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Antitrust

European Union

European Court of Justice rules on Vivendi-Mediaset

By Gabriele Accardo

On 3 September 2020, the European Court of Justice ("**ECJ**") issued a preliminary ruling (in the case C-719/18) establishing that the restrictions imposed by Italian law on Vivendi's 28% stake of the capital of Mediaset is contrary to the principles on the freedom of establishment enshrined in Article 49 of the Treaty on the Functioning of the European Union.

The ruling is a timely reminder of the fundamental importance of the "freedoms" established in the EU Treaties, when EU Member States and the European Commission itself are increasing their scrutiny on acquisitions of undertakings and assets by companies from third countries (i.e. outside of the EU).

The practical effects of the principles established by the ECJ in this case will likely be a game-changer in the Italian telecommunications and media sectors, potentially paving the way for further integration and convergence. Indeed, the timing is always of the essence, and this ruling comes at a crucial time, considering that the Italian Government is currently discussing the potential merger between TIM and OpenFiber, which may lead to a new monopoly operator managing the next generation of superfast broadband network.

Interestingly, the ECJ ruling, which upholds Vivendi's rights, may push Mediaset into the arena to play an active role in this game, a possibility which so far appeared to be prevented by the same provision of Italian law challenged by Vivendi.

Facts at the origin of the dispute

Over the years, Vivendi, which is a French group active in the media sector and in the creation and distribution of audiovisual content, has made significant investments in Italy, including acquiring a controlling stake in Italy's former telecommunications incumbent Telecom Italia SpA ("**TIM**"), and 28.8% of Mediaset group (and 29.94% of its voting rights), also active in the media sector, as Vivendi.

In turn, Mediaset lodged a complaint before the Italian communications regulatory authority, the Autorità per le Garanzie nelle Comunicazioni ("**AGCOM**"), claiming that Vivendi's allegedly hostile acquisition of Mediaset shareholdings infringed a provision of Italian law which, with the aim of safeguarding pluralism of information, prohibits companies, the revenue of which in the electronic communications sector, including that secured through controlled or affiliated undertakings, is greater than 40% of the total revenues generated in that sector, may not earn, within the so-called integrated communications system ("**SIC**"), revenue exceeding 10% of the total revenues generated in that system (pursuant to Article 43 of Testo Unico dei Servizi di Media Audiovisivi e Radiofonici, consolidating the provisions on broadcasting and audiovisual media services, so-called "**TUSMAR**").

Interestingly, the provision in Article 43 of TUSMAR relied upon by Mediaset had been introduced by the Italian Government, when Silvio Berlusconi was its Prime Minister, as a compromise with the political parties of the opposition, so as to introduce a "guarantee" in case Berlusconi's media empire extended into the telecommunications sector, and actually to prevent Mediaset acquiring control of TIM.

AGCOM upheld Mediaset claim that Vivendi had acquired a significant presence in the electronic communications sector in Italy and ordered Vivendi to put an end to that infringement (ultimately leaving Vivendi to choose whether relinquishing its stake in either TIM or Mediaset).

To comply with the AGCOM decision Vivendi thus transferred to a third company part of its stake of Mediaset, but it then brought an action before the Tribunale Amministrativo Regionale per il Lazio, claiming that ultimately AGCOM's enforcement of the TUSMAR provision would limit Vivendi's investments in TIM and Mediaset in violation of EU law principles, such as freedom to provide services and/or the free movement of capital. AGCOM (and Mediaset) claimed that the protection of media pluralism enshrined in the Charter of fundamental rights of the EU, would actually back the restrictions on Vivendi investments in Italy.

The TAR Lazio thus requested the ECJ to issue a preliminary ruling on the compatibility with the EU principles on the freedom of establishment of the threshold of 40% of the total revenues generated in the electronic communications sector, which is set in order to restrict the access of undertakings active in that sector to the SIC.

The provision of Italian law is not proportionate to protect media pluralism

The ECJ preliminarily concurred with the AGCOM that the protection of media pluralism, enshrined in Article 11 of the Charter of Fundamental Rights can, in principle, can justify a restriction on the freedom of establishment, provided the restriction is proportionate to achieve that objective.

However, the ECJ concluded that, in the circumstances, the provision of Article 43 of the TUSMAR is not proportionate to pursue that objective (safeguarding media pluralism) and would ultimately restrict Vivendi's freedom of establishment, within the meaning of Article 49 TFEU, by preventing it from acquiring more shares in the capital of Mediaset and therefore exert greater influence on that company.

The ECJ clarified that, in essence, Article 43 of the TUSMAR precludes a single undertaking from acquiring a large part (10% of the total revenues) of the media sector (the SIC) in Italy when such an undertaking already has significant presence (40% of the total revenues generated) in the electronic communications sector, and therefore seeks to prevent the negative aspects of convergence between these two sectors.

In order to assess the proportionality of that provision, the ECJ considered the link between, on the one hand, the revenue thresholds referred to in the TUSMAR and, on the other hand, the risk to media pluralism.

First, the ECJ held that the 40% threshold provided for by TUSMAR was calculated based on an artificially narrow definition, noting that AGCOM ought to have taken into consideration all of the markets comprising the electronic communications sector, and not just some of them (such as fixed network wholesale and retail services, mobile wholesale services, radio and TV broadcasting services for the transmission of content to end users). In doing so, the AGCOM left important markets outside its perimeter, such as mobile telephone retail services or other electronic communications services linked to the internet and satellite broadcasting services, which actually are of increasing importance for the transmission of information.

In the same vein, the ECJ also found that whether an undertaking meets the 10% threshold concerning the SIC is not, in itself, an indication of the risk of influencing media pluralism, since the SIC includes a wide range of different markets, potentially leading to false positives or negatives, ultimately being inconclusive as to the risk to media pluralism. For instance, if an undertaking earned more than 10% of the revenue in just one of the markets making up the SIC, with the result that the rate achieved remains below 10% when all the markets making up the SIC are taken into consideration, the fact that the 10% threshold of total revenue generated in the SIC is not achieved would not be such as to exclude all risk to pluralism of the media. Similarly, in the event the 10% of total revenue in the SIC were reached, would not necessarily point to a risk of media pluralism, where that revenue was shared between each of the markets comprising the SIC.

Finally, the ECJ held that the method used for the calculation of the revenue earned in the electronic communication sector or in the SIC was not appropriate, insofar as treating a "controlled company" in the same way as an "affiliated company" for such purposes is likely to lead to revenue being taken into consideration twice and thus to a distortion of the calculation of revenue generated in the SIC (the same revenue of a company active in the SIC might therefore be taken into account both for the calculation of the income of an undertaking which is its minority shareholder and in calculating the revenue of an undertaking which is its majority shareholder and actually controls it). Such practice does not appear reconcilable with the objective pursued by the provision at issue.

Therefore the ECJ held that Article 43(11) of TUSMAR cannot be considered to be appropriate for attaining the objective which it pursues, in so far as it sets thresholds which bear no relation to the risk to media pluralism, since those thresholds do not make it possible to determine whether and to what extent an undertaking is actually in a position to influence the content of the media.

As to the next steps, it is understood that the AGCOM has requested an opinion to the State Attorney to assess whether it should take any precautionary measure (e.g. revoking its decision or annulling it outright) before the TAR Lazio will hand down its judgment, which most likely will quash the AGCOM decision.

Surely, once again, the ECJ has confirmed the fundamental importance of EU law for EU nationals seeking to invest in other EU Member States and to establish their businesses in those markets. The importance of EU law to build a stronger single market has never been more actual than today.

Intellectual Property

United States

Oh, What a Case (9th Circ. 2020): Works Presented as Factual are Factual when Determining Scope of Copyright Protection

By Marie-Andrée Weiss

The U.S. Court of appeals for the Ninth Circuit held on September 8, 2020, in Corbello v. Valli, that the musical *Jersey Boys* did not infringe plaintiff's copyright in an autobiography of Tommy DeVito ghost written by Rex Woodward, as it had not copied any protectable elements of the book.

The case is interesting because the Court applied its newly adopted "Asserted Truths" doctrine, holding that an author representing a work as nonfiction cannot later claim that it was fictionalized and thus entitled to full copyright protection.

The facts

Tommy de Vito is one of the founding members of the Four Seasons, with Frankie Valli, Bob Gaudio and Nick Massi. The group produced several hits, *Sherry*, *Big Girls Don't Cry*, *Walk Like a Man* and *December, 1963 (Oh, What a Night)* and was inducted into the Rock and Roll Hall of Fame in 1990.

Rex Woodard ghostwrote Tommy DeVito's autobiography in the late Eighties (the Work), using taped interviews of the musician and even portions of the F.B.I. file on the Four Seasons obtained under the Freedom of Information Act. The two men, however, did not find a publisher for the book.

Tommy DeVito executed an agreement in 1999 with Frankie Valli and Bob Gaudio, granting them the exclusive rights to his "biography" for the purpose of creating a musical based on the life and music of the Four Seasons. The rights were to revert to DeVito should Valli and Gaudio not exercise their rights within a defined period. In 2004, Valli and Gaudio granted the right to use the name and music of the band, the name and likeness of the musicians, and the story of their lives, to the producers of an upcoming show about the Four Seasons.

DeVito provided access to his unpublished autobiography to the writers of the show, which became the Jersey Boys musical (the Play). It ran on Broadway from 2005 to 2017 and was adapted into a movie in 2014. The musical and the movie tells the story of the four members of the Four Seasons.

Donna Corbello, Woodward's surviving wife, tried again unsuccessfully to publish the book written by her husband after the show started to run, believing that its success might help sell the autobiography to a publisher.

She discovered then that DeVito had registered the copyright of the Work as sole author and she then filed a supplementary application with the U.S. Copyright Office to add her late husband as a coauthor and co-claimant of the Work. The certificate of registration was amended to list Woodward and DeVito as coauthors and co-claimants of the Work.

The (long) procedure

Corbello then sued DeVito for breach of contract and equitable accounting for the Work's profits, later adding as defendants the producers of *Jersey Boys* and Valli and Gaudio, after learning that DeVito provided access to the book, and also sued for copyright infringement. Corbello claimed that the Play was a derivative work of the Book, owned exclusively by the co-authors and thus herself, as lawful successor of her husband.

The U.S. District Court of Nevada issued a summary judgment in 2011, declaring the book a joint work, "*because of DeVito's non-de minimis creative edit*s." The Court reviewed the 1999 agreement, found it to be the grant of an exclusive license, which had lapsed, but not a transfer of copyright. Woodard was a co-owner, Corbello a successor in interest.

A panel of the U.S. Court of appeals for the Ninth Circuit reversed in part in 2015. Judge Sack noted in his concurring opinion that the matter would be greatly simplified if the district court would decide on remand that the work is not infringing. But the case nevertheless proceeded to trial after the District had only partially granted summary judgment on remand, holding that, while there was substantial similarity sufficient to avoid summary judgment at least with a thin copyright protection, most of the similarities were based on historical facts. The jury found in favor of Plaintiff. The District Court granted a motion for new trial, which was appealed. The 9th Circuit then reviewed the case *de novo.*

The Ninth Circuit copyright infringe-ment test

The Ninth Circuit's substantial-similarity test contains an extrinsic and intrinsic component.

The extrinsic test requires a three-step analysis: (1) identifying similarities between the copyrighted work and the accused work, (2) disregarding similarities based on unprotectable material or authorized use; and (3) determining the scope of protection ("thick" or "thin") to which the remainder is entitled "as a whole."

The intrinsic test is conducted only if the extrinsic analysis succeeds. It examines an ordinary person's subjective impressions of the similarities between two works.

In our case, the Court did not apply the intrinsic test because the extrinsic test failed. The Court applied the extrinsic test to elements of the Work which were "undisputedly factual". The introduction of Tommy de Vito is about a historical character, the introduction of the Song *Sherry* is a historical fact, as are the introduction of the songs *Big Girls Don't Cry* and *Dawn*, and as is the description of the induction into the Rock and Roll Hall of Fame. As for comparing the Four seasons and the Beatles, these were unprotectable ordinary phrases. These elements were therefore not protectable.

The new asserted facts doctrine

The Court then applied the extrinsic test to the claimed fictions represented to be facts and presented its new asserted-truth doctrine, stemming from the doctrine of copyright estoppel, under which once a plaintiff's work has been held out to the public as factual, the author-plaintiff cannot claim that the book is actually fiction and thus entitled to the higher protection allowed by fictional works.

The Ninth Circuit did not believe that copyright estoppel is the right term for the doctrine and named it instead the "asserted truths" doctrine, citing *Houts v. Universal City Studios*:

"Estoppel" is not, in our view, an apt descriptor for the doctrine at work here. For one thing, … detrimental reliance is not an element of this doctrine, as "the [so-called] estoppel [is] created solely by plaintiff's affirmative action and representation that the work was factual.". For another, application of estoppel concepts often suggests that the party against whom estoppel is applied is in some way culpable….

"Rather than "copyright estoppel," we will refer to this rule of copyright law as the "asserted truths" doctrine, because it is the author's assertions within and concerning the work that the account contained in the book is truthful that trigger its application."

In our case, the Work was presented as a reliable source of factual information about the Four Seasons, even presented as a "complete and truthful chronicle of the Four Seasons." The Court noted that DeVito had provided a copy of it to Play's writers when they were researching the history of the Four Seasons, and they viewed it as a factual source "*even better than newspaper or magazine articles, because it was co-written by a participant in the events described*."

The Court specified that "*the asserted truths doctrine applies not only to the narrative but also to dialogue reproduced in a historical nonfiction work represented to be entirely truthful"* and "*includes dialogue that an author has explicitly represented as being fully accurate, even if the author was unlikely to have recalled or been able to report the quotations exactly."*

Authors of biographies should thus be well advised to add a disclaimer to their work, claiming that the dialogues, while based on historical facts, are the fruits of the author's imagination.

Intellectual Property

United States

U.S. Investor Loses in Trademark Dispute against Panama

By Gabriel M. Lentner and Dayana Zasheva

On 14 August 2020 an ICSID tribunal decided on a denial of justice claim surrounding a trademark dispute brought by two subsidiaries in the Bridgestone Group under Chapter 10 of the United States-Panama Trade Promotion Agreement ('TPA').

Background

The case arose against the backdrop of international competition between two international tire makers, the Japanese company BSJ and its United States subsidiary BSLS, which own the 'Bridgestone' and 'Firestone' trademarks respectively, and its Chinese competitor, the Luque Group that uses the 'Riverstone' trademark. When Muresa, a member of the Luque Group, registered the 'Riverstone' mark in Panama, BSJ and BSLS initiated opposition action against that registration. Since the opposition claim was unsuccessful, Muresa and TGFL, a distributor of Riverstone tires, brought proceedings in the Panamanian Courts against BSJ and BSLS, asserting to have suffered losses, as they had to stop selling Riverstone tires due to the opposition proceedings (para 128). On appeal, the Panamanian Supreme Court held BSJ and BSLS liable for the sum of US$ 5 million (para 128).

In reaction to this ruling, BSLS and BSAM, the latter being a licensee of the 'Riverstone' and 'Bridgestone' trademarks, alleged a violation of investment protection under the TPA, citing denial of justice (para 312). The Claimants argued that the Panamanian Supreme Court '(i) incurred fundamental breaches of due process; (ii) produced an arbitrary decision; (iii) produced a grossly incompetent decision; and (iv) there was corruption in the process' (para 321).

The Supreme Court erred but not egregiously

While rejecting the charge of corruption (paras 538 and 546), the tribunal found that the Supreme Court erred in giving undue weight to a piece of evidence used to conclude that the opposition action was bound to fail (para 475) and in holding BSJ and BSLS responsible for the hold in sales of the Riverstone tires during the opposition proceedings (para 505). Nevertheless, the Tribunal stated that these errors were not so egregious that no competent and honest court could have made them (paras 528-530). Furthermore, the Tribunal did not find it unreasonable to conclude that BSLS and BSJ acted recklessly by filing the opposition action (para 497).

