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The Impact of Digitalisation on Liberal Professions

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## **PART I**

### **A BRIEF OVERVIEW OF DIGITALISATION**

#### **1. Scope and empirical background**

The last decade has been an important turning point for the digitalisation process, whose main impact has been in the most advanced countries (NCEL 2017) and it is reflected both in professions and employment. The impact carried by the current digital revolution is going to totally transform notions of time and space, as well as the fact that ways of accessing knowledge have been profoundly changed. (Michel Serres, *Petite Poucette*, Editions Le Pommier, 2012).

The most relevant causative factors, enabling digitalisation improvement, are both technological and economic and can be stated as follows:

1. Globalisation;
2. Demographic change;
3. The financial crisis which started during the first decade of the 2000s;
4. Technological Progress;
  - 1) Mass access to Internet;
  - 2) Diffusion of mobile technologies and smart devices;
  - 3) Development of ICT.

Digitalisation can be considered as a global phenomenon, whose socio-economic impact is being included in

current socio-economic literature, as well as at the institutional levels. Digitalisation has been transforming all segments of both society and the economy. It thus affects work and employment as well, as it can boost the quality of work and employment in Europe.

The European Union fostered professionals as an important point for the Union and for the achievement of its objectives under the Europe 2020 Strategy and invited Member States and the Commission, within their respective competences and in compliance with the principle of subsidiarity, to facilitate the provision of complete and accurate information to artists and cultural professionals wishing to practice mobility within the Union. Thus, the European Commission has been including digitalisation issues on its Agenda since 2015, with the Digital Single Market Strategy<sup>1</sup>.

The European institutions paid much attention to Human Capital, as a part and a driver of the wider Digital Economy and Industry Revolution. For this reason, a composite index – DESI – which summarises relevant indicators of Europe’s digital performance and tracks the progress of EU Member States in digital competitiveness has been launched.

The Digital Economy and Society Index (DESI) is one of 10 concrete actions included in the New Skills Agenda for Europe, which prioritises digital skills in all its actions. It relies upon five dimensions (Connectivity, Human Capital, Use of Internet Services, Integration of Digital Technology and Digital Public Services). Results in 2018 showed that Denmark, Sweden, Finland and the Netherlands have the most advanced digital

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1. COM (2015) 192 final, Digital Single Market Strategy for Europe, 6.5.2015, available at [www.europa.eu](http://www.europa.eu).

economies in the EU followed by Luxembourg, Ireland, the UK and Belgium.

Romania, Greece, Bulgaria and Italy have the lowest scores on the index.

Despite this gap, Internet access and usage have been increasing over the last two years. In 2017, 81% of Europeans used the internet at least weekly and about 72% daily or almost, compared, respectively, with 79% and 71% a year earlier.

Since 2016, the Commission has been seeking to further reduce the digital skills gaps by fostering the sharing, replication and upscaling of best practices in areas such as training and matching for digital jobs, certification and awareness raising. At the end of 2016, the Commission launched the Digital Skills and Jobs Coalition<sup>2</sup>, which brings together Member States and stakeholders from the private and public sectors to develop a large digital talent pool and ensure that Europe’s citizens and labour force are equipped with adequate digital skills.

In 2018, the pilot Digital Opportunity Traineeship was launched to help young people improve their digital skills and consider a career in the digital sector between 2018 and 2020<sup>3</sup>.

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2. The Digital Skills and Jobs Coalition brings together Member States, companies, social partners, non-profit organisations and education providers, who take action to tackle the lack of digital skills in Europe. <https://ec.europa.eu/digital-single-market/en/digital-skills-jobs-coalition>.

3. The pilot project is financed by Horizon 2020 and implemented through Erasmus+. The trainees receive an allowance for 2-12 months, in line with Erasmus+ rules and procedures: <https://ec.europa.eu/digital-single-market/en/digital-opportunity-traineeships-boosting-digital-skills-job>.

European policies aimed at making individuals acquire appropriate e-skills and ICT professionalism, using a common language for competences, skills and capability levels that can be understood across Europe (European E-competences Framework 3.0)<sup>4</sup>.

Information and communication technologies (ICT) are driving major transformations. They have played a crucial role: the convergence between information technology and communication technologies has characterized the digital age.

Beside these factors, the digitalisation process has been carried out by the development of emergent innovations. Robotics and Automation, together with Artificial Intelligence and Machine learning, Additive Manufacturing, and Blockchain constitute concrete examples. Furthermore, Big Data Analysis and Robotization are enforcing the automation and substitution of the human workforce in areas such as logistics, paralegal contract law, patent law tasks, accountancy, transport, manufacturing work, housekeeping, healthcare, as well as some highly-skilled medical tasks, just to name a few (Pérez Alonso and Frutos Rodríguez, 2017). In contrast, tasks with a high demand in creativity (e.g. industrial design), social intelligence (e.g. negotiations), perception and manipulation (e.g. surgery) run a low risk of being automated. However, many jobs as we know them today will disappear or change dramatically, as new and more advanced skills profiles are required.

As a consequence, it has brought with it new products, services, professions and skills markets, by stimulating

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4. [http://www.ecompetences.eu/wp-content/uploads/2014/02/European-e-Competence-Framework-3.0\\_CEN\\_CWA\\_16234-1\\_2014.pdf](http://www.ecompetences.eu/wp-content/uploads/2014/02/European-e-Competence-Framework-3.0_CEN_CWA_16234-1_2014.pdf).

the creation of new occupations and new industry sub-segments, as well as improving the outputs of the working environment. Moreover, these changes are happening faster than previously predicted<sup>5</sup>.

This research study looks at the issue of digitalisation and its impact on Professions. Digitalisation encompasses a number of diverse but complementary technological developments. By “digitalisation of professions” we mean any technological development, which leads to a demand for both new professional skills and the digitalization of jobs traditionally done by the workforce. The role of professions - both regulated and not - has been impacted by the Internet, online services and other technological means. It is thus changing occupations, as well as the organisation of work; furthermore, its adoption and impact on the workforce is a key subject across both the public and private sectors.

According to Eurostat data, the number of professionals has increased during the last decade in Europe and Italy is at the top of the graduation score for the percentage of professions. The medical, legal and administrative professionals represent the driving sector of the liberal professions in Italy: they constitute, in fact, almost 1/3 of the professional universe. In particular, the number of lawyers is close to 200 thousand, there are about 139 thousand doctors, while company consultants amount to 119 thousand. They are followed by architects (95 thousand), engineers (73 thousand) and psychologists (55 thousand). Agronomists and notaries closed the ranking respectively with 6 thousand and 4 thousand professionals.

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5. <https://www.idc.com/>

## **2. The transformation of professions due to the Fourth Industrial Revolution (4.0)**

The present section explores the role of the Fourth Industrial Revolution in transforming the labour market, leading to a demand for new professional skills and the digitalizing of jobs done traditionally by the workforce. As mentioned above, the phenomenon of Digitalisation rapidly increased in recent years. It encompassed a score of different, almost complementary, technological developments, which have been placed under the label of “Fourth Industrial Revolution”. This new revolution of economy and work follows the changes that have taken place since the 1970s through the introduction of electronics and information technology, driving new levels of automation of complex tasks and processes (automation and robotisation) which characterised the Third Industrial Revolution.

The term “Industry 4.0” (although the versions and content of the definitions are so numerous that it is impossible to identify it with a single concept) is used to refer to a fourth industrial revolution<sup>6</sup>, which is considered as an evolution of

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6. The Industrial Revolution process began in Britain in the early 18th century. It was aimed at attending a transition from an artisan manufacture production to a factory system. In the course of time, three stages occurred. The first Industrial Revolution used water and steam power to mechanize production. The second used electrical power to create mass production. The third used electronics and information technology to automate production.

the Third Industrial Revolution, with the adoption of computers and automation and enhancing it with smart and autonomous systems fuelled by data and machine learning. However, Industry 4.0, unlike the previous industrial revolution in which technology was added to man to improve and make human activities more productive, is proposed as a paradigm that, although in part, is not limited to side by side but which instead, for some activities, replaces man. Many commentators are increasingly talking about the potential impact on lifestyle and working conditions. Digitalisation transforms existing jobs, demanding new skills to carry out new tasks, which may imply that the current work force has to be retrained or replaced by workers who already have these skills. Digitalisation gives rise to new jobs, while making others redundant. These dynamics are not new. There are many examples of how new technologies, like steam engines and electricity, have shaken up the world of work before. In the past, technological progress initially led to a contraction of labour demand before it then started to generate new jobs. ICTs are playing an important role in the qualitative/quantitative improvement of efficiency, by increasing labour productivity of more goods and services with less labour. Thus, it leads to the possibility of technological unemployment, especially for routine and manual tasks (OECD, 2013).

At the same time, innovation creates new employment opportunities in different industries and in newly-created markets for workers in high-skilled, non-routine jobs. These jobs often involve tasks such as working with new information, interpersonal skills and solving unstructured problems.

This is the time of Smart Working, a new Management paradigm that advocates for the granting of greater au-

onomy and flexibility to the employee, in choosing the time, place and way of work, as a counterpart of greater accountability for results. Its central element is the appreciation of the person and the promotion of a work-life balance. To summarise, findings suggest that<sup>7</sup>:

- The technological change is one of the processing drivers, along with demographic and climate change and globalization.
- Digitization and automation are investing and radically transforming all domains of the economy: production, consumption, transport and communication
- Technological change is not neutral.
  1. The socio-economic context influences the emergence of new features and technologies changing the development mode
  2. Innovations can lead the system down different trajectories depending on the balance of power, structural characteristics and nature of the institutions.
- Non-neutrality brings out the key role of economic policy. To maximize opportunity (and associated benefits) and minimize social costs of technological transformation, it is crucial to govern the change through a broad and decisive plan of economic and social policy.

From a legal perspective, the transformation of the industrial framework has been joined, in recent years, by the liberalization of telecommunications and the massive dissemination of the Internet: thus, giving birth to the so-called “information society”. This finds its root in the sociological concept of “post-in-

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7. D. Guarascio e S. Sacchi, “Digitalizzazione, automazione e futuro del lavoro”, INAPP 2017.

dustrial society” (Daniel Bell1973)<sup>8</sup>. This term introduces a new paradigm for the allocation of resources in the process of industrialization; actually, it induces concentration of its own efforts no longer towards the production of material goods, but of services. In other words, the 21<sup>st</sup> century is now delivering a new paradigm, which stands for the shift from physical – which characterized the first and the second industrial revolution – to intangible assets.

As a consequence, the information society represents the importance and the power of information and services; thus, imposes the development of incremental knowledge and the expansion of continuing education. The most important implementation falls into the development of Information society services: pursuant to Directive 98 / 34 / EC of the European Parliament and of the Council of 22 June 1998, Information society services shall indicate those services provided “for remuneration at a distance, by electronic means, by means of electronic data processing and storage equipment, and at the individual request of a recipient”.

This new evolution of trades, together with the raising of the digital economy, constitutes a new benchmark for professions and professional firms as a whole. As a consequence, a new approach is required from professions, who should think in a different way and adopt a different approach. In particular, a new trend inspired by entrepreneurship, which makes each profession’s relevant market more dynamic, going beyond the pro-

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8. D. Bell, The Coming of Post-Industrial Society, 1976.

visions of the latest Community directives on mutual recognition of professional qualifications<sup>9</sup>.

In this regard, the professional driver has been turned into a dynamic market – based one: this means that the focal point is not just the professional skills and the core professional performance, but the way to provide more attractive and useful services for the clients. Technology can thus help professional firms – especially those belonging to the legal and accounting areas – to provide additional services (joining other professional features), as well as more precise and effective solutions (for example, investing in the artificial intelligence to speed the activities of inquiry, to understand better the behaviours of the counterparts and to elaborate suitable strategies in the debates).

In this regard, Industry 4.0 paradigm generated Professionals 4.0, whose professional activities are more dynamic and more competitive.

## References

M. BIAGI, *Quality of Work, Industrial Relations and Employee Involvement in Europe: Thinking the Unthinkable?*, in *Quality of Work and Employee Involvement in Europe*, M. BIAGI, Kluwer Law International, 2002, pp. 3 ss.

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9. Directive 2005/36/EC of the European Parliament and of the Council of 7 September 2005 on the recognition of professional qualifications, <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32005L0036>. A. Poggi, La riforma delle professioni in Italia: sollecitazioni europee e resistenze interne (doi: 10.1443/30051), *Le Regioni* 2/2009, pp.359 ss.

## 3. The taxonomy of the effects of digitalisation

The debate on the effects of digitalisation on Professions cannot be confined merely to the impact on the number of jobs and on skills. As mentioned above, the digitalisation has given birth to new forms of professions.

In particular, its effects can be observed by a double perspective.

- In terms of technology, Digitalisation produced new profiles of ICT professions, while causing significant restructuring of existing sectors;
- In terms of Professional Requirements, Digitalisation improves the development of unprofessional workers.

The Digitalisation produced new technological products and services. This requires new features with specific skills and competence. In this sense, the Digitalisation can be conceived as an enabler of new forms of work.

However, even though a huge amount of these new professions constitutes new opportunities for the labour market, they still escape traditional professional associations. As an example, it is not necessary for a Data Protection Officer to register in any professional body.

At the same time, since this new profession does not require a formal degree or membership of a body, but instead concrete skills, it could be a chance for professional features to increase their competences and

businesses, abilities and skills. Furthermore, it could be a chance to be more specialized for both scientific and humanistic professions.

#### 4. The Digitalisation of Professions

The term “digital” lacks a common and unique definition: it historically referred to the use of numerical digits. In information technology and telecommunications, it refers to the representation of information or physical quantities using characters, such as digits, or discrete-value signals. Digital also refers to systems and mechanisms or processes using this mode of discrete representation, as opposed to analogue.

Digitalisation has had truly disruptive effects on liberal professional work, even if it has penetrated more slowly than in other productive sectors. However, it did not spread homogeneously, due to the peculiarity of each sector (professions belonging to the technical and economic areas feel more confident), as well as the general consciousness regarding the potential coming from innovation.

The digitalisation of professions can be firstly considered as a direct consequence of the current socio-economic conditions. As a matter of fact, digital technologies are permeating all aspects of life, bringing someone to claim that life and work are taking place in *code/space* (Kitchin and Dodge, 2011). Besides, demographic shifts and globalisation can be considered as causative in the change of the nature of work and careers.

Digitalisation is assuming its physiognomy with very specific features. It thus induces the transformation of an array of professional landscapes and the world of

work, by redefining the boundaries of services provided, as well as professional identity and expertise. In this regard, it affects both the subject (the service provided) and the subjective professional requirements.

#### 4.1 The Impact of Technology on Professional Firms' Profitability

Even if digitalisation is a wider concept, which is beginning to diffuse all its hidden potential, professions have been quite keen on technology for decades<sup>10</sup>.

Actually, since the first introduction of the personal computer in the early 1980s for some professional associations (for example, accountants), professional firms have seen a steady, significant improvement in their efficiency in providing services to their clients and managing their firms because of these tools.

Email applications were the first technological way to improve efficiencies in the areas of communication and collaboration. Everyone in firms uses email to communicate internally as well as externally. Also, it is becoming increasingly common for firm members to be able to receive their emails from any location using remote access via the Internet or via smart phones and other PDA devices.

In this regard, the impact of technology of professional firms can be considered driven by quite exogenous conditions:

- Legal obligations have constrained professionals to conform to legal prescriptions. This is truly clear

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10. Jon E. Klemens, Future of Technology in Law Firms, Law Office Automation ABA Journal, Vol. 75, Issue 7 (July 1989), pp. 82-87.

for the legal sector, because of the mandatory use of telematics;

- Sometimes the innovation of professionals is caused by the digitalisation of Public Administration: thus, professionals must provide adequate means to communicate with the Public Administration, as well as to fulfil the obligations in digital format as required by law;
- More generally, the digitalisation of professions reflects social innovation. The new 4.0 era pays more attention to on-demand, thus professionals must conform their services to general needs.

The main effects of Digitalisation upon professional firms and services provided are:

- Dematerialisation of traditional physical assets;
- Deterritorialisation of services provided or resources;
- Flexibility of working hours and places.

Professions may be impacted by just one of these features (e.g. the E-invoicing for accountants), but a profusion of all these can be made, since each feature can be strictly tied, as a consequence, to each other. For example, the deterritorialisation usually justifies working flexibility.

Moreover, it boosts the European Institutions to reflect further on the reform of professional services<sup>11</sup>.

In this regard, the Digitalisation process, enacted by technological feasibility:

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11. Recently the European Parliament resolution of 18 January 2018 on the implementation of Directive 2005/36/EC as regards regulation and the need for reform in professional services (2017/2073(INI)) (2018/C 458/08), P8\_TA(2018)0019, Implementation of the Professional Qualifications Directive and the need for reform in professional services, <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52018IP0019&from=IT>.

- can make professional firms more efficient, due to the amount of time and effort saved: by, for example, being able to dash off a quick e-mail, find information online or take a deposition or speak with a consultant by videoconference.
- can put professional firms belonging to the same sector on a level playing field: individual and small firms that are technologically savvy are better equipped than ever to compete with firms of any size.
- requires new skills and knowledge for each sector, due to the technological feasibility.
- increases the speed of practice: information now moves instantaneously, and professionals are expected to assimilate, analyse and respond in real time.
- increases competition: since digitalisation has created new digital markets, small professional firms can compete successfully online, providing their services in real time.
- contributes to diminished professionalism: this does not just include the absence of the appropriate legal qualification to practice; it goes far beyond, dealing with human contact and relations with other colleagues.

To sum up, Digitalisation has created great opportunities, but has also brought with it tremendous challenges. Some examples of opportunities or advantages can be listed, adopting both professionals and work organizations as an objective point of observation.

Professionals and work organizations can take advantages in terms of:

- democratization of expertise;
- creation of new professional profiles;
- flexibility about times and locations of work, as smart working;
- more affordable costs to acquire skills;

- the rise of new forms of work organizations, as co-working, crowd-working, pooling-sources, thanks to network contracts or professional companies.

However, these opportunities come with risks attached. Digitalisation can thus create threats and challenges:

- This is due to the general disruptive attitude of technologies, which remove traditional schemes of intermediation and profiles. For example, the demand for routine and manual tasks is decreasing, while demand for low- and high-skilled tasks and for problem-solving and interpersonal skills is increasing.
- It is also driving a re-examination of the concept of professional identity and related claims of expertise and standards of integrity;
- It raises questions about technology's potential to substitute work. According to various estimates<sup>12</sup>, roughly 50 % of today's jobs are at risk of being replaced by digital technology in the next 20 years. At a macro level, this has led to a declining demand for labour in traditional industries, with a lower share of GDP going to labour<sup>13</sup>.

As a matter of fact, the new capabilities of digital technologies allow for the automation of ever more tasks and occupations (e.g. the self-driving car, the Internet

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12. J. Bowles, *The computerisation of European jobs — who will win and who will lose from the impact of new technology on old areas of employment?*, 2014; *The computerisation of European jobs*, C. M. Frey, M. Osborne, *The future of employment: How susceptible are jobs to computerisation?*, 2013; Pajarinen, M., Rouvinen, P., Ekeland, A., *Computerization Threatens One Third of Finnish and Norwegian Employment*, ETLA, 2015.

13. G.e, for instance, Brynjolffson and McAfee (2014): *The Second Machine Age*, New York, W.W. Norton & Company, Ch. 11.

of Things, Industry 4.0)<sup>14</sup>. Additionally, digital technologies are leading to drastic reductions in search and transaction costs and thus enabling the development of entirely new and highly-scalable business models in services (e.g. online marketplaces and platforms including the so-called sharing economy, e.g. Uber, Airbnb).

In conclusion, even if digitalisation can be considered an enabler, its impacts can be also disruptive. Digitalisation is certainly one of the most dynamic developments of our age, in which opportunities and risks are closely intertwined and counterbalanced.

The regulation of professional services is a prerogative of the Member States, whose aim is to ensure the protection of general interest objectives.

The way each Member State decides to regulate a profession stems from a number of factors recently listed by the European Commission<sup>15</sup>:

- the importance that society puts on specific general interest objectives to be protected;
- the efficiency of different administrative and judicial supervisory arrangements;
- economic situations;

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14. This key point has been already pointed out by the European Economic and Social Committee in its Opinion on “The effects of digitalisation on the services sector and employment in relation to industrial change”, (2016/C 013/24), available at <https://eur-lex.europa.eu/legalcontent/EN/TXT/PDF/?uri=CELEX:52015AE0765&qid=1547660582659&from=IT>.

15. European Commission, COM(2016) 820 final Communication from The Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on reform recommendations for regulation in professional services, {SWD(2016) 436 final}, <https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52016DC0820&from=IT>.

- the relative economic importance of the sector for the country in question and the strength of vested interests.

Professionals and professional services are considered as a key sector of the European market economy. This is the reason why European Institutions have recently proposed some Guidelines for the Lisbon Strategy, in order to stimulate greater modernization and internationalization of the sector. The action is twofold, and it aims at fostering competition but also improving fundamental relevant rights established by the Treaty:

- It stimulates Member States and representative bodies of professionals to reconsider the high level of regulation in order to break down unjustified constraints on competition, thereby fostering development, quality and occupation of the sector;
- It promotes professionals and services movement among member countries, through the improvement of general principles about the mutual recognition of professional qualifications, to complete the construction of the European single market.



Professions are gradually paying attention to technological development, as a functional tool to improve productivity, reducing the time required to perform certain tasks, increasing the automation of data acquisition and document management, including e-mail, and encouraging flexible work.

In this regard, technology is firstly aimed at the improvement of internal efficiency; secondly, it aims to improve customer relations.

This trend has been on the rise since 2016.

Information technologies are supporting the development of Italian and, more generally, European professional firms, which are investing more and more in ICT. However, sometimes the strategic choices do not perfectly reflect actual needs, so the benefits perceived by some firms are still modest. Of course, the adoption of new technological tools is facilitating the evolution of new organizational models, which highlights the importance of

work tools on the move and the cloud, perceived as an organizational lever before technology. Social networks and online consultancy are increasingly growing and integrating the service offer. 2016 is the year of maturity for ICT investments made by Italian professional firms, as a strategic lever to improve organization and market positioning. Hence the numerous innovative projects to improve efficiency and - in the most advanced cases - customer relations and the ability to provide services.

In 2017, the ICT technology costs of Italian lawyers, accountants and labour consultants reached 1.172 million, 2.6% more than in 2016, however these numbers are destined to grow even in the current year thanks an expenditure forecast of 1.217 million and an estimated increase of 3.8 percent.

In many cases, the increase in spending is mainly driven by investments to adapt to regulatory obligations. The most adopted technologies are digital signature, cloud computing, electronic invoicing and video calling software. Artificial Intelligence and Business Intelligence are still a minority.

The improvement of technologies in professional firms can cause:

- New partnership among professional firms of the same sector, as well as belonging to different areas of interests;
- Moreover, technology requires appropriate skills for its correct use. This duty covers professionals as well as their employees. In this regard, professionals more often make use of new ICT professionals, especially for security issues; in some other cases, for data analysis and website development.

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## 5. The platform revolution: towards the denial of professionalism in non-ICT professions

During the last decade the platform revolution has been deploying the mayor part of all its hidden potential. The way Platform revolution can involve professions is twofold:

- It gives them access to useful services to improve their work, as well as their profitability;
- They can provide their services online, expanding their opportunities to collect custom.

To some extent, however, the platform revolution gives birth to unprofessionalism.

### 5.1 The platform as a useful service for professions

Professionals benefit from the Platform revolution due to helpful services which make work more efficient. Platforms can provide services for storage (such as Cloud Computing or Blockchain) or fulfilment of obligations (for lawyers or consultants) and moreover, can optimize working timetables by reducing red-tape activities which deject the core of each profession.

Thus, creating a digital ecosystem where it is possible to manage schedules for every collateral activity, such as accounting, budgeting, declarations, study management or electronic invoicing.

Moreover, platform access allows daily use on every device, without any particular ability for special training, because of the intuitive nature of the software.

To summarize, platform services can improve workload both qualitatively and quantitatively, as well as in the time that must be reserved for each client, because:

- the Professional doesn't own the assets;
- Access to services can be paid per use;
- They foster work flexibility.

In addition, some platforms provide other activities in addition to their main core services. This is quite common in the case of Data Management and Analysis. Data collected under the Provisions of Privacy Law can be analysed by Artificial Intelligence engines and structured with the help of Machine Learning models. Results will constitute the analytical basis for the increase in value of professional activities.

Apart from these services, a very sensitive area such as that of relations with the public administration has been seriously impacted.

## 5.2 Platforms as a new market for professionals. The on-demand economy

In the on-demand economy, virtual work is more flexible by design, i.e. the online labour market. This flexibility fades significantly when services have to be delivered physically and locally, e.g. the local labour market. The relationship between online platforms and individuals who offer their skills and time online has been the subject of widespread debate, though no

clear-cut answer has been put forward in most cases<sup>16</sup>. Currently, the Platform economy has been creating online marketplaces. In this regard, professionals and professional firms can benefit by offering their skills and services online. This makes users feel more confident: the technological means promotes more anonymity for the user, who feels less bound. Moreover, users can benefit from online services because they can choose the most suitable provider due to the cheaper or better quotation required of each professional.

Actually, all professionals can benefit from their online presence. Platform can be firstly used as a simple communication channel: in this case, the main service entails deals with consulting.

Apart from this, another growing trend deals with online start-ups that offer professional services online. This is more frequent for legal professions, since so called "*legal-tech start-ups*" are spreading in Europe (this initiative is not very successful in Italy). Generally, these initiatives get their inspiration from the users' proactivity: as a matter of fact, the new Information Society makes users more independent and creates self-made services: they scrutinize online services and solutions to their requests before choosing or referring to offline services. One of the main reasons is the willingness to save money or reduce outgoings; in this regard, they prefer to invest time by providing themselves with appropriate solutions.

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16. A. Bruck, A. Canter, *Supply, Demand, and the Changing Economics of Large Law Firms*, 60 Stan. L. Rev. 2087 (2008).

