level of development (III.).

I. Designing the IoT (closed vs. open ecosystems)

13. While the Commission traditionally promotes "open"[25] ecosystems (1.), efficiencies brought by "closed"[26] or "semi-closed" ecosystems should not be overlooked, while framing a competitive IoT industry (2.).

1. The pro-collective standardisation approach of the Commission

14. Competition, in the context of the IoT, takes place in the context of ecosystems[27] and depends notably on the capacity of ecosystems to connect complementary but different objects.

15. The Commission has consistently highlighted the importance of interoperability as a core element of its Digital Single Market Strategy.[28] Among the different strategies to achieve interoperability in the information and communication technology (ICT) sector, collective standard-setting within standard setting organisations ("SSO"[29]) enjoys the Commission's particular support.[30] The Commission recommends, in this respect, that IoT platforms "*use well-known and industry-wide open standards and architectures*."[31] According to the European Commission "[s]*tandardisation is the critical element to deliver a single market for IoT*" inasmuch as it would be key to "*facilitate the interoperability* (…) *boosting innovation and reinforcing competitiveness*."[32] In this context, consortia such as AllSeen (which includes, notably, Qualcomm, Microsoft, LG, Panasonic and Huawei) are flourishing. This consortium intends to develop common communication standards via the open-source AllJoyn technology.[33] The benefits of open source may be a very important way, in the future, to stimulate competition[34] and increase interoperability.

16. Thus, in the IoT sector, there are sound reasons advocating for the development of interoperability through the implementation of industry-wide standards by SSO. Organised standard setting may be the superior approach to identifying the best technology, reducing firms' cost, and making the technology generally available to the industry by guaranteeing reasonable conditions of access.[35] Standardisation has been a key element of the evolution of the ICT industry for some time. This is exemplified by the mandated development of the GSM standard by ETSI and its subsequent market roll-out, which has proven to be an outstanding achievement of European standardisation policy.[36]

17. This pro-standardisation stance of the Commission is reflected in the horizontal guidelines[37] which acknowledge that, subject to certain limitations,[38] standardisation agreements which provide access to the standard on fair, reasonable and non-discriminatory (FRAND) terms will normally not restrict competition within the meaning of Article 101(1) TFEU.[39] The Court of Justice does not seem to have questioned this approach.[40]

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23 W. Kerber and H. Schweitzer, *supra* note 19, footnote 34.

24 J. Manyika et al., The Internet of Things: Mapping the Value beyond the Hype (McKinsey Global Institute 2015), p. 8. https://www.mckinsey.com/~/media/McKinsey/Business%20Functions/McKinsey%20Digital/Our%20Insights/The%20Internet%20of%20Things%20The%20value%20of%20digitizing%20the%20physical%20world/The-Internet-of-things-Mapping-the-value-beyond-the-hype.ashx.

25 System that is equipped with an interface that is accessible to component makers or system developers other than the system owner and thus can work with a relatively wide variety of other components (*see* Autorité de la concurrence and Competition and Markets Authority, The economics of open and closed system, 16 December 2014, hereafter, the ["Franco-English joint study"], para. 2.25). http://www.autoritedelaconcurrence.fr/doc/economics_open_closed_systems.pdf.

26 Systems generally equipped with a proprietary operating system which is only licensed for use on specific hardware, and certain functions of the device may only be accessed by proprietary software (ibid., para. 2.29) (e.g., Apple's iOS environment, *see* W. Kerber and H. Schweitzer, *supra* note 19, para. 11).

27 *See* ARCEP, Préparer la révolution de l'internet des objets, Document n° 1 – Une cartographie des enjeux, 7 November 2016, pp. 7–8. https://www.arcep.fr/uploads/tx_gspublication/livre_blanc_IoT-01-cartographie-071116.pdf.

28 W. Kerber and H. Schweitzer, *supra* note 19, para. 19.

29 For a definition, *see* J. Drexl, *supra* note 21, para. 24.

30 W. Kerber and H. Schweitzer, *supra* note 19, para. 19.

31 PwC-Commission study, *supra* note 11, p. 136

32 Communication of the Commission of 19 April 2016, *supra* note 1, p. 16.

33 ARCEP, *supra* note 27, pp. 30–31.

34 *See* J. Tirole, *supra* note 12, pp. 598–605.

35 *See* J. Drexl, *supra* note 21, para. 13.

36 W. Kerber and H. Schweitzer, *supra* note 19, para. 20.

37 Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements (OJ 2011, C 11, p. 1) https://eur-lex.europa.eu/legal-content/FR/TXT/HTML/?uri=CELEX:52011XC0114%2804%29&from=EN. See B. Lundqvist, Standardization for the Digital Economy – The Issue of Interoperability and Access Under Competition Law, *The Antitrust Bulletin*, 2017, Vol. 62, Issue 4, pp. 719–720, http://journals.sagepub.com/doi/abs/10.1177/0003603X17733359.

38 Ibid., horizontal guidelines, para. 264–268.

39 Para. 263; *see*, on these guidelines, R. Schellingerhout, Standard-setting from a competition law perspective, *CPN*, No. 1, 2011, http://ec.europa.eu/competition/publications/cpn/2011_1_1_en.pdf.