A licensee can bring claims for damages suffered due to treatment afforded to its covered investment

The decision is important because the

tribunal clarified that the protection of the covered investments against unfair and inequitable treatment, gives standing not only to the owner of such covered investment (in this case in the form of a trademark), but also to the licensee(s).

On this issue, the tribunal was confronted with the question whether BSAM, the licensee of the 'Bridgestone' and 'Firestone' trademarks, has *locus standi* to bring a claim even though BSLS and BSJ (the owners of the trademarks and the sources of the BSAM' investment), not BSAM were parties to the proceedings in which the denial of justice occurred. The tribunal found the situation of a licensee seeking to protect its covered investment against unfair treatment by instituting legal proceedings to not be any different from the situation when a parent company brings a claim in order to protect its subsidiary against unfair treatment, as the purpose in the both cases is to assert obligations and rights arising out of the covered investment (para 174).

Claims for loss suffered outside of the host state are inadmissible

In its previous Decision on Expedited Objections the tribunal ruled that the possibility of suffering losses outside Panama caused by the Panamanian Supreme Court ruling is inadmissible. According to the Tribunal, this is because such losses do not derive 'directly out of' the Claimants' investment (para 198). Furthermore, the attempt of the Claimants to argue that the Panamanian Supreme Court's decision drops the value of the trademarks by creating uncertainty, because other rivals may initiate similar proceedings against the Claimants, was rejected on the same grounds (para 200).

Conclusion

This case is not the first IP-related dispute to be brought before an investment tribunal. While none of the existing cases have been successful for the investors, it seems clear that this one will not be the last.

Intellectual Property

European Union

CJEU: Reputation Offsets Likelihood of Confusion of Trademarks

By Gabriel M. Lentner and Dayana Zasheva

On 17 September 2020, the Court of Justice of the European Union ('**CJEU**') ruled that despite the similarities between the 'MASSI' and 'MESSI' marks, the well-known soccer player Mr. Lionel Messi is authorized to register his name as an EU trademark.

Background

The dispute arose when in 2011 the football player Messi filed an application with the European Union Intellectual Property Office ('**EUIPO**') for registration of his name as a trademark for sports goods falling within Classes 9, 25 and 28 of the Nice Classification. The holder of the previously registered EU trademark 'MASSI' for sale of products under the same Classes filed an opposition to Mr. Messi's application, based on likelihood of confusion of the two marks. Initially the First Board of Appeal of EUIPO upheld the opposition in 2014, but the EU's General Court overturned this decision in 2018.

The reputation of a latter almost identical to a previous trademark may outweigh their visual and phonetic similarities

On appeal, CJEU concurred with the General Court that the reputation of the owners of the trademarks is a relevant factor, which should be taken into account during the assessment of the likelihood of confusion (paras 46-48). The Court found that the average buyer is informed and would associate the mark 'MESSI' with the famous soccer player (para 35). This was held to be enough to eliminate the probability of confusion of the mark with the earlier trademark 'MASSI'. The CJEU further ruled that, even if a proportion of the relevant consumers are not familiar with Mr. Lionel Messi, this is a negligible proportion, and as such does not meet the threshold for a 'likelihood of confusion on the part of the public' as a ground for refusal for the registration of the mark under article 8(1)(b) of Regulation No 207/2009 (paras 35-36).

Well-known facts are not new and do not need to be proven

Although the relevance of the reputation of Mr. Lionel Messi was raised for the first time before the proceeding in the General Court, which was limited only to determining errors of law (para 72), CJEU considered that such well-known facts to the public, which can be discovered through generally accessible sources, are to be considered that were at the disposal of the First Board of Appeal of EUIPO even without them being addressed by the parties and should have been taken should into account in the estimation of the probability of confusion of the two trademarks (para 74).

The General Court applied correctly the case-law established in RuizPicasso and Others v OHIM case

CJEU agreed with the General Court that the Ruiz-Picasso and Others v OHIM case-law is applicable whenever the relevant public recognizes the trademarks as conceptually different due to their established meaning, regardless if such differentiation is due to the reputation of the earlier mark or of the new mark (paras 86-87).

Conclusion

Renowned reputation is the main characteristic that makes the mark recognizable and distinguishable from other signs. This was also the position of the General Court in 2019 in the case Moreira v EUIPO. Relying on the popularity of the Brazilian soccer player Mr. Neymar, the Court found the registered EU trademark of his name 'NEYMAR' by a third party to be invalid, because its purpose was to profit illegally from his reputation.

Although such instances of renowned reputation will occur only in unique circumstances, it is nevertheless an important clarification offered by the CJEU.

Intellectual Property
European Union

Regulating Transformative Technology in The Quantum Age: Intellectual Property, Standardization & Sustainable Innovation

By Mauritz Kop[1]

Introduction

The behavior of nature at the smallest scale can be strange and counterintuitive. In addition to unique physical characteristics, quantum technology has many legal aspects. In this article, we first explain what quantum technology entails. Next, we discuss implementation and areas of application, including quantum computing, quantum sensing and the quantum internet. Through an interdisciplinary lens, we then focus on intellectual property ('**IP**'), standardization, ethical, legal & social aspects ('**ELSA**') as well as horizontal & industry-specific regulation of this transformative technology.

The Quantum Age raises many legal questions. For example, which existing legislation applies to quantum technology? What types of IP rights can be vested in the components of a scalable quantum computer? Are there enough innovation incentives for the development of quantum software and hardware structures? Or is there a need for open source ecosystems, a thriving public domain and even democratization of quantum technology? Should we create global quantum safety, security and interoperability standards and make them mandatory in each area of application? In what way can quantum technology enhance artificial intelligence ('**AI**') that is legal, ethical and technically robust?

How should we regulate quantum computing, quantum sensing and the quantum internet in a socially responsible manner? Which culturally sensitive ethical issues play a role in these regulations? Is it wise to embed our democratic values into the architecture of quantum systems, by way of Trustworthy Quantum Technology by Design? In the following,

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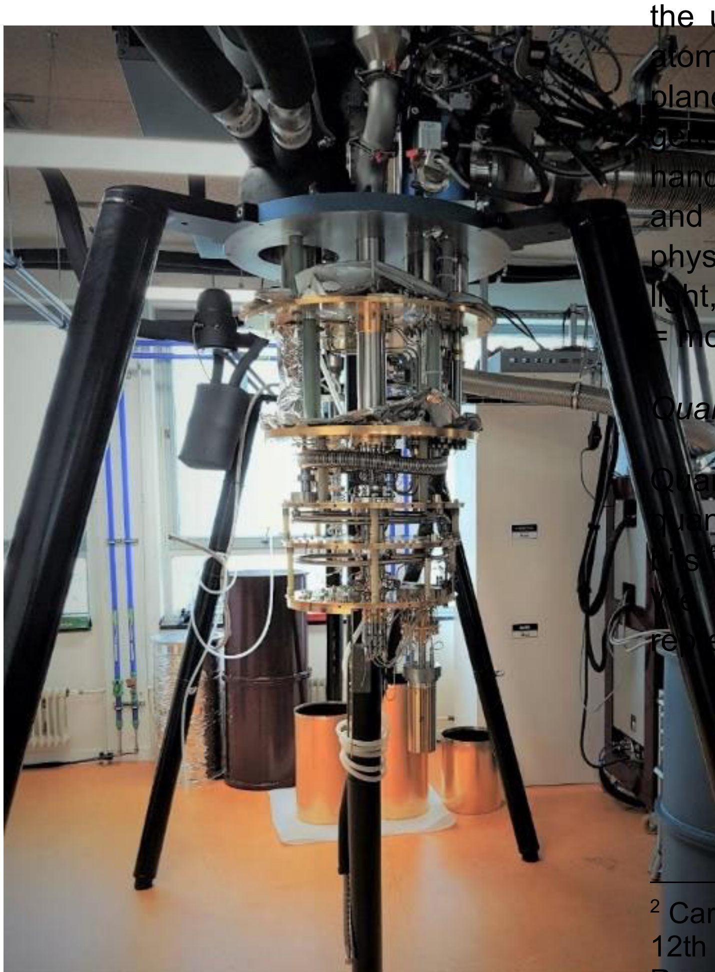
we explore possible answers to these tantalizing questions.



1. What is Quantum Computing?

First, let us zoom in on quantum computing. Quantum computing derives its constituent elements from principles of quantum mechanics (superposition and entanglement), the theory of the very small. Quantum mechanics describes the interaction between matter and energy and the building blocks of atoms at the subatomic level, beyond classical physics. Subatomic particles such as protons, neutrons and electrons. The human body is composed of atoms and molecules, some of which are as old as the universe.[2] On a micro level, these atoms connect us to each other, to our planet and to the cosmos.[3] Einstein's general theory of relativity on the other hand, is the theory of the very large, and describes the operation of laws of physics, including gravity, speed of light, time, space, mass and energy (E = mc squared)[4].

Quantum bits or qubits

Quantum bits or qubits are the quantum version of classic (binary) bits.[5] A qubit can be a 1 or a 0, or both. We call this superposition.[6] A qubit represents a quantum particle in

[2] Carl Sagan, Cosmos, Published October 12th 1980 by Random House (NY) Random House, https://www.goodreads.com/book/show/55030.Cosmos.
[3] See also: Robbert Dijkgraaf, Hoe jij, Julius Caesar en een dinosaurus met elkaar verbonden zijn, NRC, 2 October 2020, https://www.nrc.nl/nieuws/2020/10/02/hoe-jij-julius-caesar-en-een-dinosaurus-met-elkaar-verbonden-zijn-a4013077.
[4] Albert Einstein, On the Electrodynamics of Moving Bodies, by Annalen der Physik, 17, 1905. Reprinted in The Principle of Relativity, Dover Pub. E = Energy, M= Mass, C= Speed of light.
[5] See for example: Xiang Fu, Quantum Control Architecture: Bridging the Gap between Quantum Software and Hardware, (2018), https://doi.org/10.4233/uuid:8205cc34-30df-45f0-b6eb-8081bdb765b8.
[6] Fu, *supra* note 5.

superposition of all possible quantum states.[7]

In addition to superposition, quantum particles can be in several places at the same time, while they remain "aware" of each other. This is known as entanglement.[8] For us humans this is a counterintuitive quantum state. True quantum entanglement requires superluminal data transfer, or transfer of information that is many times faster than light.[9] Here, general relativity theory - which assumes that particles cannot travel faster than light in the space-time continuum - and quantum mechanics collide.[10] String theory attempts to unify both Einstein's relativity theory and quantum physics.[11]

Quantum computing methods

Several implementations of quantum computing exist today.[12] By implementations we mean the methods by which the qubits are actually created. Two promising models, or architectures are superconducting quantum computing[13] and trapped ion quantum computing.[14] Based on these methods we can distinguish two different types of quantum bits: superconducting qubits[15] and trapped ion qubits.[16] Moreover, spin qubits exist.[17] Several smart real-world implementations of quantum computing power in the cloud, that can be accessed by conventional computers, have been successfully

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[7] See: https://docs.microsoft.com/en-us/quantum/overview/understanding-quantum-computing.
[8] Fu, *supra* note 5
[9] In quantum teleportation based on classical communication, quantum information cannot travel faster than the speed of light.
[10] There are also a number of phenomena -mainly occurring at extremely low temperatures- which can only be explained by quantum mechanics, such as superconductivity and the Meissner effect, ferromagnetism and atomic spectral lines. See: https://qutech.nl/2020/03/02/the-magnet-that-didnt-exist/.
[11] See for example: Kevin Wray, An Introduction to *String Theory*, (2009).
[12] See also: https://airecht.nl/quantum-computing-software-superconducting-qubits-parallel/.
[13] See for example: Jonathan Hui, QC — How to build a Quantum Computer with Superconducting Circuit? January 17 2019, Medium, https://medium.com/@jonathan_hui/qc-how-to-build-a-quantum-computer-with-superconducting-circuit-4c30b1b296cd.
[14] See also: https://qutech.nl/demonstrators/.
[15] See for example: Peter Jurcevic et al., Demonstration of quantum volume 64 on a superconducting quantum computing system, August 19 2020, https://arxiv.org/abs/2008.08571.
[16] The Quantum Internet and Quantum Computers: How Will They Change the World? TUDelft, OpenCourseWare, https://ocw.tudelft.nl/courses/quantum-internet-quantum-computers-will-change-world/?view=lectures&paging=1.
[17] See: Zhu, X., Tu, T., Guo, A. *et al.* Spin-photon module for scalable network architecture in quantum dots. *Sci Rep* 10, 5063 (2020). https://doi.org/10.1038/s41598-020-61976-2 and Hendrickx, N.W., Lawrie, W.I.L., Petit, L. *et al.* A single-hole spin qubit. *Nat Commun* 11, 3478 (2020). https://doi.org/10.1038/s41467-020-17211-7. Particles like photons and electrons have a property called 'spin', which can be up or down, when measured. Before measuring, a particle can be in superposition of up and down. Therefore photons and electrons can act as qubit using its spin property.

developed.[18] The next step is utilizing a network of gate-based quantum computers in the cloud.[19]

Quantum supremacy

Quantum supremacy is the moment when quantum computers can perform a certain computational task better than (or impossible for) the fastest classical exascale supercomputers.[20] It is expected that (task specific) quantum supremacy will be achieved with gate-based chips with at least 100 stable qubits (i.e. the computing power) in combination with a very low margin of error.[21] Such systems must be able to demonstrate quantum benefit, or at least quantum advantage.[22] Cloud computing is practical here, because of costs, required cryogenic temperatures and the many terabytes (TB) of RAM required for 1000 operating qubits chip systems.[23] While task specific quantum supremacy is well within reach, it is estimated that a properly functioning, programmable 'general purpose' quantum computer requires millions of qubits.[24] The amount needed depends on the quantum computing method and the type of qubits used in the system.[25]

What can we do with a quantum computer?

In general, quantum computing is ideally suited for solving mathematical optimization problems, solving some of the computationally hard problems on which we build current cryptography,[26] and simulating the behavior of atoms and elementary particles. Quantum computers are useful when modelling

[18] See for example the first Dutch quantum computer in the cloud: https://www.quantum-inspire.com/ and the IBM Quantum Experience: https://quantum-computing.ibm.com/.

[19] See: https://qt.eu/understand/underlying-principles/gate-based-qc/.

[20] For a discussion between Google and IBM after Google's quantum supremacy claim, see: https://www.quantamagazine.org/google-and-ibm-clash-over-quantum-supremacy-claim-20191023/ and https://www.qusoft.org/christian-schaffner-on-bnr-radio-about-quantum-supremacy/.

[21] Scientists expect to achieve quantum supremacy in the quantum chemistry domain, such as simulating penicillin, within 3 years. See: https://www.bcg.com/publications/2019/quantum-computers-create-value-when.

[22] See: https://en.wikipedia.org/wiki/Quantum_supremacy.

[23] See also: https://www.linkedin.com/pulse/quantum-computing-mauritz-kop/.

[24] See: Jarosław Adam Miszczak (2012). High-level Structures in Quantum Computing. ISBN 9781608458516; *Bertels, K.; Almudever, C. G.; Hogaboam, J. W.; Ashraf, I.; Guerreschi, G. G.; Khammassi, N. (2018-05-24). "cQASM v1.0: Towards a Common Quantum Assembly Language".* arXiv:1805.09607v1 and Smith, Robert S.; Curtis, Michael J.; Zeng, William J. (2016), A Practical Quantum Instruction Set Architecture, arXiv:1608.03355

[25] This means for example that if Microsoft's topological qubits become a success, less are needed to build a general purpose quantum computer. See: https://cloudblogs.microsoft.com/quantum/2018/09/06/developing-a-topological-qubit/.