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### 5.3 Platforms as an enabler of unprofessionalism in the Gig-economy era

On a socio-economic level, the Platform Economy has blurred the lines of ordinary features, giving rise to a new consciousness and a proactive role towards the individuals. Since users are currently focusing their attention on the concrete result, trusting online platform contents and reliability, they sometimes prefer to choose affordable, but sometimes unprofessional, services.

### 5.3.1 The impact of disintermediation on professions: The case of journalism

One of the main major consequences of the platform revolution affects journalism. Literature has always stated that the development of new media would continue to change the way information flows from information producers to consumers<sup>17</sup>. The journalism sector is facing all the complexity of the news production process: the convergence and divergence of blogging from traditional journalism, the relationship of citizens emerging as producers of journalism, the role of journalism in the new media landscape, and the growing influence of blogs on users. The development of new communication technology affords the opportunity to consider how new technology will influence the practices of journalism. The datafication, together with the development of the platform economy and social networks<sup>18</sup>, enabled a *disintermediation* trend of data and information shared and produced, together with a participatory attitude towards the communication process. As a result, massification does not represent an improvement of the quality of information published<sup>19</sup>; it creates non-professionals (such as *freelancers*) to write about issues without having the appropriate qualification to do so. As a consequence, the whole information sector is experiencing a

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17. J. H. McManus, (1994) *Market-driven journalism: Let the citizen beware?* Thousand Oaks, CA: Sage 1994.

18. A. Hermida, *TWITTERING THE NEWS. The emergence of ambient journalism*, Journal of Journalism Practice, Volume 4, 2010 - Issue 3, pp. 297 ss., <https://doi.org/10.1080/17512781003640703>.

19. J. Hardwig, *The Role of Trust in Knowledge*, Journal of Philosophy 88 (1991): 693; K. Hawley, *Trust: A Very Short Introduction* (Oxford: Oxford University Press, 2012), 21-45.

phase of deep crisis. This problematic period has already started with the digitalisation of newspapers, which has involved a gradual decline of demand in the printed paper sector, combined with the growing weakening of local broadcasting (especially television), in part due to the collapse of advertising investments, and in part to the pulverization of the productive structures.

To sum up, the situation in the digital field is still very confusing. The rapid deployment of online navigation devices increases the possibilities of access to news by Internet users and, at the same time, has generated an evolution in the mode of supply, to the point that the device itself can be figured as a true and proper means of communication. Media now extend beyond the professionals<sup>20</sup>: mainstream newsrooms of a pre-digital era to citizen-based online journalism; social media networks, and news websites operated by non-professional groups are growing<sup>21</sup>. The universe of the media that surrounds users is redolent with fake news, which alternate facts, and are often anonymous or working through social media<sup>22</sup>.

The publishing crisis described above affects the journalistic profession. Changing technology influences journalism in at least four broad areas<sup>23</sup>:

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20. Albarran, A. B. (2001, April 21). *An overview of electronic media management challenges for the 21st century*. Presentation at the Broadcast Education Association Conference, Las Vegas, NV.

21. Elisia L. Cohen, *Inline Journalism as Market-Driven Journalism*, 46 J. Broad. & Elec. Media 532 (2002).

22. Stephen J. A. Ward, *Digital Reliance: Public Confidence in Media in Digital Era*, 18 Geo. J. Int'l Aff. 3 (2017).

23. J. Pavlik, *The Impact of Technology on Journalism*, Journal of Journalism Studies, Volume 1, 2000 - Issue 2, pp. 229 ss., <https://doi.org/10.1080/14616700050028226>.

1. how journalists do their work;
2. the content of news;
3. the structure or organization of the newsroom;
4. the relationships between or among news organizations, journalists and their many publics.

The structural transformation of the information ecosystem undermines the role and the culture of professional journalism and the trust of citizens towards professional information. To the risks that the processes of disintermediation involve more and more accentuated are the industrial choices to cut the editorial offices, which become flexible and are often populated by precarious and not fully trained collaborators, which puts the quality of journalism produced increasingly at risk<sup>24</sup>.

#### **5.4 The rise of new occupation: the birth of ICT professions; the family tree of ICT professions pursuant to UNI EN 16234-1**

As ICT is developing rapidly, digital skills are increasingly becoming important together with the need to be constantly updated. In addition, the development of e-business is increasing in demand for individuals with creativity, innovation and higher-level conceptual skills. Digitalisation has been creating new professional profiles, intimately tied to ICT management;

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24. B. Franklin, *The Future of Journalism. In an age of digital media and economic uncertainty*, Journal Journalism Studies, Volume 15, 2014 - Issue 5, pp. 481 ss., <https://doi.org/10.1080/1461670X.2014.930254>.

these profiles can be considered strategic for ordinary professional firms<sup>25</sup>.

In order to ensure homogeneity in the European framework, the attention of European Institutions has recently increased. As a matter of fact, the CEN Workshop Agreement (CWA) Part 1 provides 30 European ICT Professional Role Profile Full Descriptions<sup>26</sup>, in order to make a key contribution to increased transparency and convergence of the European ICT Skills landscape and to maturing the ICT Profession overall. The Workshop Agreement is firstly focused upon individual ICT professional competence and performance; besides, the overall aim is to influence the ability of organisations to leverage ICT for better performance. In this regard, the e-Competence Framework (UNI EN 16234-1) is structured in four dimensions which reflect different levels of business and human resource planning requirements and incorporate guidelines for the definition of work skill levels.

The UNI EN 16234-1 standard provides a reference of 40 skills required and practiced in the working environment of Information and Communication Technologies (ICT). Among them, the use of a shared language to describe skills, skills and levels of proficiency, making it easily understandable throughout Europe. The standard provides a shared language for the description of the competences of ICT professionals, professions and organizations, and is designed to meet the needs of businesses and other organizations in the public and private sectors.

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25. Andrea M Matwyshyn, *Silicon Ceilings: Information Technology Equity, the Digital Divide and the Gender Gap among Information Technology Professionals*, Northwestern Journal of Technology and Intellectual Property, Vol. 2, Issue 1 (Fall 2003), pp. 35-75.

26. [http://www.ecompetences.eu/wp-content/uploads/2018/05/CWA\\_Part\\_1\\_EU\\_ICT\\_PROFESSIONAL\\_ROLE\\_PROFILES.pdf](http://www.ecompetences.eu/wp-content/uploads/2018/05/CWA_Part_1_EU_ICT_PROFESSIONAL_ROLE_PROFILES.pdf).

The UNI EN 16234-1 standard can be a useful tool for professionals and professional firms that would recruit an ICT professional: the standard, indeed, offers a clear definition and a safe guide to support decisions both in the selection and recruitment process of candidates, and in the assessment and training of ICT professionals. Thus, it makes it possible to identify the skills and competences that may be required to correctly perform a task within the scope of an assigned responsibility. Its widespread adoption by European companies and organizations will increase transparency, mobility and efficiency in the management of human resources in the ICT sector.

## 6. Towards a legal framework

The current legal framework does not focus its attention on digitalisation of professions as a whole; nevertheless, the legal background can be traced by analysing and collecting all legal initiatives towards ICT development. At the moment, there is no authoritative source within the EU that defines and organises the core knowledge of the ICT discipline. In this regard, the focus should also encompass Data Protection Law, as well as statutory law regarding the professional organizations.

Actually, since 2013 professionals have been able to join in order to share their knowledge, skills, activities, as well as their technological assets.

The main items through professionals belonging to professional bodies are:

- Companies;
- Network contracts.

A company of professionals is a company formed according to any of the permitted corporate models that has as its purpose the exercising of one or more professional activities. The firm of professionals can be:

- mono-disciplinary: if the corporate purpose provides for the exercising of a single professional activity;
- multi-disciplinary: if the corporate purpose provides for the exercising of several professional activities.

This organization appears functional to both combining acquired professionalism and technological and entrepreneurial development, as well as embodying

principles of the Industry 4.0 revolution. However, this trend does not strictly belong to the Italian professional culture, where the professional practice carried out at already organised studios is considered as a phase of transition, preparatory to the future start-up of one's own practice. Moreover, Italian professionals are not used to joining together<sup>27</sup>.

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27. Politecnico of Milan, "Professionista, oggi apriresti uno studio?", February 2016; R. Magliulo, "Professionisti italiani, prevale la voglia di autonomia", 2016.

## **PART II**

### **ARTIFICIAL INTELLIGENCE: THE IMPACT ON PROFESSIONS AND EMPLOYMENT**

#### **1. Introduction**

Professionals are progressively using and managing technology in order to be aligned with legal obligations, as well as to enhance their competitiveness on the market in terms of better quality of work and services provided. Professionals often resort to technologies as a chance to make some routine tasks easier, or to optimize working time.

While some technologically useful tools such as cloud computing or blockchain allow professionals and their firms to lay down the appropriate conditions for flexible work, Artificial Intelligence is a strong complementary tool for professionals. However, as mentioned above, Artificial Intelligence cannot be considered the most important technological investment done by professionals<sup>28</sup>. Like Big Data Management, the diffusion of Artificial Intelligence fosters the creation of new professional profiles, such as:

- The machine-learning engineer;
- The data scientist;
- The big data developer.

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28. Politecnico of Milan, 2017.

The strongest debate that has arisen regarding Artificial Intelligence addresses the risks of workforce loss, since it could replace the human workforce. In this regard, it can be considered as a long-lasting debate. As a matter of fact, automation is not a new phenomenon, and questions on its promise and effects have long accompanied its advances. Due to several concerns raised towards its potential, Artificial Intelligence can be considered as a fashionable label which deals with - to cite some - lay-people, politicians, philosophers, entrepreneurs and professional lobbyists.

## **2. Artificial Intelligence principles: towards human-machine interaction and integration**

Artificial intelligence is the next and new frontier of computer systems, which are able to perform tasks that normally require human intelligence<sup>29</sup>.

Usually named with the acronym “AI”, it refers to systems which are able to display intelligent behaviour: they can analyse their environment and take action - with some degree of autonomy - to achieve specific goals. Artificial Intelligence allows machines to think and to act humanly and rationally. To a common observer their performances appear to be of exclusive pertinence of the natural (human) intelligence.

Systems can be firstly software-based: in this case, they act in the virtual world; the most frequent applications deal with voice assistants, image analysis software, search engines, speech and face or biometric recognition. Apart from that, they can be embedded in hardware devices, such as advanced robots, autonomous cars and drones, as well as other Internet of Things applications.

However, these are just exemplary fields of applications. Currently, Artificial Intelligence is used on a wide array of daily uses, e.g. to translate languages, generate subtitles in videos or to block email spam. The extent could also be improved more and more, especially in the case of machine learning or to the synergies with the natural intelligence.

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29. Deloitte Centre for Government Insight, 2017.

Software	Hardware
voice assistants	advanced robots,
image analysis software	Self- driving cars
human recognition	autonomous drones
Translation	
Select email spam	
search engines	

Table 2 AI Application

Artificial Intelligence is considered one of the most strategic technologies of the 21st century<sup>30</sup>. It aims at making computers and information systems more intelligent, so they can solve complex problems and provide more natural and effective services to human beings. AI has been a source of innovative ideas and techniques in computer science and has been widely applied to many information systems.

The development of Artificial Intelligence is linked to the use of Big Data, which can also play an important role by improving AI technologies. Once they perform well, they can help improve and automate decision-making

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30. This assumption has been quite clear to European Commission. It said in its Communication upon Artificial Intelligence that “*Like the steam engine or electricity in the past, AI is transforming our world, our society and our industry*”: 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, *Artificial Intelligence for Europe* {SWD(2018) 137 final}, available at <https://ec.europa.eu/transparency/regdoc/rep/1/2018/EN/COM-2018-237-F1-EN-MAIN-PART-1.PDF>.

in the same domain. For example, an AI system will be trained and then used to spot cyberattacks on the basis of data from the concerned network or system. Big data is a widely used, if problematic, term that refers to various types of data sets collected in massive volume at high velocity that tend to be exhaustive in scope, use very fine-grained resolution, and combine wide-ranging types and contexts of data (Kitchin, 2013). What marks their increased role in professional practice are their digital forms and the capacity for them to be searched, sorted and analysed digitally by the algorithms of software code (Halford et al., 2012). The results are ever-expanding masses of data and database formats that can be manipulated to produce measures of performance, analytics to predict behaviours and actions, and capacity for automated decision-making.

Artificial Intelligence is an umbrella term. It encompasses many branches of science and technology and will often involve the creation of complex algorithms to enable outcomes to be determined. AI can include machine learning, natural language processing, expert systems, vision, speech, planning and robotics<sup>31</sup>. The term encompasses several different technologies, some of which are still being developed. The primary types currently being used are:

- Reactive intelligence – This is a software program designed to work within a rule-based system, by incorporating expert knowledge that allows it to make decisions. These kinds of programs do not incorporate previous experience and are designed for one task only.

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31. M. Mills, Artificial Intelligence in Law: The State of Play 2016 (Part 1) (23 February 2016) Legal Executive Institute.

- Robotic process automation – These software programs automate repetitive tasks; this avoids humans having to do them. Examples are data entry, purchase order issuing, payroll processing and email responses to common inquiries.
- Machine learning– Software programs that are fed information from various databases and “learn” to recognize patterns and make predictions. Machine learning works by identifying patterns in available data and then applying the knowledge to new data.
- Natural language processing – Software that can read and digest the contents of “unstructured” data – such as documents, emails, social media posts, videos and recordings – and grasp whether the tone is positive or negative.
- Cognitive computing– This can be considered machine learning on a vast scale, often accompanied by natural language processing. These programs analyse massive amounts of data to solve problems. Their answers are considered corrected by humans until they can function on their own with greater accuracy.

As a consequence, (a) Artificial Intelligence has usually been described as the process of simulating human intelligence through machine processes. Furthermore, (b) machine learning is the process of teaching a program to learn from user-fed data. It aims at making the machine (robots, software, and more over) able to respond to completely new data, whereas traditionally an engineer merely programmed a specific set of instructions for every possible data point. In this regard, machine learning can be considered rather revolutionary as programs using this process learn how to give proper outputs, even if they have only just received their tasks, with limited or no instruction as to how they should ac-

complish the specific task<sup>32</sup>. This is possible due to the use of iteration, a process of repetitively feeding data into an algorithm, to improve their outputs.

#### a. Algorithms Usage and function

AI can be categorized as either weak or strong by taking note of the different goals that these two versions of AI strive to reach.

- Strong AI seeks to create artificial persons: machines that have all the mental powers we have, including phenomenal consciousness.
- Weak AI seeks to build information-processing machines that *appear* to have the full mental repertoire of human persons. It can also be defined as the form of AI that aims at a system able to pass not just the Turing test.

This also depends on the different algorithms used.

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32. N. McCrea, *An Introduction to Machine Learning Theory and Its Applications*, TOPTAL, <https://www.toptal.com/machine-learning/machinelearning-theory-an-introductory-primer>.

### 3. The current impact of automation on professions and their employees

Cybersecurity, blockchain technology and artificial intelligence are the three most popular technologies and technological solutions adopted since 2017<sup>33</sup>.

Current Artificial Intelligence can be split in two types: reality and fiction. Real AI is what we have all around us – the voice-recognising, the hidden fraud detection systems of our banks, even the number-plate reading systems used by the police.

Artificial intelligence is spreading into professional firms as well as Public Administration procedures, with the aim of reducing routine tasks and work. Furthermore, it can positively impact on entering new markets, improving products or services, and gaining new clients. As mentioned above, the main feature of the Artificial Intelligence is twofold:

To some extent, it can replace routine works;

Also, it can be complementary to help professions by improving the quality or the quantity of work.

The table below lists some of the main frequent application of AI for professions.

AI Functions	Specification
Data Management software	(DMS) Software that takes in data and converts various kinds of data into a single storage container, or aggregates diverse data into a consistent resource, such as a database.
Use of algorithms to scan documents	Fast and Accurate Document Detection for Scanning.
Chat box	“Non-human” contact artificial intelligence algorithms are used to return a structured dialogue to the end user. The communication is very close to a human chat.
Vocal Assistant & Voice Recognition	A software agent that can perform tasks or services for an individual.
Self – driving car	A mix of software and hardware connected to the drive by interacting with the outside.

Table 3 AI Functions

While an AI complementary role can be considered positive, since it prevents mistakes, defects and controls work due to the prediction of results, its substitutive extend is raising several concerns. Firstly, Artificial Intelligence might totally replace some activities, whose demand

33. The recent report of the “High Level Group on Industrial Technologies” recognised AI as a “key enabling technology” highlighting the transformative role of AI and the necessity for the industry to use AI to maintain its leadership: [http://ec.europa.eu/research/industrial\\_technologies/pdf/re\\_finding\\_industry\\_022018.pdf](http://ec.europa.eu/research/industrial_technologies/pdf/re_finding_industry_022018.pdf).

might disappear from the market. Artificial intelligence has thus the potential to become one of the world's most disruptive technologies. AI is more complex to understand, manage and control than other technologies because its behaviour evolves and changes over time. It can badly affect the financial sector, while accounting and auditing has been named as the professions most at risk from technology automation (OECD 2017)<sup>34</sup>. As with any transformative technology, some AI applications may raise new ethical and legal questions, for example related to liability or potentially biased decision-making. This could be a quite possible scenario for those routine activities (as occupations mainly consisting of tasks following well-defined procedures that can easily be performed by sophisticated algorithms). Generally speaking, Artificial Intelligence can have a more significant impact on lower skilled jobs<sup>35</sup>. However, the most relevant concern deals with the disruption of professional activities requiring a high level of specialisation. As a matter of fact, AI scope is no longer confined to routine manufacturing tasks.

The example of driverless cars is exemplary to demonstrate how different tasks apart from routinary ones may soon be automated. Seminal work by Autor, et al. (2003), for example, distinguishes between cognitive and manual tasks on the one hand, and routine and

non-routine tasks on the other. While computer substitution for both cognitive and manual routine tasks is evident, non-routine tasks involve everything from legal writing, truck driving and medical diagnoses, to persuading and selling.

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34. OECD White Paper, *Digital Transformation Initiative Professional Services Industry*, [https://www.accenture.com/\\_acnmedia/Accenture/Conversion-Assets/WEF/PDF/Accenture-Professional-Services-Industry.pdf](https://www.accenture.com/_acnmedia/Accenture/Conversion-Assets/WEF/PDF/Accenture-Professional-Services-Industry.pdf).

35. L. Nedelkoska, and G. Quintini (2018), *Automation, skills use and training*, *OECD Social, Employment and Migration Working Papers*, No. 202, OECD Publishing, Paris, <https://doi.org/10.1787/2e2f4eea-en>.

#### 4. The general debate about the use of Artificial Intelligence. Dispelling Common Myths

As technology is going to change the way in which we work, there are predictions that many aspects of human activity will be replaced or supported by newer technologies<sup>36</sup>.

Since Artificial Intelligence can replace humans, several concerns have been raised. The main reasons behind this ethical debate can be listed as follows:

- The new automation age ushered in by Industry 4.0 has been creating a new reality in which robots and computers are not only capable of performing a range of routine physical work activities better and at lesser expense than humans, but they are also increasingly capable of accomplishing activities belonging to cognitive capabilities. In this regard, the potential of Artificial Intelligence is not limited to routine tasks (which should be considered as a positive point for professionals), but can be compared to high level skills, such as the intellectual work of professionals.

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36. T. Sourdin, *Judge v Robot? Artificial Intelligence and judicial decision-making*, UNSW Law Journal, Vol. 41(4), 2018, <http://www.unswlawjournal.unsw.edu.au/wp-content/uploads/2018/12/Sourdin.pdf>.

- Moreover, in a more pessimistic bias, another noteworthy idea is that Artificial Intelligence will drive and develop a society of well-being<sup>37</sup>.

These concerns are not considered valid by most literature<sup>38</sup>. In this regard:

- Artificial Intelligence only exists in order to overcome urgent challenges. It will solve problems as well as it will be developed to solve those challenges if its future relies on its success.
- Artificial Intelligence requires appropriate structures. This means that it is necessary to design new structures/algorithms that are specialised for each challenge faced by the AI. Different types of problem require different structures.
- Intelligence requires comprehensive testing<sup>39</sup>. Since AI is used to solve problems, every new design of intelligence needs complete testing on all the problems that it exists to solve.
- AI has existed since the birth of computers<sup>40</sup>. This circumstance should create any fear about it.

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37. O. Häggström, (2016) *Here Be Dragons: Science, Technology and the Future of Humanity*. OUP Oxford. See also David Schatsky, Craig Muraskin and Ragu Gurumurthy, *Demystifying Artificial Intelligence: What Business Leaders Need to Know about Cognitive Technologies* (Report, Deloitte University Press, 2014) 3.

38. P. Bentley, *The Three Laws of Artificial Intelligence: Dispelling Common Myths*, European Parliament Report “Should we fear artificial intelligence?”, [http://www.europarl.europa.eu/RegData/etudes/IDAN/2018/614547/EPRS\\_IDA\(2018\)614547\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/IDAN/2018/614547/EPRS_IDA(2018)614547_EN.pdf).

39. A. Garner, M. Mayford, (2012) *New approaches to neural circuits in behaviour. Learn. Mem.* 2012. 19: 385-390. Doi: 10.1101/lm.025049.111.

40. P. J. Bentley, (2012) *Digitized: The science of computers and how it shapes our world*. OUP Oxford. ISBN-13: 978-0199693795.

Furthermore, findings show that the automation of activities can enable productivity growth and other benefits for both individual process and businesses<sup>41</sup>.

## 5. Case studies

The scope of Artificial Intelligence cannot be definitively identified, due to its versatile application in a great number of sectors and relevant professions. Researchers predict that AI will have applications across nearly every sector—from construction to financial services and beyond. Lastly, in order to understand the extent of the impact of digitalisation on professions, this study will seek to provide specific attention on some specific professions.

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## 5.1 Artificial Intelligence in Legal Professions

Among non-scientific sectors, legal professions seem to be very affected by the development and the use of Artificial Intelligence<sup>42</sup>, which belongs to *legal-tech*<sup>43</sup>. A great deal of legal work consists of monotonous activities such as sifting through documents, searching for irregularities in large amounts of data and analysing numerous cases. Combined with Big Data, it has been considered as a powerful tool to make predictions about judgments, trials and more over.

### 5.1.1 Courts

The emergence of Artificial Intelligence (AI) is changing many aspects of our lives. The judiciary is not excluded from this development. However, the use of AI today and in the foreseeable future is limited to specific tasks,

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42. Jamie J. Baker, *A Legal Research Odyssey: Artificial Intelligence as Disruptor*, 110 Law Libr. J. 5 (2018).

43. J. B. Ruhl, *Lawyer+Tech: Tomorrow's Bespoke Lawyer*, 20 TYL 4 (2016).

whereas the work of a judge requires a broad range of different skills. Findings show that Artificial Intelligence could reshape the justice system in three main ways:

- AI as a supportive technology. At the most basic level, technology is helping to inform, support and advise people involved in the justice system.
- AI as a replacement technology. In this second case, technology can replace functions and activities that were previously carried out by humans.
- AI as a disruptive technology. At a third level, technology can change the way that judges work and provide for very different forms of justice. The disruption can be particularly effective where processes change significantly, and predictive analytics may reshape the adjudicative role.

In this regard, the first case can be considered to be simply a support for the judiciary activities: as a result, many people now locate justice services online and obtain information about justice processes, options and alternatives (including legal alternatives) through web-based information systems. People also increasingly locate and obtain legal support and services online. Apart from this, these second and third levels emerge in terms of the impact of technology on the role and function of a judge insofar as the adjudicative function is concerned. Actually, Artificial Intelligence is particularly relevant in the criminal jurisdiction, because it is characterized by a strong area of doubts, hypothesis and prognostic judgments<sup>44</sup>.

- Support impartiality. Firstly, the use of AI in the judiciary might help with minimising the influence of

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44. E. Rowden, *Distributed Courts and Legitimacy: What Do We Lose when We Lose the Courthouse?*, (2018) 14 Law, Culture and the Humanities 263.

extraneous factors such as weariness and emotional instability. Furthermore, AI algorithms have been used to support more impartial criminal justice, yet they are accused of racial bias.

- Detect danger. Artificial intelligence is used to detect and understand if a person should be considered dangerous, also by offering the amount of the predictable risk of committing a crime. This result can also be used to determine the duration of custodial decisions.
- Predictability. Artificial Intelligence can be used to realize algorithms able to predict, under a certain degree, if a person might commit another crime or should be considered as a danger for the whole society.
- Liability. Artificial Intelligence can be an effort to understand if a person can be considered liable for a crime.

The application of Artificial Intelligence in the judiciary is quite common in common law states, such as America<sup>45</sup>, where the so-called Judge – Robots have been already changing judicial decision-making.

In America, findings show that the growing rise in the number of self-represented litigants has negative implications for both the court system and access to justice. Thus, the expanding use of Artificial Intelligence and the World Wide Web has led to the development and use of

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45. For example, in Mexico, the Expertus system is advising judges and clerks ‘upon the determination of whether the plaintiff is or is not eligible for granting him/her a pension’: see Davide Carneiro et al., *Online Dispute Resolution: An Artificial Intelligence Perspective* (2014) 41 *Artificial Intelligence Review* 211, 227–8.

Online Dispute Resolution<sup>46</sup>; in other European countries, instead, this trend is not so strong, and some pilot projects have been created in just a few cases. In this regard, for example, the UK Civil Justice Council recommended the introduction of Her Majesty’s Online Court for civil disputes under the value of £25 000<sup>47</sup>. Moreover, there has been a growing focus on online courts and what they may provide<sup>48</sup>. In England and Wales, for example, the plans aimed at the introduction of Judge AI in relation to some categories of dispute were dropped in 2017; it was less controversial, but significant measures associated with the introduction of online dispute resolution referred to above are proceeding<sup>49</sup>.

In the Netherlands, an advanced ADR program, called *Rechtwijzer*<sup>50</sup>, has been launched: it incorporates ODR components that could be used to assist couples in the separation or divorce process. The program asks questions about the parties and their relationship, and provides options

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46. J. Zeleznikow, *Can Artificial Intelligence and Online Dispute Resolution Enhance Efficiency and Effectiveness in Courts*, 8 *IJCA* 30 (2017); Thomas J. Buocz, *Artificial Intelligence in Court Legitimacy Problems of AI Assistance in the Judiciary*, *Retskraft – Copenhagen Journal of Legal Studies* / Vol. 2, 2018.