40 *See* judgement of 20 May 2010, *EMC Development v. Commission* (T-432/05, EU:T:2010:189).

2. The gaps in a one-size-fits-all approach

18. Even if it may prove to be better for competition than de facto standardisation,[41] sector-wide standardisation through SSO does not resolve all competition issues.[42]

19. On the one hand, from a legal standpoint, companies may "hold up" users after the adoption of the standard by excluding competitors from the market or extracting excessive royalty fees.[43] This is clearly illustrated by the *Samsung*[44] and *Motorola* cases.[45] Anticompetitive practices may also arise within the framework of patent pools with "*package-licensing*."[46] Overall, as acknowledged by the Commission, the standardisation process may create a "*clear antitrust context*."[47]

20. On the other hand, from an economic standpoint, as the Franco-English joint study finds, "*closure of an ecosystem can also generate positive effects on competition*"[48] and lead to innovation.[49] As mentioned in the PwC-Commission study, in some IoT sectors, proprietary standards "*have* (…) *coincided with new innovations in the market*."[50] Therefore, according to this study, trade-offs between the two types of ecosystem "*need to be carefully managed*."[51] By the same token, the Franco-English joint study contends, in essence, that effects of these ecosystems on competition have to be assessed on a case-by-case basis.[52] This analysis has been expressly restated recently by the French telecommunications authority in its White Paper on the IoT.[53]

21. Finally, some economists maintain that industry-wide standards should only be promoted, and tolerated under competition law in case of market failure, for instance, the dominance of a company (such as Microsoft on the market of PC operating systems) or the advent of a standard as a de facto monopoly (i.e., the DVD).[54] Indeed, as recalled by Nobel Prize Laureate Jean Tirole, the standardisation process may create a monopoly income. A patent that is not essential may become "essential" only because it has been designated so by the SSO,[55] which is not without posing competition issues.

22. Therefore, there is no one-size-fits-all approach as regards the benefits of open models and *de jure* standardisation for competition.

23. However, it is less debatable that competition law has to play a role in ensuring interoperability in case of market failure, that is, in particular, when an ecosystem becomes dominant and tends to abuse its dominant position..

II. Unlocking the IoT (opening flawed ecosystems)

24. The essential facility theory may prove key, in the future, to ensuring interoperability in market failure situations (1.), as the determination of FRAND conditions following the *Huawei*[56] case (2.). Even if interoperability failed to be reached by competition between rivals, it may, unexpectedly, be achieved through the new right to data portability recently enshrined in EU primary legislation (3.).

1. Reaching interoperability through the essential facility theory

25. As regards lower layers,[57] sector-specific regulations, in the field of electronic communication law, lay down rules enabling horizontal interoperability, based on an essential facility rationale. In particular, pursuant to Articles 8(2) and 12(1) of the Access Directive,[58] NRAs may impose access obligations upon network operators found to possess "significant market power." The duties that may be imposed include a duty to "*grant open access to technical interfaces, protocols or other key technologies that are indispensable for the interoperability of services or*

41 *See supra* para. 16.

42 *See*, J. Tirole, *supra* note 12, pp. 591–592.

43 EU Competition Policy Brief, issue 8, June 2014, and J. Baron and T. Pohlmann, Who Cooperates in Standard Consortia – Rivals or Complementors?, *Journal of Competition Law & Economics*, Vol. 9, Issue 4, 2013, pp. 905–929.

44 Commission Decision of 29 April 2014 (Case AT.39939 – *Samsung – Enforcement of UMTS standard essential patents*), http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=1_39939.

45 Commission Decision of 29 April 2014 (Case AT.39985 – *Motorola – Enforcement of GPRS standard essential patents*), http://ec.europa.eu/competition/elojade/isef/case_details.cfm?proc_code=1_39985.

46 *See* J. I. Seidl and N. J. Lawson, Recent Developments in Antitrust Guidance for IP Licensing: Implication for the Internet of Things, http://www.bakerbotts.com/ideas/publications/2017/unspecified-month/recent-devleopments-in-antitrust-guidance. However, in the context of the IoT, this risk may be played down as patents that may be licensed will, in principle, be complementary and not substitute technologies. *See* Guidelines on the application of Article 101 of the Treaty on the Functioning of the European Union to technology transfer agreements, para. 245 (OJ 2011, C 89, p. 3), https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52014XC0328%2801%29&from=EN.

47 MLex, EU sees clear "competition context" for certain patent practices, 11 April 2018.

48 Franco-English joint study, *supra* note 25, para. 3.8.

49 Ibid., para. 4.15 to 4.19.

50 PwC-Commission study, *supra* note 11, p. 89.

51 Ibid.

52 Franco-English joint study, *supra* note 25, para. 4.20.

53 ARCEP, *supra* note 27, p. 28.

54 W. Kerber and H. Schweitzer, note 19 *supra*, para. 14 to 16 and B. Lundqvist, *supra* note 37, p. 718.

55 *See*, J. Tirole, *supra* note 12, p. 591.