[26] For quantum-safe cryptography using an advanced security proxy (ASP), see: https://www.tno.nl/en/focus-areas/information-communication-technology/roadmaps/trusted-ict/quantum/quantum-safe-crypto/.

nature[27] or searching large amounts of data using parallel quantum query algorithms.[28] They excel when complex systems have to be simulated. Quantum machines also have limits. Quantum computers can help finding approximate solutions to computational complexity NP-hard and NP-complete problems, such as the travelling salesman problem. [29] They can however not solve them by delivering exact answers.

Practical obstacles for scalable quantum computing

There are still some practical hurdles to the practical, physical realization of scalable, commercially available quantum computers. [30] For example, current quantum computers require refrigerated qubits i.e. very heavy cooling to operate near absolute zero (15 milli-Kelvin). The point where atoms almost come to a standstill.[31] QuTech Delft researchers recently managed to build silicium qubits that can operate at higher temperatures, together with the conventional electronic parts of the machine that control the qubits, instead of having to separate components through a vacuum freezer. [32] This paves the way for quantum integrated circuits that contains millions of qubits.[33]

Electrical interference, error correction and noise-less qubits

Today's machines cannot withstand shocks and electrical interference very well. Once disturbed, they start making too many mistakes. In addition, coherent quantum states have a limited lifespan. Solutions for these challenges can be found in noise-less qubits[34] that are isolated from any electrical interference, robust fault tolerance implementation and quantum error correction.[35] On top of that, present-day machines contain a powerful magnet.

[27] See: https://www.ias.edu/ideas/2014/ambainis-quantum-computing. Quantum information can lead to a better understanding of the principles of quantum systems.

[28] See: Jeffery, S., Magniez, F. & de Wolf, R. Optimal Parallel Quantum Query Algorithms. Algorithmica 79, 509–529 (2017). https://doi.org/10.1007/s00453-016-0206-z.

[29] See: https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-845-quantum-complexity-theory-fall-2010/.

[30] See Van Meter, Rodney & Devitt, Simon. (2016). The Path to Scalable Distributed Quantum Computing. Computer. 49. 31-42, https://ieeexplore.ieee.org/document/7562346; C. G. Almudever et al., Towards a scalable quantum computer, 2018 13th International Conference on Design & Technology of Integrated Systems In Nanoscale Era (DTIS), Taormina, 2018, pp. 1-1, https://ieeexplore.ieee.org/document/8368579.

[31] An atom consists of negatively charged electrons, positively charged protons and neutrons.

[32] For technologies that rival quantum computing, see: Dmitri Nikonov, Stochastic magnetic circuits rival quantum computing, Nature 573, 351-352 (2019), https://www.nature.com/articles/d41586-019-02742-x

[33] See also: https://ocw.tudelft.nl/course-lectures/2-2-2-many-quits-computer/?course_id=28465.

[34] Yuichiro Fujiwara, Quantum error correction via less noisy qubits, 20 Feb 2013, https://arxiv.org/abs/1302.5081.See also: https://news.mit.edu/2019/non-gaussian-noise-detect-qubits-0916

[35] See also Fu, *supra* note 5.

When this magnet is on, it is unpleasant and even unhealthy to stay around for a long time.

Anno 2020, quantum computers are becoming increasingly powerful but prone to unreliability because of interference. Sourcing exotic, high-quality parts for quantum computers is a challenge. [36] It is essential for quantum computing scalability that both hardware and software are reliable, safe and easy to upgrade.[37]

Quantum & artificial intelligence hybrids

The combination of artificial intelligence, machine learning and functioning quantum computers & simulators can theoretically solve mathematical, physical and chemical optimization problems. Technological synergies can disentangle problems that are currently not soluble with the help of binary computers. Synergies such as AI & quantum computing hybrids consisting of bits, neurons and qubits. Combining powerful AI algorithms using classical computers together with quantum algorithms that utilize the quantum mechanical principles, have the potential to revolutionize bio engineering - including synthetic cells[38] - and nano engineering. Quantum will enhance AI. It is expected that quantum computing and quantum software will play an important role in the development of autonomous artificial beings, and in the awakening of Artificial Super Intelligence (‘**ASI**’). A downright paradigm shift.

2. Application areas of quantum technology

Quantum technology has various application areas. [39] Each area, or domain, has its own, separate line of development. In some cases, these domains intersect. Take, for example, Quantum Key Distribution (‘**QKD**’), a secure communication method that uses quantum cryptography.[40] QKD is an application of quantum internet, that does not depend on the development of quantum computers. In the future, quantum internet will make (advanced) networked quantum computing possible, which includes QKD.[41] This way, in networked quantum computing, two lines of development come together.

[36] Martin Giles, “We'd have more quantum computers if it weren't so hard to find the damn cables". MIT Technology Review, 17 January 2019, https://www.technologyreview.com/2019/01/17/137811/quantum-computers-component-shortage/.

[37] For example, using germanium quantum dots instead of silicon is essential to scale up qubits. See: https://qutech.nl/story/it-all-comes-together/. See also: https://phys.org/news/2020-07-wiring-path-scalable-quantum.html and https://cloudblogs.microsoft.com/quantum/2018/05/16/achieving-scalability-in-quantum-computing/.

[38] See: https://www.genome.gov/about-genomics/policy-issues/Synthetic-Biology.

[39] See TUDelft, *supra* note 16.

[40] See: https://qiskit.org/textbook/ch-algorithms/quantum-key-distribution.html.

[41] See: https://tu-delft.foleon.com/tu-delft/quantum-internet/the-six-stages-of-quantum-networks/.

We can distinguish the following six application areas of quantum technology:

1. Quantum computing, including optimization problems among which package delivery route optimization and the travelling salesman problem, prime factorization, and chemistry, such as next generation batteries, fluid mechanics, medicines, nutrition, fertilizers and novel materials;

2. Quantum communication, such as the quantum internet that includes quantum-safe encryption based on the uncertainty principle[42];

3. Quantum sensing, including quantum nanoscience and metrology, for instance advanced, high-resolution distance measuring, quantum MRI, brain-machine interfaces and atomic clocks, automotive, navigation, imaging;

4. Quantum simulation, such as weather forecasting, water management, carbon removal technology, self-driving cars, modelling behavior of molecules and even single electrons;[43]

5. Fundamental quantum science, studying the fundamental laws of quantum physics;

6. Artificial intelligence, which includes machine learning and neural networks.

In our current NISQ ('**Noisy Intermediate State Quantum**') era[44], each of these six quantum domains requires dedicated hardware infrastructures and software ecosystems including algorithms, API's and apps.

Quantum computing complements classical computing

Apart from hybrids of quantum and AI, it is expected that quantum technology will stand out in the above-mentioned application areas. AI will retain its own application areas, but it will be enriched and boosted by quantum. One of the reasons for this is that quantum and AI have different physical characteristics. Quantum computing will therefore complement, instead of replace conventional computing in the foreseeable future. The same applies to quantum sensing, quantum simulation and the quantum internet.

From a legal perspective, the economic sectors in which quantum technology is used often determine the vertical, industry-specific regulations that apply to quantum, such as the Medical Device Regulation [45] in the health

[42] See: Tujner, Zsolt & Rooijakkers, Thomas & van Heesch, Maran & Önen, Melek. (2020). QSOR: Quantum-safe Onion Routing. 618-624, https://www.researchgate.net/publication/343183996_QSOR_Quantum-safe_Onion_Routing.

[43] It is even possible that we ourselves live in a quantum simulation.

[44] See: John Preskill, Quantum Computing in the NISQ era and beyond, January 2 2018, https://arxiv.org/abs/1801.00862.

[45] Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC (MDR).

sector, or the Machinery Directive[46] in the case of Robotics. Sectors and industries are a key starting point for the applicability of product liability regimes, and for proprietary or third-party IP rights.

3. IP on the components of quantum computers

Let us return to quantum computing and link it to intellectual property law. Quantum computers can be protected by different types of intellectual and industrial property rights, such as chip rights (semi-conductor topography protection), patents, copyrights, trade secrets, design rights and trademarks. Per component, we discuss which IP rights can be established. We also discuss whether there are gaps / loopholes in protection or whether there are overlaps. Although IP rights are territorial rights, we make these qualifications as much as possible from the perspective of an international IP acquis. [47] There may be regional differences in formal and material requirements, flexibilities, scope and term of protection in the EU, China, India or the US.

The components

Quantum computers, depending on their specific application in the domains listed above, and depending on their precise implementation method, may contain the following layers of components[48]: the technology building blocks (qubits), quantum gates & multipliers, quantum integrated circuit chips, the various types of quantum processors such as spin qubits and superconducting[49] transmon qubits[50], quantum interference devices[51], compiler engines (i.e. optimizers, translators, mappers)[52], decoders, a simulator and an emulator, a circuit drawer, the microarchitecture (quantum execution (‘**QEX**’) block & quantum error (‘**QEC**’) block), the quantum-

[46] Directive 2006/42/EC of The European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (Machinery Directive).

[47] See also: Paul Goldstein & Bernt Hugenholtz, *International Copyright: Principles, Law, and Practice* (4rd edn, OUP 2019), and Maciej Szpunar, Territoriality of Union Law in The Era of Globalisation, in: « Evolution des rapports entre les ordres juridiques de l'Union européenne, international et nationaux » Liber Amicorum Jiří Malenovský, D. Petrlík, M. Bobek, J. Passer et A. Masson (dir.), Bruylant 2020.

[48] 5 Essential Hardware Components of a Quantum Computer." National Academies of Sciences, Engineering, and Medicine. 2019. *Quantum Computing: Progress and Prospects*. Washington, DC: The National Academies Press. doi: 10.17226/25196, https://www.nap.edu/read/25196/chapter/7#114.

[49] See also: Glennda Chui, Stanford physicist’s quest for the perfect keys to unlock the mysteries of superconductivity, September 10, 2020, https://news.stanford.edu/2020/09/10/unlocking-mysteries-superconductivity/.

[50] See: https://qutech.nl/demonstrators/.

[51] See: Loft, N.J.S., Kjaergaard, M., Kristensen, L.B. *et al.* Quantum interference device for controlled two-qubit operations. *npj Quantum Inf* 6, 47 (2020). https://doi.org/10.1038/s41534-020-0275-3.

[52] See: Epiqc, New compiler makes quantum computers two times faster, University of Chicago, October 11 2019, https://phys.org/news/2019-10-quantum-faster.html.

classical interface, the quantum instruction set architecture, quantum memory, quantum software[53], smart quantum algorithms[54], the API's (application programming interface),[55] quantum arithmetic unit (quantum addition, subtraction, multiplication, and exponentiation), runtime assertion & configuration, quantum computing platforms, program paradigm & languages, the Bacon-Shor stabilization code, three dimensional color codes[56], and surface codes.

Furthermore, the actual casing (the dilution refrigerator) of a quantum computer contains *-inter alia-* a cryoperm shield, quantum amplifiers, cryogenic isolators, a mixing chamber, superconducting coaxial lines[57], input microwave lines and a qubit signal amplifier.

In addition, a conventional computer is used to be able to access the output of the quantum computer in human and machine-readable formats. This means there is a certain amount of 'classical control', through the quantum-classical interface. In case we are dealing with quantum & AI hybrids (or hybrid quantum-classical co-processing systems) we have to add all the parts of the AI system to this list of components, including the inference engine that processes the rules.[58]

Creations & inventions

Only novel, useful, inventive and non-obvious inventions made by a human inventor, can be patented. Copyrights generally require a minimum of

[53] 6 Essential Software Components of a Scalable Quantum Computer." National Academies of Sciences, Engineering, and Medicine. 2019. *Quantum Computing: Progress and Prospects*. Washington, DC: The National Academies Press. doi: 10.17226/25196, https://www.nap.edu/read/25196/chapter/8#137.

[54] See: Montanaro, A. Quantum algorithms: an overview. *npj Quantum Inf* 2, 15023 (2016). https://doi.org/10.1038/npjqi.2015.23 and "3 Quantum Algorithms and Applications." National Academies of Sciences, Engineering, and Medicine. 2019. *Quantum Computing: Progress and Prospects*. Washington, DC: The National Academies Press. doi: 10.17226/25196, https://www.nap.edu/read/25196/chapter/5.

[55] See for example: https://en.wikipedia.org/wiki/Quantum_programming.

[56] See: Aleksander Kubica, Michael E. Beverland, Fernando Brandão, John Preskill, and Krysta M. Svore, Three-Dimensional Color Code Thresholds via Statistical-Mechanical Mapping, Phys. Rev. Lett. 120, 180501 – Published 4 May 2018, https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.120.180501.

[57] See also: Yufan Li, Xiaoying Xu, M.-H. Lee, M.-W. Chu, C. L. Chien, Observation of half-quantum flux in the unconventional superconductor β-Bi_2Pd, https://science.sciencemag.org/content/366/6462/238 *Science,* 11 Oct 2019 : 238-241 and Johns Hopkins University, New Superconducting Material Discovered That Could Power Quantum Computers of the Future, October 11 2019, https://scitechdaily.com/new-superconducting-material-discovered-that-could-power-quantum-computers-of-the-future/.

[58] Mauritz Kop, *AI & Intellectual Property: Towards an Articulated Public Domain*, TEXAS INTELLECTUAL PROPERTY LAW JOURNAL 2020, VOL. 29. Available at SSRN: https://ssrn.com/abstract=3409715.

creativity, originality and a human author.[59]

Technical discoveries that have been developed and embedded into hardware, can be patented. Software can be copyrighted. From the perspective of IP rights, we can group the components of a quantum computer by hardware (chip rights, design and utility patents), software (copyrights, creative commons), and algorithms (open source [60] or public domain). The protection term for patents is 20 years, compared to 70 years for software. One of the reasons for this difference, is that the copyright system and the patent system both have distinct objectives.[61] In general, quantum computing hardware is much more difficult to develop and replicate than the accompanying software and algorithms. It requires more investments to make than writing the code. As a result of this, computer chips can become subject to geopolitical conflicts and export control reforms [62], as observed in today's trade war between the US and China.[63]

Patents

The patent system aims to incentivize inventors to disclose, produce and market their invention with the prospect of return on investment.[64] It intends to encourage the detailed disclosure of innovative ideas and optimize the allocation of R&D capacity, by granting exclusive rights to the inventor. At the same time, it incentivizes inventors to improve and build upon earlier patents.[65]

The following components are eligible for patent protection:

The technology building blocks (qubits), quantum gates & multipliers, quantum integrated circuit chips, the various types of quantum processors such as spin qubits and superconducting transmon qubits, quantum interference devices, compiler engines (i.e. optimizers, translators, mappers), decoders, a simulator and an emulator, a circuit drawer, the microarchitecture (quantum execution (QEX) block & quantum error (QEC) block), the quantum-classical interface, the quantum instruction set architecture, quantum memory. The 'quantum computing process' can be protected by patent as well. The dilution refrigerator as a whole, including its individual cryoperm shield, quantum amplifiers, cryogenic isolators, a mixing

[59] See also Kop, *supra* note 58.

[60] See for example the Qiskit Open-Source Quantum Development, https://qiskit.org/. Qiskit is an open source SDK for working with quantum computers at the level of pulses, circuits and algorithms.

[61] Menell, Peter S. and Lemley, Mark A. and Merges, Robert P. and Balganesh, Shyamkrishna, Intellectual Property in the New Technological Age: 2020 (Clause 8 Publishing, 2020).

[62] See: https://merics.org/en/report/export-controls-and-us-china-tech-war and https://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_BRI%282019%29644187.

[63] See for example: https://www.bbc.com/news/business-45899310 .

[64] Menell et al., *supra* note 61.

[65] Kop, *supra* note 58.

chamber, superconducting coaxial lines, input microwave lines and a qubit signal amplifier component, are also eligible for patenting.

Copyrights

Copyright intends to incentivize and maximize creativity, cultural diversity, technological progress and freedom of expression. An important objective of copyright is to stimulate creation and dissemination of diverse cultural expression by enabling successive generations of authors to draw freely on the works of their successors.