47. Online Dispute Resolution Advisory Group, *Online Dispute Resolution for Low Value Civil Claims* (Report, Civil Justice Council, February 2015) 6–7.

48. See Ministry of Justice of the Government of the United Kingdom and Her Majesty’s Courts and Tribunal Service, *Transforming Our Justice System* (Policy Paper, September 2016).

49. Richard Johnstone, *HM Courts and Tribunals Service’s Susan Acland-Hood on Digital Courts, Making Big Changes and Her Whitehall Hammock*, *Civil Service World* (online), 6 October 2017.

50. <https://rechtwijzer.nl/>.

based on this input information<sup>51</sup>. Additional services are provided: for example, information, tools, links to other websites and personal advice which encourages the parties to resolve their dispute between themselves. Unless parties reach an agreement, the program will provide the parties with information and contact details of professional third parties such as mediators, legal representatives, and other dispute resolution processes.

The Netherland Pilot Project findings show that many participants feel satisfied with the online services provided; on the other hand, some others get lost because of the absence of a third-party check over the agreement made through the system, so they feel the need to have a human support.

Some other experiments have been conducted using AI computer programs to predict the outcomes of cases based on textual information, by textually analysing decisions relating to breaches of human rights in the European Court of Human Rights to discover patterns in judgments<sup>52</sup>.

The impact of AI on the justice system is significant as it has the capacity to be blended with existing adjudicatory or non-adjudicatory processes. Findings show that technology is not yet ready to produce an AI with a skill-set that is broad enough for the work of a judge<sup>53</sup>. How-

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51. Esmée A. Bickel, Marian A. J. van Dijk and Ellen Giebels, *Online Legal Advice and Conflict Support: A Dutch Experience* (Report, University of Twente, March 2015) 5.

52. N. Aletras et al., *Predicting Judicial Decisions of the European Court of Human Rights: A Natural Language Processing Perspective* [2016] (October) *PeerJ Computer Science* 1, 15–16.

53. Robin Hanson, *The Age of Em. Work, Love, and Life when Robots Rule the Earth* (Oxford University Press 2016) 271ff; J. Waldron, *Judges as moral reasoners* [2009] 7/1 *International Journal of Constitutional Law* 2 all.

ever, the justification does not rely on the complexity of the necessary intellectual tasks to be processed by an AI. Rather, the work of a good judge consists of a mix of skills including research, language, logic, creative problem solving and social skills<sup>54</sup>: whose tasks can be faced by AIs separately, but not yet in combining them<sup>55</sup>.

### 5.1.2 Lawyers

These developments in ADR also suggest that the further introduction of AI systems into legal practice is likely. Artificial Intelligence represents a new functional tool to improve the quality of services provided by solo professions as professional firms. The development of AI in the legal sector has progressed a great deal in America, where several studies and experimentations have been carried out for many years, especially for those predictive analytics developments that enable predictions to

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54. Schatsky, Muraskin and Gurumurthy offer a practical definition of AI, stating that it is “the theory and development of computer systems able to perform tasks that normally require human intelligence”: D. Schatsky, C. Muraskin and R. Gurumurthy, *Demystifying Artificial Intelligence: What Business Leaders Need to Know about Cognitive Technologies* (Report, Deloitte University Press, 2014) 3. The Australian Law Reform Commission has noted that such factors include induction and intuition, as well as the capacity to assess the social impact of decisions: see Australian Law Reform Commission, *Technology: What It Means for Federal Dispute Resolution*, Issues Paper No 23 (1998) 101.

55. Joshua Browder’s, *The World’s First Robot Lawyer* drafting very specific types of legal documents.

be made regarding the outcome of litigation<sup>56</sup>; for this reason, the American environment is very much in favour of this innovation<sup>57</sup>.

Artificial Intelligence can be used for an array of sectors, as:

- Natural language processing to perform legal research and memo drafting. Thus, the user can pose full sentences (as questions) to the system, and the system performs legal research based on its understanding of that question;
- Machine learning for contract drafting<sup>58</sup>. In this regard, AI can be a useful tool to read contracts, summarize them, and make suggestions for possible edits;
- Due diligence (the verification of the budget data);
- The analysis of existing documentation in case laws on a case about to go to court.

The rationale is that AI provides solutions which always allow savings, both in economic and time terms. Some of these activities can improve the efficiency and constitute a sort of collaboration among professions in the firms: for example, sharing research makes the future potential work of another colleague more efficient. This could be considered a crucial turning point either

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56. C. Schubarth, *Y Combinator Startup Uses Big Data to Invest in Civil Lawsuits*, Silicon Valley Business Journal (online), 24 August 2016.

57. As a matter of fact, expert systems have been developed to address diverse areas of the law like the Employees Retirement Income Security Act of 1974 (ERISA), Article 9 of the Uniform Commercial Code, corporate tax planning, will preparation, asbestosis case analysis and trade secrets law governing computer software.

58. Z. Abramowitz, *Lawgeex Free Contract Review Could Be a Gamechanger*, ABOVE THE LAW (Apr. 21, 2016, 3:44 PM), <http://abovethelaw.com/2016/04/lawgeex-free-contract-review-could-be-a-gamechanger/?rf=1>.

in those countries where professional legal firms can be considered as companies, as well as in other realities where there is simply a pooling attitude with all the colleagues of the same professional firm.

As for the judiciary sector, one of the main basic AI functions is supportive. As a matter of fact, a great deal of legal work consists of monotonous activities such as sifting of documents, searching for irregularities in large amounts of data and analysing numerous cases. In this case, the development of e-discovery software for cases that involve many documents to be screened can be very helpful for legal professional firms<sup>59</sup>. In the United States, technology-assisted legal review is also starting to receive judicial stamps of approval<sup>60</sup>.

Moreover, in Italy the biggest law firms are also investing in Artificial Intelligence support, especially for due diligence activities and the economic treatment of the client. There are lots of applications: for example, due diligence dealing with contracts, that allow identification of the most delicate clauses; the same AI system can be extended, in certain circumstances, to the audit required by the GDPR. Instead, applications that support lawyer or judges profiling have not yet been used.

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59. J. Markof, *Armies of Expensive Lawyers, replaced by Cheaper Software*, New York Times (New York, 4 March 2011); H. Son, *JPMorgan software does in seconds what took lawyers 360,000 hours*, The Independent (London, 28 February 2017).

60. Dean L. Dalke, *Can Computers Replace Lawyers, Mediators and Judges?* (2013).

### 5.1.3 Concerns raised regarding the use and the development of Artificial Intelligence in legal professions

Strict regulations have traditionally shielded the legal sector from disruption. However, a recent study by Deloitte found that lower-skilled jobs, such as legal secretaries and paralegals, could be cut by 39% over the next two decades. Data science is enabling law firms to exploit large volumes of existing data to create value for their business.

Apart from this, many other AI applications can induce people to provide self-made solutions for their legal matters, trusting in the ability of new software and robots. For example, some A.I. tools have been created for contract review, which are primarily targeted at non-lawyers. These applications can be considered as a tech justice tool: they are designed for users who need to review and manage contracts but lack the expertise to do so themselves or the money to hire an attorney.

As an example, *Do Not Pay* is the “first lawyer robot”. It is a free chatbot that offers AI-powered legal counsel; it consists of a software that provides automatic advice to customers fined in car parks<sup>61</sup>.

Similarly, client expectations could change. They could come to expect more value for the amount charged, as they would reach the maximum profits – in qualitative and quantitative sense due to services offered by the lawyer – by reducing the amount spent. This is due, in part, to an increase in the number of online prompt

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61. J. Millar and I. Kerr, *Delegation, relinquishment, and responsibility: The prospect of expert robots*, in Ryan Calo, A. Michael Froomkin and Ian Kerr (eds), *Robot Law* (Edward Elgar Publishing 2016) 104.

solutions, which constitutes the new benchmark with mainstream legal services traditionally provided.

With these changing client expectations, firms must either lower their prices and adapt, or lose huge amounts of business. Alternative-fee systems may become more popular, especially for simple form contracts and everyday documents.

As Artificial Intelligence looms over the practice of law, ethical concerns rise because of the fear that the long-standing development of Artificial Intelligence applications could replace human and high qualities professionalism. Actually, findings have tried to dispel the notion that artificially-intelligent machines will replace humans and their high professional skills<sup>62</sup>.

### 5.1.4 Legitimacy Problems of AI Assistance in the Judiciary

There are some specific factors that are especially relevant in the context of the development of AI which deal with the adjudicative function of judges. Even if some applications suggest that AI can replace some adjudicative functions, the issues that emerge are whether this is appropriate or not, and under which circumstances human judges should retain most adjudicative functions.

In this regard, one initial issue is whether a computer program or automated process possesses the same legal authority to make decisions in place of a human judge. A negative opinion says that many judgments within the

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62. Z. Rose, *Artificial Intelligence: Application Today and Implications Tomorrow*, 16 *Duke L. & Tech. Rev.* 85 (2017-2018).

legal system involve an element of discretion. Instead, computer programs operate based on logic, where input information is processed via programmed algorithms to arrive at a predetermined outcome<sup>63</sup>.

## 5.2 Finance and Health sector

### 5.2.1 Health sector

Artificial Intelligence has already been very close to medicine for several years<sup>64</sup>. It can be considered very helpful in supporting medical practices. It is able to be extended on a variety of applications, such as diagnostic, research, surgery and more over<sup>65</sup>.

In Denmark, for example, AI is helping save lives by allowing emergency services to diagnose cardiac arrests or other conditions based on the sound of a caller's voice. In Austria, it is helping radiologists detect tumours more accurately by instantly comparing x-rays with a large amount of other medical data.

However, the involvement of artificial intelligence in the medical profession (working process) will call into question the efficiency of existing labour law regulations, espe-

cially for the concerns raised towards the “Robots – Doctors”. For years, robots' involvement in medical procedures has been limited to robotic-assisted surgeries<sup>66</sup>. Advanced robots were not only successful at performing physical operations, they were also included in much more sensitive therapeutic procedures concerning mental disabilities<sup>67</sup>. Actually, current scientific achievements present a completely different scenario, where medical surgeries can be performed one hundred percent autonomously by a robot: the development of smart tissue autonomous robots, also known as STARs, shows that robots are currently able to perform only the simplest medical procedures, yet this might change in the near future.

Due to the complexity of the medical practice, there are several types of machine decision-making processes. Thus, Artificial Intelligence is made possible by the use of deterministic, supervised and unsupervised learning algorithms, as well as machine based on multi-agent systems, due to the contextual degree of unpredictability of a machine's actions<sup>68</sup>.

Artificial Intelligence, however, raises legal concerns due to data protection. As a matter of fact, the Data Protection Regulation protects different categories of personal data, where those recognized as particularly

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63. A. Roth, *Trial by Machine*, (2016) 104 Georgetown Law Journal 1245, 1266.

64. William B. Schwartz, Ramesh S. Patil, Peter Szolovits, *Artificial Intelligence in Medicine Where Do We Stand*, 27 Jurimetrics J. 362 (1987).

65. AI&Fundamental Rights 17 September 2018 Ellas Papadopoulou Legal Officer DG Research & Innovation Directorate “Health”, Artificial Intelligence (AI) in EU Health Care Research, [www.europa.eu](http://www.europa.eu).

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66. Cohen Hiyaguha, *Robots Replacing Surgeons?*, Neutral Health Blog, May 28, 2016, <https://jonbarron.org/doctors-and-drugs/robots-replacing-surgeons>.

67. On March 7, 2016, scientists in Singapore introduced *Nadine*, an emotionally intelligent humanoid robot who can feel, think, and recognize people, as an experiment to evaluate the possible use of Artificial Intelligence in supporting the shrinking workforce, become personal companions for children and the elderly at home.

68. T. Zapusek, *Artificial Intelligence in Medicine and Confidentiality of Data*, 11 Asia Pacific J. Health L. & Ethics 105 (2017).

sensitive enjoy additional attention and are exposed to stricter protective measures<sup>69</sup>.

### 5.2.2 Finance

Artificial Intelligence applications can be observed in finance too, with the *fin-tech* development. It is usually used to verify the risk rate of such operations, and can constitute a useful means for companies' investments. One area in which AI is already proving itself adept is discovering fraud. One system reviewing expense accounts discovered that employee meals were actually charged to a strip club. Another found that a guest invited to a company function was on a list of barred employees. In this regard, the professional profile of the actuary is increasing. The actuary profession, in Italy as in Europe and the rest of the world, is in constant and continuous development and is today considered one of the most requested in the world. In this regard, it is witnessing a continuous development of software able to support the complex calculations that new models provide. In particular, research invests in innovative sectors such as data science, the use of telematics, optimization in the distribution of insurance products, management of further complex risks, such as those deriving from cybernetics, catastrophic, environmental, reputational, non-financial companies (ERM), activities commercial, public administration, and the areas of accidents and health<sup>70</sup>.

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69. Bigit Toebes, Mette Hartlev, Aart Hendriks and Jane Rothmar Herrmann, eds., *Health and Human Rights in Europe* (Intersentia, 2012), 77.

70. [http://www.cuprofessionisti.it/2%C2%B0\\_Rapporto\\_Professionisti\\_2018\\_schede.pdf](http://www.cuprofessionisti.it/2%C2%B0_Rapporto_Professionisti_2018_schede.pdf).

### 5.3 Public services

Artificial Intelligence can significantly improve public services and contribute to the objectives set out in the Ministerial Declaration on eGovernment – the Tallinn Declaration (October 2017)<sup>71</sup>. For example, the Commission will look into AI's potential to analyse large amounts of data and help check how single market rules are applied.

### 5.4 Accounting and Auditing

Artificial Intelligence affects accounting too. Robotic process automation is used for drafting confirmation letters and send customer reminders. Moreover, machine learning is also used to detect fraudulent invoices. A robotic processing automation platform has also been developed to match staff needs with contractors who can fill them. Smaller firms don't usually have the resources for AI, but over time, the technologies will likely become more affordable, as well as better suited to specific uses.

Auditing may provide the best example of how AI brings both rewards and risks to service businesses, since it saves companies time and money by automating routine processes and doing work at remote facilities. To speed up auditing, some firms are honing machine-learning algorithms to examine a year's worth of transactions for irregularities, instead of using traditional sampling. Drones have replaced humans by taking inventories at warehouses and hard-to-reach or dangerous sites, such as mines or forests.

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71. <https://ec.europa.eu/digital-single-market/en/news/ministerial-declaration-egovernment-tallinn-declaration>.

However, since they deal with such massive amounts of data, they uncover many thousands of exceptions, which can overwhelm auditors. But over time, they might learn to distinguish “small fires” from “potential explosions”.

Accounting and auditing are believed to be most at risk from computerization and technology. A PwC research report ranked professions by the likelihood of their being automated in the next 20 years. With a 97.5% probability, accounting came in the top.14 The business and operating models for this segment are also expected to shift significantly, as 24/7 automated solutions become increasingly prevalent<sup>72</sup>.

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72. <https://www.pwc.com/my/en/assets/press/1608-accountants-today-automation-impact-on-accounting-profession.pdf>.

## 6. The Current legal framework

The importance due to wide range of applications of Artificial Intelligence induced both the European Union<sup>73</sup> and the Member States to study the technology. Their attention can be found very recently<sup>74</sup>.

Currently, the development and promotion of Artificial Intelligence has been enacting soft law acts, as:

1. Guidelines;
2. Public Partnerships among Member States;
3. White Papers.

European Union approached the Artificial Intelligent issue recently. It can be considered a part of the European Commission’s strategy for the digitization of industry (COM (2016) 180 final) and in the new EU policy strategy (COM (2017) 479 final) as well as being present in the framework for development and research program since 2004.

Whatever its long-lasting approach through the Digital Single Market, only in October 2017 did the European Council ask the Commission to present a European approach to Artificial Intelligence. Six months later, in April 2018, two important events occurred:

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73. European Commission stated that if Member States and the private sector (beyond established partnerships) make similar investment efforts, the total investments in the EU will grow to around EUR 7 billion per year, totalling more than EUR 20 billion by the end of 2020.

74. In January 2016, the term “artificial intelligence” was not in the top 100 search terms on gartner.com.

On 10<sup>th</sup> April 2018 the Member States signed an agreement to work together on the most important issues raised by Artificial Intelligence. Thus, 25 European countries signed a Declaration of cooperation on Artificial Intelligence<sup>75</sup>, whose inspiration took place towards the creation of a Digital Single Market, able to ensure the achievements and investments of Europe in AI as well as the progress. By teaming up, Europe's competitiveness in the research and deployment of AI can be further ensured, while the challenges dealing with social, economic, ethical and legal questions can be more successfully faced by the collective workforce.

According to the Declaration, better access to public sector data can be an essential condition to influence AI development, fuelling innovative business models and creating economic growth and new qualified jobs.

Whereas a number of Member States had already announced national initiatives on Artificial Intelligence.

On April 25<sup>th</sup>, the European Commission published a Communication on the development of Artificial Intelligence for Europe<sup>76</sup>. It aims to:

- Boost the EU's technological and industrial capacity and AI uptake across the economy, both by the private and public sectors;
- Prepare for socio-economic changes brought about

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75. <https://ec.europa.eu/jrc/communities/en/community/digitranscope-digital-transformation-and-governance-human-society/document/eu-declaration>.

76. 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 Artificial Intelligence for Europe*, COM/2018/237 final, <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1548762831573&uri=CELEX:52018DC0237>.

by AI by encouraging the modernisation of education and training systems;

- Ensure an appropriate ethical and legal framework, based on the Union's values and in line with the Charter of Fundamental Rights of the EU and values, including privacy and protection of personal data, as well as principles such as transparency and accountability.

Furthermore, the High-Level Expert Group on Artificial Intelligence, appointed by the Commission in June 2018, released the first draft of its Ethics Guidelines for the development and use of artificial intelligence<sup>77</sup> in December. It sets out how developers and users can make sure AI respects fundamental rights, applicable regulation and core principles, and how the technology can be made technically robust and reliable.

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77. <https://ec.europa.eu/digital-single-market/en/news/draft-ethics-guidelines-trustworthy-ai>.

## **PART III**

### **BLOCKCHAIN AS A FUNCTIONAL TOOL**

#### **1. Blockchain Technical Functioning**

Blockchain is a distributed ledger technology which has been sold as the most important technological innovation of the current economy. It is typically open, shared and public-trusted, managed in a decentralized manner. Its function has experienced major change over time: it has been traditionally popularized as the technology behind the cryptocurrency Bitcoin<sup>78</sup>; apart from this, its scope has widened. Actually, blockchain has given rise to other applications, such as smart contracts, featuring payments triggered by a tamper-proof consensus of contingent outcomes and financing through initial coin offerings.

Actually, the blockchain works as a combination of different technologies that are intended to work together to share data, to validate contracts and to monetize each transaction: it works as a combination of different technologies, such as Blockchain Distributed Ledger Technology (DLT), P2P network, crypto currency system for micro payments and smart contracts.

The appeal of blockchain technology lies in its use of peer-to-peer network technology combined with

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78. The term “bitcoin” is used when describing a bitcoin as a unit of account, whereas “Bitcoin” is used when describing the concept or the entire network designed by Satoshi Nakamoto.

cryptography. This combination enables parties who have never known each other to conduct transactions without requiring a traditional trusted intermediary. The main key role is played not by powerful intermediaries like banks or payment processing network, governments and technology companies, but through mass collaboration and clever code. Protocols built on blockchain specify how participants in a network can maintain and update the ledger<sup>79</sup>.

By eliminating the intermediary and harnessing the power of peer-to-peer networks, this technology may provide new opportunities for reducing transaction costs and decreasing transaction settlement time. All participants using the shared database are called “nodes”: they are connected to the blockchain and maintain an identical copy of the ledger. Every entry into a blockchain is a transaction. It represents an exchange of value between participants; it can be a digital asset that represents rights, obligations or ownership. Since each node is connected to the ledger, when one participant wants to send value to another, all the other nodes in the network communicate with each other using a pre-determined mechanism to check that the new transaction is valid. This work is called *mining*. Anybody can become a miner and compete to be the first to solve the complex mathematical problem of creating a valid encrypted block of transactions to add

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79. M. D’Aliessi, *How Does the Blockchain Work?*, MEDIUM (Jun. 1, 2016), <https://medium.com/@micheledaliessi/how-does-the-blockchain-work-98c8cd0ld2ae>.

to the blockchain<sup>80</sup>. This mechanism of validation is referred to as a consensus algorithm. Thus, if one node goes offline, the ledger is still readily available to all other participants in the network.

In addition to being more efficient, the blockchain has other unique characteristics that make it a breakthrough innovation. Blockchain is considered reliable because full copies of the blockchain ledger are maintained by all active nodes. After the transaction has been accepted by the network, all copies of the ledger are updated with the new information. An array of transactions is usually combined into a block which, once completed, is added to the ledger; each block in the chain refers to the previous blocks, which prevents deletion or reversing transactions once they are appended to the blockchain.

In summary, the ledger is composed of blocks; each of them contains information that refers back to previous blocks and thus all blocks in the chain link together in the distributed identical copies. Participating nodes are free to manage the chain: they can add new, time-stamped transactions; in this way, integrity and reliability will remain intact as long as it is being used. However, a properly functioning blockchain is thus immutable, despite lacking a central administrator since the blockchain is irreversible,

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80. As a recent European Parliament Report, there are various means of incentivising people to do this work. Most often, the first miner to create a valid block and add it to the chain is rewarded with the sum of fees for its transactions. Fees are currently around €0,10 per transaction, but blocks are added regularly and contain thousands of transactions. Miners may also receive new currency that is created and put into circulation as an inflation mechanism. European Parliament, *How blockchain technology could change our lives*, 2017, [http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/581948/EPRS\\_IDA\(2017\)581948\\_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/IDAN/2017/581948/EPRS_IDA(2017)581948_EN.pdf).

its participants cannot delete or alter the entries once they have been validated and accepted by the network.

One of the most successful characteristics is that blockchain relies on its distributed nature. This could avoid the ordinary presence of an intermediary to the transfer of value between two parties; this operation, indeed, generally requires centralized transaction processors such as banks or credit card networks. These processors reduce counterparty risk for each party by serving as an intermediary but centralize credit risks with themselves. In contrast, a blockchain allows parties to transact directly with each other through a single distributed ledger, thus eliminating one of the needs for centralized transaction processors.

The main important parts of a block are:

- the header: this includes metadata, such as a unique block reference number, the time the block was created and a link back to the previous block;
- its content: as mentioned before, it is usually a validated list of digital assets and instruction statements, such as transactions carried out, amounts and the addresses of the parties to those transactions.

## **2. Blockchain concerns and advantages for professions: Permissioned and Permissionless Blockchain**

Blockchain functions have been raising concerns about the impossibility to delete data. In this regard, there are several concerns dealing with data protection and data subject rights. For this reason, it is necessary to understand its functionality and find appropriate solutions, by adopting it if necessary. As a matter of fact, blockchain could compromise not only privacy but also anonymity. While some blockchains do offer full anonymity, some sensitive information simply should not be distributed in this way.

Moreover, blockchain-based currencies present many legal and regulatory challenges including consumer protection mechanisms, enforcement methods and possibilities for engaging in illegal activities such as tax evasion and the sale of unlawful goods.

In the current ecosystem, the two major classifications of blockchain networks are permissionless and permissioned. The difference lies in the determination of which parties are allowed access to the network.

- In Permissionless blockchain, the ledger may be shared publicly with anyone who has access to the Internet. In this regard, it is open to any potential user who can participate as a node in the chain by agreeing to relay and validate transactions on the network thereby offering their computer processor as a node. For example, the Bitcoin blockchain is a public or permissionless blockchain.

- On the contrary, the Permissioned blockchain can be shared only with certain participants. Joining the blockchain is as simple as downloading the software and bitcoin ledger from the Internet. Only some users in the network can add records and verify the contents of the ledger. Permissioned ledgers offer many applications in the private sector, even in the way of Consortium Blockchain<sup>81</sup>.

Permissionless Blockchain rises several concerns:

- Limitation to remedy against the out-dating: when the blockchain is created, transaction volume or size may be set to the best available technology at the time. As technology advances, initial settings may become limitations that may make the blockchain out of date, potentially slowing transaction speeds.
- Users of permissionless blockchains should also be aware that their transaction history is exposed to anyone who downloads the database for as long as the database is active.
- In the absence of trust, public blockchains typically require additional mechanisms to arbitrate disputes among participants and protect the integrity of the data. This involves added complexity because there is no central authority to arbitrate in a decentralised network.

Given the limitations of permissionless blockchains, some organizations have started to explore the use of private or permissioned/consortium blockchains, which restrict participation in the blockchain network to participants who have already been given permission by approved ad-

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81. Teresa J. Walker, *Get Ready for Blockchain*, Legal Management, Vol. 37, Issue 8 (September 2018), pp. 16-21; P. Grider, *Advancing and Implementing Blockchain in the Legal Industry*, Colorado Lawyer, Vol. 47, Issue 11 (December 2018), pp. 6-9.

ministrators. However, this choice sacrifices some of the potential benefits as decentralized transactions, wide distribution of the ledger, and a truly decentralized environment without any intermediaries. Permissioned blockchains are likely to be set up by a consortium of parties that can collectively benefit from a shared ledger system. For example, a supply chain network may want to use a blockchain to track the movement of goods.

Apart from these disadvantages, the Blockchain is proposed to be an advantage to address the security issues inherited in cloud-based systems because it can maintain a continuously growing list of records, which are distributed and immutable<sup>82</sup>. It can be used to guarantee transparency and to ensure a better storage of Data.

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82. C. Esposito, A. De Santis, G. Tortora, H. Chang, and K. K. R. Choo, *Blockchain: a panacea for healthcare cloud-based data security and privacy?*, IEEE Cloud Computing 5(1):31–37, 2018; O. Novo, *Blockchain meets IoT: An architecture for scalable access management in IoT*, IEEE Internet of Things Journal 5(2):1184–1195, 2018.