56 Judgement of 16 July 2015, *Huawei Technologies* (C-170/13, EU:C:2015:477).

57 Lower layers refer to the routing of information by communication protocols. Technical or infrastructural interoperability enable devices to exchange data under a common network. ARCEP, *supra* note 27, p. 28, and B. Lundqvist, *supra* note 37, p. 717.

58 Directive 2002/19/EC of the European Parliament and of the Council of 7 March 2002 on access to, and interconnection of, electronic communications networks and associated facilities (Access Directive) (OJ 2002, L 108, p. 7).

virtual network elements" (Art. 12(1) lit. e) and a duty "*to provide specified services needed to ensure interoperability of end-to-end services for users, including facilities for intelligent network services or roaming on mobile networks*" (Art. 12(1) lit. g).

26. As regards upper layers,[59] the theory of essential facilities, as applied in the *Microsoft* case[60] may play an important role in remedying foreclosure effects in IoT markets, in the context of refusal to license intellectual property rights. Indeed, the essential facility cases, in particular *IMS Health*[61] and *Microsoft* addressed the erection of de facto standards (Windows for operating systems and the so-called "1860 brick structure" for collecting and treating data on the sale of drugs).[62]

27. To this respect, in *Microsoft*, the General Court seems to have lowered the threshold of the "exceptional circumstances" test laid down in the previous *Magill* and *IMS* cases when access to interoperability information is at stake.[63]

28. Firstly, as regards the so-called "new products" rule (the most difficult condition to satisfy), the Commission substituted the requirement of a "new product" by the development of "*advanced features*."[64] This approach was not challenged by the General Court, which took into consideration the limitation of "technical development" to the detriment of consumers.[65] Secondly, the Commission also took the view that "[i]*mmediate elimination of competition is not required*." The Commission stated that "[t]*his approach is all the more appropriate in a market that exhibits strong network effects and where therefore elimination of competition would be difficult to reverse.*"[66] This approach applies particularly well to the digital market, and, in particular, to the IoT sector. Thirdly, the Commission connected the lack of an "objective justification" test with a new "incentives balancing test." The Commission found that a refusal to license should be justified if the resulting innovation incentives for the dominant firm would outweigh the loss of innovation by rival firms on the adjacent market.[67] This evolution might equally prove to be of particular importance in the context of the IoT. Indeed, interoperability is necessary to create 40% of the potential value.[68]

29. On the basis of the *Microsoft* case, it is possible to imagine, for instance, manufacturers of home automation solutions (i.e., smart locks) seeking in court access to interoperability information to integrate dominant smart-home ecosystems. Chances of success may be very reasonable, under the traditional case law (*Magill* and *IMS*), when the new entrant proposes a new product that does not exist in the ecosystem. However, what if a competing firm proposes a product competing with other products of the proprietary ecosystem but bearing "advance features"? Applicants may be well justified to build a case on *Microsoft*. Indeed, a defence based on the fact that an obligation to disclose IP-protected interface information would reduce the dominant company future incentives to innovate may be found, on balance, insufficient to outweigh the benefits drawn by interoperability, in particular in the current context of the Commission policy to develop an IoT cross-business model.[69]

2. Reaching interoperability through FRAND terms

30. The communication of the Commission of 29 November 2017 on Setting out the EU Approach to Standard Essential Patents[70] sheds some light on the notion of "FRAND" terms, even if these clarifications are considered by many as still insufficient.[71]

31. In the absence of clear guidelines from legislatures and public institutions, courts may be called to play a major role, in particular in the valuation (royalty rates) and enforcement of SEPs in the cases of refusal to license. The way national courts will apply the *Huawei* judgement, in which the CJEU considered that a refusal by a patent owner to license a SEP on FRAND terms may, in principle, constitute an abuse within the meaning of Article 102 TFEU,[72] may prove determinant in the development of the IoT.[73]

32. In this respect, it is already possible to see emerging different approaches within Europe and between Europe and the United States on SEPs. To this respect,

59 Upper layers refer to data interoperability and concern users and developers of IoT applications, allowing them to connect their software interfaces for those applications. Upper layer interoperability is attained by reading and reproducing interfaces, which contain the information necessary to "run" programs in a compatible format. ARCEP, *supra* note 27, p. 28, and B. Lundqvist, *supra* note 37, p. 717.

60 Judgement of 17 September 2007, *Microsoft v. Commission*, T-201/04, EU:T:2007:289 and Decision 2007/53/EC of 24 March 2004 (Case COMP/C-3/37.792 – Microsoft) (OJ 2007 L 32, p. 23), http://ec.europa.eu/competition/antitrust/cases/dec_docs/37792/37792_4177_1.pdf.

61 Judgement of 29 April 2004, *IMS Health*, C-418/01, EU:C:2004:257.

62 J. Drexl, *supra* note 13, para. 125 and 145.

63 *See*, P. Larouche, The European Microsoft case at the crossroads of competition policy and innovation, *TILEC Discussion Paper* No. 2008-021, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1140165, and M. B. Ünver, Turning the crossroad for a connected world: reshaping the European prospect for the Internet of Things, International Journal of Law and Information Technology, Vol. 26, Issue 2, 2018, pp. 12–13.