According to TRIPs and WTC, creative aspects of software source code and firmware can be protected by copyright, as where they literary works. Expression of computer software is protected, not its functionality.[66] The idea/expression dichotomy prescribes that ideas are not protected by copyright. Algorithms, functionality, principles and ideas on the other hand, are not protected.[67] These are part of the public domain. Before the expression of an idea is captured in a tangible medium, it can be time-stamped by an i-Depot. Ideas can also be protected contractually, by an NDA.

The following components are eligible for copyright protection:

Quantum software, the API's (application programming interface), quantum arithmetic unit (quantum addition, subtraction, multiplication, and exponentiation), runtime assertion & configuration, quantum computing platforms, program paradigm & languages, the Bacon-Shor stabilization code, color codes, and surface codes. These components fall within the scope of copyrightable subject matter.

It is possible that certain applied program languages, such as eDSL in Python[68], will be open sourced instead of copyright protected, or licensed for use via Creative Commons.[69] As with classical computing, it is expected that both commercial and open source operating systems will come onto the markets.

A few uncrystallized areas require specific attention and perhaps some legal pioneering. Functionality for instance, is not protected by copyright.[70] This raises the question whether software and API functionality

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[66] See for example: Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs (EU Software Directive).

[67] Daniel Gervais and Estelle Derclaye, 'The scope of computer program protection after SAS: are we closer to answers?' 34(8) European Intellectual Property Review, 565 (2012) (pp. 565-572)

[68] See: https://github.com/topics/edsl.

[69] See: https://creativecommons.org/.

[70] Pamela Samuelson, 'Functionality and Expression in Computer Programs: Refining the Tests for Software Copyright Infringement' (January 31, 2017). Berkeley Technology Law Journal, Forthcoming. Available at SSRN: https://ssrn.com/abstract=2909152 and Peter Menell, Rise of the API Copyright Dead?: An Updated Epitaph for Copyright Protection of Network and Functional Features of Computer Software (January 18, 2017). 31 Harvard Journal of Law & Technology 305 (2018), UC Berkeley Public Law Research Paper No. 2893192, Available at SSRN: https://ssrn.com/abstract=2893192.

should be protected by patents. Arguments for and against patentability of software functionality and computer implemented inventions can be made.[71] Legal uncertainty about IP protection, whether concerning copyrights or patents, usually results in a shift to trade secrets, which generally stifles innovation.[72]

Input & output data

Depending on the application area, current quantum computing systems input consists of problem definitions. It is also possible to feed input data from a classical computing device into a quantum circuit, via the quantum-classical interface.

In case of AI hybrids that utilize machine learning training datasets, clearance of the input information is needed in the event this data represents IP subject matter.[73] Besides a rainbow of potential IP rights potentially vested in the data that need to be licensed under current law, including a *sui generis* database right on the training corpus itself (in territory Europe), the main roadblocks for the uptake of AI & data are privacy and GDPR concerns, and uncertainty about ownership of data.[74] There is a lack of trust in the existing rules, because they are complex and abstract and not written specifically for AI and machine learning training data. database EU. As for AI, there needs to be a broad exemption, or even a superior right to process data for quantum computing purposes, that respects privacy and other fundamental rights.[75]

In case quantum computing output represents IP subject matter, this output is eligible for IP protection. It can then be licensed or sold. If desired, IP rights on the output can also be waived and pushed into the public domain.

IP ownership: legal subjectivity and public domain

[71] For case law on this subject, see: Péter Mezei, Dóra Hajdú, Luis Javier Capote-Pérez and Jie Qin, Comparative Digital Copyright Law (Vandeplas publishing 2020).

[72] Kop, *supra* note 58

[73] See: Mauritz Kop, *Machine Learning & EU Data Sharing Practices*, TTLF NEWSLETTER ON TRANSATLANTIC ANTITRUST AND IPR DEVELOPMENTS STANFORD-VIENNA TRANSATLANTIC TECHNOLOGY LAW FORUM, STANFORD UNIVERSITY 2020, VOLUME 1, https://www-cdn.law.stanford.edu/wp-content/uploads/2015/04/2020-1.pdf. See also Kop, *supra* note 58.

[74] *id.*

[75] Mauritz Kop, The Right to Process Data for Machine Learning Purposes in the EU (June 22, 2020). Harvard Law School, Harvard Journal of Law & Technology (JOLT) Online Digest 2020, Forthcoming, Available at SSRN: https://ssrn.com/abstract=3653537. See also: Christophe Geiger, Giancarlo Frosio, & Oleksandr Bulayenko, *The Exception for Text and Data Mining (TDM) in the Proposed Directive on Copyright in the Digital Single Market - Legal Aspects*, CENTRE FOR INTERNATIONAL INTELLECTUAL PROPERTY STUDIES (CEIPI) RESEARCH PAPER NO. 2018-02 (March 2, 2018). See also: Sean Flynn, Christophe Geiger & João Quintais et al., *Implementing User Rights for Research in the Field of Artificial Intelligence: A Call for International Action,* EUROPEAN INTELLECTUAL PROPERTY REVIEW 2020, ISSUE 7 (April 20, 2020). Available at SSRN: https://ssrn.com/abstract=3578819.

Output created or invented by autonomous quantum/ AI systems without human upstream or downstream intervention should be public domain. The output lacks human creativity and inventiveness and society benefits from a robust public domain. Besides that, IP rights can only be owned by legal subjects, such as people, universities or corporations. Autonomous systems lack legal subjectivity or legal personhood needed to own rights and carry responsibilities. Machine generated Quantum/AI Creations & Inventions should be *Res Publicae ex Machina*.[76] These belong in an articulated public domain.

Trade secrets & trademarks

On top of copyrights and patents, virtually each component can contain trademarks (and in some circumstances trade-dress) and trade secrets[77], with potentially unlimited duration of IP protection. Further, cybersecurity law and national security considerations could, beyond the scope of the IP toolkit, play a role in keeping technological breakthroughs a state secret. As is the case with AI system, legal uncertainty about the patentability of quantum computing systems together with the unlimited duration of trade secret rights, could ultimately cause a shift towards trade secrets, in order to protect assets and commodify quantum computing applications. This trend might ensue in a disincentive to disclose ideas and impedes dissemination of information, technology transfer to the market[78] and follow on innovation.[79]

Note that a trade secret right does not protect against reverse engineering. This IP loophole can be filled by concluding contracts that prohibit unwanted reverse engineering.[80]

Additionally, both a quantum computer's looks, brands and functional design can be protected. Product design, artwork, logos, software interfaces, layouts and hardware modelling can, depending on the territory for which protection is sought, be protected by an arrangement of IP instruments such as design rights, tradename rights and trade dress.

IP overlap & overprotection

Strategically using a mixture of IP rights to maximize and protect the value of the IP portfolio of the quantum computer's owner, can result in an unlimited duration of global exclusive exploitation rights for first movers, absent compulsory licensing of standard essential patents (SEP) in certain territories. Thus, there are no consequential loopholes in IP protection possibilities. Far from it.

[76] Kop, *supra* note 58.

[77] See also: Drexl, Josef, 'Designing Competitive Markets for Industrial Data - Between Propertisation and Access' (October 31, 2016).

[78] See for example: https://www.tno.nl/en/focus-areas/techtransfer/.

[79] Wachter, Sandra and Mittelstadt, Brent, 'A Right to Reasonable Inferences: Re-Thinking Data Protection Law in the Age of Big Data and AI' (October 05, 2018). Columbia Business Law Review, 2019(1).

[80] Kop, *supra* note 58.

Instead, there is an overlap of IP protection regimes.[81] At this time, new layers of rights do not seem appropriate.

Other quantum technology applications, among which quantum sensing, quantum simulation and the quantum internet are equally eligible for IP protection, using the same amalgam of IP rights. From a beyond IP innovation law perspective, future quantum internet functionality [82] ought to be public domain and net neutrality should exist. Its constituting, enabling components, however, could in theory be protected by an array of IP rights. With each right protecting something different. The same applies to quantum sensors, quantum simulation, engineered/synthesized plants and novel materials invented with the help of quantum technology.

In general, our current intellectual property framework is not written with quantum technology in mind. Intellectual property should be an exception -limited in time and scope- to the rule that information goods can be used for the common good without restraint. From a dogmatic sustainable innovation policy perspective, IP rights holders should not be legally entitled to internalize the full social benefits of their creations and inventions.[83] There is no need to limit uncompensated positive externalities in a well-structured quantum technology market place, nor is there a need to internalize such positive spillovers in intellectual property, after initial investment costs have been retrieved. [84] Furthermore, there is no tragedy of the commons in IP on quantum technology knowledge goods. [85] Information cannot be overused.

Intellectual property cannot incentivize creation, prevent market failure, fix winner-takes-all effects, eliminate free riding and prohibit predatory market behavior at the same time. To encourage fair competition and correct market skewness, antitrust law is the instrument of choice.[86]

The question is whether the identified overlap in regimes benefits business dynamism and accelerated innova-

[81] *id.* See also Deltorn, Jean-Marc and Macrez, Franck, Authorship in the Age of Machine learning and Artificial Intelligence (August 1, 2018). In: Sean M. O'Connor (ed.), The Oxford Handbook of Music Law and Policy, Oxford University Press, 2019 (Forthcoming); Centre for International Intellectual Property Studies (CEIPI) Research Paper No. 2018-10. Available at SSRN: https://ssrn.com/abstract=3261329.

[82] See also: https://ec.europa.eu/digital-single-market/en/news/quantum-technologies-and-advent-quantum-internet-european-union-brochure.

[83] See also: Lemley, Mark A., Property, *Intellectual Property, and Free Riding*. Texas Law Review, Vol. 83, p. 1031, 2005. Available at SSRN: https://ssrn.com/abstract=582602.

[84] *id.*

[85] Kop, *supra* note 58.

[86] To *inter alia* ensure that dominant online platforms can be challenged by new market entrants and existing competitors, so that consumers have the widest choice and the Single Market remains competitive and open to innovations, the European Commission recently introduced the Digital Services Act package, as part of the European Digital Strategy. See: https://ec.europa.eu/digital-single-market/en/digital-services-act-package.

tion.[87] The subsequent IP overprotection may create barriers for market entrants and raise concerns regarding fair competition, freedom of expression and the creation of new jobs.[88] Overprotection might hinder industry-specific innovation. In this particular case it slows down progress in an important application area of quantum technology, namely quantum computing.

A solution tailored to the exponential pace of innovation in The Quantum Age, is to introduce shorter IP protection durations of 3 to 10 years for Quantum and AI infused creations and inventions. These shorter terms could be made applicable to both the software and the hardware side of things. Clarity about the proposed limited durations of exclusive rights -in combination with compulsory licenses or fixed prized statutory licenses- encourages legal certainty, knowledge dissemination and follow on innovation within the quantum domain.[89] In this light, policy makers should build an innovation architecture that mixes freedom (e.g. access, public domain) and control (e.g. incentive & reward mechanisms).

IP alternatives

With regard to innovation incentives and allocation mechanisms, IP rights are not the only answer - and not automatically the best answer. Policy makers could apply innovation policy pluralism (i.e. mix, match and layer IP alternatives such as anti-trust law, contract law, consumer privacy protection, tax law, standardization & certification, as well as prizes, subsidies, public-private funding, competitions, penalty's and fines) to enable fair-trading conditions and balance the effects of exponential innovation within the markets.[90] Further, IP rights might be less necessary in a quantum and AI driven world where creation, reproduction, and distribution have become inexpensive.[91]

4. Regulating quantum technology

Back to quantum technology. The pervasiveness of quantum technology askes for a holistic view on a politically

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[87] See also: See also Deltorn, Jean-Marc and Macrez, Franck, Authorship in the Age of Machine learning and Artificial Intelligence (August 1, 2018). In: Sean M. O'Connor (ed.), The Oxford Handbook of Music Law and Policy, Oxford University Press, 2019 (Forthcoming) ; Centre for International Intellectual Property Studies (CEIPI) Research Paper No. 2018-10. Available at SSRN: https://ssrn.com/abstract=3261329.

[88] Kop, *supra* note 58.

[89] *id.*

[90] See: Daniel J. Hemel & Lisa Larrimore Ouellette, *Innovation Policy Pluralism*, 128 YALE L.J. (2019), Available at: https://digitalcommons.law.yale.edu/ylj/vol128/iss3/1 and Mauritz Kop, Beyond AI & Intellectual Property: Regulating Disruptive Innovation in Europe and the United States – A Comparative Analysis, https://law.stanford.edu/projects/beyond-ai-intellectual-property-regulating-disruptive-innovation-in-europe-and-the-united-states-a-comparative-analysis/.

[91] Lemley, Mark A., IP in a World Without Scarcity (March 24, 2014). Stanford Public Law Working Paper No. 2413974. Available at SSRN: https://ssrn.com/abstract=2413974.

feasible regulatory framework. It also demands for lawmakers and their staff to acquire interdisciplinary competences. Knowledge and skills pertaining to application areas like the quantum internet, quantum computing methods and use cases, allow policy makers to communicate more effectively about governing quantum technology.[92] A thorough understanding of quantum mechanics gives context to multifaceted challenges surrounding quantum technology, including its impact on society.[93] Defining legal requirements requires interdisciplinary skills and must be informed by a solid grasp of relevant quantum technologies and the way technology, humans and the law interact.[94]

Policy makers should construct a legal framework that balances the interests of stakeholders and that of society at large.[95] A framework that offers legal certainty, a favorable investment climate and an innovation optimum, while respecting democratic rights, fundamental freedoms, ensuring inclusive societal outcomes, protecting citizen's wellbeing and safeguarding our joint humanist moral values.[96] In addition to standards, certification and consensus on codes of ethics[97], we need an agile legislative framework that can adapt quickly to changing circumstances and societal needs.[98]

Legislative framework

Let us link quantum to the Trustworthy AI principles. Right now, the European Commission ('**EC**') is drafting its Law of AI, to stimulate the commitment to Trustworthy AI in the European economy.[99] Trustworthy AI has 7 key requirements: Human agency and oversight, Technical robustness and safety, Privacy and Data Governance,

[92] For more interdisciplinary roadblocks surrounding emerging tech, see: Susan Athey & Guido W. Imbens, *Machine Learning Methods that Economists Should Know About*, ANNUAL REVIEW OF ECONOMICS, VOL. 11, pp. 685-725, 2019. Available at SSRN: https://ssrn.com/abstract=3445877.
[93] See also: Pieter E. Vermaas, The societal impact of the emerging quantum technologies: a renewed urgency to make quantum theory understandable, Ethics Inf Technol (2017), https://dl.acm.org/doi/abs/10.1007/s10676-017-9429-1.
[94] See also Kop, *supra* note 90.
[95] See also Mauritz Kop, Shaping the Law of AI: Transatlantic Perspectives, TTLF Working Papers No. 65, Stanford-Vienna Transatlantic Technology Law Forum (2020), https://law.stanford.edu/publications/no-65-shaping-the-law-of-ai-transatlantic-perspectives/.
[96] Kop, *supra* note 90.
[97] See also: Principled Artificial Intelligence: Mapping Consensus in Ethical and Rights-Based Approaches to Principles for AI, Berkman Klein Center Research Publication No. 2020-1, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3518482; World Economic Forum, White Paper Digital Policy Playbook 2017: Approaches to National Digital Governance, http://www3.weforum.org/docs/White_Paper_Digital_Policy_Playbook_Approaches_National_Digital_Governance_report_2017.pdf and Kop, *supra* note 95.
[98] See also: World Economic Forum *supra* note 97.
[99] See: https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12527-Requirements-for-Artificial-Intelligence.

Transparency, Diversity, Non-discrimination and fairness, Societal and environmental well-being, and Accountability.[100] The EC is also designing a legislative framework for data governance: The Data Act.[101] Both the Law of AI and the Data Act are expected to be adopted next year.[102] This will make access to data easier and provides clarity about the rules for AI like liability, insurance and risks.[103] It is expected that the scope of these new laws will also extend to technological synergies such as AI & quantum computing hybrids.