### 3. The current legal framework: chances and boundaries

The European Parliament has recently focused its attention on blockchain issues, by adopting a resolution where it highlighted the wide range of DLT-based applications that could potentially affect all sectors of the economy<sup>83</sup>, such as healthcare sector or education.

Actually, Member States are going to adopt a coherent legal framework on blockchain and smart contracts. In Italy, it has been recently adopted a Draft Law Draft providing legal value to the blockchain and, generally speaking, the transaction that exploits a distributed electronic register and computerized, without passing from notaries or central certification bodies. Moreover, smart contracts are considered having the same legal value of traditional contracts.

France, instead, pioneers a blockchain legal framework for unlisted securities, by endeavouring to take the lead in financial innovation. Thus, it becomes the first country to introduce a legal framework for the use of blockchain technology for the transmission and representation of unlisted securities<sup>84</sup>.

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83. European Parliament resolution of 3 October 2018 on distributed ledger technologies and blockchains: building trust with disintermediation [2017/2772(RSP)], <https://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P8-TA-2018-0373+0+DOC+XML+V0//EN>.

84. The DLT Order (Order no. 2017-1674 dated 8 December 2017), <https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000036171908&categorieLien=id>.

### 4. Blockchain as a useful tool for deploying entrepreneurship in professional firms

The focus on digital currencies like Bitcoin has created a common misconception that blockchains are relevant only to the banking sector. Thus, a number of other independent blockchains have emerged in recent years. Litecoin, for example, is a smaller competitor of Bitcoin but offers faster transaction times. The Ripple Transaction Protocol is a simpler type of blockchain providing instant, certified and low-cost international payments targeted at banks and non-bank financial services companies. In recent years, blockchain technology has evolved far beyond bitcoin and is now being tested in a broad range of business and financial applications. Blockchain can be very useful for professional firms, since it reduces costs, but improves security. They do offer other benefits, such as increased speed, larger data capacities, different consensus methods or more advanced functionality.

A key development in blockchain technology was the introduction of smart contracts, which are computer code stored on a blockchain that executes actions under specified circumstances. They enable counterparties to automate tasks usually performed manually through a third-party intermediary. Smart-contract technology can speed up business processes, reduce operational errors and improve cost efficiency.

Smart contracts are usually referred to *Ethereum*, the second largest blockchain network after Bitcoin (based on market capitalization). It was the first platform to

introduce the concept of a smart contract that could be deployed and executed on a distributed blockchain network. This ledger is a public protocol that allows anyone accessing to view the terms of each contract unless they are protected by encryption. Smart contracts are a method to automate the contracting process and enable monitoring and enforcement of contractual promises with minimal human intervention. Automation can improve efficiency, reduce settlement times and operational errors. This may prove problematic for contracts involving sensitive information, developers are actively building solutions to preserve confidentiality while taking advantage of public blockchains. As smart contracts continue to evolve, inherent risks that need to be mitigated may emerge, as in case of renegotiating contractual terms and clauses. This could lead to smart contracts with vulnerabilities or errors that could lead to unexpected business outcomes. Moreover, incomplete or flexible contracts can lead to settlement problems and disputes.

Blockchain technology is actively used in the financial sector via cryptocurrencies, such as Bitcoin<sup>85</sup>. Despite its apparent complexity, a blockchain is just another type of database for recording transactions – one that is copied to all of the computers in a participating network. In this regard, it can be used to ensure:

- Digitalisation of documents, folders and activities;
- Security. Thanks to the cryptographic process, it is not possible to change or make changes to the blocks already inserted in the chain; the data stored in it are thus safe, certain and not manipulable;

- Trusted. Being organized chronologically (since the blocks are added to the chain according to a precise and unchangeable chronological order), it prevents the emergence of disputes regarding the execution, for example, of the different phases of a contract;
- Speed. Blockchain does not require a central entity that verifies its congruity and validity, because this is done by consensus of the network, and being a completely digital solution eliminates execution times, checks, paper, back-office and operational risks;
- Reliability. Its technical characteristics prevent any loss of data or damage.

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85. See Tal Yellin, Dominic Aratari, and Jose Pagliery, What is Bitcoin?, CNNMONEY, <http://money.cnn.com/infographic/technology/what-is-bitcoin/>.

## 5. Most relevant case studies

The blockchain phenomenon arouse a certain enthusiasm thanks to the multiple benefits it brings to both individuals and businesses; at the same time, it is not exempt from concerns. On the one hand, it is expected to allow a safer and faster transmission of data and information, while the creation of databases with the same characteristics of the master books will allow a simplification and speeding up of the necessary processes, for example, for the assessment and the payment of taxes.

On the other hand, one of its main characteristics, namely decentralization, allows the execution of trials in the absence of a certification intermediary, putting at risk all professions such as notaries, lawyers, auditors and accountants, who have always dealt with, at different levels, certifying data and information.

### 5.1 Consultants and Auditors

Blockchain technology has the potential to impact all record-keeping processes, including the way transactions are initiated, processed, authorized, recorded and reported. Changes in business models and business processes may impact back-office activities such as financial reporting and tax preparation. Independent auditors likewise will need to understand this technology as it is

implemented at their clients. Both the role and skill set of CPA auditors may change as new blockchain-based techniques and procedures emerge. For example, methods for obtaining sufficient appropriate audit evidence will need to consider both traditional stand-alone general ledgers as well as blockchain ledgers. Additionally, there is potential for greater standardization and transparency in reporting and accounting, which could enable more efficient data extraction and analysis. Blockchain technology could bring new challenges and opportunities to the audit and assurance profession. While traditional audit and assurance services will remain important, a CPA auditor's approach may change. Just as the audit and assurance profession is evolving today, with audit innovations in automation and data analytics, blockchain technology may also have a significant impact on the way auditors execute their engagements. Moreover, CPAs may need to broaden their skill sets and knowledge to meet the anticipated demands of the business world as blockchain technology is more widely adopted.

### 5.2 Legal Professions

Blockchain technology is likely to transform professional legal services. Its applications may be used:

- For effecting the service of documents and providing a digital platform for confidential information sharing which is useful for discovery and due diligence;
- To digitise registries, such as those recording titles of land and property;
- To facilitate the exchange of ownership without re-

quiring intermediaries (such as lawyers to draft legal title exchange documents);

- To provide authentication services which could be of significant practical application in securing the integrity of evidence used in courts.

As mentioned above, the blockchain structure makes it one of the most secure, immutable and transparent solutions. Its application in legal systems will allow attorneys to record and authenticate many types of legal matters. That includes any ledger-based activity: property records, UCC filings, court records, funds transfers, chains of custody, contracts and even legal opinions. The legal technology industry is still in its infancy of exploring viable solutions that utilize the blockchain technology. Anyway, several applications of the Blockchain can be listed as helpful application to the legal sector:

- Smart contract. As mentioned before, smart contracts are becoming more fashionable, since they have the potential to reshape our understanding of contract law. Smart contracts could become a useful tool for the smart lawyer. With it, firms can offer a more efficient service at a reduced cost. In this case, the question raised is whether attorneys will want to exercise creative freedom.
- Land Registry and Property Deeds. The Blockchain mechanics can be helpful to illustrate transactions by keeping reliable records of property titles, deeds and ownership changes as they occur.
- Intellectual Property Rights. Blockchain is irreversible, secure, and time-stamped, offering a reliable way to track first use. A blockchain approach to IP management could also be used with any kind of digital assets, such as images, video files, audio recordings, and other digital content. For example,

professional photographers or musicians could use it to manage licensing rights to their creations and to enable royalty payments.

- Criminal Cases. The ledger can be used to share and track Criminal charges to allow law enforcement, prosecution, courts, probation, defence attorneys, and correction facilities could access. When charges are added or dropped by law enforcement, prosecution, or courts, that information would be posted to the ledger as well, with the expected result being a faster, more efficient administration of justice.
- Dispute Resolution. A blockchain platform could provide a secure, immutable, and transparent platform for capturing negotiations, terms of a resolution, and the identities and agreements of each of the parties, which will be available and traceable in case of further disputes. Availability and expertise of qualified third-party mediators could be recorded in a blockchain ledger as well.

Although this technology would not be implemented by legal firms, Blockchain can be a new frontier for legal consultants. The future might see the lawyer's role shift from drafting mindlessly, to becoming a strategic adviser to clients. For legal professionals, the important point is to be aware of some of these possibilities and the impact they might have. In this regard, lawyers are going to be a guidance and support on how this technology might affect their businesses and policies.

However, the full extent of blockchain technology capabilities in the legal sector is not yet known. Nevertheless, concerns raised regarding the possibility that smart contracts integrated with blockchain technology could have significant disruptive potential. This is not considered to be at all right, since legal consultants can attend to verify

the validity of consensus. Another possible legal difficulty deals with recognising a smart contract itself as a valid legal agreement is uncertain as to terms, such as the parties to the contract. In this regard, the burgeoning of smart contracts offers new opportunities for the legal profession.

Smart contracts and traditional ones are often complementary, since the original definition of a smart contract presupposes there are existing contractual terms for the code to execute. This is a hybrid model, which allows contracting parties to benefit from the legal certainty of written (traditional) contracts, but with the efficiency of smart contracts.

A concrete example of this comes from Initial Coin Offerings (“ICOs”)<sup>86</sup>, which are a revolutionary tool for capital formation, and are contributing to disintermediate financial markets where companies offer digital tokens for sale to the public. The smart contract facilitates the collection of virtual currencies and distribution of the company’s digital token, but a written agreement sets out the risks that purchasers assume and the rights they have against the vendor.

As a result, the advent of smart contracts and their hybrid forms and applications have actually created demand for legal services. However, lawyers will need to understand and address the peculiar risks associated with smart contracts and blockchain technology, to profitably provide their legal services.

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86. M. Dell’Erba, *Initial Coin Offerings: The Response of Regulatory Authorities*, 14 N.Y.U. J.L. & Bus. 1107 (2018); J. Preston, *Initial Coin Offerings: Innovation, Democratization and the SEC*, Duke Law & Technology Review, Vol. 16, pp. 318-332.

### 5.2.1 Notaries

The technological progress the notary world has been making has forced an adaptation to the new needs of speed and efficiency stimulated since the advent of the Internet and now with the diffusion of the digital act and of the electronic signatures. In this regard, among European Member States, France has already introduced the use of biometric signatures on tablets since 2017. The creation and the development of Istrumentum will allow public IT documents to be received with a more agile and more advanced procedure<sup>87</sup>. Blockchain is considered to add value to the contractual and property processes (Arrunada 2018), by a reduction of the costs for ownership transfers. In summary, it could be a useful tool to simplify bureaucratic procedures, while introducing more transparent and efficient systems.

This is truly evident for Land Registry and Property Deeds. The Blockchain mechanics can be helpful to illustrate transactions by keeping reliable records of property titles, deeds and ownership changes as they occur. Property owners, banks, insurance companies, title companies and municipalities would all have access to clean records of ownership and title transfers, reducing future title search time and increasing transparency. Besides, this application is not considered to be currently applied, since the whole process of estates registration have already reached a certain degree of automation, together with the intercourses with tradi-

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87. <https://www.notaires.fr/en/notaire/role-notaire-and-his-principal-activities/role-notaire>; C. Ferretto, *Evoluzione informatica applicata all’attività notarile*, Notariato 1/2017, p. 58.

tional intermediaries<sup>88</sup>. Decentralised ledger technology and smart contracts have the potential to be used in trust creation and estate administration. The division of assets in an estate could potentially be cryptographically and securely coded into the blockchain, which upon the passing of the testator and the registration of the death certificate, the terms of the will or trust could self-execute to disburse the assets<sup>89</sup>. The piloted service Blockchain Apparatus advertises the potential to administer and execute will documents without human involvement, even allowing revisions of the documents, which are stored in their own original state, to preserve the right to amend. Hence, strong doubts on admissibility of the deed whose price is paid in bitcoin without the intervention of the notary, to guarantee the quality of the store and control aimed at the prevention of recycling of money of illicit origin, on whose need the National Council of Notaries pronounced itself in the answer to the question n. 3/2018/B.

Apart from this, several concerns have arisen regarding the possibility that blockchain could replace notaries. As a matter of fact, blockchain ensures great certainties about the exact transaction moment, which can be easily tracked. However, some believe that blockchain cannot replace the professional role of notaries.

Firstly, the notary is considered to have a wide certification power, which goes towards the supervision of legality. In this regard, similarly to Artificial Intelligence

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88. G. Laurini, *Il notaio e le valute virtuali*, *Notariato* 2/2018, p. 141.

89. J. Dewey and S. Amual, *Blockchain Technology will transform the practice of law*, *Bloomberg Law* (25 June 2015) <https://bol.bna.com/blockchain-technology-will-transform-the-practice-of-law/>. B. Arrunada, *Blockchain's Struggle to Deliver Impersonal Exchange*, 19 *Minn. J.L. Sci. & Tech.* 55 (2018).

concerns regarding legal professions, the Blockchain does not have the same authoritativeness, as well as the same extent of validation power.

Secondly, consequently, Blockchain cannot provide the same legality and legitimacy parameters. Currently, the cryptographic signature itself is not considered sufficient to prove parties' identity. Moreover, the disintermediation should increase asymmetries by creating more lack of information upon the weakest party.

In summary, findings allocate a more powerful role to notaries: even if blockchain should be used, the notary will continue to assist the parties, especially the weakest ones, carrying out its function of adjustment. The notary is an irreplaceable item, i.e. the interpretation of the parties' will, by translating it into stable contractual clauses, destined to remain firm and to stand up also in the event of a dispute between the parties<sup>90</sup>.

### 5.3 Health sector

The blockchain technology is currently used in the United States to manage health data in order to achieve a more efficient national healthcare system. Increasing amounts of research in the professions is exploring the issues raised by the introduction of digital technologies and the use of big data and analytics. In medicine, for example, electronic patient records (EPRs) are being implemented in hospitals across most developed countries. Generally, blockchain is treated as a distributed ledger

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90. D. Restuccia, *Il notaio nel terzo millennio, tra sharing economy e blockchain*, *Notariato* 1/2017, pp. 53 ss.

to store health records for sharing, exchanging or other purposes among stakeholders<sup>91</sup>. In e-Health systems, the patient may visit different medical institutions and each institution manages their own database and is expected to achieve secure distribution of health records.

Actually, the medical field has rapidly adopted new technology in recent decades, achieving instruments and tools to improve the care provided, to realize and ensure healthcare information infrastructure and record storage<sup>92</sup>. Health institutions suffer from the chronic inability to securely share data. In this regard, the blockchain is considered useful to ensure the security of electronic medical records<sup>93</sup>. This can encourage more accurate diagnosis, as well as achieving the most suitable and appro-

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91. Kuo, T., Kim, H., and Ohno-Machado, L., Blockchain distributed ledger technologies for biomedical and health care applications. *Journal of the American Medical Informatics Association* 24(6):1211–1220, 2017.

92. Wynne M. Snoots, *Information Technology and the Medical Profession: A Curse or an Opportunity?*, BAYLOR UNIVERSITY MEDICAL CENTER PROCEEDINGS, (Apr. 15, 2002), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1276501/>.

93. B. Nguyen, *Exploring Applications of Blockchain in Securing Electronic Medical Records*, 20 *J. Health Care L. & Pol’y* 99 (2017); J. Schlesinger & A. Day, *Dark Web is Fertile Ground for Stolen Medical Records*, CNBC, (Mar. 11, 2016), <https://www.cnbc.com/2016/03/10/dark-web-is-fertile-ground-for-stolenmedical-records.html>. Lydia J. Andrasz, *HIPAA and Electronic Medical Records: Benefits and Security Issues*, 25 *DCBA BRIEF* 26, 29 (2012); Lori J. Strauss, *Electronic Medical Records-Benefits and Liabilities, Organizations Must Safeguard Against Risks When Using Electronic Medical Records*, 17 *J. HEALTH CARE COMPLIANCE* 57, 57-58 (2015); N. Yaraghi, *A Health Hack Wake-Up Call*, *USNEWS* (Apr. 1, 2016), <https://www.usnews.com/opinion/blogs/policy-dose/articles/2016-04-01/ransomwar-hacks-area-hospital-health-it-wake-up-call>.

priate option to ensure effective treatments; more generally, it can induce an increase in the overall capacity of healthcare systems to provide good care. Blockchain applied to the healthcare sector allows hospitals, payers and other healthcare facilities to share access to their networks without compromising data security and integrity. At the same time, pursuant to data protection rules, it is necessary to ensure the right balance between rights of the data subjects and the competing priority of the health-care.

## 5.4 Public Administration

As a whole, the Public Administration, together with strategical sectors such as the distribution of public aid and the management of the welfare system, can be helped to improve their efficiency by blockchain. It can help simplify the procedures for granting aid and guarantee better public governance of the initiatives. The potential towards the implementation of this ledger for Public Administration is growing fast, also involving public – private partnerships. For example, the company GovCoin Systems Limited, based in the financial heart of London, the City, supports the UK government in the distribution of interventions to support the inclusion of the most disadvantaged sections of the British population.

## 5.5 Conclusion

The digitalisation of professions and professional firms is changing an array of professional sectors, by disrupting traditional activities and services provided. However, technology is playing an important role by giving them a new chance to be more competitive in order to reach a higher level of profitability. Despite mandatory digitalisation by law, the new technological development can stimulate professional firms to invest in new technological supports, in a more active way.

Even if Blockchain and Artificial Intelligence cannot be considered one of the main investments in professional firms, they constitute a profitable opportunity to assist parties in order to ensure the correct use of these technologies. In these two cases, indeed, the revolution is quite slow, due to the higher potential inside them. Education and awareness are the key words to ensure them a competitive advantage among other professional competitors.

## THE IMPACT OF TECHNOLOGIES ON THE CURRENT PROFESSIONAL LANDSCAPE

### 1. The empirical background in the era of globalization

Digitalisation of professions has been increasing over the last decade, becoming one of the most relevant trends of the 21<sup>st</sup> century. One of the main factors is globalisation.

By globalisation we mean a process through which classic space-time barriers have fallen, and local societies merge together creating a new and bigger society. It is a broader concept than internationalization, which is just focused on relations among states<sup>94</sup>.

Globalisation has been generally referred to as a huge number of dynamic phenomena, associated by the common presence of some characteristic elements<sup>95</sup>. In this regard, globalisation undercover phenomena that:

1. cut across national boundaries;

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94. Internationalization represents the process of decentralization and reorganization of productive activities, first concentrated in a single geographical area, in those geographical areas that offer the best economic and management conditions.

95. M. A. Di Pietro, E. Mirjam Girsberger, A. Vuille, Swiss Federal Statistical Office (FSO), Switzerland, *The Impact of Globalisation on Employment*, <https://ec.europa.eu/eurostat/documents/1001617/4576272/SESSION-II-DOC-4.pdf>.

2. result in higher integration or interdependence of human societies.

The proliferation of communication means, as well as the possibility to share information in real time across the world, thanks to the contextual increase in flows of investments, goods and individuals, a hybridization of socio-economic cultures<sup>96</sup>.

Globalisation is usually referred to economical causes. In these terms, globalisation can be considered as a new way in which capitalism can manifest itself. In this regard, the saturation point reached by existing domestic economies lead to finding new markets<sup>97</sup>.

Currently, globalisation induces professions, stakeholders, companies and all actors to operate in a more internationally competitive business environment and be able to respond to rapid changes in market conditions and customer demands. Competition can be a double-edged sword, however. Several studies have shown that a competitive working climate increases the likeli-

hood of unethical conduct<sup>98</sup>.

Implication of a more competitive working climate means that:

- The barriers to entry of a state, once effective, today are becoming more and more ineffective against potential foreign entrants;
- Concentration in sectors is significantly reduced, due to the fact of an expansion of the sector boundaries;
- Competitors are becoming increasingly numerous and in ever-more varied forms, causing ever more vigorous competition, making cooperation difficult;
- Big customers see their bargaining power increase towards their suppliers.

However, globalisation can be of an economic, social, political or environmental nature. Technology plays a functional role, enabling the globalisation of professions.

This became quite clear after the 2000 crisis, when the ICT market started to grow again, especially with the push of an ever-increasing demand.

Its main consequences are:

a) The number of professional figures.

This has been viewed in an optimistic perspective by some of the latest ILO analyses, whose studies argue that the number of jobs available in the world is higher than ever before<sup>99</sup>.

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96. V. Cesareo, *Studi di sociologia*, Università Cattolica del Sacro Cuore, (1997) pag.249-281; L. E. Rothenberg, (2003). *Globalization 101: The three tensions of globalization*, <http://www.globaled.org/issues/176.pdf>.

97. R. Kelly, G. Stewart, &, P. W. Hyland (2004). *The impact of globalisation on the process of career development. Regionalism and Globalisation: The Challenge for Employment Relations: Proceedings of the 12th Annual Conference of the International Employment Relations Association (IERA), held at Yeppoon, Qld., 5-8 July, 2004.*

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98. See, for example, Anderson et al. (2007); M. Anderson, K. Louis and J. Earle, *Disciplinary and Departmental Effects on Observations of Faculty and Graduate Student Misconduct*, *Journal of Higher Education*, vol. 65 (1994), pp. 331–350; David Blumenthal, Eric Campbell, Manjusha Gokhale, Recai Yucel, Brian Clarridge, Stephen Hilgartner and Neil Holtzman, ‘Data Withholding in Genetics and the Other Life Sciences: Prevalences and Predictors’, *Academic Medicine*, vol. 81 (2006), pp. 137–145.

99. ILO, *World Employment Social Outlook, 2018*, [https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms\\_615594.pdf](https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_615594.pdf).

Some others, furthermore, argue that the real cause of this situation may not be the increase of demand itself, but other attendant factors, such as demographic growth.

b) Structure and composition of job.

Globalisation is generating a turnover of professions and the types of jobs involved. To some extent, some jobs linked to certain economic activities may tend to disappear, whereas changing competitive advantages and patterns of specialisation require more jobs to be linked to other, and usually new activities. This might depend on the level of skill of each kind of job: lower levels of skills required are more facilitated to be substituted by robots and automated process.

The whole scenario could be due to economic issues, as well as technological ones.

c) Flexibility about time and space.

Actually, globalisation leads to new standards of work. Routine items have become smart (i.e. smartphones, smart cars, and smart homes) with the ability to connect and provide information in a very simple and standard way, mostly to increase the quality of lives for its users. In an attempt to stay abreast of these changes, governments are investing billions to convert cities into smart hubs, connecting people to city-wide WiFi networks. These networks provide up-to-date information on government programs, traffic, as well as local attractions and restaurants.

Moreover, they are also adopting this trend by investing large capital in ICT in order to remain competitive, and also increase efficiency and cost-effectiveness (Tusubira

& Mulira, 2004)<sup>100</sup>. The improvement of 24/7 services impact all the major sectors; meanwhile, the possibility to communicate leads to working outside traditional workplaces or working hours<sup>101</sup>. This attitude might depend on either the kind of work (for example, in the case of international professional offices) and the kind of activities, which do not necessarily need a physical presence in the workplace (since the use of technology combined with the digitalisation of professions only need access to a technological asset with which it is possible to work with). Several studies found globalization measures appear to increase working time and flexibility, but they were just focused on particular industries or occupations<sup>102</sup>. Others, instead, found globalization might increase firms' profitability that gets passed on to workers in wages and benefits<sup>103</sup>.

This can be a positive point for liberal professions, since it provides more convenient and flexible conditions, able to improve efficiency; this may also alleviate some

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100. F. Tusubira, & N. Mulira (2004, September). *Integration of ICT in organizations: Challenges and best practice recommendations based on the experience of Makerere University and other organizations*. Paper presented at Universities, Kampala: Taking a leading role in ICT enabled human development.

101. B. Burgoon, D. Raess, *Globalization and Working Time: Working Hours and Flexibility in an Open Economy*, Politics & Society, Vol 37, Issue 4, 2009, <https://doi.org/10.1177/0032329209349224>; Isabelle de Pommereau, "E. Europe's low costs erode Germans' 35-hour workweek", Christian Science Monitor, August 24, 2004.

102. Mary Blair-Loy and Jerry A. Jacobs, *Globalization, Work Hours, and the Care Deficit among Stockbrokers*, Gender and Society 17, no. 2 (2003): 230-49.

103. Robert J. Flanagan, *Globalization and labor conditions: Working conditions and worker rights in a global economy*, New York: Oxford University Press, 2006.

gender gaps (the necessity for women during maternity to give up work or reduce the weight of it to concentrate her attention upon the child. On the contrary, it leads to reflection about labour implication, for example about the boundaries of the employer to exercise his/her power of control over the employees, as well as the correct definition of their working hours.

d) Society and knowledge have become fluid.

As a result, apart from having completely subverted the most common concept of geographical and temporal distance, multi-skills are now required. This means that the professional figure must embrace several – and often very antithetic – skills due to the complexity of new work dynamics. This trend should be considered as connected to the increase of the new professions required<sup>104</sup>.

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104. L. Meleo, *Le nuove professioni dell'ICT*, *Economia dei Servizi* 1/2009, pp. 127 ss.

## **2. Deployment of ICT onto the professions: skimming for efficiency and profit.**

Digitalisation in the last decade has brought about a deep change in the professions market, by introducing different and more dynamic working styles, which require new, transferable skills. Some work activities have started to disappear due to the automation of production processes, but it is equally true that new jobs were born to be covered by professionals who are not always available on the market. The effects of technological change, both on the quantity and quality of employment, has been analysed during this time.

Information and Communication Technologies (ICT) are increasingly viewed as a vital infrastructure for all sectors. This advent, together with the development of the telecommunications market, have determined an unprecedented change in the economic history in the last decade, enabling the new “access era” (Rifkin 2001)<sup>105</sup>. As a combination of digitalisation, together with globalisation, the *access era* stands for a shift from ownership, which is no longer considered as a step towards efficiency. Access to resources or assets – either physical or not – as well as services allows both demand and supply to have low transactional costs, only paying for real and effective use. The widespread use

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105. J. Rifkin, *The zero marginal cost society*, St Martins Press 2014

of ICT has affected the whole significant consequences on economic systems.