64 Commission Decision, *supra* note 60, para. 695.

65 Para. 647–648.

66 Commission Decision, *supra* note 60, para. 622.

67 Ibid., para. 783.

68 J. Manyika et al., *supra* note 24.

69 PwC-Commission study, *supra* note 11.

70 *See*, on this communication, T. Kasten, The EU Commission publishes a communication on Standard Essential Patents, 29 November 2017, *e-Competitions Bulletin* November 2017, Art. No. 85457.

71 *See* P. Debré and S. Corbineau-Picci, Brevets essentiels: "FRANDez-vous en terre inconnue", *Propriété industrielle* n° 4, April 2018, étude 10, para. 28.

72 *supra* note 56, para. 53.

73 S. Pepe, K. Post and L. Shapiro, Internet of Things: Next Patent War Zone, *Bloomberg Law*, 7 February 2018, https://biglawbusiness.com/internet-of-things-next-patent-war-zone.

the approach adopted in *Huawei* seems at odds with the position taken by the United Kingdom Patent Court in the *Unwired Planet* case,[74] where the Court held that "*the FRAND undertaking is justiciable and enforceable in court irrespective of competition law*."[75] This vision, recently endorsed by the assistant attorney general for the Antitrust Division of the Department of Justice,[76] seems to be not consistent with the view of the Commission, according to which "*antitrust enforcers have a role to play in IP*."[77]

33. In any case, jurisdictions that protect SEPs too much may considerably harm the development of the IoT.[78] However, as observed by Jean Tirole, it is very difficult for a jurisdiction to assess whether the amount of royalties requested is reasonable as it generally does not have the information to make such an assessment.[79]

3. Reaching interoperability through the right to data portability

34. Interestingly and somewhat surprisingly, a third way to ensure interoperability between IoT ecosystems could be the new right to data portability, which may, as put by Commissioner Vestager, help competition and unlock big data potential by giving consumers more choice and more control.[80] On the one hand, the Commission, in its recently published Proposal for a Directive on ECC,[81] envisages additional interoperability obligations that could be imposed on the undertakings, which provide "*number-independent interpersonal communications services (ICS)*" (e.g., WhatsApp).[82] This marks a significant step further towards interoperability of the IoT upper layers.[83] On the other hand, both Article 20 of the General Data Protection Regulation ("GDPR") 2016/679,[84] and Article 16(4) lit. b of the Draft Directive on Digital Content[85] set out a duty to ensure data portability.

35. Admittedly, the concrete effect on competition of the GDPR is still limited, as "non-personal" data is excluded from the scope of the regulation, that is, this right does not cover inferences from personal data analytics, like algorithmically or statistically derived categorisations or personalisation profiles.[86] However, the Commission has recently proposed a regulation[87] with a view to removing these obstacles to the free movement of non-personal data.[88] This approach, which has a tendency to widen the right to data portability to non-personal data, can also be observed in France[89] and may enable consumers to limit the risk of lock-in effects in IoT ecosystems.

III. Regulating the IoT (privacy and robots)

36. If the IoT sector thrives, as it is supposed to, and overcomes the interoperability issue in the case of market failure, the question of its regulation will arise with more acuity. Competition authorities may be called to determine, in the aftermath of the *Facebook* case,[90] whether abusive privacy policies may amount to an infringement under Article 102 TFEU (1.). Connected objects may, at the same time, become the support or the author of anticompetitive practices, which may cause competition authorities to rethink the way they apply competition law rules (2.). Another issue, which will not be examined in this article, is the capture and transformation of "day-to-day" products such as watches,[91] home devices (lights, heating, locks, and meters) and sporting equipment by the leading information technology companies. The mere connection of these objects with the Internet will render their former manufacturers obsolete and will rapidly give a strong market power to tech firms due to the above-mentioned (*supra* para. 9) network effects and economy of scale specific to the IoT economy.

74 Patents Court, 5 April 2017, *Unwired planet v. Huawei* [2017] EWHC 711.

75 Para. 723 of the judgement, *see also* para. 724, 745 and 806 (ii and iii).

76 In a recent speech, the assistant attorney general stated that "[T]*o the extent a patent holder violates its commitments to a standard setting organization, remedies under contract law, rather than antitrust remedies, are more appropriate to address licensees' concerns*." Speech held on 21 February 2018, www.justice.gov/opa/speech/assistant-attorney-general-makan-delrahim-delivers-remarks-college-europe-brussels.

77 MLex, Antitrust enforcers have a role to play in IP, say EU official, former DOJ division head, 12 April 2018.

78 *See* J. Drexl, *supra* note 21, para. 22.

79 J. Tirole, *supra* note 12, p. 592.

80 MLex, New EU data rules to help competition, unlock Big Data potential, Vestager says, 13 April 2018.

81 Proposal for a Directive of the European Parliament and of the Council establishing the European Electronic Communications Code (Recast), COM/2016/0590 final - 2016/0288 (COD).

82 *See* Art. 59(1) lit. c. of the Draft European Electronic Communications Code.

83 M. B. Ünver, *supra* note 63, p. 16.

84 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016, OJ 2016 L 119/1. *See also*: Art. of Data Protection Working Party, Guidelines on the right to data portability, adopted on 13 December 2016, 16/EN WP 242.