Overarching core quantum technology rules

The first regulatory step should be for countries to adopt a holistic set of overarching core quantum technology rules.[104] Universal, horizontal rules that apply across all industries, and that protect our democracy and our fundamental human rights & freedoms in the Information Age.[105] These core rules should build upon the principles we embraced for AI. They have to cover development and introduction of quantum-based applications, products and services, software and hardware paradigms, the supply chain as well as enabling factors that include quantum computing ecosystems, quantum communications infrastructure[106], talent development and related technologies.[107]

Particles and energy at the atomic level do not follow the same rules as the objects we can see in our everyday lives. Similarly, quantum laws do not work well in the macro cosmos. As quantum technology and AI have different physical properties, we need additional overarching core rules. Imagine Ten Quantum Technology Commandments, consisting of tables or

[100] See: https://ec.europa.eu/digital-single-market/en/artificial-intelligence.
[101] The Data Act is part of the European Strategy for Data, see: https://ec.europa.eu/digital-single-market/en/policies/building-european-data-economy.
[102] For further reading on AI regulation, see: Hoffmann-Riem, Wolfgang. (2020). Artificial Intelligence as a Challenge for Law and Regulation. 10.1007/978-3-030-32361-5_1, in Regulating Artificial Intelligence, Editors: Wischmeyer, Thomas, Rademacher, Timo (Eds.) (Springer 2020).
[103] For a groundworks analysis of the different notions of data interoperability, see: Hoffmann, Jörg and Gonzalez Otero, Begoña, Demystifying the Role of Data Interoperability in the Access and Sharing Debate (September 29, 2020). Max Planck Institute for Innovation & Competition Research Paper No. 20-16, Available at SSRN: https://ssrn.com/abstract=3705217.
[104] Paul Nemitz & Matthias Pfeffer, Prinzip Mensch. Macht, Freiheit und Demokratie im Zeitalter der Künstlichen Intelligenz, https://prinzipmenscheu.wordpress.com/. See also: Kop, *supra* note 95.
[105] See: https://ec.europa.eu/competition/state_aid/legislation/horizontal.html.
[106] See also: https://ec.europa.eu/digital-single-market/en/faq/frequently-asked-questions-quantum-communication-infrastructure.
[107] NWO, National Agenda on Quantum Technology - Key technologies as a solution to societal challenges, 16 September 2019, https://www.nwo.nl/en/news-and-events/news/2019/09/national-agenda-on-quantum-technology-the-netherlands-as-an-international-centre-for-quantum-technology.html.

Prime Directives[108] similarly to “Thou shall not distort the space-time continuum”, and “Thou shall not interfere with the history of mankind in its current simulation of the universe, during time-travelling.” Another core rule should be that quantum computing is equally available to everyone, via desktop or cloud.[109] A quantum divide should be avoided.[110] According to the quantum scientists from QuTech Delft, governance of quantum computing and the quantum internet needs to be construed around at least the following public values: Security, Safety, Resilience, Trust Privacy, Equal Access and Net Neutrality.[111]

Differentiated industry-specific approach

In addition to universal, overarching guiding principles of Trustworthy & Responsible Quantum Technology that are in line with the unique physical characteristics of quantum mechanics, we advocate a vertical, differentiated industry-specific legislative approach regarding innovation incentives (based on the innovation policy pluralism toolkit)[112] and risks (based on the pyramid of criticality, which should include a definition of high-risk quantum technology applications).[113] This means that certain sector-specific quantum technology boundary setting requirements in hi-risk industries such as health, food, energy, security, finance and defense are stricter than rules in lower risk areas such as entertainment and art.[114] Rules must not hinder rapid sustainable exponential innovation[115], in the sense of opening up new horizons of knowledge in the scientific, technological, aesthetic, cultural and social areas.[116]

Specific risks for society identified in light of quantum technology, are:

1. Risk of increased inequality during the introductory phase;

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[108] See: https://memory-alpha.fandom.com/wiki/Prime_Directive.

[109] Export controls implemented on quantum technology, AI and 3D printing will stand in the way of this pursuit of equality. See: https://www.kirkland.com/publications/article/2020/01/anticipating-turning-point-us-export-controls-tech.

[110] Vermaas, *supra* note 88.

[111] See: Quantum Internet | The internet's next big step, TU Delft, June 3, 2019. https://issuu.com/tudelft-mediasolutions/docs/quantum_magazine_june_2019.

[112] See Hemel & Larrimore Ouellette, *supra* note 90.

[113] See also Kop, *supra* note 95. Exclusive rights are performing different roles in different economic sectors. See in this context: Dan Burk and Mark Lemley, *The Patent Crisis and How the Courts Can Solve It* (University of Chicago Press, 2009) 38, and Kop, *supra* note 58.

[114] See Kop, *supra* note 95.

[115] Kop, *supra* note 73.

[116] McKenna, Mark P. and Frischmann, Brett M., *Comparative Analysis of Innovation Failures and Institutions in Context* (December 11, 2019). HOUSTON LAW REVIEW, VOL. 57, NO. 2, 2019; NOTRE DAME LEGAL STUDIES PAPER NO. 191211. Available at SSRN: https://ssrn.com/abstract=3502528. See also: Camilla Hrdy, Challenging what we think we know about "market failures" and "innovation", https://writtendescription.blogspot.com/2020/03/challenging-what-we-think-we-know-about.html.

2. Risk to the stability of the financial system;

3. Risks pertaining to data privacy, data security, legal certainty and trust;

4. Risks of fake news, disinformation and misinformation and their impact on democratic processes;

5. Risks associated with state surveillance and control;

6. Risks of altered geopolitical relations.

Synchronous to implementing of quantum technology specific laws and standards and making risk-based impact assessments mandatory, the European Commission should take citizens and businesses by hand, prepare the workforce for quantum and construct specialized institutions that provide guidance, certainty, guarantees and trust on the current possibilities regarding the development and use of quantum technology.[117]

Towards an international quantum technology legislative acquis

The uncodified territory of Quantum & Law represents a phenomenal opportunity to establish a harmonized core of internationally pursued, common principles.[118] Innovation policy developments in countries that produce leading, next level technological inventions may have a strong impact on the creation of such an international acquis.[119] Further, the ubiquitous nature of quantum technology, which could pose challenges to oversight and enforcement of related laws, demands for an international approach. It goes without saying that an acquis in quantum technology legislation should also include special international private law provisions that prevent forum shopping.[120]

5. Standardization and effects on innovation, IP & competition

Standardization is a pillar of innovation policy.[121] Key objectives of standardiza-tion are quality, safety, security and sustainability. Standards intend to promote the competitiveness of enterprises large and small, protect

[117] See also Kop, *supra* note 73 and Kop, *supra* note 95.

[118] See also Kop, *supra* note 95.

[119] Pluralism or Universalism in International Copyright Law, Introduction, Edited by Tatiana Eleni Synodinou. Kluwer, 2019, and Griffiths, Jonathan, Universalism, Pluralism or Isolationism? The Relationship between Authors' Rights and Creators' Human Rights (July 28, 2019). Tatiana Eleni Synodinou (ed), Pluralism or Universalism in International Copyright Law (Kluwer Law International), Available at SSRN: https://ssrn.com/abstract=3427997.

[120] See also: Graeme Dinwoodie & Rochelle Dreyfuss, 'An international acquis: Integrating regimes and restoring balance' in Daniel J. Gervais (ed), *International Intellectual Property: A Handbook of Contemporary Research* (Edward Elgar Publishing 2015) 121.

[121] See: Granieri, Massimiliano, Renda, Andrea, Innovation Law and Policy in the European Union, Towards Horizon 2020 (Springer 2012).

consumers, remove technical obstacles to trade, and enhance market access and international trade. [122] As such, standardization has a significant impact on society, ranging from the safety and wellbeing of workers and citizens, the environment, the circular economy, to innovation and overall prosperity. Standards are voluntary, while certification is often mandatory. Both can add value to the quantum technology ecosystem. ISO/IEC standards for quantum computing are currently under construction.[123]

CEN-CENELEC Focus Group, EU Flagship, US QIS

Important initiatives that strive to *inter alia* bring quantum technology and standardization together, are the CEN-CENELEC Focus Group on Quantum Technologies, an initiative supported by the EU Quantum Flagship, and the 5 US Quantum Information Science Research Centers. CEN-CENELEC has its own IP rights policy under the provision of the CEN-CENELEC Guide 8 "Standardization and intellectual property rights (IPR)". [124] The Focus Group will ensure the cooperation of relevant stakeholders, identify standardization needs in the field of Quantum Technologies and suggest further actions to warrant that standards support the deployment of quantum technology in industry. [125] Furthermore, the Focus Group will set up a High-Level Expert Group on Quantum Technology ('**HLEG QT**'), assigned by the European Commission. The EU Quantum Technologies Flagship initiative aims to place Europe at the forefront of the second quantum revolution, develop a solid industrial base for quantum technologies and create practical applications in many different fields, including coordinated research and funding efforts. [126] Many EU Member States have adopted national Agenda's on Quantum technology. In august 2020, the White House Office of Science and Technology Policy and the U.S. Department of Energy ('**DOE**') announced the formation of five new Quantum Information Science ('**QIS**') Research Centers led by DOE national laboratories across the country. [127]

[122] CEN-CENELEC, Faces of Standardization, interview with Carla Sirocchi, Secretary of CEN/CLC/JTC 19, https://www.cencenelec.eu/news/brief_news/Pages/TN-2020-049.aspx. See also: United Nations, Transforming our world: the 2030 Agenda for Sustainable Development, https://sustainabledevelopment.un.org/post2015/transformingourworld.

[123] See: https://www.iso.org/standard/80432.html and https://www.iso.org/committee/45020.html. These are (very) early stage developments in quantum computing standardization.

[124] See: https://www.cencenelec.eu/standards/Guides/Pages/default.aspx.

[125] See: https://www.cencenelec.eu/standards/topics/quantumtechnologies/pages/default.aspx and https://www.cencenelec.eu/news/events/Pages/QuantumTechnology.aspx. To this end, the Focus Group will produce a roadmap.

[126] See: https://ec.europa.eu/digital-single-market/en/policies/quantum-technologies-flagship

[127] See: https://www6.slac.stanford.edu/news/2020-

SLAC National Accelerator Laboratory and Stanford University are founding partners of Q-NEXT national quantum center, one of the national QIS centers.[128]

CE-marking

Responsible Tech and sustainable innovation require synergetic relationships between standardization, certification, legislation and government institutions.[129] Standards can be used as a policy lever, ahead of the market.[130] Take for example Europe, a leader in the field of quantum technology. The European Commission should steer to 'mandatory' standards for interoperability and interconnectivity in the Quantum Internet, with associated IEC, ISO and NEN standards and certification schemes. Companies that supply parts for quantum computers and quantum sensing would also benefit from interoperability standards. Certification is all about conformity and guarantees. Quantum products and services made within the EU or elsewhere in the world should adhere to EU safety and security benchmarks, including not limited to the high technical, legal and ethical standards that reflect Trustworthy quantum technology core values, before they qualify for a CE-marking and are eligible to enter the European markets.[131]

Fair competition

Both insufficient and excessive standardization and certification can have adverse effects on innovation, competition and consumer welfare.[132] The right balance should be struck for any key enabling emerging technology. This includes a risk-based, differentiated industry-specific approach. The effects of requiring all implementations of quantum technology across all domains to be benchmarked by law beforehand, before it can obtain a CE-marking and/or other forms of certification, must be assessed in light of innovation incentives and global competition. Besides that, competitive and innovative aspects of open

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08-26-slac-and-stanford-join-q-next-national-quantum-center.aspx.

128 See: https://www.q-next.org/ China is also participating in the race to quantum supremacy, see: https://www.scmp.com/news/china/science/article/3101219/china-claims-quantum-leap-machine-declared-million-times-greater and https://www.globaltimes.cn/content/1198916.shtml.

129 CEN-CENELEC, *supra* note 122. https://sustainabledevelopment.un.org/post2015/transformingourworld

130 See also: Mark Lemley interview at The Robots Are Coming podcast, July 21, 2020, https://anchor.fm/ken-and-michael/episodes/The-Robots-Are-Coming-10---Professor-Mark-Lemley-eh1sdv.

131 Kop, *supra* note 95. For China that would be the China Compulsory Certification (CCC), the US uses the USA Compliance Marking.

132 See: Zafrilla Díaz-Marta, Vicente and Ferrandis, Carlos Muñoz, Open Standards and Open Source: Characterisation and Typologies (May 15, 2020). Available at SSRN: https://ssrn.com/abstract=3632406 and see: Hovenkamp, Herbert J., "Is Antitrust's Consumer Welfare Principle Imperiled?" (2019). *Faculty Scholarship at Penn Law*. 1985.

standards for quantum technologies should be thoroughly investigated.[133]

Roadblocks for SME's

Lastly, it is crucial that small and medium enterprises ('**SME**') get the chance to effectively participate in the standards-making process.[134] Where incumbents have sufficient budget, SME's often lack awareness and resources to implement standards, which leads to competitive disadvantages including less access to foreign markets.[135] It encourages a winner-takes-all effect and associated declining business dynamism.[136] This is a main roadblock for building a thriving quantum technology ecosystem. It is vital that SME's have access to and comply with the latest internationally accepted standards, that allow them to benefit from the presumption of conformity with legal requirements.[137]

[133] *id*. Marta *supra* note 132. See also Kop, *supra* note 73.
[134] CEN-CENELEC, Standards: A gateway for SMEs to the Single Market, Interview with *Maitane Olabarria* Uzquiano, SBS Director, 29 June 2020, https://www.cencenelec.eu/news/publications/Publications/2020-0626-Publication_StandardsBuildTrust.pdf.
[135] *id.*
[136] Cunningham, Colleen and Ederer, Florian and Ma, Song, Killer Acquisitions (April 19, 2020). Available at SSRN: https://ssrn.com/abstract=3241707, and Lemley, Mark A. and McCreary, Andrew, Exit Strategy (December 19, 2019). Stanford Law and Economics Olin Working Paper #542, Available at SSRN: https://ssrn.com/abstract=3506919.
[137] CEN-CENELEC, *supra* note 134.

6. ELSA – Ethical, Legal & Social Aspects

As with other emerging technologies, ethical, legal and social aspects ('**ELSA**' or '**ELSI**') play a pivotal role in the uptake of quantum technology. Our societal values need to be in sync with the immense innovative power of quantum technology.[138] An ELSA approach aims to proactively anticipate on societal issues and possible controversies, encourages stakeholders and the general public to actively participate in co-designing interdisciplinary research agendas, and intends to bridge boundaries between research communities.[139] In Europe, the related term 'Responsible Research and Innovation' ('**RRI**') is used to express a focus on the societal impact of scientific research.[140] The RRI principles are being applied to quantum technology.

Awareness

An important part of syncing our norms, standards, principles and values with quantum technology is to raise awareness of its ethical, legal and social aspects. Stakeholders like decision makers, entrepreneurs and the general public need to be adequately taught and informed.[141]

[138] TU Delft *supra* note 16.
[139] See for example: https://en.wikipedia.org/wiki/Ethical,_Legal_and_Social_Aspects_research and https://cordis.europa.eu/programme/id/FP4-BIOTECH-2_0901.
[140] See: Peckham, James "What is responsible innovation, and why should tech giants take it seriously?". TechRadar, 2018-08-27.
[141] See also: Mauritz Kop, What are the main requirements for AI systems in

Other central topics that need to be addressed are human capital together with coordinated efforts to upgrade the workforce, and the knowledge and skills agenda including quantum education across all levels. The overall goal should be to make quantum theory understandable to key players in the quadruple helix innovation model i.e. government, industry, academia and citizens.