The impact onto professions can be described as multi-sided:

- Firstly, online services create a new digital market of services provided online. Thus, they foster the sector of consulting, which is the main sector which benefits from the use of ICT to provide online services. Consequently, findings highlighted that automation of some work activities optimised professional firms' duties and time, creating appropriate spare time to be implemented for consulting activities.
- Secondly, there is a strong relationship between the adoption of ICT measures and the increase of earnings<sup>106</sup>. Studies observed that 2016 was the year of maturity for ICT investments made by Italian professional firms: not only did the total spending on technologies of lawyers, accountants and job consultants grow by 2.5%, reaching € 1.122 million in 2016, but in many professional firms, it became a strategic lever for improving organization and market positioning<sup>107</sup>.
- However, notwithstanding the strong relationship mentioned before, this does not imply that the size and turnover of the study is an impediment to the digital approach. On the contrary, data and studies confirm that these cannot be considered as impediments.
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106. Politecnico of Milan 2015.

107. However, only in the last decade has it been picked up empirical evidence on how the boom of the ICT investments in the eighties and early 90s were positively influencing on the economic performance of the countries, initially in the United States, thereafter also in Europe.

- As a consequence, the increase of investments has required appropriate providers, with the right skills to use technology in the required way<sup>108</sup>. From the point of view of professions as employers, this means that the work of their employees is no longer conceived as a purely physical resource. This can justify the reason why more attention is paid to employee training.

From the picture just outlined, it would seem that the new information and communication technologies are leading to a better situation<sup>109</sup> in terms of allocation and important productivity gains. Such advantages constitute the foundation logic on which the European Commission has decided to build, within the Community, a strategy to encourage ICT adoption development. The European Commission has focused its attention on ICT since 2005<sup>110</sup>. The European Commission considers the internet economy to be a fundamental lever for growth of the entire continent and places the constitution of the so-called Digital Single Market among its official priorities. In this regard, the two main areas of labour market have been identified as follows:

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108. Technological revolutions have not always led companies to ask for more qualified work: in 1800 in Great Britain with the advent of the industrial revolution, the most skilled workers (the artisans, for example) were replaced by machinery.

109. In January 2016 the World Economic Forum (WEF) published *The Future of Jobs*. The report's headline finding was that up to 7.1 million jobs could be lost in 15 major developed and emerging economies due to "redundancy, automation or disintermediation, with the greatest losses in white-collar office and administrative roles.

110. European Commission, *The use of ICT to support innovation and lifelong learning for all - A report on progress*, SEC(2008) 2629 final, [http://www.europarl.europa.eu/registre/docs\\_autres\\_institutions/commission\\_europeenne/sec/2008/2629/COM\\_SEC\(2008\)2629\\_EN.pdf](http://www.europarl.europa.eu/registre/docs_autres_institutions/commission_europeenne/sec/2008/2629/COM_SEC(2008)2629_EN.pdf).

- Hard ICT professions, which belong to a scientific–engineering area. Professions such as the Chief Officer, Data Manager and Security Expert fall into this group. It has been estimated that professions related to the ICT sector have undergone a considerable increase over the past decade<sup>111</sup>.
- Soft ICT professions. This group involves and is accessible to candidates from graduates in humanities disciplines such as digital managers, online marketing experts, digital shop managers, e-commerce specialists, specialists of digital reputation.

This articulation shows that ICT involves not only scientific profiles; often, due to transversal skills, humanists can apply. ICT is a growing and increasing sector. Overall, according to a report prepared in 2016 by the United States Department of Labor (DoL), the Information Technology and Information Technology sector will see an average growth of 13% between 2016 and 2026. This increase will have positive effects on the number of jobs. The DoL estimates that, over the decade under review, more than half a million jobs will be created, with a request increasingly focused on cloud computing, collecting and storing big data and information security. The report refers to the USA, but it can be indicative of a world trend.

ICT development, as part of the whole and more complex scenario of the Digitalisation process, originated the creation of:

- new professional figures;
- new ways of making profits;
- new working relationships and opportunities for new business creation.

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111. ISTAT, La classificazione delle Professioni, [https://www.istat.it/it/files/2013/07/la\\_classificazione\\_delle\\_professioni.pdf](https://www.istat.it/it/files/2013/07/la_classificazione_delle_professioni.pdf).

### 3. The most relevant technological tools and services used

Professional firms' services in the digital economy are characterized by:

- New offer models;
- More interactions with the customer;
- New models of work organization.

All these items have been made possible thanks to innovation, especially ICT development.

Since 2016, the maturity for ICT investments carried out by Italian professional firms has been increasing: not only has the total spending on technologies for lawyers, accountants and job consultants grown by 2.5%, reaching € 1,122 million in 2016, but in many professional firms, it has become a strategic lever for improving organization and market positioning.

Researches carried out on labour consultants, lawyers and accountants highlight evidence that professional firms are becoming more digital–friendly. They see technology and digitalisation as a functional process to become more efficient. For this reason, technology enables professional firms to:

- Improve Internal efficiency;
- Improve their renown and their position on the market.

In this regard, technology enables the improvement of both internal and external dynamics. Providing efficiency means that professionals have more time to dedicate

to their customers, but also for the development of new services, such as managing financial aspects.

- Graphometric signature - Digitalization and document storage

These are the most used tool by professional firms. They aim at enforcing internal organization and efficiency by dematerialization of documentation, with consequent progressive elimination of paper supports. They support the acquisition of:

- customer signatures for assignments and declarations;
  - data for accounting records;
  - querying of data and documents;
  - sharing practices or their status among members of the firm.
- *Website*

In order to ensure the improvement of their online visibility, professionals and professional firms traditionally resort to the use of websites. Currently, the website stands out among the most interesting and profitable technologies for the improvement of external visibility of the professional firms. The website constitutes a sort of shop window, which marks the desire of the firms to communicate more and better with served and potential customers. The website is often followed by the creation of an account on social networks: this ensures the maximum coverage of visits.

In order to ensure the best visibility online, professionals can resort to appropriate sponsorships, to reach the greatest index on online search engines. Even if traditional, the website can represent a useful tool to track visits of users and searches, profiling visitors, in accordance with the privacy law.

- Cloud computing, Blockchain and AI

Moreover, for internal organization, cloud computing-based solutions, as well as blockchain and artificial intelligence, Internet of things and data management have been adopted. However, 36% have already adopted cloud computing for all or part of the work processes and its demand has increased over time<sup>112</sup>. Moreover, some studies show how the cloud has been considered more profitable than ICT investments. And one in four studies uses data transiting to provide new content to customers.

- Internet of Things (IoT)

The term Internet of Things (IoT) refers to infrastructures where innumerable sensors are designed to record, process, store data locally or interacting with each other both in the medium range, using radio frequency technologies (e.g. RFID, Bluetooth etc.), and via an electronic and communications network<sup>113</sup>. The rise of IoT, which coincides with the rise of big data, leads to almost limitless possibilities for consumers seeking remote access and control options relating to their electronic devices and other objects. It is considered a very powerful tool

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112. <http://www.ipresslive.it/comunicates/1359/il-cloud-crescepiu-dellict-e-vale-493-milioni-di-servatori-ict-delpolitecnico-dimilano>.

113. Nt'l conference of data prot. & privacy comm'rs, Mauritius declaration on the Internet of things 2 (Oct. 14, 2014), [https://edps.europa.eu/sites/edp/files/publication/14-10-14\\_mauritius\\_declarationen.pdf](https://edps.europa.eu/sites/edp/files/publication/14-10-14_mauritius_declarationen.pdf)

for health<sup>114</sup>: patients could be no longer required to visit the physician's office for evaluation and monitoring or stay in long-term care and health monitoring facilities. Engineering, and many other professional activities profit from these interactions. However, an effective implementation of the Internet of Things paradigm expands several concerns about privacy<sup>115</sup>, security<sup>116</sup> and liability.

- Smartphones and Social Networks

Smartphones and social networks belong to the digitalization process as a whole, including their use for professional use. They allow professionals to work from mobile, helping them to:

- improve customer service;
- remain in contact with the office, customers and suppliers;
- increase mobility;
- increase productivity;
- work remotely.

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114. For example, findings show that IoT may greatly benefit consumers of healthcare; for example, insulin pumps and blood-pressure cuffs can connect to a mobile app and enable patients and doctors to record and monitor vital signs. See Medical device privacy consortium, comments to the U.S. House Energy and Commerce Committee concerning "21st century cures" 2 (October 31, 2014), <http://bit.ly/1Ln6CDP>

115. Consumer Notice: Internet-Connected Toys Could Present Privacy and Contact Concerns for Children, FBI (July 17, 2017), <https://www.ic3.gov/media/2017/170717.aspx>

116. See generally Fed. Trade Comm'n, Internet of Things: privacy & security in a connected world (Jan. 2015), <https://www.ftc.gov/system/files/documents/reports/federal-trade-commission-staff-report-november-2013-workshop-entitled-internet-things-privacy/150127iotrpt.pdf>.

- a) Smartphones

Smartphones, regardless of any other technological means such as blockchain, or cloud computing, are confined to management uses. It acts as a communication means with clients, colleagues and employees. Findings shows that quick responses to queries correlate with higher productivity<sup>117</sup> and expanded the ability to multitask<sup>118</sup>. It is frequently used as an agenda, to manage meeting, send emails or messages and share documents. Moreover, it can be used to upload files on cloud or elsewhere. However, it is important, especially when the content of documents or messages is very delicate, to provide appropriate security measures.

- b) Social Networks

Findings shows that social networks are often used by professional firms to sponsor themselves. They usually provide more visibility, since many people find it much more easier using a social network than a search engine to find a professional through websites.

As a matter of fact, one of the main features of sponsored pages on social networks is the possibility, for users, to write

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117. Aral, Sinan and Brynjolfsson, Erik and Van Alstyne, Marshall W., Harnessing the Digital Lens to Measure and Manage Information Work (November 16, 2010), <http://dx.doi.org/10.2139/ssrn.1709943>. Bulkeley, N. & Van Alstyne, M. (2004) "Why Information Influence Should Productivity" The Network Society: A Global Perspective; Manuel Castells (ed.). Edward Elgar Publishers. pp: 145-173.

118. Aral, S., Brynjolfsson, E. & Van Alstyne, M. 2006. "Information, Technology, and Information Worker Productivity: Task Level Evidence" Proceedings of the 27th Annual International Conference on Information Systems, Milwaukee, WI. Aral, S., Brynjolfsson, E. & Van Alstyne, M. 2007. "Productivity Effects of Information Diffusion in Networks" Proceedings of the 28th Annual International Conference on Information Systems, Montreal, CA.

feedbacks on the service provided, the knowledge of the professional, up to every detail about the premises or the kindness and ability of the employee. This can allow more transparency of professional work, but in an informal and unconventional way, even if many studies argue that this method is more effective than traditional ones. However, many distortion effects may occur: for example, some negative feedbacks could be a fake, posted just to damage the image of the professional firm; moreover, there could be a lack of transparency due to the fact that the owner of the page (the professional firm) can delete negative feedback published, in order to have just good ones.

The relation between technology and institutional change constitutes another reason for the digitalisation of professions, firmly established for many years (Brock, 2006; Brock et al., 1999; Fountain, 2004; Greenwood, Hinings, & Suddaby, 2002)<sup>26</sup>. Many investments can thus be considered as a consequence of legal obligation. For example, from March 31, 2015 it is mandatory for all companies to use certified e-mail, digital signatures, and software to securely store documents for at least 10 years. These legal obligations encourage, therefore, professional studies to innovate and also to offer new services to the companies that need their support: technologies, such as documentary dematerialization, cloud computing, social networks, smart working, thanks to smartphones and tablets, can contribute strongly to activating internal efficiency and the external effectiveness needed at this particular moment. The technologies most used by professional firms are digital signatures, electronic invoicing and video calling software<sup>119</sup>.

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119. Osservatorio professionisti e innovazione digitale della School of Management del Politecnico di Milano.

### 3.1 Cloud computing

Adapting to the change enacted by the digital revolution, both for the needs dictated by law and to make the service more efficient, is becoming an increasing necessity for professional firms. Thus, they prefer to resort to digital document management in outsourcing.

The cloud today is a driver of change for the entire organizational structure of professional studies. Currently, cloud solutions, (both as web-based and Software as a Service (SaaS)) can support this type of professional, expanding the range of services they offer to their own customers, whether they are larger or private companies, without however increasing internal management costs and without making major infrastructure investments, such as the purchase of new servers or more powerful and modern computers.

It is important to understand this operation as a prior step to better checking the impact on customers, collaborators and employees.

The technological revolution which characterizes the new millennium has significantly affected the transfer of information, facilitating retrieval and exchange. Telematics and the creative proliferation of mobile computing devices, such as netbooks, tablets and smartphones, have simplified the life of every citizen-user of the network, which, by exploiting the available connection systems, can access the web more freely. Although these devices have a number of advantages (consider the small size), they are at the same time lacking adequate storage support.

In recent years, the need to reorganize information flows, as well as to rationalize costs, have led to the diffusion of heterogeneous service models, generally defined as cloud computing (or simply cloud). These are characterized by

a set of technologies and service models which foster the use and delivery of IT applications, processing capacity and web storage and which, as the case may be, promote transfer - the processing or storage of data from users' computers to the systems of the service provider.

Recently, many professional firms have undertaken strategic planning efforts including that of migrating to cloud computing to address issues of network server costs, file sharing through physical locations, reduction of traditional paper-based record management systems, and disaster recovery.

In this context, cloud computing is a set of service models increasing more than others; it is spreading in both the public and private spheres, as it encourages flexible use of its resources (infrastructure and applications) or those made available by a specialized service provider.

Cloud can be considered as the natural evolution of the way of using the Internet, which from a simple tool for sharing documents (the web page made available by the remote website), it becomes the gateway to the processing resources of a service provider (the application made available in web mode). It is a new approach for the supply of IT resources (computational capacity, storage space or even software) in the form of services accessible via the network. As a consequence, cloud computing cannot be considered as a temporary phenomenon, but the next step in evolution in the way the Internet is used, which is a tool for sharing documents only (the web page available from the remote website) becomes the gateway to the processing resources by a service provider (the application made available in web mode).

Although it is not considered something totally new, as it has not been considered as a new technology itself

(on the basis of the exchange and data transfer perspective), it would represent a new approach to the use of existing technologies, able to mark the transition to the 3.0 web<sup>120</sup>. It represents all its difference among previous traditional storage methods. It can perform all those previous tasks of storage, via a simple Internet browser. It can use remote software not directly installed on the computer and save data on mass online memories prepared by the provider himself (exploiting both cable networks and wirelessly).

According to the Cisco Global Cloud Index 2015-2020 (GCI) - which provides growth forecasts - and the trends in global IP traffic involving data centres and the cloud over a period of time from 2015 to 2020, the supply of cloud services is rapidly rising. Overall, global data centre traffic was expected to increase fourfold between 2011 and 2016, and in particular cloud IP traffic for 2016 will increase by 235% by 2020, reaching 15.3. zettabyte<sup>121</sup>. Currently, the Cloud represents the enabling platform for digital transformation, with an increasingly sophisticated offer even on complex and innovative subjects such as Artificial Intelligence, Analytics and the Internet of Things.

On an international level, the cloud knows no crisis, as demonstrated by data that project the global market to just

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120. G.N. La Diega, *Il cloud computing. Alla ricerca del diritto perduto nel web 3.0*, Europa e Diritto Privato, n.2/2014, p. 578; V. Falce, *Standard e Cloud computing*, in *Il diritto Industriale* 2/2015, p.155.

121. Cisco Systems, *Cisco Global Cloud Index*, Cisco Knowledge Network (CKN) Session, 2015- 2020, [https://www.cisco.com/c/dam/m/en\\_us/serviceprovider/ciscoknowledgenetwork/files/622\\_11\\_1516-Cisco\\_GCI\\_CKN\\_2015-2020\\_AMER\\_EMEAR\\_NOV2016.pdf](https://www.cisco.com/c/dam/m/en_us/serviceprovider/ciscoknowledgenetwork/files/622_11_1516-Cisco_GCI_CKN_2015-2020_AMER_EMEAR_NOV2016.pdf).

under \$ 120 billion for 2018, with a growth rate of 26%<sup>122</sup>. Apart from this short description, which it is focused solely on comparing some of the direct and most clear advantages of cloud rather than other methodology of storage documents et alia, it is necessary to briefly concentrate attention on the description of what cloud computing is, as well as its architecture.

### 3.1.1 Defining cloud computing

Cloud computing, as well as other technologies, lacks a common definition. There are various definitions of cloud in scientific literature. The first and more complete definition has been formulated by the NIST<sup>123</sup>, i.e. the *National Institute for Standards and Technology*. Pursuant to NIST definition<sup>124</sup>, cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to

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122. Gartner, Set. 2018. Data referred to Cloud Application Services (SaaS), Cloud Application Infrastructure Services (PaaS), Cloud System Infrastructure Services (IaaS).

123. The first Draft of the cloud computing definition was created in November 2009. Actually, the current NIST Definition of Cloud Computing (SP 800-145) is available at <http://csrc.nist.gov/publications/PubsSPs.html#800-145>.

124. As mentioned above, there are many other definitions for cloud computing available in scientific literature, which seek to capture the essential aspects of cloud computing. In L. M. Vaquero, L. Rodero-Merino, J. Caceres, M. Lindner: A Break in the Clouds: Towards a Cloud Definition. ACM SIGCOMM Computer Communication Review, Volume 39 Number 1 January 2009, many other definitions are reported, from which the authors try to identify the main characteristics of the cloud. Other interesting definitions are those issued by ERCIM in in 2010 (ERCIM NEWS: Special theme: Cloud

a shared pool of configurable computing resources (e.g., networks, servers, storage, applications and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. This cloud model is composed of five essential features, three service models, and four deployment models.

For a better comprehension of the whole phenomenon, the ENISA (i.e. the European Union Agency for Network and Information Security) stated that cloud computing is a new way of delivering IT services (and not a new technology)<sup>33</sup>.

### 3.1.2 The main features of cloud computing

The cloud computing model is based on five key features, respecting traditional approaches, as defined in the Security Guidance by the Cloud Security Alliance<sup>34</sup>. In this regard, five essential characteristics of cloud computing has been listed from this definition:

- Cloud is an *on-demand, self-service*: this means that a) anyone can unilaterally and automatically acquire the necessary computational capabilities, such as machine time and memory (*on-demand*). Moreover, since cloud can be directly used by the user, b) the intermediation of a service provider is not necessary (*self-service*). Thus, the user has full control over the services he uses. The self-service interface must be *user-friendly* and must offer ease of management. Another positive aspect is the elimination of human interaction with the provider, which leads to efficiency and savings;
- It provides a *broad network access*: in this regard, capabilities are available on the net and accessible through

standard mechanisms that promote use through heterogeneous platforms and means (laptop, smartphones, tablets and more over), according to the different profile of the client. As a consequence, data integrity and authentication must also be guaranteed;

- Cloud implies the *pooling of resources*: as a matter of fact, the vendor's computing resources (e.g. memory, processing and network bandwidth) are pooled to provide the service to a huge number of consumers. This is possible by using a shared (multi-tenant) model, which dynamically reassigned resources pursuant to the demand. Thus, the user is not generally able to exercise control over the exact location of the resources provided; it might be possible to specify the position to a higher level of abstraction (for example, country, state or data centre);
- It allows *rapid elasticity* to acquire or release resources: this process can in some cases imply to acquire resources also automatically. To the consumer, the resources available often appear unlimited and available in any quantity, at any time. A cloud application that is scalable, that does not show any loss of performance as the number of users increases, involves three mechanisms: the position or mobility (the services can reside anywhere and on any device and can be invoked from any position); data replication (to offer redundancy and guarantee business continuity and disaster recovery); load balancing (optimizes the use of an instance of a cloud resource to best meet demand);
- Cloud can also be described as a *measured service*. Cloud systems automatically control and optimize the use of resources, relying on the ability to measure at a level of abstraction appropriate to the type

of service. Cloud services use a pay-per-use payment model based on optimizing the use and consumption of resources and their dynamic allocation (they can reside on virtualized hardware in multiple locations), providing methods for managing them and measurement, both on the customer and provider side.

### 3.1.3 Positive and negative consequences for professions

In summary, cloud offers flexibility, compared to traditional data centres: by exploiting virtualization technologies, it permits the rapid provision of a new server or deployment of an application or specifies the computing power for a specific service required user. The direct consequence is the lowering of costs, as it will not be necessary for the client to invest the company assets to obtain the same services with its own data centre, equipped with a solid reliable infrastructure in terms of performance and information security. For example, it will be sufficient to connect to the cloud, instead of installing the software to run on the hardware.

Cloud computing might be considered as a useful tool for professional firms:

- Leveraging Cloud computing technology and thanks to Internet users connected to a Cloud provider can archive, edit, delete or upload files;
- The traditional work of professional firms (i.e. the management of the accounting and calculations and the transmission of declaratives) is perceived by customers as a “commodity”, or a non-differential service for the professional firm;

- Technologies and work on the move can contribute strongly to activate internal efficiency and external effectiveness to a professional studio, thus giving a greater availability of time to devote to its customers and for develop new services (such as electronic invoicing or Management control).

For many users, the cloud appears, indeed, as a single point of access to the cloud, accessible from the Internet with a simple web browser. In reality, several cloud infrastructures distribute services through a network of shared data centres, both physical and virtual. For some of these services it is not a priority to pay attention to where the data is physically located or where the servers are. The important thing is to use them if necessary and in real time.

The definition is intended to serve as a means for broad comparisons of cloud services and deployment strategies, and to provide a baseline for discussion from what cloud computing is to how to best use cloud computing. However, it is necessary to point out that the study of cloud computing cannot be limited to national contexts, as the concepts of outsourcing and virtualization (typical of the service) are frequently accompanied by delocalization in extra-territorial areas. In fact, cloud providers often have their headquarters or servers in countries other than those using the services.

The ubiquity of servers is a crucial point, intimately tied to obligations of professions as well as professional firms.

### 3.1.4 Legal concerns

The most important implications deal with legal concerns. The negative considerations of cloud comput-

ing appear to be centred around security over data and maintaining the integrity of data. Moreover, other concerns deal with the need to provide effective control over the access to all client and firm files and documents, protection of client information, identity theft, disaster recovery. In this regard, professions must ensure:

- Data protection and, as a consequence, the correct application of GDPR;
- Security, to avoid Data Breaches;
- Ensure the rights of individuals whose Data are referred.

#### A) Data Protection:

The integrity of the data means that the information must be intact and therefore not modifiable by subjects for all the period of processing and the consequent time for conservation, especially those who do not have the rights to do so. From a technical point of view, to achieve this goal, the system must be constantly updated operationally and all commonly-used applications, with particular reference to word-processing software and those used to create files in PDF format. Many releases from part of the software houses provide additional code to fix previous bugs. Equally important are the adoption of antivirus and antispyware software and the periodic maintenance of IT systems.

Since cloud resources can be potentially accessed by any person belonging to the professional firm, it is necessary to ensure compliance with the GDPR Framework. This means that, pursuant to the accountability general principle of GDPR, the use of cloud services must be aligned and observed either by professions and employees.

Moreover, the usage of cloud does not mean that the cloud service provider acquires the ownership of Data. Data and information put in the Cloud remain the

property of the client (i.e. the professional); however, due to contractual terms, the Cloud provider is entrusted with the storage of uploaded data by the user, so he plays a relevant role as to the treatment and security measures.

In case of violations committed by the supplier, even the client will be called to respond of the possible tort.

Finally, other legal concerns deal with Data transfer outside the European Union.

#### B) Confidentiality:

Besides Data Protection, Confidentiality is another important point that must be ensured. As a consequence, it must not to be confused or combined with the privacy and professional secrecy issues: confidentiality means the quality that allows access to the data only to authorized subjects. The preservation of confidentiality necessary involves physical security measures, aimed at avoiding unauthorized access from outside: particularly delicate from the physical point of view in professional studies is for example the management of customers' paper files and the logistics location of historical archives. Less thought, instead, to the adoption of a firewall, the Intrusion Detection System (IDS), Intrusion Prevention System (IPS), which protect the organization from computer violations, therefore virtual, that exploit logical vulnerabilities of IT systems.

#### C) Security:

Security represents a key factor in ensuring Data protection and Confidentiality. Since 2016, a period in which the use of Cloud has become more frequent, several concerns about security have been raised. Discussions has usually arisen around the theme of computer secu-

rity, as highlighted in the Cloud Industry Forum<sup>125</sup>, in the 2016 report "Cloud and the digital imperative", in which it emerges that 61% of the entire sample stated that security was a significant concern with respect to theme of the Cloud, with 54% of respondents worried about data privacy.

The data controller must ensure that technical and technical measures are taken, organizational measures to minimize the risks of destruction or loss also accidental data, unauthorized access, unauthorized processing or not compliant with the purposes of collection, modification of data as a consequence of interventions not authorized or not in compliance with the rules. To ensure data security as a whole, it is necessary to pay attention not only to the modalities by which they are kept, but also those with by they are sent (for example using encryption techniques).

#### D) Contractual clauses:

Moreover, apart from Data Protection Regulation and Confidentiality (but it is functional to guarantee their respect), since Cloud is delocated in extra – territorial areas, also International Private law for the regulation of services contracts must be taken into account. The aforesaid risks can be mitigated through the adoption of good contractual clauses, in order to ensure more transparency by the service provider.

This is a very common concern, also highlighted by Public Authorities: since 2012, the Italian Data Protection Authority has pointed out that the complexity of the infrastructures, and their possible dislocation at sites outside the national fields could imply the impos-

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125. <https://www.cloudindustryforum.org/content/cloud-and-digital-imperative>.

sibility of knowing the location of the own data in the cloud exactly, both to know if and when data is moved from one place to the other for organizational, technical or economic needs that are difficult to determine and manageable in advance<sup>126</sup>.

Furthermore, the size of the supplier – in terms of power - could condition the contractual force of the service users and their ability to exercise direct control, albeit agreed, on the sites and infrastructures used to host the data. As a consequence, the customer often has no ability to negotiate a reformulation of the term of use clauses offered by providers; however, a solution is to choose between different providers.

### 3.1.5 Delivering cloud services

The NIST also lists three “service models” (software, platform and infrastructure), and four “deployment models” (private, community, public and hybrid) that together categorize ways to deliver cloud services.