85 Draft Directive on certain aspects concerning contracts for the supply of digital content, 9 December 2015. COM(2015)634 fin.

86 L. Urquhart, N. Sailaja and D. McAule, Realising the Right to Data Portability for the Domestic Internet of Things, *Personal and Ubiquitous Computing*, Vol. 22, Issue 2, August 2017, https://link.springer.com/article/10.1007/s00779-017-1069-2.

87 Proposal for a Regulation of the European Parliament and of the Council on a framework for the free flow of non-personal data in the European Union (COM (2017) 495) (13 September 2017).

88 *See* European Commission, Free flow of non-personal data (Digital Single Market, 2017) https://ec.europa.eu/digital-single-market/en/free-flow-non-personal-data (access 16 July 2018).

89 *See* Art. L. 244-43-3 of the Code de la consommation.

90 *See* Bundeskartellamt, 19 December 2017, Preliminary assessment in Facebook proceeding: Facebook's collection and use of data from third-party sources is abusive, http://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Pressemitteilungen/2017/19_12_2017_Facebook.pdf?blob=publicationFile&v=3. *See also* Bundeskartellamt, Background Information on the Facebook proceeding, 19 December 2017, http://www.bundeskartellamt.de/SharedDocs/Publikation/EN/Diskussions_Hintergrundpapiere/2017/Hintergrundpapier_Facebook.pdf?__blob=publicationFile&v=4.

91 *See* A. Oyedele, Apple is crushing the Swiss watch industry – and one brand is particularly vulnerable, *Business Insider*, 27 June 2017, http://uk.businessinsider.com/apple-watch-swiss-watch-swatch-2017-6?r=US&IR=T.

1. Regulating privacy

37. The growing reliance on smart objects will fuel the creation of even more "big data."[92] Many of these technologies will eventually operate in the background of consumers' lives and be almost invisible to them.[93] Because of the very important amount of information that the IoT and wearable technologies can gather, privacy and security-related concerns will grow as these devices and services expand.[94] Thus, as the IoT expands steadily, so will concerns about consumer privacy. Therefore, the need for legal protection for the privacy of individual persons will increase dramatically.[95] In particular, the IoT will render even more common the provision of free services in return for personal data. These services will be paid by the users with their personal information.[96] As this was fairly put by an IoT expert "*Courts, regulators and lawmakers will be fighting over IoT privacy safeguards for years to come*."[97]

1.1 The Facebook investigation

38. In this respect, the *Facebook* investigation of the Bundeskartellamt marks a shift toward taking personal data into consideration in competition enforcement and will prove to be particularly relevant within the context of the IoT. Indeed, the German competition authority found, in its preliminary assessment, that Facebook had abused its dominant position "*by making the use of its social network conditional on its being allowed to limitlessly amass every kind of data generated by using third-party websites and merge it with the user's Facebook account*."[98] The investigation is based on Facebook's misleading terms and conditions for user data. Interestingly, the BKA's investigation directly links competition violations with data protection law infringements, which is very relevant in the IoT context as, arguably, a significant part of the new services/applications will be "paid" by user personal data.

39. The position taken in the *Facebook* case is not specific to Germany. In the study "Competition Law & Data," the French and German antitrust authorities pleaded for the assessment of privacy policies under competition law[99] and recently the president of the French competition authority outlined the importance of privacy rules to competition analyses.[100]

40. Admittedly, the Commission, in the *Facebook/WhatsApp* merger seemed to exclude EU data protection rules from competition law.[101] However, it is worth noting that it circumscribed this exclusion to the online advertising market,[102] leaving open the question for the consumer side of the market.[103] Likewise, the impact of the *Equifax* case[104] where the Court held that "any possible issues relating to the sensitivity of personal data are not, as such, a matter for competition law" may be played down, due to the use of the expression "as such" which clearly circumscribes the exclusion of privacy consideration from competition law.

1.2 The aftermath of the Facebook case in the context of the IoT

41. It is the subject of much debate whether personal data should be considered as a source of competitive advantage due to the ubiquitous and non-rival nature of personally inflected data.[105] This very feature of digital data is considered as limiting any exclusive control over data and thus avoids any foreclosure effect with respect to (actual or potential) competitors.[106]

42. Accordingly, the question arises of whether this trend illustrated by the *Facebook* case can and should be expanded within European competition authorities with the advent of the IoT. Indeed, the *Facebook* case seems to be based on a specific provision of German law on exploitative business terms (Article 19 GWB) as applied in two cases of the German Federal Court[107] and not on general provisions of EU competition law.

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92 G. Allouche, Big Data and the Internet of Things: A Powerful Combination, *SmartData Collective*, June 4, 2014, https://www.smartdatacollective.com/big-data-and-internet-things-powerful-combination.

93 S. G. DuBravac, A Hundred Billion Nodes, *Five Technology Trends to Watch* (2014), p. 8, archived at https://perma.cc/3ABK-YSGH.