Quantum technology impact assessment

We could imagine a practical tool, based on the Dutch AI Impact Assessment [142] that would offer entrepreneurs, data scientists and software programmers a concrete code of conduct with which quantum technology can be safely implemented in their products and services. We could name it: the Quantum Technology Impact Assessment. It would provide a moral compass and nurture awareness. The Quantum Technology Impact Assessment could be a guide for the application of quantum computing, quantum sensing, quantum simulation and the quantum internet. It would use a practical checklist from a legal, technical and ethical point of view, in line with the European Trustworthy Quantum Technology principles. Quantum technology has to be safe, secure and resilient.

Further, quantum technology start-ups[143] and scale-ups should implement the Quantum Technology Impact Assessment in their workflow. An external audit ought be conducted by a multidisciplinary team that consists of a quantum technologist, an engineer, data scientist, an ai developer, a software programmer, lawyer, privacy specialist, ethicist, a manager and someone who has sector specific knowledge such as a doctor, to conduct the Quantum Technology Impact Assessment. [144] Going through this process can have a beneficial effect on insurance, duties & responsibilities of care, and liability issues. The successful implementation of the audit can, in addition to the presumption of legal conformity [145] , be a decisive reason for multinationals to award a certain assignment to an SME, and vice versa.

As quantum technology and AI have different physical characteristics, additional requirements to balance its societal impact may be needed. Implementing change requires balancing the right combination of

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Healthcare? 10 December 2018, European AI Alliance, European Commission,

https://ec.europa.eu/futurium/en/european-ai-alliance/what-are-main-requirements-ai-systems-healthcare

[142] AI Impact Assessment | Netherlands, December 6, 2018, https://airecht.nl/blog/2018/ai-impact-assessment-netherlands. See also: HLEG's Assessment List for Trustworthy Artificial Intelligence (ALTAI) for self-assessment and Council of Europe's Recommendations on the human rights impacts of algorithmic systems.

[143] Such as Dutch quantum computing start-up Orange Quantum Systems, see: https://thequantumdaily.com/2020/05/19/orange-quantum-systems-enabling-the-future-of-quantum-computing/.

[144] AI Impact Assessment, *supra* note 142.

[145] CEN-CENELEC, *supra* note 134.

public and private incentives.[146] It is urgent that thorough, multidisciplinary research is carried out into the expected ELSA implications of this technology, plus the required funding. Society needs to be ready for a quantum future because it's coming.[147]

7. Trustworthy Quantum Technology by Design

The second quantum revolution is now underway.[148] Although atoms, neutrons and molecules are neutral, technology is not. Therefore, we should shape quantum technology for Good by embedding our norms, standards, principles and values into the architecture of our quantum systems, as much as possible.[149] This can be accomplished by pragmatically and responsibly building upon future overarching core quantum technology rules[150], which include the 7 key ethical, legal and technical requirements set for AI.[151] Following this path, we can develop a Trustworthy Quantum Technology by Design paradigm.

Our society's norms, standards, principles and values need to be baked into our intelligent quantum systems[152] by means of sustainable Trustworthy Quantum Technology by Design, analogous to AI.[153] Technological crossovers can contribute to making the construction and configuration of quantum systems consistent with future key Trustworthy quantum technology requirements. For example, neurosymbolic computing together with genetic algorithms, distributed ledger technology ('**DLT**') and analogue computing paradigms can solve problems relating to black box (oracle) and explainability problems through the architecture of the hardware and the design of the code.[154] In addition, Trustworthy quantum technology can enhance artificial intelligence (AI) that is legal, ethical and technically robust,

[146] See also: Adapting policies that respond to today's challenges, https://news.stanford.edu/2020/09/28/2020-u-s-election-issues-challenges/.

[147] NATO Report "Science & Technology Trends: 2020-2040", D.F. Reding & J. Eaton, NATO Science & Technology Organization, March 2020 https://www.nato.int/cps/en/natohq/news_175574.htm. See also: https://www.economist.com/news/essays/21717782-quantum-technology-beginning-come-its-own.

[148] See: https://ec.europa.eu/commission/presscorner/detail/de/MEMO_18_6241.

[149] Kop, *supra* note 73 and Kop, *supra* note 95.

[150] As mentioned above in Chapter 4 Regulating Quantum Technology.

[151] See: Trustworthy AI 7 key requirements, *supra* note 100.

[152] See also: See also: Nemitz, Paul Friedrich, Constitutional Democracy and Technology in the age of Artificial Intelligence (August 18, 2018). DOI 10.1098/RSTA.2018.0089 - Royal Society Philosophical Transactions A, Available at SSRN: https://ssrn.com/abstract=3234336 and 20200917_IETC Hearing with Chairman Eric Schmidt: "Interim Review of the National Security Commission on AI" https://youtu.be/USEKVNSf4oI?t=862.

[153] Kop, *supra* note 73.

[154] For quantum technology related high-performance computing initiatives, see: https://ec.europa.eu/digital-single-market/en/content/high-performance-computing-and-quantum-technology-unit-c2.

and vice versa, creating socially responsible synergetic effects. Moreover, adding analogue computing, memristors and nanomagnet chips to the mix can solve energy and sustainability challenges.

Quantum technology should reflect core societal values

Combining neural networks and symbolic reasoning is a promising method to optimize self-learning and self-reasoning of systems. Systems that have a richer understanding of context and concepts like ethics, deduction, causality and interpretation, without the need for large, hand-labelled training, testing and validation datasets during the learning process. Breakthroughs in information theory can help to create the much sought-after transparency and trust. Instead of *ex post* safety audits, automated checks & balances should be integrated in the process, including *ex ante* impact assessments. The architecture of systems equipped with quantum technology should articulate values that we consider important as a society.

Conclusion

Our current intellectual property framework is not written with quantum technology in mind. Anticipating spectacular technological advance-ments in quantum computing, quantum sensing and the quantum internet, the time is now ripe for governments, research institutions and the markets to prepare regulatory and intellectual property strategies that strike the right balance between safeguarding our democratic values, fundamental rights & freedoms, and pursue policy goals that include rapid technology transfer and the free flow of information, whilst encouraging healthy competition and incentivizing sustainable innovation.

Other Developments

European Union

Artificial Intelligence: A Reliable Tool to Increase Board Accountability and Shareholder Value in a Post-Covid World

By Maria Lillà Montagnani and Maria Lucia Passador

Often perceived as the realm of people with IT skills only (when not feared for its presumed ability to replace human beings in their current positions), Artificial Intelligence ("**AI**") has turned out to be a crucial tool to tackle some of the difficulties that emerged in this global emergency. In fact, by processing an enormous amount of data, the AI makes it possible to detect important correlations and carry out crucial researches for the curbing of the health crisis. It enables, for example, the tracing of people mobility in the areas most affected by the virus (https://bluedot.global/products), or the recognition of the symptoms characterizing the onset of the disease, so that doctors may concentrate on the affected patients, immediately quarantine them and ensure the most suitable therapies (https://www.technologyreview.com/2020/03/11/905366/how-baidu-is-bringing-ai-to-the-fight-against-coronavirus). AI has revealed itself essential in each and every phase of the pandemic: from the early symptoms detection to the spreading prevention – through the assessment of the contagion potential; from the response – through the use of drones and robots for the supply of materials and the care of high-risk patients – to the healing phase, by monitoring the recovery and identifying possible relapses (OECD, Using artificial intelligence to help combat COVID-19, 23 April 2020, available at http://www.oecd.org/coronavirus/policy-responses/using-artificial-intelligence-to-help-combat-covid-19-ae4c5c21).

The use of AI has proved its potential, which in turns has hopefully generated trust towards it, encouraging to its recourse even in the post-Covid phase. This would be in line with the EU policies (https://ec.europa.eu/info/sites/info/files/communication-shaping-europes-digital-future-feb2020_en_4.pdf), which call for an economic upturn to be focused on an AI beneficial to people. Yet it will require further investments protecting cyber risks, developing high-speed data connections and high-tech solutions.

In the context of the upcoming digital economy, AI could thus be the tool that drive economic recovery, especially for those companies that, looking beyond the current crisis, will focus on a long-term strategy and place AI at the heart of their own business approach. As a matter of fact, crisis periods affect the business landscape, forcing companies to innovate. The SARS epidemic in 2003 led to the establishment of e-commerce giants such as Alibaba and JD.com. The 2008-9 global financial crisis led to the dramatic increase of American Express' and Starbucks' shareholder value. Although at present, apparently, only 16 % of the companies derive value from the use of AI, it is likely that this number will increase significantly if we look at the investments undertaken over the last year (https://www.protiviti.com/sites/default/files/united_states/insights/ai-ml-global-study-protiviti.pdf).

AI can indeed perform a major role within companies, both as a support in mainstream decision-making processes and in relation to "emerging" issues such as sustainability. Several companies are already using technology to bring about gradual changes in terms of efficiency and emission reduction (http://news.mit.edu/2020/artificial-intelligence-ai-carbon-footprint-0423). Although AI employment is currently at an early stage, several studies already suggest that it will bring significant ESG benefits to companies (https://expertinvestoreurope.com/can-ai-resolve-esg-rating-differences/). If the implementation of ESG factors in corporate management can increase equity value and if AI is a tool to promote innovation, identify inefficiencies and manage risks, thus, a strategy combining these two elements – and helping boards of directors to select the most appropriate methods to enhance them – would result in a positive return on investment. In a word, an AI strategy may well bring about an increase in shareholder value, thanks to its undeniable potential in refining the predictive models required to offer a more accurate and in-depth information to directors and senior executives.

It is precisely in the hard times we are facing that it becomes vital to further delve into the role of AI in large and listed companies. AI can surely be a means to innovate the business model, to manage risk more efficiently – especially in those sectors where it where it constitutes a key aspect of business activity, such as the financial and insurance industries (https://www.technologyreview.com/2020/03/25/950291/trustworthy-ai-is-a-framework-to-help-manage-unique-risk) – and to foster the M&A market (https://www.accenture.com/_acnmedia/PDF-69/Accenture-AS-Tech-Led-M-A-From-Art-to-Science-POV.pdf#zoom=50). In addition, AI can become the instrument to steer in the direction of a sustainable capitalism, limiting a capitalist solely geared towards profit (https://bthechange.com/what-ai-can-teach-us-about-corporate-law-and-the-dangers-of-shareholder-capitalism-6c8e42f49910) by enabling major companies to renew themselves by prioritizing shareholder value. This is even truer nowadays, at a time in which ESG factors have been universally recognized as relevant, for instance, in the Codes of Corporate Governance, in empirical studies on banks and M&A transactions, in the Business Roundtable Statement and in the British Academy's research projects, in both the economic (https://ssrn.com/abstract=3004794) and law literature (https://ssrn.com/abstract=3553493).

The full exploitation of AI potential passes for its trustworthiness. IA entails, especially when used on a larger scale, a series of risks potentially leading to severe implications for the whole society, and to even major ones for companies that decide to indiscriminately exploit it, ranging from reputational damages to the loss of shareholder value. It is thus essential to resort to a trustworthy AI, i.e. an AI that is compliant with the law and the principles identified by the European Group of Independent Experts on Artificial Intelligence (https://ec.europa.eu/futurium/en/ai-alliance-consultation/guidelines#Top). A trustworthy AI takes the following factors into account: (i) human agency and oversight; (ii) technical robustness and safety; (iii) privacy and data governance; (iv) transparency; (v) diversity, non-discrimination and fairness; (vi) societal and environmental well-being; and (vi) accountability.

Although the above requirements are equally important, they may be differently prominent depending on the sectors in which the AI is employed. For example, the reliance of the boards of large firms on IA as a tool for growth and renewal calls for a special attention on transparency, and hence accountability. In fact, a transparent system in illustrating the phases of the process - from the data selection to the architecture of the algorithm - is the only way to enhance the accountability of both the system itself and the board that consciously uses it.

Because if a board engages in more and better dialogue, if it is transparent and employs transparent instruments, it certainly creates economic value according to the traditional theory of "shareholder primacy", but, at the same time, it can go beyond it by adopting more inclusive policies that can lead to the creation of "shareholder welfare".

Other Developments

European Union

Enabling “Code is Law”: Computational approaches to trade and data regulation

By Craig Atkinson

Recent decisions by the Court of Justice of the European Union mirror a broad, and modern, shift in policy for ‘digital Europe’.

The ‘*Schrems II’* judgement evolves EU-US cross-border data transfer mechanisms and invalidates the data protection ‘Privacy Shield’.[155] In the ‘*BMW v German Customs*’ case, import valuations are now obligated to include the cost of ‘free’ software embedded in automobile hardware (even if the software was developed in the EU).[156]

With the expansion of the digital economy and proliferation of information technology-enabled goods, computational approaches to regulation can supplement converging international trade and cross-border data transfer policies.

The Rise of Computational Trade Policy

The concept of “code is law”, attributed to Lawrence Lessig, is becoming a reality in several jurisdictions. Described by Stanford University’s Michael Genesereth (2015), computational law - “the codification of regulations in precise, computable form” - has emerged as a vector of innovation in trade policy design.[157]

Assembly, transformation and transmission of electronic data have become core processes for trade compliance. In parallel to natural language rules, computational forms of policy allow for trade regulation ‘by proxy’. In the most advanced type of system, data elements found in electronic documents can be provided to, and processed by, numerous authorities through a ‘single window’ platform. These systems allow for improved coordination by national authorities and between national governments.

World Trade Organization Commitments and United Nations Guidance

The World Trade Organization (‘**WTO**’) mandate has enshrined the use of digital technologies to facilitate trade in goods. The Trade Facilitation Agreement commits all members, to the ‘extent practicable’, to deliver measures for customs automation via electronic means, namely:

- Electronic payment of duties (Art. 7.2)
- National single window (Art. 10.4)

The World Customs Organization (WCO) cross-border data model and guidance from the United Nations (e.g. UNCITRAL, UN/CEFACT, and UNNExT) support the adoption of digitally enabled modes of policy delivery. While largely disconnected and incompatible, disparate implementa-

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155 Facebook Ireland v Schrems (C-311/18)

156 BMW Bayerische Motorenwerke AG v Hauptzollamt München (C–509/19)

157 Michael Genesereth, Computational Law: The Cop in the Backseat, White Paper, CodeX—The Stanford Center for Legal Informatics (2015). Available at: http://logic.stanford.edu/complaw/complaw.html

tions of systems are pushing toward more 'frictionless' trade at the multilateral level.

Digital Economy Partnership Agreement

Concluded in early 2020, the plurilateral Digital Economy Partnership Agreement ('**DEPA**') between Chile, New Zealand and Singapore is the first arrangement of its kind. To address the digital economy and the interface of national markets, the DEPA aims to better facilitate digital trade and enable cross-border data flows.[158]

More specifically, the DEPA tackles areas pertaining to both goods and services trade: digital identity, electronic invoicing, electronic payments, financial technology ('fintech') and paperless trade. With provisions on data protection and open data, ensuring trust in cross-border contexts is a primary objective of the agreement.

By further clarifying a role for computational approaches to trade and data regulation, the DEPA takes a step toward interoperable markets in both tangible and intangible realms.

A 'Born Digital' Transatlantic Trade and Investment Partnership?

Negotiations for an EU-US Transatlantic Trade and Investment Partnership ('**TTIP**') ended without conclusion in 2016.[159] A future deal must address existing and emergent policies as well as court rulings, for example:

- The General Data Protection Regulation ('**GDPR**') and the forthcoming Digital Services Act, an update to the E-commerce Directive established in 2000.
- September 2020 saw the European Commission ('EC') launch a novel Customs Union Action Plan and publish Explanatory Notes on new Value Added Tax ('**VAT**') rules for E-commerce.
- In October 2020, a new framework for cooperation proposed an EU Single Window project to modernize customs controls.