As stated before, Cloud computing can be separated into:

- *Private Cloud*: Cloud computing services are provided from the company, or from an external provider, uniquely the company itself and its different units (on-premise). What matters is the use of services: the infrastructure can be managed or operated by the company itself or by an external provider, the property can be internal or external, but the services must be the prerogative of a single organization.

- *Community Cloud*: Cloud computing services are provided by a company or service provider to a restricted group of organizations that share some features like, for example, levels of security, legal standards, objectives and so on. Also, in this case, the infrastructure can be managed or operated from one of the group companies or from a provider external.
- *Public Cloud*: these are Cloud computing services provided through the Internet by a service provider to different customers. The infrastructure, the platform, the applications are owned by the service provider, they are managed by the service provider and are shared with more customers.
- *Hybrid Cloud*: services are built on infrastructures hybrids that use private mode for some aspects (e.g. data retention) and the public mode for others (for example, the access interfaces).

Currently, a new evolution of the Hybrid model is multi-cloud environments. In this case, two or more public cloud services are used in an integrated way. Multi Cloud represents a new significant opportunity to increase the value generated by the use of the Cloud thanks to the interconnection of different environments with the aim of optimizing costs and performance, reducing the risk of lock-in to part supplier and ensuring greater business continuity. However, this is only possible through the introduction of new technological tools, new practices, skills and models government.

#### a) *Software as a service (SaaS)*

It is the model that today is typically referred to as “services in the cloud” and is the evolution of the ASP (Application Service Provider) model of the 1990s.

Cloud Software as a Service is a model where the supplier provides a score of application services via the web, plac-

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126. <https://www.garantepriacy.it/documents/10160/10704/1819933>.

ing them in end users. These services are often offered as substitutes for traditional applications installed locally by the user on their systems, which is therefore driven to “outsource” its data by entrusting it to the supplier.

This model is usually adopted for typical office applications provided in web mode such as spreadsheets, word processing, applications for the computer protocol, the contacts section and shared calendars, but also the modern offers of cloud email.

Several practical and economic advantages drive the successful adoption of this cloud model. From a user perspective, there is above all the advantage of not having to face a demanding expense for the purchase of the software, its implementation and its maintenance. The software in SaaS is used by subscription and involves a lower and certain expense, even if recurring, and maintenance is performed directly by the software vendor. Another advantage is that this model offers access to the service on a standard basis for employees of the professional firms. For all of them, the software will have the same version, the same degree of protection and the data format will be compatible for all, the with a reduction of costs, risks, which are now entrusted to the provider, and implementation time the application and the roll out of the changes.

#### b) *Platform as a service (PaaS)*

In the Platform as a service Model, the provider offers solutions for the development and evolved hosting of applications. This can be considered a kind of service typically addressed to operators’ markets who use this service model to develop and host their own application solutions, in order to fulfil internal needs or to provide services in turn to third parties. Moreover, the service provided by the supplier deletes the need for the user

to equip themselves with hardware tools or specific or additional software.

The Platform as a Service (PaaS) is a cloud computing service model where the consumer cloud is primarily interested in developing and running software applications.

#### c) *Infrastructure as a service (IaaS)*

Through this model, the provider hires an infrastructure technology, i.e. remote virtual servers, that the end user can use with techniques and methods that make the replacement simple, effective and productive. Nevertheless, it is possible to support the systems which have already been installed in the premises of the professional firms. These suppliers are typically specialized market players that they really have a physical infrastructure, complex and often distributed in different geographical areas.

### 3.1.6 Implication for Professional Firms

As a matter of fact, Cloud computing is a broader concept, as well as services offered by cloud providers. There is a huge amount of advantages coming from the use of cloud; however, professions must pay attention to the most appropriate kind of service, pursuant to the specific use, kinds of data and activities. It is thus most appropriate to choose the type of cloud which could represent the most suitable service model due to professional own needs. In particular, the adoption of the public cloud must consider that almost the entire process is outsourced, and data goes away from a direct and effective control.

Before opting for a certain type of “cloud”, it is still appropriate for the user verify the quantity and type of data

that they intend to outsource (for example data personal data, in particular sensitive data, or data critical to their business, as projects reserved or covered by patent or industrial secret), evaluating the possible risks and the possible consequences deriving from this choice.

The use of cloud services allows a professional firm management system to be created in a simpler, certainly innovative way, but also more profitable because it allows:

- to manage the firm whenever and everywhere;
- to monitor the activities carried out by each profession and employees, and their progress;
- to monitor in real time the performance of the Firm and Customers.

Besides, another important key point is that cloud solutions totally depend on Internet. As a consequence, problems due to disservices should be evaluated in advance, planning an emergence strategy.

From a governance point of view, the Cloud does not represent just a new technological challenge; furthermore, it requires a change that extends to the whole organization.

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#### 4. A brief overview of the current legal framework

The digitalization process represents the convergence of some statutory provisions and obligations for some professions. In this regard, law represents one of the major drivers for the innovation of professional firms.

Currently, there is not a regulatory framework regarding digitalization itself. The regulatory approach can be considered as a mix of European and national legal initiatives. Since 2010 the European Commission focused on the importance of digitalization, as a driver for the innovation, as well as the creation of the market<sup>127</sup>. This was the first step for the creation of a concrete Digital Single Market Strategy, driven by innovation. European initiatives, however, have always given much freedom to member States to choose the best approach towards it.

Many countries, like Germany, have a very advanced politics and regulatory framework to foster digitalization.

In Italy, instead, the need to adhere to digital innovations mainly comes from the fact that the Public Administration increasingly pushes the use of telematic procedures (such as e-invoicing).

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127. European Commission, EUROPE 2020 A strategy for smart, sustainable and inclusive growth /\*COM/2010/2020 final\*/.

#### 5. Privacy concerns

Privacy concerns raised for professional firms and solo professionals can be considered equivalent, to some extent, to the current general debate on data protection. In this regard, professionals must ensure data protection, especially for legal and health professions, which deal with a very specific kind of data. Data protection necessarily involves all professionals, operating both individually and in professional firms, due their daily activities of finding, collecting and processing a considerable amount of personal data, for purposes related to the service requested by customers. Think of the accountant who provides advice on tax or accounting matters, the lawyer who must take care of the client's defence, draft opinions or contracts, and again to the consultant who manages matters relating to labour law.

Data protection implies a specific duty for the professional, who must be compliant in the protection of clients. At the same time, the digitalization also impacts on the professional as employer: in this regard, the pervasiveness of the technology into the professional firm's lifestyle does not be converted in a chance to control employees. From the professional point of view, instead, privacy concerns can be referred on violations put by his or her colleagues or by employees.

For this reason, in order to ensure the GDPR compliance, it is necessary the adoption of appropriate measures (as passwords, monitoring access to PC location and more over).

As a matter of fact, the professional, as owner of the treatment and therefore the subject that determines the purposes and means (art.4) has therefore greater discretion in deciding how to comply with the legislation, but has the burden of demonstrating the reasons to support these decisions and the reasons for which he believes that the same are in compliance with the Regulation. This means that they must follow its provision.

Pursuant to the Recital of Article 32, both the controller and the processor shall implement appropriate technical and organisational measures to ensure a level of security appropriate to the risk. Moreover, they shall take steps to ensure that any natural person acting under the authority of the controller or the processor who has access to personal data does not process them except on instructions from the controller. The Regulation considers appropriate:

1. the pseudonymisation and encryption of personal data;
2. the ability to ensure the ongoing confidentiality, integrity, availability and resilience of processing systems and services;
3. the ability to restore the availability and access to personal data in a timely manner in the event of a physical or technical incident;
4. a process for regularly testing, assessing and evaluating the effectiveness of technical and organisational measures for ensuring the security of the processing.

Above all, one of the problems arises if the data is collected without the explicit consent of data subjects, for example within the scope of a service action or a request for proposal. Secondly, pursuant to Article 5, data must be processed lawfully, fairly and in a trans-

parent manner in relation to the data subject, and limited to what is necessary in relation to the purposes for which they are processed (data minimisation).

## 6. Labour concerns

The impact of digitalisation is disruptive. This means that technology is replacing traditional means, services and skills provided, creating a new, level playing field in which both professionals and their employees are involved. It is no longer sufficient to carry out their functions through their ordinary training.

In this regard, the digital revolution affects both the organizational sphere of work and its conditions. In particular, the rapidity of the technological development has shown how almost all of them are unprepared. This trend creates a weight burden especially for employees as they play a key role in professional firms by helping professions to interact with the technological environment and usually have to manage innovative – especially digital – ways of organizing the work.

Technologies, automation and digitization lead to a profound context change and ask a series of questions: Will new jobs be created, will current jobs be destroyed, what will the impact be on employment, will the training system be able to create the necessary skills. As a matter of fact, the workers are becoming inadequate and could lose their work because of the high rate of specialization actually required<sup>128</sup>.

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128. Gina Rosamari Simoncini, *L'incidenza della rivoluzione digitale nella formazione dei lavoratori*, Il lavoro nella giurisprudenza n. 1/2018, pp. 39 ss.

However, it has been noted that the complete transformation of production systems does not necessarily imply a decline in employment. This is because today it is not yet able to make technology, in the form of intelligent machines, but above all robot, as efficient as an excellent worker<sup>129</sup>. In this sense, the digitalisation of work must be seen as an opportunity for professional growth for every worker, with the awareness that, if the content of the work also changes and changes suddenly, fears can be overcome with the skills certification system. However, certified professionalism can become the object of the contract, relegating the task to a mere standard company not corresponding to professional value of the worker<sup>130</sup>.

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129. E. Brynjolfsson & A. McAfee, *La nuova rivoluzione delle macchine: Lavoro e prosperità nell'era della tecnologia trionfante*, Milano, 2015.

130. M. Freedland, *Vocational Training in the EC Law and Policy: Education, Employment or Welfare?*, in *Industrial Law Journal*, 1996, 25:2, 110 ss.; J. Middleton, *Skills for Productivity: Vocational Education and Training in Developing Countries*, in Oxford University Press, 200 Madison Avenue, New York, NY 10016, 1993; G. Schmid, *Sharing Risks of Labour Market Transitions: Towards a System of Employment Insurance*, in *British Journal of Industrial Relations*, 2015, 53:1, 70 ss.

## 7. IT Security concerns

Digitalisation leads us to reflect on security concerns as new and additional duties to professional use of technology.

This is strictly tied to privacy and data protection, whose regulation requires appropriate security measures. In this regard, a secure and mature use of technology must encompass security. In particular, it is necessary avoid any unfair data processing, and, in the worse scenario, data breaches. Since security implies professional liability in this case, professionals might consider security as a disadvantage for them, a heavy duty.

Moreover, some computer attacks come from criminals, who try to hack into the firms' computers (e.g., through a misconfigured website, exploiting obscure software vulnerabilities).

But most successful attacks exploit employee day-to-day activities, such as:

- an e-mail apparently from a client, friend, or family member that contains a hidden malware payload (almost impossible to detect after being clicked);
- a thumb-sized flash drive inserted into a laptop;
- unprotected use of public WiFi.

Besides these traditional examples, the dangers are growing because of the increasing connectivity and the diffusion of IoT solutions, as well as the use of cloud and many other digital storage options.

In order to avoid all these concerns and problems, professionals must reach the right level of awareness. This

means that they must understand and feel confident with technology, in order to know what kind of negative consequences could happen. As well as for professional features, their employees should also be educated to risk using technologies.

## **TECHNOLOGICAL FEASIBILITY AS A CHANCE FOR THE IMPROVEMENT OF PROFESSIONAL FIRMS**

### **1. The creation of new professional features in both private and public spheres**

The digitalization process enables new professional features to emerge either in the public and private sphere. These new features, however, do not belong to a specific professional order. Due to the transversal skills required, this could be a great chance for professions – especially for those coming from the legal area – with a relevant enlargement of the professional relevant market.

In this regard, one of the most important new profession is the Data Protection Officer. Aside, other important features will be important to contextualize and align business strategies and technological developments, such as:

- Digital Strategic Planner;
- Digital Manager;
- Chief Digital Officer;
- Innovation Manager.

Together with new Data specialist, new professions in security are required to oversee heterogeneous and constantly changing contexts. The professions in the field Industry 4.0 will have to combine technological exper-

tise on several fronts (industrial protocols, IoT, Cloud Computing, Big Data, new apps, augmented reality, robotics and security) and more strategic skills.

## 1.1 The role of Data Protection Officer

The introduction of the EU General Data Protection Regulation (GDPR) has caused increasing demand from both public and private entities for Data Protection Officers.

This is a new professional figure, even if it has already been introduced in several countries, who is not included in a defined professional order, although it is an extremely crucial profession due to the key role in the entire private/public organisation. The attention paid by European Member States is very different. In Luxembourg, for example, a large-scale project for the formation of DPOs across the entire Public Administration has been launched, while Belgium has even appointed a minister to manage this issue.

Chapter IV, Section 4 of the new General Data Protection Regulation (hereinafter, GDPR) creates the new professional role of and requirement for organisations to designate a formal Data Protection Officer for the organisation. The GDPR deals with:

- organisations' designation of the Data Protection Officer;
- groups of undertakings and the appointment of a single Data Protection Officer;
- the appointment of a single Data Protection Officer by public bodies or public authorities.

This essentially creates a new profession, perhaps one of a number of new professions and career paths in relation to data protection issues and the new data protection regime. This emphasises the new importance attached to personal data.

### 1.1.1 A general overview about the role of Data Protection Officer

The Data Protection Officer is mentioned in the Chapter IV, Sections 4 and 5 of the new General Data Protection Regulation, which contains Articles 37 to 42. Specifically, these relate to:

- the designation of the Data Protection Officer (Article 37);
- position of the Data Protection Officer (Article 38);
- the tasks of the Data Protection Officer (Article 39);
- codes of conduct (Article 40);
- certification (Article 42).

The Data Protection Officer will be chosen on the basis of professional qualities and in particular expert knowledge of data protection law and practices and the ability to fulfil the tasks (Article 37(5)). He or she will have expert knowledge of data protection law and practices, including:

- regulations;
- technical and organisations measures and procedures;
- expertise on technical requirements for data protection by design, by default and data security;
- industry and sector specific knowledge;
- experience with the size of the controller or processor;

- aware of the sensitivity of the data processed;
- ability to carry out inspections, consultation, documentation and analysis (including outsourcing or delegating);
- ability to work with data subject and employees' representation organisations;
- the organisation must enable the Data Protection Officer to take part in ongoing advanced training measures to maintain specialised knowledge.

Actually, there is no official qualification nor a professional register for Data Protection Officer. As specified by the Privacy Guarantor in the newsletter n. 432 of 15 September 2017, the DPO “is appointed according to the professional qualities, in particular the specialized knowledge of data protection regulations and practices, and the ability to perform the tasks pursuant to Article 39. Thus, the Data Protection Officer shall be appointed on the basis of professional qualities and, in particular, expert knowledge of data protection law and practices and the ability to fulfil the tasks referred to in Article 39. The Data Protection Officer may be a staff member of the controller or processor, or fulfil the tasks on the basis of a service contract.



Figure 1 Data Protection Officer Skills required

### 1.1.2. The Italian legal framework

In Italy, the Data Protection Officer is considered a non-professional feature. In particular, this figure can be filled in the application of Law 4/2013, which defines mechanisms for demonstrating skills to which both professionals and organizations entrusted with professional duties can refer. The latter, in the absence of such demonstrations, could incur self-incendiary disputes with the penalties provided for by the Consumer Protection Code. Among the possible mechanisms provided for by Law 4/2013 for the demonstration of professional skills there is the certification of professional skills, a mechanism that is based on requirements defined by the reference UNI standards. Even if Data Protection officer does not belong to a specific order in Italy, its introduction, due to the importance towards the

increasing digitalisation, allows professional features, especially who belong to legal and economic area, to increase their income by covering the role of Data Protection Officer. In this regard, Data Protection Officer can be the next frontier for all kind of professional orders and firms as well. Although Data Protection Officer can be referred to legal professions, this is not binding, since the Regulation does not require a specific legal background, but familiarity with privacy issues. DPOs must have significant experience in privacy and security risk assessment and best practice mitigation, including significant hands-on experience in privacy assessments, privacy certifications/seals, and information security standards certifications. These skills should be founded upon wide-ranging experience in IT programming, IT infrastructure, and IS audits.

As a matter of fact, Data Protection Officer can be appointed with regards to the professional qualities, in particular the specialized knowledge about the legislation and practices on data protection. Apart, DPOs are responsible for monitoring an organisation's compliance, informing and advising on its data protection obligations, and acting as a contact point for data subjects and the relevant supervisory authority. As a direct consequence, since risks can constantly evolve, DPOs must demonstrate awareness of changes to the threat landscape and fully comprehend how emerging technologies will alter these risks. Providing guidance is like the lawyer skill of giving advice, using client-relationship skills to ensure controllers continue to seek such advice even if not in agreement and at the earliest phase.

The GDPR introduces a duty for you to appoint a data protection officer (DPO) if you are a public authority or body, or if you carry out certain types of processing

activities. DPOs assist you to monitor internal compliance, inform and advise on your data protection obligations, provide advice regarding Data Protection Impact Assessments (DPIAs) and act as a contact point for data subjects and the supervisory authority.

The DPO must be independent, an expert in data protection, adequately resourced, and report to the highest management level.

A DPO can be an existing employee or externally appointed.

In some cases, several organisations can appoint a single DPO between them.

DPOs can help you demonstrate compliance and are part of the enhanced focus on accountability

## **1.2 The new chief office for digital transition in the Public Administration**

The process of digital revolution is changing both private and public sector. The digitalization of Public Administration can be seen in a deeper and longer path, referred to the Open Government Development. Actually, the Ministerial Declaration on eGovernment signed by Italy in Tallinn in October 2017 commits our country, together with other Member States, to the implementation of the principles and objectives of the eGovernment Action Plan 2016-2020, an integral part of the European Digital Single Market strategy.

Nowadays, a new profession is rising, i.e. the Chief Digital Officer, who should have appropriate technological skills, legal and managerial informatics and taking into account the same delicacy of the function.

### 1.3 The revitalization of the Internet Service Provider in the Platform economy

Besides the role of the Data Protection Officer, the development of the Platform economy requires many other new figures:

- The User Experience Director, who manages the user experience within complex spaces.
- The Director of Analytics and Data Analyst, i.e. people skilled in reading, understanding and analysing - accurate and careful - of any type of digital data (for example, data recorded on Google Analytics).
- The Chief Technology Officer, a figure charged with selecting the technologies to be applied to the products and services that the company he works in offers to the market.
- The Mobile Developer, whose work focuses on mobile devices and, therefore, on the development of applications for smartphones and tablets.
- The Big Data Architect, who manages the analysis of the data system architecture. The Web Analyst, figures in the company that interprets the data and provides detailed analysis of the activities on the web.
- The Digital Copywriter, who manages advertising content on digital platforms (websites, E-commerce platforms, for example).
- The Community Manager, a figure responsible for managing and developing a virtual community with the tasks of designing the structure and coordinating all activities and exchanges.
- The Digital PR, a figure who has the task of dealing with public relations through online channels.
- The Digital Advertiser, who is the person in charge of managing and coordinating web advertising campaigns

(AdWords campaigns, banner campaigns, Google Display Network campaigns, social campaigns, etc.).

- The e-Reputation Manager, who has the task of managing online reputation (on sites, on different social channels, etc.).

### 1.4 Data Management: a new opportunity for professional firms

The digitalization of any aspect of everyone's life, thanks to the massive use of smartphones, together with the use of Internet and surfing of an array of websites, blogs and applets has been led the creation of a huge amount of routine data. The joining of internet access to commerce has meant that platform and service providers as a well, have been archiving personal information about users for more than a decade. Therefore, the creation of the so – called “Big Data”<sup>131</sup> sets has been followed by analytic researches about the importance and the hidden value below them. As for all other technological innovation, Big Data lacks a common definition; most definitions share a common theme, succinctly summarized as, “large pools of data that can be captured, communicated, aggregated, stored, and analysed”<sup>132</sup>

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131. A dozen definitions may not even cover it. See Gil Press, 12 Big Data Definitions: What's Yours?, FORBES (Sept. 3, 2014, 8:01 AM), <http://www.forbes.com/sites/gilpress/2014/09/03/12-big-data-definitions-whats-yours/>.

132. James Manyika et al., Big Data: The Next Frontier for Innovation, Competition, and Productivity, MCKINSEY GLOBAL INSTITUTE iv (June 2011), <http://www.mckinsey.com/insights/business-technology/big-data-the-next-frontier-for-innovation> (last visited Jan. 9, 2019).

The potential value of Big Data was used at first by companies, in order to reach a competitive advantage over other companies. Thus, the desire to find the most suitable design methods to render data useable has given birth to a new kind of professions, traditionally coming from the American context, where they are specialized in Data analysis. Among the most requested figures in the sector, the Data Scientist, the Data Engineer and the Data Analyst are those most required.

However, professional firms have not undervalued the importance of Big Data, as they have understood the need for quality data and the bad impact that poor data can have on their firm.

Thus, studies carried out by the International Data Corporation (IDC)<sup>133</sup> found that the worldwide revenues for big data and analytics will reach \$203 billion by 2020. Among all the sectors that are currently investing in big data and analytics solutions, professional and financial services firms are making the largest investments.

Arguments around the fact that Big Data can be considered as an important tool for professional firms is twofold:

- Big Data can be a powerful tool for the internal efficiency, as well as to develop new strategic internal plans;
- Big Data can improve services provided, enforcing the relationship with the client and the custom as a whole.

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133. <https://www.idc.com/>.

### **1.4.1 Big Data as a powerful tool to improve professional firms' efficiency**

As mentioned before, Big Data can become relevant for the success of the internal organization. For this reason, many large – especially law – firms have been already leveraging big data, on a number of fronts:

- Pricing<sup>134</sup>. Firms can make more intelligent decisions about their fee structures by using big data to benchmark prices against competition results in more coherent and attractive pricing structures. Therefore, pricing is considered one of the most powerful levers for improving profitability<sup>135</sup>.
- Human resources<sup>136</sup>. In order to reach the maximum profitability, Big Data helps the screening of potential employees and is able to attempt and predict job success.
- Case analysis. It is useful not only for legal or accounting professions. Screening results can be helpful to make informed and reasoned decisions when screening cases and developing case strategies. As mentioned, there is no shortage of service providers in this area: some products provide case predictions for specific practice either scientific and humanistic

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134. <https://www.mckinsey.com/business-functions/marketing-and-sales/our-insights/using-bigdata-to-make-better-pricing-decisions>.

135. Deloitte Pricing Analytics The three-minute guide Report, <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Deloitte-Analytics/dttl-analytics-usda-pricinganalytics3minguide.pdf>.

136. Juani Swart, Nina Katrin Hansen, and Nicholas Kinnie, *Strategic Human Resource Management and Performance Management in Professional Service Firms*, Oxford 2015.

areas<sup>137</sup>, including medical<sup>138</sup> malpractice and patent law<sup>139</sup>. Other tools analyse the litigation histories of judges and opposing counsel and provide comparative case outcomes for every stage of litigation<sup>140</sup>.

#### 1.4.2 Big Data as a powerful tool for customization

The valorisation of data makes it possible for Professionals to provide customers with an enriched vision about their business strategies and planning, able to impact more directly on the income statement, their strategic position and more. They consider the potential utility of leveraging their databases in such a way as to yield better targeted information and more pointed strategy respecting the ways in which they attract clients, implement technology solutions and rate employee performance. For example, firms can gain valuable informa-

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137. Verdict and Settlement Analyzer, LEXISNEXIS, <http://www.lexisnexis.com/en-us/products/verdict-and-settlement-analyzer.page> (providing comparative litigation analyses reporting).

138. AfedAfal Navigator, LEXISNEXIS, <http://www.lexisnexis.com/en-us/products/lexisnexismedmal-navigator.page> (last viewed Apr. 7, 2015) (predicting medical malpractice cases through comparative analyses of similar verdicts and settlements, as well as guidance to assess deviations in the standard of care).

139. See, e.g., JURISTAT, <https://juristat.com> (last visited Apr. 7, 2015) (analyzing U SPTO data to predict outcomes of future patent applications); LEX MACHINA, <https://lexmachina.com> (last visited Apr. 7, 2015) (aggregating and analyzing information from databases to assist with patent litigation).

140. See CourtLink, LEXISNEXIS, <http://www.lexisnexis.com/en-us/products/courtlinkforcorporate-or-professionals.page> (last viewed Apr. 7, 2015) (offering litigation histories of judges, experts, litigants, and opposing counsel).

tion about potential clients by collecting and analysing website visitor behaviour<sup>141</sup>; moreover, it allows to make client conversions clustered around certain practice areas, certain times of the year, or certain persons.

To summarise, through Data analysis professional firms can provide new kinds of services to the client. In this regard, Datafication involves:

a new strategic tool for professional firms, because they can understand the real (and new) needs of the customer by Data analysis;

- a new opportunity for consulting activities, because Big Data (smart) analysis allows you to predict (on some extents) events which could be relevant for customers. Thus, the traditional consulting activity is enriched by technology, which constitutes a competitive advantage for professional firms, to be perceived more and more as a strong and important support for decisions, as generators of value;
- new partnerships with ICT features or other professional firms: professional firms can avail themselves of a Data manager support, or any other equivalent feature.

The use of Big Data stimulates the creation of either new skills and professional figures able to increase professional multidisciplinary, encourage collaboration and transversality. We can thus affirm that Big Data, as well as other technological innovation and digitalisation processes as a whole, fosters multidisciplinary, whose dimension is not much implemented in the Italian professional environment. Nevertheless, one of the most

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141. Stephen Fairley, How to Use Google Analytics to Improve Your Law Firm Marketing, NATIONAL LAW REVIEW (Dec. 19, 2012), <http://www.natlawreview.com/article/how-to-use-google-analytics-to-improve-your-law-firm-marketing>.

important turning points of digitalisation, which cannot be ignored, deals with the improvement of transversal skills for the single professional, and multidisciplinary for professional firms. As recently observed by research carried out by Observatory of Professions, professional firms must develop greater collaboration between themselves to share investments and data. The professionals who, before others, will perceive the intrinsic value of the data, will gain a competitive advantage. Solo and small firms could decide to pool their small data, in order to create a corpus of big data. Of course, this also raises, as mentioned below, privacy concerns about how that data is anonymized, given ethics and privacy issues, which can be deleted by an agreed-upon standard.