94 *See* P. Thibodeau, The Internet of Things could encroach on personal privacy, *Computerworld*, 3 May 2014, https://www.computerworld.com/article/2488949/emerging-technology/the-internet-of-things-could-encroach-on-personal-privacy.html, and W. Kerber, Digital Markets, Data, and Privacy: Competition Law, Consumer Law, and Data Protection, *Journal of Intellectual Property Law & Practice*, Vol. 11, Issue 1, 2016, pp. 856–866 https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2770479.

95 Ibid.

96 *See*, on this new model of services, Commissioner Vestager, Competition in a big data world, speech held in Munich on the 17th of January 2016, https://ec.europa.eu/commission/commissioners/2014-2019/vestager/announcements/competition-big-data-world_en.

97 P. Thibodeau, Explained: The ABCs of the Internet of Things, *Computerworld*, 6 May 2014, https://www.networkworld.com/article/2176643/smb/the-abcs-of-the-internet-of-things7.html.

98 *See* Preliminary assessment in Facebook proceeding, *supra* note 89.

99 *See* Autorité de la concurrence and Bundeskartellamt, Competition Law and Data, 10 May 2016 (the "Franco-German joint study"), p. 29.

100 MLex, EU privacy rules key to competition analyses, head of France's antitrust watchdog says, 4 May 2018.

101 European Commission, *Facebook/WhatsApp*, 3 October 2014, Case No. COMP/M.7217, http://ec.europa.eu/competition/mergers/cases/decisions/m7217_20141003_20310_3962132_EN.pdf, para. 164.

102 Ibid.

103 Franco-German joint study, *supra* note 99, p. 26.

104 Judgment of 23 November 2006, ASNEF-EQUIFAX and Administración del Estado, C 238/05, EU:C:2006:734, para. 63.

105 G. Schneider, Testing Art. 102 TFEU in the Digital Marketplace: Insights from the *Bundeskartellamt's* investigation against Facebook, *Journal of European Competition Law & Practice*, Vol. 9, Issue 4, 1 April 2018, p. 217, https://doi.org/10.1093/jeclap/lpy016.

106 *See* the Franco-German joint study, *supra* note 99, pp. 41–55, and MLex, DOJ's Delrahim says antitrust enforcers shouldn't intervene in consumer privacy markets absent barriers to entry, 19 April 2018.

107 Bundeskartellamt, Background information on the Facebook proceeding, *supra* note 90, para. 9.

43. However, Article 102(a) TFEU states that an abuse may, in particular, "*consist in directly or indirectly imposing* (…) *unfair trading conditions*," providing, therefore, a legal basis to pursue exploitative abuses.[108]

44. In this respect, in *Allianz Hungária*,[109] the CJEU seemed to consider, in essence, that the impairment of objectives pursued by another set of national rules could be taken into account to assess whether there was a restriction of competition. Furthermore, relevant precedents are also provided by case law regarding collecting societies' imposition of unfair trading conditions on original copyright holders. In the 1974 *Belgische Radio en Televisie v. SABAM* case,[110] in assessing the "unfairness" of the conditions imposed within the meaning of Article 102 TFEU, the Court of Justice took into account the "necessity" of the clause "*for the attainment of its objects*." The Court of Justice, in *AstraZeneca*,[111] upholding the General Court judgement, also gave guidance on how to assess whether a commercial conduct is misleading.[112] An analogy may be made with misleading commercial terms.

45. Against this backdrop, it cannot be excluded that privacy terms of a dominant undertaking that would be considered as (i) unnecessary or disproportionate and/or (ii) misleading, fall within the scope of Article 102 TFEU. In terms of competition policy, this could be justified by the importance of quality as a competitive criterion.[113] Very few questions have been posed to the Court, as regards the conditions surrounding the provision of Internet services by the main digital platforms. However, it should not be deduced from that, that their business practices do not raise any difficulties in terms of justification[114]. The CJEU may well be seized, in the future, of requests for preliminary rulings, to clarify these questions.

2. Regulating "things"…

46. In the near future personal assistants such as Amazon's Alexa, Facebook's M, and Apple's Siri will become smarter and transform the way we access information (in suggesting restaurants, news, stories, music, films and hotels) and communicate with other smart objects (watches, televisions, phones, home-connected devices). Having unparalleled access to their users' personal data, their recommendations will gradually improve, as will their users' own reliance on these suggestions.[115] By the same token, smart objects will make more and more autonomous decisions. Consumers can already purchase a washing machine that makes autonomous orders and payments (e.g., buying detergent), updating the owner via a smartphone.[116] The same can be imagined of fridges equipped with sensors that would be able to order food.[117] These smart "things" will simplify our lives, leaving punctual and daily decisions to algorithms, in a manner which is consistent with the advent of the so-called "*économie de l'attention*."[118]

47. Purchase algorithms embedded in these smart objects ("purchase algorithms") has the potential to significantly affect the competitive dynamics of the market. Indeed, consumers will not make purchase decisions directly, but outsource such tasks to algorithms. The use of purchase algorithms also affects the mere notions of "market demand" or "trade conditions" and raises novel and far-reaching regulatory issues, which question some of the most fundamental notions of competition law such as, for instance, "consumer choice," which is central in current competition policy. What does "consumer choice" mean when preferences are defined, predicted and shaped by algorithms?[119] We identify below anticompetitive practices related to these smart objects that could arise with the development of the IoT.[120]

108 Ibid., para. 7.

109 Judgement of 14 March 2013, *Allianz Hungária Biztositó and Others*, C-32/11, EU:C:2013:160, para. 46-47. *See* Franco-German joint study, *supra* note 99, p. 26.