Standards Enable Interoperability

Digitalization relies on legal and technical approaches to manage data flows and allow for interoperability. Model laws and digital standards have improved cross-border data exchange and the deployment of trade automation / payment systems:

- Countries are adopting UNCITRAL model laws as national legal templates to support domestic and cross-border e-commerce (e.g. e-signatures and electronic transferrable records).
- Companies are obtaining digital 'legal entity identifiers', including the Global Legal Entity Identifier ('**LEI**') that leverages the ISO 17442 standard.
- In addition to semantic standards developed by bodies such as the WCO and UN/CEFACT, the Universal Business Language ('**UBL**'), or ISO 19845, provides a free library of standardized electronic documents. To exchange data along domestic and international supply chains, the UBL

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[158] The Digital Economy Partnership Agreement (DEPA). Available at: https://www.mti.gov.sg/Improving-Trade/Digital-Economy-Agreements/The-Digital-Economy-Partnership-Agreement

[159] The Transatlantic Trade and Investment Partnership (TTIP). See: https://ec.europa.eu/trade/policy/in-focus/ttip/

format includes 89 document types for procurement, transportation / logistics and customs.

- ISO 20022 for electronic financial data interchange is rapidly becoming a common standard for global payments.

Achieving Scale with Open Innovation

The promise of open source, “is higher quality, better reliability, greater flexibility, lower cost, and an end to predatory vendor lock-in”.[160] Presenting barriers to scale and interoperability, various closed source approaches are in competition to provide governments with solutions.

However, an open source approach with a system agnostic focus on the ambitious challenge of expressing regulations in computational form may hold the key to realize global ‘borderless’ trade and transfers of data.

[160] According to the Open Source Initiative (OSI). See: https://opensource.org/

Other Developments

European Union

The European Commission's Digital Finance Strategy for the European Union

By Jonathan Cardenas

On 24 September 2020, the European Commission (the "Commission") adopted a Digital Finance Package [161] aimed at enhancing the European Union's ('**EU**') competitiveness in the financial sector and ensuring that EU financial services regulation is "fit for the digital age."[162] The Digital Finance Package builds upon the Commission's FinTech Action Plan of 2018,[163] and consists of two initiatives: the EU Digital Finance Strategy[164] and the EU Retail Payments Strategy,[165] both of which establish a series of regulatory objectives and priorities that the Commission intends to achieve by 2024. In addition, the Digital Finance Package includes legislative proposals on markets in crypto-assets,[166] market infrastructures based on distributed

[161] European Commission, Digital Finance Package (September 24, 2020). Available at: https://ec.europa.eu/info/publications/200924-digital-finance-proposals_en.

[162] European Commission, Digital Finance Package: Commission sets out new, ambitious approach to encourage responsible innovation to benefit consumers and businesses (September 24, 2020). Available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_20_1684.

[163] European Commission, FinTech Action Plan: For a more competitive and innovative European financial sector (March 8, 2018). Available at: https://ec.europa.eu/info/publications/180308-action-plan-fintech_en. See also, Cardenas, J., The European Commission's FinTech Action Plan and Proposed Regulation on Crowdfunding, TTLF Newsletter on Transatlantic Antitrust and IPR Developments, Stanford–Vienna Transatlantic Technology Law Forum (June 8, 2018). Available at: https://ttlfnews.wordpress.com/2018/06/08/the-european-commissions-fintech-action-plan-and-proposed-regulation-on-crowdfunding/.

[164] European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a Digital Finance Strategy for the EU (September 24, 2020). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0591&from=EN.

[165] European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a Retail Payments Strategy for the EU (September 24, 2020). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020DC0591&from=EN.

[166] European Commission, Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-assets, and amending Directive (EU) 2019/1937 (September 24, 2020). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020PC0593&from=EN.

ledger technology,[167] and digital operational resilience for the financial sector,[168] as well as related amendments to pre-existing EU regulation.[169] This article briefly summarizes the regulatory objectives and priorities that the Commission has outlined in its EU Digital Finance Strategy.

I. <u>The Commission's Strategic Objective for Digital Finance</u>

Recognizing that technological disruption is transforming the European financial services sector and the European economy as a whole, the Commission has defined its strategic objective as that of embracing digital finance "for the good of"[170] European consumers and businesses. In this light, the Commission states that its aim is to promote digital finance on the basis of European values and emphasizes that the EU must "drive digital finance with strong European market players in the lead."[171] The Commission's strategic objective of embracing digital finance is justified on four grounds. First, it would catalyze financial innovation and provide opportunities to develop improved financial products for consumers and small businesses. Second, it would advance Europe's economic recovery strategy, and in particular, would help to create new channels of financing that would support Commission President Ursula von der Leyen's New Industrial Strategy for Europe.[172] Third, it would strengthen European Economic and Monetary Union through enhanced market integration in the EU's Banking Union and Capital Markets Union. Fourth, it would strengthen the EU's "open strategic autonomy" in the financial services industry and would also

[167] European Commission, Proposal for a Regulation of the European Parliament and of the Council on a pilot regime for market infrastructures based on distributed ledger technology (September 24, 2020). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020PC0594&from=EN.

[168] European Commission, Proposal for a Regulation of the European Parliament and of the Council on digital operational resilience for the financial sector and amending Regulations (EC) No 1060/2009, (EU) No 648/2012, (EU) No 600/2014 and (EU) No 909/2014. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020PC0595&from=DE.

[169] European Commission, Proposal for a Directive of the European Parliament and of the Council amending Directives 2006/43/EC, 2009/65/EC, 2009/138/EU, 2011/61/EU, EU/2013/36, 2014/65/EU, (EU) 2015/2366 and EU/2016/2341. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52020PC0596&from=EN.

[170] European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a Digital Finance Strategy for the EU (September 24, 2020).

[171] Id.

[172] European Commission, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: A New Industrial Strategy for Europe (March 10, 2020). Available at: https://ec.europa.eu/info/sites/info/files/communication-eu-industrial-strategy-march-2020_en.pdf.

strengthen the EU's ability to regulate and supervise the global financial system.[173]

II. The Commission's Regulatory Priorities for Digital Finance

In order to achieve its strategic objective of embracing digital finance for the good of consumers and businesses, the Commission has identified four priorities that will inform EU policymaking activities through the end of Commission President Ursula von der Leyen's term in 2024.

a. Removing Fragmentation in the Digital Single Market for Financial Services

The Commission's first priority is to address fragmentation in the Digital Single Market in order to enable consumers and retail investors to have access to cross-border financial services and in order to facilitate the ability of financial services firms to scale up their businesses across the entire Single Market. In this regard, the Commission calls for the implementation of a legal framework that enables the use of interoperable digital identity solutions across the EU that would allow for quick and easy remote onboarding of new financial services customers. The Commission explains that this framework should be based on harmonized anti-money laundering and counter-terrorism financing rules, as well as on an updated version of the EU Regulation on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market.[174] In order to facilitate the scaling up of financial services across the Single Market, the Commission plans to introduce regulatory reforms that permit passporting and one-stop shop licensing across the EU in areas that are considered essential to digital finance, such as crowdfunding, crypto-assets and non-bank lending. In addition, in order to encourage cross-border cooperation between public and private sector stakeholders, the Commission will establish an EU digital finance platform that will allow for online interactions related to digital finance initiatives, as well as online access to national innovation facilitators and national e-licensing procedures.

b. Adapting the EU Financial Services Regulatory Framework

The Commission states that the purpose of the Digital Finance Strategy is to ensure that EU financial services regulation is "fit for the digital age."[175] In this regard, in order to make the EU financial services

[173] European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a Digital Finance Strategy for the EU (September 24, 2020).

[174] Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32014R0910&from=EN.

[175] European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a Digital Finance Strategy for the EU (September 24, 2020).

regulatory framework compatible with best practices in software development and deployment, and in order for EU regulation to serve as a facilitator of the use of financial services technology across Europe, the Commission has identified five strategies to accomplish its objectives.

First, the Commission recommends that the EU adopt a comprehensive regulatory framework by 2024 that enables the uptake of, and that addresses the risks associated with, distributed ledger technology and crypto-assets in the financial services industry. In this light, the Commission has published legislative proposals that would clarify the applicability of existing EU rules to crypto-assets and distributed ledger technology and that would establish a new EU regulatory framework for those crypto-assets that are not covered by pre-existing EU rules.

Second, the Commission recommends that the EU promote the use of cloud computing infrastructure in financial services. To do so in a secure way, the Commission has published a legislative proposal that would create an oversight framework for critical third-party financial services industry cloud service providers.[176] The Commission has also requested that the European Union Agency for Cybersecurity develop a cybersecurity certification program for cloud service providers that would comply with the requirements of the EU Cybersecurity Act.[177]

Third, the Commission recommends that the EU promote a significant level of investment in software by financial services industry players. In order to do so, the Commission recommends that EU rules on prudential requirements for financial institutions be adapted so as to facilitate a transition toward a more digital European banking sector. In this regard, the Commission plans to adopt regulatory technical standards that are presently being developed by the European Banking Authority.

Fourth, the Commission recommends that the EU promote the deployment of artificial intelligence (‘**AI**’) tools in the financial services industry. To do so, the Commission intends to collaborate with the three supervisory authorities of the European System of Financial Supervision (namely, the European Banking Authority, the European Securities and Markets Authority, and the European Insurance and Occupational Pensions Authority) to clarify supervisory expectations as to how EU financial services regulation should apply to financial services-related AI applications. In addition, as set out in the Commission's February 2020 White Paper on Artificial

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[176] European Commission, Proposal for a Regulation of the European Parliament and of the Council on digital operational resilience for the financial sector and amending Regulations (EC) No 1060/2009, (EU) No 648/2012, (EU) No 600/2014 and (EU) No 909/2014.

[177] Regulation (EU) 2019/881 of the European Parliament and of the Council of 17 April 2019 on ENISA (the European Union Agency for Cybersecurity) and on information and communications technology cybersecurity certification and repealing Regulation (EU) No 526/2013 (Cybersecurity Act) (Text with EEA relevance). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32019R0881&from=EN.

Intelligence,[178] the Commission plans to promote the use of AI by proposing significant investment in AI at the EU level. The Commission also plans to propose a new regulatory framework for AI in 2021 that reflects European values.

Fifth, the Commission aims to ensure that the EU financial services regulatory framework is future proof by engaging in legislative reviews and issuing interpretative guidance on an on-going basis. It plans to do so by regularly carrying out an EU Digital Finance Outreach that will identify potential regulatory obstacles to financial services innovation and that will provide interpretative guidance on these issues.

c. Promoting Data-Driven Innovation in Finance

In conjunction with the Commission's European Strategy for Data, the Commission plans to promote data-driven financial innovation by establishing a "common financial data space"[179] that will help to integrate European capital markets and facilitate investment in sustainable development. In addition, in furtherance of the objectives of the EU Capital Markets Union, the Commission plans to facilitate real-time online access to capital markets-related public disclosures by 2024. The Commission also plans to promote the use of regulatory and supervisory technology tools for supervisory reporting by regulated entities, as well as for information sharing between and among the Member States and EU regulatory authorities. The Commission also plans to promote open finance by presenting an open finance regulatory framework by mid-2022.

d. Addressing Digital Transformation Challenges and Risks

In order to address the challenges and risks posed by the digital transformation of financial services, the Commission plans to modernize EU prudential and conduct regulation in line with the "same activity, same risk, same rules" principle.[180] It also plans to integrate consumer protection and competition policy goals into its digital finance-related initiatives. As set out in the EU Retail Payments Strategy, the Commission plans to review and revise the Payment Services Directive[181] and E-Money Directive.[182] The Commission will

[178] European Commission, White Paper: On Artificial Intelligence - A European approach to excellence and trust (February 19, 2020). Available at: https://ec.europa.eu/info/sites/info/files/commission-white-paper-artificial-intelligence-feb2020_en.pdf.

[179] European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a Digital Finance Strategy for the EU (September 24, 2020).

[180] Id.

[181] Directive (EU) 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC (Text with EEA relevance). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32015L2366&from=EN.

[182] Directive 2009/110/EC of the European Parliament and of the Council of 16 September 2009 on the taking up, pursuit and prudential supervision of the business of electronic money institutions amending Directives 2005/60/EC and 2006/48/EC

also explore ways of ensuring that the EU prudential supervisory regime is sufficiently flexible to capture risks arising from the provision of financial services by non-bank internet platforms and technology companies. Finally, the Commission plans to strengthen the resilience of digital financial operations, and in order to do so, has introduced a legislative proposal for a new EU regulatory framework for digital operational resilience in financial services.[183]

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and repealing Directive 2000/46/EC (Text with EEA relevance). Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32009L0110&from=EN.

[183] European Commission, Proposal for a Regulation of the European Parliament and of the Council on digital operational resilience for the financial sector and amending Regulations (EC) No 1060/2009, (EU) No 648/2012, (EU) No 600/2014 and (EU) No 909/2014.

Other Developments

European Union

EU Perspectives on the COVID-19 Contact Tracing Apps

By Elif Kiesow Cortez

Privacy scholars were used to debates on *privacy vs. security,* and since the COVID-19 pandemic, a new debate is attracting attention on *privacy vs. public health* regarding the use of contact tracing apps. Before COVID-19 hit EU hard, a contact tracing app was in use in couple of countries, including South Korea. The app was alerting users when an individual infected with coronavirus infected was in a certain neighborhood [184]. This led to discussions on whether the individual's privacy could be preserved sufficiently, as required by the GDPR, while using the contact tracing apps[185].

EU approach to Contact Tracing Apps

In April 2020, the European Data Protection Board declared that should only trace proximity of users and that using contact tracing applications should not be mandatory[186]. However, while this guideline would be aiming that protecting individual's right to privacy and safeguarding compliance with the GDPR, it might cause the contact tracing apps to be less effective as they strongly count on a network effect[187].

The contact tracing apps mainly use a Bluetooth based functionality that detects proximity of phone owners. The apps are aimed to facilitate contact tracing and quarantining only the people with contact and are proposed as an alternative to large scale lockdowns, however recent research reported that currently no empirical evidence was found to support the effectiveness of automated contact tracing and the results suggest that manual contact tracing is more effective[188]. Many EU countries launched national contact tracing apps, and when it came to its use, there were differences across the board. For example, it is reported that the contact

[184] Babones, S., Countries Rolling Out Coronavirus Tracking Apps Show Why They Can't Work, 12 May, 2020 https://foreignpolicy.com/2020/05/12/coronavirus-tracking-tracing-apps-cant-work-south-korea-singapore-australia/, Accessed 12 September 2020

[185] Laura Bradford, Mateo Aboy, Kathleen Liddell, COVID-19 contact tracing apps: a stress test for privacy, the GDPR, and data protection regimes, Journal of Law and the Biosciences, Volume 7, Issue 1, January-June 2020, lsaa034.

[186] European Data Protection Board Guidelines 04/2020 on the use of location data and contact tracing tools in the context of the COVID-19 outbreak, 21 April 2020. https://edpb.europa.eu/sites/edpb/files/files/file1/edpb_guidelines_20200420_contact_tracing_covid_with_annex_en.pdf

[187] Chiara Farronato, Marco Iansiti, Marcin Bartosiak, Stefano Denicolai, Luca Ferretti and Roberto Fontana, Harvard Business Review, "How to Get People to Actually Use Contact-Tracing Apps", July 15 2020, https://hbr.org/2020/07/how-to-get-people-to-actually-use-contact-tracing-apps, Accessed on 12 September 2020.

[188] Braithwaite, I., Callender, T., Bullock, M. and Aldridge, R.W., 2020. Automated and partly automated contact tracing: a systematic review to inform the control of COVID-19. The Lancet Digital Health.

tracing app in France has been downloaded 2.3 million times and the German app has had 17.2 million downloads[189]. In both examples, the number of users would not be sufficient to create the targeted efficiency level due to the network effect.

South Korea Example

The initial privacy debate on the risks of contact tracing apps for limiting coronavirus infections were fueled by early examples like its use in South Korea. The authorities are allowed to conduct automated contact tracing based on the regulatory decisions made after the 2015 outbreak of the Middle East Respiratory Syndrome (MERS)[190]. In March 2020, it was stated that the contact tracing app in South Korea would send emergency alerts to all users when a user was tested positive and this alert contained detailed personal data about the infected person including age, gender and a location log about the person[191]. Although originally the infected users are referred with unidentifiable, anonymous user codes, the level of detail that was shared allowed relatively easy deanonymization of the infected users[192]. Identification of the positive tested citizens then led to organized, public attacks on the identified individuals through social media, for example, blaming and insulting them for being present in too many locations within a day, and thus contributing to the fast spread of the disease[193].