Moreover, the claim that these approaches are only accessible to studies starting from a certain size<sup>142</sup> is not valid, as well as concerns towards prohibitive investments for data analysis. Neither of these claims can be considered valid, since practice shows that such profitable activities rely on initiatives of small professional firms, with not very expensive costs.

Nevertheless, all these arguments can be considered still valid even in the case of small data analysis<sup>143</sup>.

Apart from Data analysis, the simplest – and favourite – way to collect and organize this data is through electronic systems: specifically, cloud-based electronic systems that have upgraded ease of use across the board, including for data entry and access to information. The

reason relies upon the economic affordability of cloud rather than other means just centred on data analysis. In this regard, cloud-based solutions are considered as the ones more complete to tackle every activity referred to the professional firm's life.

### **1.4.3 Legal concerns towards Big Data analysis and Management. Towards an ethically correct use of Big Data**

Since Big Data Analysis and Management should be considered as a powerful tool for the improvement of the quality and incomes of professional firms, many legal implications can be referred to.

- Firstly, Data Protection must be ensured. Pursuant to Article 4 (2) of GDPR, “processing” means any operation or set of operations which is performed on personal data or on sets of personal data, whether or not by automated means, such as collection, recording, organisation, structuring, storage, adaptation or alteration, retrieval, consultation, use, disclosure by transmission, dissemination or otherwise making available, alignment or combination, restriction, erasure or destruction. As a consequence, data analysis falls under the prescription and scope of the GDPR, and this also implies the anonymization of data. Moreover, the professional is the controller of data, i.e. the natural or legal person, public authority, agency or other body which, alone or jointly with others, determines the purposes and means of the processing of personal data. However, the professional can determine the purposes, his or her activity depends on the consent of the data subject. This

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142. Joe Dysart, *The Dawn of Big Data*, ABA J., (May 1, 2013, 10:20 AM), [http://www.abajournal.com/magazine/article/the\\_dawn\\_of\\_bigdata](http://www.abajournal.com/magazine/article/the_dawn_of_bigdata).

143. Jared D. Correia; Heidi Alexander, *Big Data, Big Problem: Are Small Law Firms Given a Sporting Chance to Access Big Data*, 37 W. New Eng. L. Rev. 141 (2014)

means that, in order to ensure the lawfulness of processing which is apart from the professional service required, clear information about the aim and the reason why data can be additionally be processed must be provided. Thus, the data subject has to give any freely given, specific, informed and unambiguous indication as a response, by a statement or by a clear affirmative action, signifying agreement to the processing of personal data relating to him or her. As a consequence, according to Recital of the Regulation, silence or inactivity do not constitute consent. As a consequence, necessary data processing implies a guarantee to data subjects' rights of access, rectification, erasure and more.

- Confidentiality must be ensured. This statement is valid for both physical and legal persons. Data referred to legal persons does not go under the application of GDPR. However, this does not mean that professionals are allowed to use these data indiscriminately.
- Especially for legal persons, industrial secrets or any other similar data must be kept secure.

Apart from legal concerns, Ethical issues are also one of the most crucial points, especially when referred to health data<sup>144</sup>.

## **2. The importance of Digital education and improvement of digital skills of professionals and their employees**

Education and improvement of digital skills can be considered as an adaptive strategy to face digitalization challenges in a profitable way.

Increasing use of digital technologies at work is raising the demand for new skills along three lines:

- Workers across an increasing range of occupations need to acquire generic ICT skills to be able to use such technologies in their daily work, e.g.: access information online or use software;
- The production of ICT products and services – software, web pages, e-commerce, cloud and big data – requires ICT specialist skills to programme, develop applications and manage networks;
- The use of ICTs is changing the way work is carried out and raising the demand for ICT-complementary skills, e.g.: the capability to process complex information, communicate with co-workers and clients, solve problems, plan in advance and adjust quickly. Last but not least, the attainment of sound levels of foundation skills constitutes a prerequisite for the proficient development of

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144. L. Jetten; S. Sharon, Selected Issues concerning the Ethical Use of Big Data Health Analytics, 72 Wash. & Lee L. Rev. Online 489 (2016)

ICT generic, specific and complementary skills<sup>145</sup>. The digital revolution requires from professionals a more articulated mix of skills, which do not necessarily belong to their primary areas of interests. A mix in which skills of a technological nature are complemented by soft skills, such as critical thinking, creativity and emotional intelligence, leadership and change management skills<sup>146</sup>. Professionals must immediately consider the wide impact of digitalization, especially when this process involves data processing. In this regard, since digitalization implies both expertise towards the technological mean and comprehension about possible legal consequences depending on an incorrect and unfair use. This means professionals must develop technical knowledge and expertise, though the appropriate skills will depend on their substantive practice focus, firm infrastructure, and clients. This educational moment is sometimes bypassed, since the widespread use of technology makes pro-

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145. <https://www.itu.int/en/ITU-D/Digital-Inclusion/Women-and-Girls/Girls-in-ICT/Portal/Documents/OECD%20skills%20for%20a%20digital%20world.pdf>. Autor, D.H., et al, (2003), “The Skill Content of Recent Technological Change: An Empirical Exploration”, *Quarterly Journal of Economics*, Vol. 113, No. 4, pp. 1279-1333. European Commission (2016), *e-Skills for growth and jobs*, [http://ec.europa.eu/growth/sectors/digitaleconomy/e-skills/index\\_en.htm](http://ec.europa.eu/growth/sectors/digitaleconomy/e-skills/index_en.htm) (accessed 23 May 2016).

146. European Commission (2007), *E-Skills for the 21st Century: Fostering Competitiveness, Growth and Jobs*. October, [http://ec.europa.eu/enterprise/sectors/ict/files/comm\\_pdf\\_com\\_2007\\_0496\\_f\\_en\\_acte\\_en.pdf](http://ec.europa.eu/enterprise/sectors/ict/files/comm_pdf_com_2007_0496_f_en_acte_en.pdf) (accessed 23 May 2016). European Commission (2013a), *Active Labour Market Policies*, (Figure 1), 1–14. European Commission (2013b), *Reducing early school leaving: Key messages and policy support*, (November), 46. [https://www.agid.gov.it/sites/default/files/repository\\_files/osservatorio\\_competenze\\_digitali\\_2017.pdf](https://www.agid.gov.it/sites/default/files/repository_files/osservatorio_competenze_digitali_2017.pdf)

professionals feel more confident with it; thus, they trust in their own ability to manage technological means. This opinion can be considered valid every time professions interact with very simple and user – friendly means, which do not require a particular training, with a certain degree of seeming safety. However, apart from routine use, some happenings can occur, such as a system crash, as well as an error message, a data breach and more. These occurrences require additional knowledge to address them.

In this regard, educational training, together with the choice of the most appropriate educational sources, has become an essential factor for growth. This mainly depends on the different level of necessary skill required: in this regard, insights on specific issues can be carried out but simple readings of online articles or professional journals, as well as more complicated scenario requires a training course.

Thus, it induces both private and public training bodies to promote advanced courses in legal informatics, in digital investigations, in privacy protection and data protection, which with an interdisciplinary approach, try to form different profiles that are then useful in the workplace.

Education and training are very important items for professional firms’ employees, since they are often the most affected area interested by the interaction with technologies<sup>147</sup>. However, professions such as secretarial or accounting staff are those traditionally more exposed to technological innovations, since it is able to reduce the human contribution to the pro-

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147. D. Acemoglu e D. Autor (2011), *Skills, tasks and technologies: Implications for employment and earnings*, *Handbook of labor economics*, n.4, pp.1043-1171.

duction process (think of management software that rationalizes accounting and secretarial activities) and therefore more at risk from the point of view of technological unemployment<sup>148</sup>.

### **3. Technology tackling entrepreneurship: innovative start-ups and IP skills**

Start-ups are playing an important role in this revolutionary era<sup>149</sup>. They represent one of the major innovation drivers, focusing on the development of innovative services and goods. Their activities also interact with professional firms: start-ups, indeed, develop solutions for professionals, mainly focused on services supporting studies and for a better assistance. Professional firms must not only adapt to a completely different environment but, to maintain their competitiveness, must acquire innovative tools. Legal professions are mostly used to require this kind of services.

The innovative solutions required aim to make routine activities more efficient or improve the visibility of the studies, as well as make interoperability easier by improving cost reduction. The most innovative ones are artificial intelligence and machine learning solutions applied to the legal world, for accounting records with the acquisition and automatic reading of documents in the fiscal area. Also, professional firms invest in technology to create online platforms in order to achieve visibility even in foreign markets.

Sometimes the core activity of these start-ups is disruptive, since they provide online services that can replace

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148. [https://oa.inapp.org/bitstream/handle/123456789/82/INAPP\\_Quaranta\\_Gualtieri\\_Guarascio\\_Cambiamento\\_tecnologico\\_2017.pdf?sequence=7&isAllowed=y](https://oa.inapp.org/bitstream/handle/123456789/82/INAPP_Quaranta_Gualtieri_Guarascio_Cambiamento_tecnologico_2017.pdf?sequence=7&isAllowed=y).

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149. B. Sims, J. Jr. Petro Nerino, Start-up Tech for Any Budget, 31 GPSolo 18 (2014); M.L. Megan, Start-up Opportunities, Los Angeles Lawyer, Vol. 40, Issue 11 (February 2018), pp. 25-29.

professional activities. This is quite common for legal professions: many start-ups all over the world provide legal services as writing contracts, supporting civil obligation to build an online company and more over.

#### **4. The improvement of existing professions: advantages and boundaries**

Digitalisation requires the development of new skills and the updating of existing ones in order to favour an effective matching between job demand and supply. The strengthening of skills and their adaptation to technological progress, at various professional levels, is essential to fully exploit the economic and production potential of new technologies. For this reason, digitalisation takes with it both advantages and boundaries.

- *Advantages.* Digitalisation can consist in a more efficient and profitable organization of work: cloud solutions, together with dematerialization of documents allow professionals to work without any space or time limits. Furthermore, it allows expansion of the list of customs and services provided. Moreover, the cooperation and pooling with new specialized figures allow traditional professionals to expand the amount of services ordinary provided.
- *Boundaries.* Nevertheless, any advantages can be listed, digitalization is sometimes claimed as a risk for profession, because of new online services. This risk could rise in relation to the consequent improvement of technology, which could replace also intellectual professions. Risk of obsolescence of professions, tasks and tasks and reduction of job demand as consequence of automation and digitalisation of production processes.

In order to focus the attention on the challenges launched by the strong digitalization, it is necessary to remember the neutrality of the technological mean. Since technology is something neutral towards its recipients, the most concrete point of view encompasses ethics about the way technology is used by people.

## **CASE STUDIES: The impact of digital transformation in the most relevant professional bodies**

### **1. Health sector**

The health sector is one of the main sectors affected by digitalisation. Innovation processes go with a wider path of digitalisation of health professionals imposed by the rulemaking process, which obliged the profession to become confident with several and different technological items. In this regard, technology is a prismatic tool, dealing with the obligations related to each professional work, as well as instruments to improve medical practice and its results. Findings show that the adoption of digital technologies could improve the performance of main healthcare business processes; in particular, there could be an improvement in those processes that can be simplified with the adoption of information technology. In particular, digital technologies could increase efficiency and, at the same time, allow for the delivery of better quality and reduced response times, with many benefits for several stakeholders, such as national health systems, clinicians and patients<sup>150</sup>.

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150. E. Laurenza, M. Quintano, F. Schiavone, D. Vrontis, (2018) "The effect of digital technologies adoption in healthcare industry: a case-based analysis", *Business Process Management Journal*, Vol. 24 Issue: 5, pp.1124-1144, <https://doi.org/10.1108/BPMJ-04-2017-0084>

According to recent studies, since 2017 the health sector has seen a first significant leap forward in IT expenditure related to applications and software services included in the typically clinical segments: specialty folders, pathology networks, Clinical Collaboration tools, Clinical Decision Support System solutions, telemedicine in its various forms, PDMS and digital “Point of Care” management. The volumes have been considered to still be low (less than 40 million euros, net of VAT) but the growth trend has finally reached double-digits. The main areas of application have affected:

- the clinic electronic medical records;
- the single health file;
- the prescriptions and the electronic certificates;
- the assistance at domicile;
- medicine in the territory;
- the dematerialization of documents;
- cloud computing;
- solutions for the computerized management of drugs.

Many other innovations deal with communication systems to share information and offer citizens remote assistance, also multidisciplinary. Furthermore, the patient relationship management solutions, which allow a better relationship with the patient, business intelligence to support clinical governance for effective management, information analysis and governance of health services, mobile health that facilitates access to care and the collection of clinical data, unified communication, the conservation of health databases, and finally the intuitive interfaces that simplify interaction and services for the citizen.

## 1.1 Applications

### • E-health

The Health sector has been very influenced by the trend of digitalisation launched by Public Administration initiatives, giving rise to the phenomenon that today is better known as “e-health”<sup>151</sup>. This is a phenomenon which has experienced a period of significant growth and maturity in recent years. However, the general purpose is to reach integration. Data, people, processes and tools need to “talk” to each other and it is a dialogue that has an impact both on the outside and inside. Fundamental for the improvement of the relationship between citizens-patients and health-care operators is the offer of a patient-path, based on accessible and innovative services (for example relating to booking and management of appointments and visits, to telemedicine systems and assistance from remote, to systems that integrate data and automate care pathways).

Studies carried out about the development of E-health show that the most frequent application of technology

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151. V. S. Callens, (a cura di), E-health and the law, Kluwer law international, 2003 e Thonnet M., L’e-santé, une mise en Œuvre prometteuse et délicate, Sève, 9, 4, 61, 2005. Cfr. L. Sartori, La tutela della salute pubblica nell’Unione europea, Cittadella, 2009, 33-49; Buccoliero-Caccia-Nasi, e-he@lth. Percorsi di implementazione dei sistemi informativi in sanità, Milano, 2005. G. Eysenbach, What is ehealth? [Editorial], Journal of Medical Internet Research, 3, 2, 2001, e (20): «(...) the term characterizes not only a technical development, but also a state-of-mind, a way of thinking, an attitude, and a commitment for networked, global thinking, to improve health care (...)». C. Caccia, Management dei sistemi informativi in sanità, Milano, 2008. Moruzzi, Fascicolo sanitario elettronico personale e reti e-Health. Appunti per un’analisi della sanità di Internet, Salute e società, 2008, p. 3.

in the Health administration is referred to the records of documents<sup>63</sup>. Traditionally, the clinical history of the patient was collected through the establishment of separate folders and paper files. Those did not allow a complete view of the diagnostic and therapeutic history of the patient; this aim was possible only after their collection and joint analysis. Consider, for example, the health information on their patients, collected in the cards usually kept by the general practitioner and substantially visible only in his own unique vision, or the medical records relating to individual episodes of care (so-called “medical records” “), which are drawn up and kept by the health facility and which can be accessed only upon request and often after a long waiting period<sup>152</sup>.

The medical history of the patient, more than anything else, must be easily and quickly retrievable and consulted to allow health workers, in any place and with minimal waste of time to become aware of useful information, sometimes indispensable, for the formulation of a diagnosis or the pre-registration of an exclusive therapy safeguarding the main human value, constitutionally guaranteed: the right to life. This may be simple information, such as the existence of allergies, or more detailed and complex, such as the existence of specific diseases, or cures to which the subject has already been subjected or other therapies revealed ineffective or that have given rise to intolerance to certain drugs. As part of this process of modernization of either public and private health care, several initiatives have been undertaken and various tools have been introduced. They aimed at improving the efficiency of health services through further development of networks and increasing-

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152. [http://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0012/302331/From-Innovation-toImplementation-eHealth-Report-EU.pdf](http://www.euro.who.int/__data/assets/pdf_file/0012/302331/From-Innovation-toImplementation-eHealth-Report-EU.pdf).

ly broader management of documents and procedures, through IT and telematic methods. Thus, the Dossier and the Electronic Health Dossier, the on-line reports and the Electronic Clinical Folder have been introduced. The success of the Electronic Folder as a valid technological solution to improve and enhance the path towards a complete digitalisation of healthcare has been considered via cloud computing. Cloud services, as already mentioned, provide a very valid technological solution for managing and sharing data and documents to be sent in. However, this solution has no explicit legal basis. Just A brief overview is contained, for the Italian case, albeit in general terms, in Legislative Decree no. 82/2005 of the Digital Administration Code, which envisages the cloud among the solutions adopted by the Public Administration to acquire IT systems in compliance with the principles of economy and efficiency, protection of investments, reuse and technological neutrality. Cloud Computing, in each of its forms, represents a new way of organizing networks and offering services via the Internet and is therefore able to respond to the above needs and to bring considerable benefits, which will be discussed further on. It could be very useful for the management of the huge amount of data and information that is stored in health databases: as a matter of fact, cloud infrastructures can take the management of databases (outsourced), with significant savings on management costs. Moreover, this information, once inserted into cloud infrastructures, is shared with other health administrations, making the system more efficient through rapid access to it.

- Telehealth

Moreover, Telehealth is another important key point of the digitalisation of Health sector, as well as the E- health

sector<sup>153</sup>. Telehealth allows, thanks to the use of telecommunications and virtual technology, the delivery of health care outside traditional health-care facilities. Telehealth, which requires access only to telecommunications, includes some examples such as virtual home health care: patients (this is very important for patients with chronic diseases, or the elderly) may receive guidance in certain procedures while remaining at home. Telehealth has also made it easier for health care workers in remote field settings to obtain guidance from professionals elsewhere in diagnosis, care and referral of patients. Training can sometimes also be delivered via telehealth schemes or with related technologies such as eHealth, which make use of small computers and Internet.

- Artificial Intelligence

Currently, the development of Artificial Intelligence allows to use sensors, robotics to help in those specific activities which require precision: robotics has more often been applied in the field of surgery. Findings states that diagnosis largely differentiates doctors from other health professionals<sup>154</sup>. However, this distinctive role of diagnosis is ultimately a pattern-recognition algorithm by artificial intelligence. Information is gathered, synthesised, and compared with predefined categories we call diseases. If a patient's pattern of symptoms, signs and test results match that of a known disease, then we classify and treat them accordingly. The most important benefits are:

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153. C. Filauo, *Telemedicina, cartella clinica elettronica e tutela della privacy*, *Danno e responsabilità* 5/2011, pp. 472 ss.; U. Izzo, *Medicina E Diritto Nell'era Digitale: I problemi giuridici della cybermedicina*, *Danno e Responsabilità* n. 8-9/2000, pp. 807 ss.

154. BMA. *The Role of The Doctor* | British Medical Association. Available from: <http://www.bma.org.uk/developing-your-career/medical-student/the-role-of-the-doctor>

- Error Reduction: AI facilitates the reduction of error and the chance of being more accurate with a greater degree of precision;
  - Difficult Explorations: AI combined with the science of robotics can overcome human limitations and be put to use in difficult explorations such as mining and for exploring the ocean floor;
  - Every day Use: Machines with AI continuously make lives easy for us. With Siri or Cortana offering personal assistance, self-driving cars for long journeys, the smart chef to make our meals;
  - Digital Assistance: Since robots do not possess emotional capabilities, they are capable of thinking logically and making the right program decisions, making highly advanced organizations use "avatars" which are digital assistants to interact with the users;
  - Machine intelligence can be employed to perform dangerous or monotonous tasks.
- Nevertheless, Artificial Intelligence can bring some risks:
- ethical argument against replicating human intelligence;
  - replacement of humans, causing large-scale unemployment;
  - common fear is the machines will be so highly developed, so as to surpass humans and take off on their own, redesigning themselves at an exponential rate.

- Internet of Things

Moreover, from the Internet of things that will give a substantial boost to telemedicine, advanced visualization, including augmented reality and simulators, and 3D printing, which allows printing in three dimension of objects or prototypes in different materials while maintaining high precision and loyalty to the original project from which it derives, and which is

expected to be widely distributed in the health sector.

- Big Data

In less than a decade, big data in medicine has become quite a phenomenon and many biomedical disciplines got their own platform on the topic. Some techniques usually presented as specific to big data such as machine learning techniques are supposed to support the ambition of personalized, predictive and preventive medicines. On the other hand, several issues closely related to the properties of big data and inherited from other scientific fields such as artificial intelligence are often underestimated if not ignored<sup>155</sup>.

- Mobile health

Another new frontier is the development of medical apps or mobile health<sup>156</sup>. Mobile health is a new model of social health care and a new economic model; whose success is linked to the ability to make significant improvements in public and individual health, due to the possibility of providing services to anyone (anyone), anywhere (anywhere), at any time (anytime) and with any device (any device). The general accessibility is due to the chance to download an app on the device, which replaced traditional services provided by professionals. Through apps, the individual is self – made in diagnos-

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155. ThomasLefèvr, Big data in forensic science and medicine, <https://doi.org/10.1016/j.jflm.2017.08.001>.

156. Mobile Health: innovazione sostenibile per una sanità 2.0, Associazione Italiana Sistemi Informativi in Sanità, p. 14; J. L. Chopard, Legal, deontological and ethical issues applied to telemedicine. A few insights about telestroke, 2012, Doi: 10.1016/j.eurtel.2012.05.001; A. Atienza. K. Patrick, Mobile Health: The Killer App for Cyberinfrastructure and Consumer Health, American Journal of Preventive Medicine, Volume 40, Issue 5, Supplement 2, May 2011, Pages S151-S153.

tics, since the software is considered able to take medical consultants as medical professions.

Mobile health<sup>157</sup> constitutes the “use of mobile and wireless devices to improve health outcomes healthcare services and health research<sup>158</sup>. It can disrupt the delivery of healthcare and its industries by enabling a larger population of less-skilled people to do in a more convenient, less expensive setting things that historically could be performed only by expensive specialists in centralized, inconvenient locations<sup>159</sup>, Mobile apps, together with artificial intelligence can lower health costs, but they can’t replace human professions.

## 1.2 Legal Framework

Due the importance of the new trends listed above, a huge amount of States in Europe addresses a specific regulatory framework, as a consequence of the national policies to improve welfare and wellness of individuals.

Each initiative, thus can have a specific legal background: for example, the electronic health file (ESF) is defined and regulated by art. 12 of the d.l. October 18, 2012, n.179.

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157. Definitions of Mobile Health, mHiMSS, <http://www.himss.org/ResourceLibrary/GenResourceDetail.aspx?temNumber-20221>.

158. Nathan Cortez, The Mobile Health Revolution? 47 U.C. Davis L. Rev. 1173 (2014).

159. C. Christensen et al., Will Disruptive Innovations Cure Health Care? HARV. Bus. REV. 3 (2000).

The impact of telemedicine on health professions is currently considered above all regarding<sup>160</sup>:

- permanent training (in this case e-learning);
- management of IT procedures;
- medical responsibility (especially regarding the application of the rules on privacy in the telematic field and on informed consent).

Also, digitalisation necessary involve privacy concerns. Pursuant to the new General Data Protection Regulation (GDPR), health data are considered as a specific kind, whose processing must be consistent with the Regulation.

## **2. Legal and judiciary sector**

The legal professions have been strictly involved in the Digitalisation process. As for the health sector, part of the Digitalisation process has been due to legal obligations and the reformation of the Justice Administration. It can be thus affirmed that legal professions have been gradually approached to the technological innovation, as well as they have become accustomed to the technological mean. The legal services market is also experiencing a phase of rapid change, with the right which, progressively, is moving towards an ever increasing sectorization.

### **2.1 Lawyer and Judiciary**

Lawyers must immediately consider their own confidentiality and competence obligations when analysing the legal and practical issues relating to IoT. This means lawyers must develop technical knowledge and expertise, though the appropriate skills will depend on their substantive practice focus, firm infrastructure, and clients. In fact, this technical competency requirement is starting to surface in ethics opinions and in the rules governing legal practice in many jurisdictions.

The main application deals with Artificial Intelligence as follows:

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160. Empam, Digital revolution E-health e professioni sanitarie, <https://www.enpam.it/wpcontent/uploads/Digital-Revolution.pdf>

- Outcome prediction. Prediction of litigation, transaction, and compliance outcomes is, of course, what clients want dearly from their lawyers are becoming possible thanks to Artificial Intelligence. On this front, many services are already building enormous databases of litigation and transaction histories and applying advanced analytics to tease out how a postulated scenario might fare. Lawyers could take advantages by using analytics.
- Analogical and evaluative legal search. Artificial Intelligence could facilitate that process; the strength of it many times is a qualitative judgment or depends on analogical reasoning. Nevertheless, Artificial Intelligence could become a personalized tool making the research process substantially more efficient and effective.
- Risk management. Managing litigation, transaction, and compliance outcomes over time requires a sense of how to identify and control risk. Artificial Intelligence could help risk management by allowing evaluation of massive transactional regime histories or commercial real estate developers, to detect loss or litigation risk patterns under different contractual terms.
- Strategic planning. Lawyers engage extensively in strategic planning for clients, as to choose how hard to negotiate a contract term, or when to settle and on what terms. Here again, Artificial Intelligence could be employed to detect those patterns from massive databases of transactions, litigation, and compliance scenarios.

### **2.1.1 The Lawyer in the era of the Platform revolution**

Nowadays, when choosing a lawyer, it is possible to simply install an application on the device mobile, define roughly if the case is civil or criminal and in a short time it is possible to get a quote with specification of what the paths will be from a judicial point of view. In this sense, digitalization has a disruptive scope.

Thus, technologies bring opportunities and advantages together with concerns. The most important ones are related to the use of technology as a substitution of professional support. In this regard, some application adopting Artificial Intelligence algorithms can be used to avoid legal consulting. Moreover, Blockchain and Smart contracts can replace support usually required in contract law.