110 Judgement of 21 March 1974, *BRT et Société belge des auteurs, compositeurs et éditeurs*, 127/73, EU:C:1974:25, para. 11, 12 and 15.

111 Judgement of 6 December 2012, *AstraZeneca v. Commission*, C-457/10 P, EU:C:2012:770.

112 Ibid., para. 62, 63, 65–93.

113 *See*, judgement of 5 October 1988, Alsatel, 247/86, EU:C:1988:469, para. 10, *Microsoft* Decision, *supra* note 60, para. 782, Commission Decision of 16 July 2003 (Case COMP/38.233 – *Wanadoo Interactive*, para. 359), http://ec.europa.eu/competition/antitrust/cases/dec_docs/38233/38233_87_1.pdf, *see also* the judgement of 2 April 2009, *France Télécom v. Commission*, C- 202/07 P, EU:C:2009:214, para. 112.

114 Thomas von Danwitz, Les défis du « Big data », L'observateur de Bruxelles, n°113, July 2018, p.21.

115 A. Ezrachi and M. E. Stucke, The welfare effects of digital butlers – All that glitters is not gold, *Concurrences* n° 4-2017, para. 4.

116 *See*, *The Guardian*, Amazon launches Dash instant-order Internet of Things buttons in the UK, 31 August 2016, https://www.theguardian.com/technology/2016/aug/31/amazon-launches-dash-instant-order-internet-of-things-buttons-in-the-uk.

117 L. Arselin, Internet des objets et régulation, *RLC*, November 2016, No. 55; *see also* on this aspect, Visa brings secure payment solutions to the Internet of Things, https://usa.visa.com/visa-everywhere/innovation/visa-brings-secure-payments-to-internet-of-things.html.

118 Services enabling us to spare the time dedicated to routine tasks, *see*, on this concept, J. Tirole, *supra* note 12, pp. 510–512.

119 M. S. Gal and N. Elkin-Koren, Algorithmic Consumers, *Harvard Journal of Law and Technology*, Vol. 30, No. 2, Spring 2017, p. 311, https://jolt.law.harvard.edu/assets/articlePDFs/v30/30HarvJLTech309.pdf. However, a decision of an algorithm may be reached according to settings predetermined by users.

120 On potential practices that could emerge through the use of algorithms, *see* A. Ezrachi and M. E. Stucke, Artificial intelligence & collusion: When computers inhibit competition (University of Oxford, Center for Competition Law & Policy), Working Paper No. CCLP (L) 40, 2015. *See also*, M. Cousin, O. Sautel, C. Nouël de Buzonnière, E. Pfister, A. Ezrachi and M. E. Stucke. Tarification algorithmique et concurrence (dossier), *Concurrences* n° 4-2017, and G. Goeteyn, Algorithms and artificial intelligence and the risk of collusion, ibid. Finally, *see*, M. Dolmans, J. Turner and R. Zimbron, Pandora's box of online ills: We should turn to technology and market-driven solutions before imposing regulation or using competition law, *Concurrences* n° 3-2017.

2.1 Practices likely to arise under Article 101 TFEU

48. Firstly, competitors on the buying side may collude to use an algorithm in order to police or monitor a pre-existing anticompetitive agreement.[121] A relevant example of such a practice is given by a recent decision of the Competition and Markets Authorities.[122] The liability in this case arises from the express agreement between humans.

49. Secondly, competitors may code algorithms by agreement to enter into an ad hoc anticompetitive purchasing policy (i.e., boycotting a certain supplier).[123] In this scenario, the parties could also entrust a third party to implement the anticompetitive algorithm ("hub and spoke" collusive model).[124] In this situation, the *Eturas* case of the Court of Justice[125] gives some guidance as how to address the situation of facilitators.

50. Thirdly, different users of the same purchase algorithm may engage in a parallel conduct, which together might create anticompetitive effects. Should a sufficiently large number of users make the choice to use the same purchase algorithm, it may integrate the purchasing decisions of a large number of consumers and enjoy significant market power. In this case, the question arises whether an agreement is created among such users or between each user and the algorithm's designer or owner of the purchase algorithm (this agreement having a cumulative effect).[126] As of today, as put by Commissioner Vestager, the prospect of automated systems "*reaching a meeting of minds is still science fiction*"[127] and, in the current state of competition law, parallel behaviour is not an infringement unless concertation constitutes the only plausible explanation for such conduct.[128]

51. However, the practice may arguably raise competition concerns if the algorithms use of informational transparency creates "*mutually consistent expectation*"[129] regarding market uncertainties such as price with the results that competitors can "*reach a common understanding on the terms of their competitive behavior.*"[130] One may also wonder if, in the absence of agreement, the practice may not fall within the theory of abuse of a collective dominant position,[131] especially if few dominant purchase algorithms exist on the market.