Given that the privacy and data protection infringements through contact tracing apps were reported in the media in 2020, discussions started among privacy scholars in EU countries on whether use of such apps could be compatible with the GDPR. In March 2020, observing South Korea's success in containing the spread of the disease without strict lockdowns, encouraged EU countries to work on potential national contact tracing apps. In light of these developments, the European Data Protection Board issues its guidelines on use of these apps in April 2020[194].

GDPR vs. Contact Tracing

Learning from the deanonymization possibilities in the South Korea example, the EDPB guidelines highlight the importance of the anonymization of data, listing three criteria that contact tracing apps should comply with: (1) the collected

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[189] Martuscelli C., Heikkila M., "Scientists cast doubt on effectiveness of coronavirus contact-tracing apps", August 23 2020, https://www.politico.eu/article/scientists-cast-doubt-on-the-effectiveness-of-contact-tracing-apps/ Accessed 12 September 2020.

[190] Zastrow M (2020) South Korea is reporting intimate details of COVID-19 cases: has it helped? https://www.nature.com/articles/d41586-020-00740-y Accessed 23 September 2020.

[191] *Ibid*.

[192] Kim, H.E., Coronavirus privacy: Are South Korea's alerts too revealing?, 5 March 2020, https://www.bbc.com/news/world-asia-51733145, Accessed 12 September.

[193] *Ibid*.

[194] European Data Protection Board Guidelines 04/2020 on the use of location data and contact tracing tools in the context of the COVID-19 outbreak, 21 April 2020. https://edpb.europa.eu/sites/edpb/files/files/file1/edpb_guidelines_20200420_contact_tracing_covid_with_annex_en.pdf

data through the app should not give possibility to single out the individual, (2) it should not be possible to link two or more data points about any surveilled individual, (3) inference with significant probability. EDPB also expressed their concern in these guidelines that the current legitimate need to collect location data to contain the spread of the disease and control the pandemic have a risk of giving too many possibilities to increased surveillance by governments, which should not be continued after the urgent need for collecting this data is lifted by the end of the pandemic.

The national supervisory authorities (data protection authorities) also have a strong position in assessing privacy risks under the GDPR. The Dutch Data Protection Authority raised their concerns about the vulnerability of the national contact tracing app emphasizing that further commitment from Apple and Google are required on safeguarding the collected large-scale sensitive data of the Dutch citizens[195].

Before the launching of the contact tracing apps, possibly due to the fact that their launch could not have been fast and that their use had to remain voluntary as advised by the EDPB to remain compliant with the GDPR, an alternative and manual solution for contact tracing was made mandatory by several EU countries. This included asking certain sectors, for examples restaurants to note down names and contact information of their customers. The French Data Protection Authority clarified with a recent guideline how the collection of this type of data is also subject to GDPR and therefore compliance is required with data subject's rights and processing principles such as data minimization, right to information, access, data retention period etc.[196] CNIL also declared their opinion on the French contact tracing app by in April and June 2020, stating that they support the application to use pseudonymized data and they made additional recommendations on further compliance with the GDPR, for example on limiting the data stored about the individual to 15 days as it is commonly known as the upper limit of risk of contamination[197].

Centralization or Decentralization?

In the peak of the pandemic, researchers were working on comparisons between centralized and decentralized models of gathering data[198] focusing on which model

[195] Autoriteit Persoonsgegevens, Dutch Data Protection Authority, DPA: Privacy of coronavirus app users not yet sufficiently guaranteed, 17 August 2020, https://autoriteitpersoonsgegevens.nl/en/news/dpa-privacy-coronavirus-app-users-not-yet-sufficiently-guaranteed, Accessed 17 September 2020.

[196] CNIL, French Data Protection Authority, COVID-19 et les cahiers de rappel : les recommandations de la CNIL, https://www.cnil.fr/fr/covid-19-et-les-cahiers-de-rappel-les-recommandations-de-la-cnil, Accessed 8 October 2020

[197] Deliberation N° 2020-056 from 25 May 2020 delivering an opinion on a draft decree relating to the mobile application known as "StopCovid" https://www.cnil.fr/sites/default/files/atoms/files/deliberation_ndeg_2020-056_from_25_may_2020_delivering_an_opin-ion_on_a_draft_decree_relating_to_the_mobile_application_known_as_stopcovid.pdf

[198] Fraser C, Abeler-Dorner L, Ferretti L, Parker M, Kendall M, Bonsall D (2020) Digital contact tracing: comparing the capabilities of centralized and decentral-

will protect individuals' privacy while serving the public interest in data gathering to control the spread of the disease.[199] A centralized approach allows all data to be kept centrally at a remote server and French contact tracing app follows this approach[200]. A decentralized contact tracing app, as it is accepted after long discussions by Germany, might provide better possibilities for safeguarding the anonymity of data subjects as the copies of data are not kept centrally therefore making it more difficult to reach all data points at once through a possible data breach[201].

Based on the decentralized model, the contact tracing app rolled out in Germany in June 2020 attempts to accommodate privacy concerns through the adoption of the following design features.[202] First, the real identities of the users are not exchanged, but only anonymized IDs, not stored centrally, but instead de-centrally on the respective smartphones. Exclusively the list of anonymized IDs of the infected individuals is kept on a central server. The identification and matching of users that were close to an infected user for a sufficient amount of time takes place solely on the individual smartphones. Third, the app does not record names, addresses or telephone numbers of users.

Different models of data storage and management for contact tracing apps, namely centralization or decentralization might create a potential issue of these apps not being interoperable. Given the frequent across national border visits of EU citizens, this might pose an obstacle for conducting contact tracing across the borders of EU countries and for having a unified EU approach to fight the pandemic through automated contact tracing.

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ized data architecture to effectively suppress the COVID-19 epidemic whilst maximizing freedom of movement and maintaining privacy. https://github.com/BDI-pathogens/covid-19_instant_tracing/blob/master/Centralised%20and%20decentralised%20systems%20for%20contact%20tracing.pdf Accessed 20 May 2020

[199] Criddle C and Kelion L (2020) Coronavirus contact-tracing: world split between two types of app. https://www.bbc.com/news/technology-52355028 Accessed 20 May 2020

[200] Osborne, C., France defends 'centralized' coronavirus tracing app, insists privacy held sacred, 19 May 2020, https://www.zdnet.com/article/france-defends-centralized-coronavirus-tracing-app-insists-privacy-held-sacred/, Accessed 12 September 2020.

[201] Busvine, D., Rinke, A. Germany flips to Apple-Google approach on smartphone contact tracing, 26 April 2020, https://www.reuters.com/article/us-health-coronavirus-europe-tech-idUSKCN22807J, 17 September 2020

[202] Federal Government of the Federal Republic of Germany (2020), press release on the "Introduction of the Corona-Warning-App" https://www.bundesregierung.de/breg-de/themen/coronavirus/veroeffentlichung-der-corona-warn-app-1760892 Accessed 17 June 2020

Other Developments

European Union

International Data Transfers after the Schrems II Decision

By Péter Tóth[*]

The European Court of Justice delivered a landmark data protection case on 16th July 2020: case C-311/18 ('**Schrems II decision**').

The decision concerns data transfers from the European Union[203] ('**EU**') to countries outside the EU and international organizations.

The judgement covers two key verdicts:

The Privacy Shield between the US and the EU:

The adequacy decision of the European Commission (EU) 2016/1250, establishing the so-called *Privacy Shield* framework allowing the transfer of personal data to US organizations from the EU is declared **invalid.**

The decision 2010/87/EU of the Commission (the 'SCC Decision'):

The Commission decision on the standard contractual clauses ('**SCCs**') for transferring personal data to third country data processors (data processors located in non-EU countries) is declared **valid**. However, the Court highlighted certain conditions to the transfer based on these SCCs that must be examined before transferring personal data to third countries, in order to ensure an adequate level of protection for personal data.

Background

The framework of the GDPR

Based on the GDPR (Regulation 2016/679 of the European Parliament and the Council on data protection), the transfer of personal data outside the EU is strictly regulated. Personal data may only be transferred to a third country or to an international organization if the protection of personal data is ensured after the transfer to an adequate level equivalent to that provided within the EU. Data controllers and data processors may establish the conditions for the legality of data transfers through various methods (adequacy decisions, SCCs, binding corporate rules, consent of the data subject etc.).

EU-US data transfer

In practice, the most widely applied legal basis for the transfer of personal data from

* This article has been edited and supervised by Ildiko Moricz (Associate at OPL) and Miklos Orban (Partner at OPL).
** The author is grateful to Dorottya Nagy for her excellent in-depth analysis and research on this topic. Dorottya is an intern at OPL who is finishing her legal studies at Pazmany Peter University, Budapest.

203 In practice, the decision also applies to EEA (European Economic Area) countries: Iceland, Lichtenstein, Norway. Therefore, when referring to the EU, these countries are also included.

the EU to the United States used to be the 'Privacy Shield' framework. The Privacy Shield provided for a mechanism to ensure an adequate level of protection for personal data transferred to the USA from the EU. The Privacy Shield replaced the earlier adequacy decision, the so-called 'Safe Harbor' (Commission Decision 2000/520/EC) after it had been declared invalid by the European Court of Justice in 2015 in Case C-362/14 ('**Schrems I. decision**').

The merits of the Schrems II case

Similarly to its predecessor, in the Schrems II case, the Court found that restrictions on the protection of personal data arising from US domestic regulations did not meet the essential requirements of the principle of proportionality set out by the EU. The basis of this statement is that the Privacy Shield expressed the primacy of US laws granting access to personal data to public bodies for the pursuit of national security measures, pubic interests or law enforcement requirements if prescribed by law, such as the Foreign Intelligence Surveillance Act ('**FISA**').

The Court's reasoning was that surveillance programs conducted by US authorities for national security purposes based on those regulations were not limited to what was strictly necessary and thus proportionate and that European citizens do not have access to appropriate remedies under US law, even considering the Ombudsperson Mechanism established by the Privacy Shield framework, which is incompatible with Articles 7, 8 and 47 of the Charter of Fundamental Rights of the European Union (the 'Charter'). Therefore, an adequate level of protection was not afforded to EU citizens.

In contrast, the Court declared that the SCC Decision establishing the possibility of controller-processor data transfers to third countries via the application of SCCs, is deemed to be valid despite the fact that SCCs are not binding on the public authorities of the data importers' countries. The Court argued that the SCC Decision itself does not declare the level of protection of personal data provided in a country to be adequate compared to that of the European Union in general. It only establishes a framework in which the data controller and the data processor must provide for adequate measures to provide such level of protection.

What the decision means in practice

Since the Privacy Shield may no longer serve as appropriate legal basis for the transfer of personal data across the Atlantic, data exporters must establish other means of data transfers from the EU to the US.

Applicability of SCCs

The Schrems II judgement also elaborates on the other significant means of data transfers to the USA, the applicability of the SCCs under the SCC Decision. As mentioned above, the Court declared the SCC Decision to be valid and applicable, however the Court emphasized that *"this validity depends, however, on whether […] such a standard clauses decision* *incorporated effective mechanisms that make it possible, in practice, to ensure compliance with the level of protection required by EU law and that transfers of personal data pursuant to the clauses of such a decision are suspended or prohibited in the event of the breach of such clauses or it being impossible to honor them."*[204]

This highlights several aspects and preconditions to applying the SCCs as a form of adequate protection of personal data in controller–processor data transfer relations, i.e. that data transfer based on the SCCs cannot be automatic, it must be preceded by deep scrutiny on the adequacy of the level of protection of personal data in every single case, taking into consideration all the relevant circumstances.

In terms of public authorities having access to personal data, the Court declared that in itself this may not be regarded as a factor not being in line with the standards of protection provided by the EU. However, data controllers and processors must thoroughly analyze the proportionality of such measures, i.e. whether public authorities are only allowed to have access to personal data in cases strictly necessary for the purpose specified by law, in this case national security, public interest and law enforcement of the US.

In this regard, the Court also stated that it is the duty of the data controller and the data processor established in a third country to examine the circumstances of the transfers and the appropriate level of protection of personal data prior to such transfers taking place. The Court declared that the recipient data processor is obliged to notify the data controller if it is unable to ensure an adequate level of security for the affected personal data being transferred.

Other legal bases of extra-EU data transfers

As mentioned above, there are a number of ways to provide for the legality of transferring personal data to third countries. Since the obligation to provide for adequate protection also forms the basis of all the means listed in Art. 46 of the GDPR, the Schrems II decision has also indirect effect on certification mechanisms and binding corporate rules (the latter being a commonly used method to facilitate intra-company group data transfers). The exceptions listed in Art. 49 of the GDPR (such as the data subjects' consent) may still be applied, however, data controllers must consider the findings of the Schrems II decision when assessing the risk of the data transfer.

Implications of the decision on future data transfers to third countries

Application of the SCCs

While the Court did not declare it explicitly when assessing the applicability of the SCCs, it can be challenging to prove adequacy of protection offered in the USA, as in cases where companies subject to state supervision legislation on data transfer, the level of protection which led the Court to eventually invalidate the Privacy Shield is also likely to be

[204] Para 137, Decision of the Court of Justice of the European Union C-311/18

insufficient under the general data protection provisions. However, the Court's wording suggests no intention to declare that the SCCs automatically cannot provide for adequate protection in countries covered by a no adequacy decision. Nonetheless, the ruling definitely calls for data controllers to exercise caution and more thorough scrutiny when opting for this measure in data transfer scenarios. This seems to be supported by the fact leaked from the Irish data protection authority (Data Protection Commission – '**DPC**')[205] that the DPC launched a case against Facebook Inc. and issued a preliminary decision instructing Facebook to stop transferring personal data to the US. While at this stage there is no public information available on the legal basis of the decision, it is highly likely that the DPC covers the data transfers on the basis of the SSCs as well. If this is the case, it is reasonable to expect that other data protection authorities ('**DPAs**') will act similarly, however, a case of this impact will highly likely result in communication or more detailed guidelines issued by the European Data Protection Board, in order to avoid a situation where different DPAs interpret the GDPR inconsistently which would only cause confusion and 'forum shopping' in a matter of high significance.

The Schrems II decision has indirect effect on the application of SCCs in general. Besides the direct effects we mentioned above (the data exporters' responsibility to assess the legal system of the country where data is exported), the Court's interpretation draws attention to foreign intelligence agencies' operations affecting data importers. That is, if the intelligence activity of the US reaches a level that can be disproportionate in the case of EU citizens (not having all the rights of US citizens) other countries' intelligence activity might also be an issue especially in cases where there is no adequacy decision in place, but a vast amount of data is transferred (such as the People's Republic of China). In such cases, data exporters will have to pay an increased level of attention when deciding whether to employ SCCs in a cross-border controller-processor relationships.

The future of adequacy decisions

The Court's decision might also question the applicability of other adequacy decisions and will probably heavily affect the European Commission's work with third countries when assessing their legal system before issuing an adequacy decision, forcing the Commission to exercise more caution and to enhance its efforts in uncovering how the given country's legal regime is applied in practice.

With 2021 approaching, this might also be an issue for the United Kingdom that will be deemed a third country under the GDPR and, therefore, data controllers will need to establish the legality of the data transfer where an adequacy decision would facilitate trade and data flows between the EU and the UK the most. However, the European Commission – being under pressure as a result of the Schrems II decision – will probably request information on the intelligence activities of

[205] At the time of writing this article, the Data Protection Commission has not officially declared that it launched a case against Facebook.

the UK, that in itself will probably slow down the acceptance of an adequacy decision. This might also be hindered by the fact that the Privacy Shield will continue to apply between the US and the UK even after the interim period – in which most EU laws and court decisions continue to apply – comes to an end after 31st December 2020.