2.2 Practices likely to arise under Article 102 TFEU

52. Firstly, within the context of privacy, personal assistants may assist the platform in refining its user's profile, including the user's reservation price (willingness to pay), shopping habits, and general interests. This information may be a source of "behavioural discrimination," where the platform can facilitate the purchase of products, which the user would not have purchased under normal conditions, or can price closer to the user reservation price.[132] As put by Jean Tirole, this poses a question of trust toward the machine and its recommendations, as trust is linked not only to knowledge but also to an absence of conflict of interest.[133]

53. Secondly, the purchase algorithm may provide the buyer (i.e., the owner of the device in which the algorithm is embedded) with a distorted view of available options and market reality, thereby excluding rivals. The personal assistant or smart device may promote its affiliated products and services to the detriment of competing offers and services offered by other platforms. Consequently, it may become harder or costlier for retailers unaffiliated with the platform to reach the buyer.[134]

54. Thirdly, a purchase algorithm might enter into exclusive dealings contracts with suppliers, thereby foreclosing access to other purchase algorithms. A purchase algorithm may choose not to buy from a certain supplier even if the latter proposes the best terms.[135] When a purchase algorithm, which enjoys significant market power engages in exclusionary anticompetitive conduct, such conduct might then be examined under the prohibition of abuses of dominance. However, such a practice may also be examined under Article 101 TFEU.

55. Fourthly, a last scenario may be caused by algorithms acting in their own capacity. According to some authors,[136] in the future, algorithms could be designed to achieve a precise target (i.e., price reduction). The algorithms would independently determine the means to reach that target, through self-learning and feedback collected from the market. Thus, the parallel conduct will not be the fruit

121 M. Cousin, L'algorithme au service de la politique tarifaire : Nouvelles pratiques, nouveaux risques, *Concurrences* n°4-2017, para. 13; C. Nouël de Buzonnière and E. Pfister, Algorithmes tarifaires et personnalisation des prix : Quelles implications pour la concurrence ?, *Concurrences* n° 4-2017, para. 13. *See also* M. S. Gal and N. Elkin-Koren, *supra* note 119, p. 345.

122 Decision of 12 August 2016, *Online sales of posters and frames*, Case 50223 (for a description *see* M. Cousin, ibid.).

123 M. Gal and N. Elkin-Koren, *supra* note 119, para. 346.

124 M. Cousin, *supra* note 121, para. 16.

125 Judgement of 21 January 2016, *Eturas and Others*, C-74/14, EU:C:2016:42.

126 M. Gal and N. Elkin-Koren, *supra* note 119, para. 347–352.

127 Bundeskartellamt, 18th conference on competition and algorithms (Berlin, 16 March 2017), https://ec.europa.eu/commission/commissioners/2014-2019/vestager/announcements/bundeskartellamt-18th-conference-competition-berlin-16-march-2017_en.

128 Judgement of 31 March 1993, *Ahlström Osakeyhtiö and Others v. Commission*, C-89/85, C-104/85, C-114/85, C-116/85, C-117/85 and C-125/85 to C-129/85, EU:C:1993:120, para. 71.

129 Para. 66 of the Horizontal Guidelines, *supra* note 37.

130 Ibid. *See* G. Goeteyn, *supra* note 120, para. 16.

131 *See* M. Gal and N. Elkin-Koren, *supra* note 119, para. 344.

132 A. Ezrachi and M. E. Stucke, *supra* note 115, para. 23. *See also*, A. Ezrachi and M. E. Stucke, The dream of ultimate personalization (and the disturbing reality of behavioural discrimination), *Concurrences* n° 4-2017, pp. 33–36.

133 *See* J. Tirole, *supra* note 12, pp. 538–539.

134 A. Ezrachi and M. E. Stucke, *supra* note 115, para. 24.

135 M. Gal and N. Elkin-Koren, *supra* note 119, para. 344.

136 Ibid., para. 346.

of explicit human design but the outcome of machine learning and evolution. This last category is difficult to place within the current concept of abuse of dominance and anticompetitive agreement; it also poses questions as to who is liable for the infringement (i.e., the owner of the device or the designer of the algorithm). However, it may be argued that such conduct is not very different from the conduct of a rogue employee for whom the undertaking is classically held liable under competition law rules.

IV. Conclusion

56. The role of jurisdictions and competition authorities will be crucial in the development of the IoT. Thorny questions will arise as regards practices implemented by closed ecosystems, refusal to license (on the basis of the essential facility doctrine or FRAND terms), but also privacy. While those questions can be resolved on the basis of current case law, new solutions will have to be designed as regards pricing practices implemented by algorithms. As said, in essence, by Commissioner Vestager, the challenges raised by such "automated systems" will determine whether the tools of competition enforcement are fit for purpose in the future.[137] In this respect, the joint project launched by the French Autorité de la concurrence and the German Bundeskartellamt (on the 19th of June 2018), on algorithms and their implications on competition[138] is particularly expected. ■

137 *See supra* note 127.

138 https://www.concurrences.com/en/bulletin/news-issues/july-2018-en/the-french-and-german-competition-authorities-launch-a-joint-project-on.

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