### **2.1.2 Legal-tech Start-ups**

The impact of technology goes beyond the needs of legal firms or solo professional: recently, many legal tech start-ups have been established, in order to provide online services in terms of organization and management of procedures, as well as the provision of legal services. This kind of start-up has become very common in England, where there are almost 64. Here, most of these are mainly in practice management, or management tools, while in France they are more oriented towards automated production of documents and contracts, but also to provide legal information. This start-up service provides a tool that can generate cookies and privacy policies both for sites and for start-ups. Thanks to this service, in fact, both the deed of incorporation and the company's statute can be drawn up.

Even if this kind of start-up might raise concerns, this opinion is twofold: actually, legal tech start-ups can exist and provide legal services thanks to a pool of legal professionals who support them for the creation of legal services. In this regard, this could be an advantage for legal professions, since they can consider start-ups as new clients.

## 2.2 Notaries

The disruptive impact of technology has been involving notaries too. One of the most crucial point is the role of blockchain as a substitution of intellectual activity. Currently, the Nodes of the blockchain are an automatically notarized ledger.

Apart from the disruptive dimension of some kind of technologies, digitalisation can also be declined in pooling and cooperation initiatives. An example is the experimental project, through the Eufides platform, “to allow a European citizen to buy a property in an EU state different from his own, directly in the state of residence”. Undersecretary of Justice Cosimo Ferri draws conclusions, emphasizing some key words such as “meritocracy”, “controls” and “training”, among other things hoping for “tax incentives” to finance common study and training courses between countries. bilateral agreements. With regard to unions between couples of different citizenships (so-called International Couples), the CNUE (Council of the Notariats of the European Union) has set up a site of information on the legislation in force in the Member States of the European Union concerning capital ratios between spouses

and civil unions. This site, [www.compleseurope.eu](http://www.compleseurope.eu), is in addition to the similar [www.succeSSIONIS-europe.eu](http://www.succeSSIONIS-europe.eu), focusing on succession matters<sup>161</sup>.

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161. M. Notarile, *L'atto notarile di compravendita immobiliare*, Utet, 2015

### 3. Accountants

The accounting sector represents the most long-lasting sector affected by digitalization. The process has been thus carried out as a consequence of the digitalization of Public Financial Administration. Hence, the public innovation path and the digitization of obligations and the fulfilments strongly characterized the evolution of the accountant profession, at least from the introduction of the electronic tax office at the end of the nineties. Findings have observed that electronic tax, starting from the establishment of the Entratel channel to send tax returns, has built a new feature of Italian accountants, devoted to accounting consultancy and tax, so they can be considered strict digital professionals.

Moreover, the technological progress required more investments in hardware and software assets. OECD findings observed that, since 2007, Italy has saved on average 2 billion euros each year in financial administration costs, because the amount has been moved onto accountants.

At the moment, accountants are experiencing a very important turning point, due to B2B e-invoicing<sup>162</sup>. The impact will be considerable: it is estimated, indeed, that

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162. Consiglio Nazionale dei Dottori Commercialisti e degli Esperti Contabili, Fondazione Nazionale dei Commercialisti, I servizi contabili nell'era della digitalizzazione: il passaggio dalla contabilità analogica alla contabilità digitale e le opportunità per il commercialista

the recent intervention will produce about 1.3 billion digital documents annually.

This new obligation is considered as an important chance for accountants, who can be considered to play a central and essential role for their clients. In fact, the resources that in this way are freed from the time required by “Analogical” traditional accounting processes, resources for mere accounting registration or, mainly, for collection of paper documentation, data entry and paper filing, can be, in whole or in part, be redirected to the more correct stages of validation and control of processes, as well as of arrangement and analysis of data, consequently increasing efficiency in customer service. The resources that in this way are freed, from the perspective of the necessary organizational transformation of the study, the evolved / digital model presented in the document intends to be a first reference model to indicate a direction that can be followed in this sense.

The main elements of interest of the model can be summarized as follows:

- practice-client collaboration will become increasingly relevant, because it will allow the accountant to continue to perform, even if in a different way, their central role of intermediary between company and Financial Administration that has always distinguished it;
- integration between the different modules that make up the software solution of the professional studio, will enable the Accountant to maximize the benefits of digitization, where integration means the ability of software to exchange data quickly and without ambiguity, encouraging the sharing of information among the different subjects involved;
- the invoice data that the study is able to intercept in real time, information is exploited which consti-

tute a real asset and can be attached to value services added to propose to customers;

- it reduces the manual entry of a multitude of accounting data by the study staff, that will see part of their usual activities modified and can devote themselves to different activities. If they are merely accounting entries or, mainly, collection of paper documentation, data entry and paper filing can be, in whole or in part, redirected to the more correct stages of validation and control of processes, as well as of arrangement and analysis of data, with the consequence of increasing efficiency in customer service.

The services to offer to customers in this area could be:

- information, transmission and digital preservation of electronic invoices in XML format;
- management of notifications / receipts received from the Interchange System (SDI);
- management of the Credit Certification Platform, especially with regard to those Public Administrations that do not comply with Legislative Decree No. 231 of October 9, 2002 on the subject of combating late payment in commercial transactions.

The services to offer to customers in this area could be:

- digital preservation of accounting records: journal, VAT registers, accounting masters, etc;
- digital preservation of other documents: DDT, PEC, email, orders, etc;
- digital preservation of compulsory social books: book of meetings, assemblies, etc.

### 3.1 Blockchain

The peculiarity of the blockchain consists in the absence of a professional intermediary that must guarantee the truthfulness of the data. This task, in fact, is performed by the participants themselves to the blockchain through an authentication system. In addition, every transaction saved in the chain cannot be deleted or modified, and can be consulted at any time by members of the network. Its decentralization allows the execution of processes in the absence of a certification intermediary, putting at risk all those professions such as notaries, lawyers, auditors and accountants, who have always dealt - at different levels with certifying data and information. Accountants are not destined to disappear with the development of technology, and this is because they are not professionals who deal only with obligations but are also those who listen to businesses and solve problems and difficulties that often fall outside the fiscal sphere.

### 3.2 Most relevant legal concerns

Among the various obligations of an accountant, there are also those relating to the retention of data and documents in compliance with the anti-money laundering legislation currently in force. The anti-money laundering legislation places particular emphasis on preventing the loss of information. An Accounting Firm, therefore, should minimize the risks of destruction or loss of data, even accidental, and above all should ensure that no access to information is made by unauthorized parties.

In particular, the Fourth Anti-Money Laundering Directive and the enactment of Legislative Decree no. n. 90/2017, the retention of data and documents is regulated in Articles 31 (Retention obligations) and 32 (Retention methods). As for the object of the obligation, professionals must keep:

- copy of the documents acquired on the occasion of the customer's proper verification;
- the original or a copy having probative value, of the records and records relating to the operations.

The preservation of these documents and information, which constitute the client's file, must allow to reconstruct:

- the date of establishment of the continuous relationship or the assignment of the appointment;
- the identification data of the customer, the actual owner and the executor and information on the purpose and nature of the relationship or performance;
- the date, the amount and the reason for the transaction;
- the means of payment used.

### 3.3 Privacy and data retention

Accountant's activities, such as keeping the customer file, updating, modification and moreover, oblige the accountant to use the client's personal data, but, in compliance with the new Regulation 679/2016. A recent study highlighted the different approach to privacy and anti-money laundering legislation adopted by Europe

and the United States<sup>163</sup>. The IV anti-money laundering directive provides for the protection of all personal or business data in the context of anti-money laundering and anti-terrorism activities.

US legislation follows a different approach, in which the data are owned by the entity that holds them (for example a bank) differently from the European Union where the privacy policy confers ownership of data to the individual, as a human right, often opposing the anti-money laundering and anti-terrorism regulations.

Regarding storage methods, art. 32 par. 1 of Legislative Decree 231/2007 expressly provided for the adoption of systems for the conservation of documents, data and information suitable to guarantee compliance with the provisions of the personal data protection code. guarantee compliance with the rules set out on privacy, as well as the treatment of the same exclusively for anti-money laundering purposes. It is necessary to prevent any loss of data or information, ensure the integrity and non-alterability of data and information after their acquisition, the transparency, completeness and clarity of data and information, as well as maintaining their historicity.

### Conclusion

Digitalisation can create opportunities for professions and professional firms. The technological revolution is going to stay, therefore professions must accept it as a revolutionary era for the whole society. They should be more

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163. <https://swiftinstitute.org/news/interactive-infographic-conflicts-between-eu-us-on-amlctf/>

informed and acquire more skills about the management and use of technology, as a tool to be more competitive by providing more sophisticated services. It is important that the Legislator points out ethical guidelines for the use of technology: as a matter of fact, increased personalization and categorization allows for discrimination with respect to pricing, services, and opportunities.

## THE IMPACT OF DIGITALISATION ON LIBERAL PROFESSIONS

### 1. Introduction

#### 1.1 The logical relation between digitalisation and social partnership

The project assumption is rooted in the role of social dialogue in designing and delivering, through collective bargaining, social protection services to both professionals and employees of the liberal profession firms.

In an era where social partnership is weak, stronger reasons justifying this assumption are sought in the digitalisation process and its impact on business and society.

As a result, three dimensions are described as follows:

- A) the impact of digital economy on the liberal profession sector;
- B) the future of work;
- C) the future of professionals.

The review seems convincing to resort to social dialogue as the coherent response. Social Dialogue here is considered the means to achieve common results (common to both professionals and employees), not an end unto itself. Social dialogue, in turn, is the common tools towards sustainability measures in the liberal professions' sector, in terms of social protection schemes.

This is a new paradigm beyond the liberal profession

sector since the outcome of social partnership replace services provided by the state in the Fordism model.

The professional sector counts more than 5 million professionals, 27 million employees and 1,300 billion Euro as gross-added value. On a country-by-country basis, the high number of liberal professionals in Italy is particularly noticeable, with more than 1 million professionals, followed by Germany (970.000) and United Kingdom (717.000)<sup>164</sup>.

The number of professionals with own employees fell from 1.48 million in 2008 to 1.45 million in 2012. The decline of the share of professionals with employees, which fell from 32.3% in 2008 to 28% in 2012, highlights the trend reported in the overall economy and the related redundancy issue. Around two thirds of the employees in the liberal professions are employed in the sector of health and social services. The lowest proportion of employees as a share of overall employment was found in 2012 in Bulgaria (7%), while the highest share was recorded in Denmark (25%).

The role of professionals in European society goes beyond its economic value.

Liberal professions provide jobs, contribute to economic growth and fulfil important social-welfare functions. They typically provide services that are of high importance for the performance of core state functions.

These tasks carried out for the common good and in the public interest include ensuring legal protection for citizens, ensuring the rule of law within the tax and social levy system and a functioning market economy, as well as providing health care for the population.

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164. European Economic Social Committee, *The State of Liberal Professions*, 2014.

In all these areas, members of the liberal professions serve as particularly qualified service providers (e.g. as lawyers, auditors, accountants, engineers, medical practitioners). The general public places a great deal of trust in their activities aimed at promoting the public interest, which is why the liberal professions can also be referred to as “trust” professions.

As stated in the opinion of the European Economic and Social Committee on “The role and future of the liberal professions in European civil society 2020”, the system of liberal professions makes a significant contribution to society, providing high-quality social goods, safeguarding civil rights and increasing economic prosperity.

Liberal professions are recognised as a core component of any democratic society and offer significant potential for growth in terms of employment and GDP. The opinion also points out the role of professionals’ organisations and associations in representing the interest of their professions and supporting the State regulation in the specific legal framework.

The problems lie in the vulnerability of this sector which leads to the redundancy in specific categories such as architects and lawyers, due to the economic downturn and technology advancements.

In particular, liberal professions are involved in a remarkable change due to the digitalisation of services and the impact of artificial intelligence on professional tasks previously carried out by employees of professional firms.

Alongside this, the decrease of the demand of services experienced in the architectural, accounting and legal professions leads to the expansion of the “self-employed” and “non-standard work” as highlighted in the study of the European Commission on “Access to social

protection for people working on non-standard contracts and as self-employed in Europe”.

Finally, professionals themselves are threatened by new forms of Internet-based service provision and automation as documented in the recent literature on the future of professionals where it is claimed that machines are becoming increasingly capable and are taking on more tasks that were once the exclusive competence of professionals. The afore-mentioned business environment of professionals urges us to face the vulnerability of those professional categories, such as architects and lawyers and related staff, where the risk is higher.

In this respect, social dialogue and collective bargaining support employees at risk but at the same time encourage professionals to play their societal role with responsibility and knowledge-based approach. Aforementioned causal relationship can be summarised below:

- the digitalisation of professionals’ tasks entails less routine work to be covered by humans and therefore less employees in the professional firms at large;
- the lack of demand in specific services’ sector leads to a pattern of self-employed categories without social protection;
- professionals themselves are displaced by the increasing power of artificial intelligence, with effects on related staff.
- social dialogue, collective bargaining and current welfare schemes introduced in European Member States represent the response to the digitalisation of professional tasks and the means to a new model of professional firm based on sustainability principle.

The aforementioned logical framework leads to the description of above-mentioned realms, starting with megatrends which are transforming the future.

## 1.2 The impact of the digital economy on the Liberal Professions Sector

‘Digitization’ and ‘digitalization’ are two conceptual terms that are closely associated and often used interchangeably in a broad range of literatures.

Scholars across disciplines use the term *digitization* to refer to the technical process of converting streams of analogue information into digital bits of 1s and 0s with discrete and discontinuous values<sup>165</sup>. The first contemporary use of the term *digitalization* in conjunction with computerization appeared in a 1971 essay first published in the *North American Review*. In it, Robert Wachal (in Sanders, 1974: 575) discusses the social implications of the “digitalization of society” in the context of considering objections to, and potentials for, computer-assisted humanities research. From this beginning, writing about digitalization has grown into a massive literature one concerned less with the specific process of converting analogue data streams into digital bits or the specific affordances of digital media than the ways that digital media structure, shape, and influence the contemporary world. In this sense, digitalization has come to refer to the structuring of many and diverse domains of social life around digital communication and media infrastructures. In this section, we focus on a few prominent works that address the implications of digitalization that scholars have traced across some of the many different domains of social life.

Discussions about digitalization often invoke ‘informa-

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165. S. Brennen, D. Kreiss, Digitalization and Digitization, *Culture Digitally*, September 2014: <http://culturedigitally.org/2014/09/digitalization-and-digitization/>

tion' as the organizing mode of many domains of social life. Although the scholarship on 'the information society' is incredibly vast and varied, much traces its roots to early work by Fritz Machlup and Daniel Bell that noted broad shifts in national economies and occupation patterns. Within this framework, many scholars have argued that that "computer technology is to the information age what mechanization was to the Industrial Revolution"<sup>166</sup>. Digitalisation, therefore, has impact on knowledge production, in political participation, collective action, and social structures definition. This part of the evolution of the digital economy has the aim to highlight the impact of the digital world on reshaping the working environment.

### 1.3 The future of work

At first sight more appealing to Trade Unions, this issue is attractive even for Professional Associations involved in providing new services to professionals.

The issue is covered by walking through ILO documentation on changes in the global employment trend due to digitalisation. If the main impact of digitalisation is on the so called "gig economy", great enough to justify the term work without labour, explaining the increase of workers without social protection and employment contracts. If it is not the case for Professional firms, the phenomenon poses great challenges for those professionals who have no contract covered by collective bargaining and are exposed to risk and vulnerability. The session on the digitalisation of the la-

bour market provided enough evidence of work organisation changes. Jobs are now susceptible to computerization in such a way to redesign the labour market of the future. Since the business model intrinsic to liberal professional firms represents a good practice to be extended to professionals *tout court*, not only statutory professionals, the entire social dialogue mechanism in the professionals' sector offer a scheme to be mainstreamed.

### 1.4 The future of professionals

Finally, the core argument is discussed to raise the importance of the business model change within the liberal profession sector. Digitalisation reshapes the knowledge of professionals and ways through which it is generated. Examples of displacement effect of technology in the liberal profession sectors are provided to document the radical changes occurring and the need to organise a coherent response: social protection appears as the right answer obtained by social dialogue mechanism.

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166. Quoted in the S. Brennen, cit.

## 2. The impact of Digital economy on the liberal professions sector

### 2.1 Determinants of digital growth

In the Employment and Social developments on Europe<sup>167</sup>, general features of the relationship between digital economy and employment and business are highlighted.

To better understand how digital technologies impact on employment and business, it is useful to look at key technological development that has changed the economic model of many companies and generated a new typology of jobs in the use of new types of algorithms. The 'algorithmic revolution' has allowed the development of digital platforms for the exchange of services and goods including labour. It has also transformed traditional companies by enabling them to manage their business using digital processes. This has cut costs and facilitated the entry of newcomers into the market.

More specifically, three factors combined can explain the recent transformation: 1) the falling prices of IT tools such as Cloud computing; 2) the fact that ICT can boost labour productivity and increase efficiency; and 3) the increased usability of ICT over the last decade.

Users of technology (individuals, SMEs, start-ups and bigger corporations) have benefited from a reduction

in monetary and non-monetary barriers to the use of ICT. These processes have fostered business innovation, the production of new goods and therefore job creation, and have increased labour productivity. They have drastically changed the way in which people communicate and exchange information and knowledge.

According to the European Commission, the existence of digital platforms is an example of the potential of ICT and digitalisation. Digital platforms are a mixture of different technologies (related to the internet, computation and data usage) and their success lies in the ability to connect software, hardware, operations and networks. Digital platforms can also facilitate the growth of other digital platforms. Many of the current internet platform firms use Amazon Web Services. The ecosystem generated by digital platforms is a source of value in itself and regulates the terms by which the different actors can take part in it.

The use of computable algorithms and data clouding has initiated a profound reorganisation of sectors as diverse as service, manufacturing, consumption and leisure. These technologies have led to drastic cost reductions for businesses and lowered barriers to accessing services, thus creating the infrastructure needed for this new ecosystem to grow.

The label 'collaborative economy' covers various types of platforms that share a number of characteristics but can have widely different policy and regulatory implications (for market access, taxation, consumer protection and liability, protection of personal data, labour matters, etc.) Also, some have a user base of a few hundred or thousand individuals, others of millions of people. Even within a type of service, say, ride services, the way the service is provided and the implications can differ. Ride services

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167. European Commission, Employment and Social developments on Europe, 2016

(e.g. Uber) differ from ride sharing (e.g. BlaBlaCar) and car sharing (e.g. Turo, formerly known as RelayRides).

The collaborative economy involves three types of actors:

- a) service providers who share assets, resources, time and skills (e.g. private individuals offering services on an occasional basis ('peers') or professional service providers);
- b) users of these services;
- c) collaborative economy platforms that connect providers with users and facilitate transactions between them, also ensuring the quality of these transactions e.g. through after-sale services (handling complaints), insurance services, etc.

While they are all labour-intensive, ride services usually involve financial remuneration and profit, while car and ride sharing may have a wider range of aims (e.g. company while driving) and is seen as a way of sharing costs rather than necessarily making a profit. In addition, ride services have raised the issue of market access (i.e. licensing) and have provoked strong protests from incumbents, while car and ride sharing have not.

## 2.2 Transformation of business models

There are three distinct but connected dimensions related to the potential transformative power of this economy model for both business and work: platforms are leading economic actors in the reorganisation of different markets and transform competition; platforms transform work arrangements and influence work quality; and their business models use strategies to secure

value creation different to those of 'pipeline' businesses. The comparison between Airbnb and Hilton provides a clear picture of the huge transformation induced by digitalisation:

Numbers of rooms managed: Airbnb = 1 million; Hilton = 727,000

Market: Airbnb = 25 billion Euro; Hilton = 9 Billion Euro

Real Estate Assets: Airbnb = zero Euro, Hilton = 741 million Euro

Founded: Airbnb = 2008;

As employment has only partially recovered from the prolonged EU economic crisis, a significant number of new jobs have already emerged around digital platforms. According to the McKinsey Institute, global estimates forecast that the collaborative economy could be worth an additional 2.4 trillion EUR. Worldwide up to 540 million individuals could benefit from online platforms by 2025. Digital platforms and the collaborative economy in general might evolve and diversify further to take full advantage of this pool of talent. The presence of highly-qualified workers could lead to further innovation in services and products offered and a boom in small-scale entrepreneurs, in which individuals (rather than corporations) are the main economic actors.

Some trends can already be observed, as summarised below.

- *Job creation:* Between 2003 and 2013 employment in ICT occupations grew between 16% and 30% for 25 European countries (OECD, 2014) and is expected to continue to do so.
- *Business innovation:* In OECD countries, more than 95% of businesses have an online presence. ICT tools are increasingly used by companies to promote

business processes and improve efficiency. They are changing business strategies and creating new opportunities for business.

- *Emergence of new services and industries:* Both public and private services are benefiting from ICT development. New economic sectors are appearing, such as the app industry. Facebook apps alone created over 182,000 jobs in 2011. Some governments (e.g. in Moldova) have shifted their IT infrastructure into the Cloud and launched mobile e-services for citizens and businesses.
- *Contribution to GDP Growth:* A 10% increase in broadband penetration has been found to increase economic growth from a low of 0.24% to a high of 1.50%. ICT investment was found to have contributed to one fifth of all economic growth in the EU during the period from 1995 to 2010. For the period 2005-2010, one third of all EU growth has been traced back to investment in ICT.
- *New ways of working:* With the rise of the collaborative economy, more and more individuals can work using digital platforms.

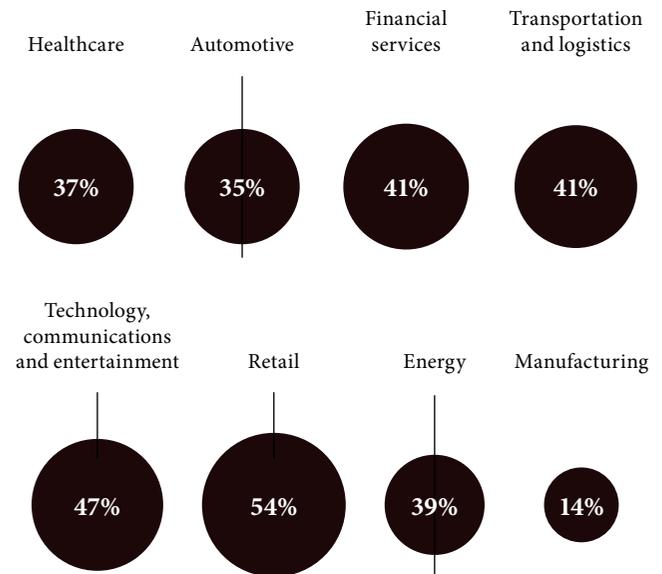
### 2.3 Urbanisation and digitalisation

Within eight years, there will be ten times more data generated worldwide, according to Raconteur<sup>168</sup>.

The emerging huge shifts of rapid urbanisation, changing demographics, hyper-globalisation and accelerated innovation will shape the world. New megatrends are having

a major impact on how people live and work. They are transforming the ways in which we do business, interact, understand services and carry out the essential processes of production. Four megatrends shaping societal evolution are rapid urbanisation, shifting demographics, hyper-globalisation and accelerated innovation.

Shane Wall said that Our digital being, who we are online and how we communicate, is becoming inextricably entwined with our physical reality. The key for us is asking how you create technology that helps life and doesn't detract from it. The growth of on-demand services is clearly here to stay and in the process is dramatically changing the nature of work for millions of people worldwide. Machine-learning, artificial intelligence (AI), the internet of things and big data are all expected to make major contributions towards enhancing the safety, speed and efficiency of supply chains worldwide. Potential impact of artificial intelligence is shown below.



168. Raconteur, The digital Economy, February, 2018.

Technology goes hand in hand with data. Many FTSE 500 chief executives and business leaders around the world recount a new mantra: “data is the new oil”. The fact is, oil is a finite fossil fuel, while data is infinite. In the next two years, 40 zettabytes of new information will be created. 90% of large organisations will have a chief data officer (CDO) by 2019, but only half will be considered a success, according to Nick Easen<sup>169</sup>. Among the challenges expected is that the role will be brand new in most companies and many new CDOs will be learning on the job. As the volume and complexity of datasets increases, CDOs will have to determine which information can add business value and drive efficiency for their businesses. This is true for professionals as well. What is changing, however, is the realisation that data and IT has a core role to play in every business and corporate culture is key to enhancing or repressing the digital imperative, especially in liberal professions services. Contrary to what one might think, digital transformation relies first and foremost on a culture shift, not technology,” says Ross Mason, founder and vice president of product strategy at MuleSoft. “Every organisation should have a Chief Information Officer (CIO) at the executive table, with a strong technology advocate and facilitator at board level. Companies will then be better equipped to understand the impact of technology on their organisation”. Moving to the professionals’ world, in the professional’s firm, each employee and professionals themselves need to be engaged in the digital journey. The next challenge as businesses transform digitally is to engage more with the data they’re collecting and knowing

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169. N. Easen, *Executives look to data for the lead*, Raconteur, February 2018.

its true worth. Cloud will continue to play its role, but edge computing is going to be a huge deal. It unleashes the IoT. Computing at the edge enables more sensors to be used and allows you to collect more data. Bandwidth and latency limitations are significantly reduced. And there’s a multiplier effect to consider. Edge and IoT are not used in isolation. They are pieces in a bigger jigsaw. Industries are embracing robotics, artificial intelligence (AI), biometrics, 3D printing, GPS, smartphones, and augmented and virtual reality. Each component feeds off the others. Edge computing can combine sensors with AI. Robotics can be improved with data analytics. The benefits but also the effects are multiplied. The volume of data created, and the computer power required both increase massively. Colin Anson reports that the impact of industrial digital technologies on the UK economy over the next decade could be as high as £455 billion and add 175,000 jobs. Needless to say, liberal professions should face the digitalisation impact with adequate competence in understanding needs and providing the ad hoc individual response.

## 2.4 Metrology and Labour Market

What follows is a description of the emerging metrology and related jobs.

Metrology comes from the Greek word “metron” and “logos” which literally means the study of measurement. This study covers both the experimental and theoretical aspects of measurement and the determination of the levels of uncertainty of these aspects. The study of measurement is a basic requirement in any field of science and

technology, most importantly in engineering and manufacturing. Since metrology is the study of measurement, it is expected to enforce, validate and verify predefined standards for traceability, accuracy, reliability, and precision. All of these are factors that would affect the validity of measurement. Although these standards vary widely, these are mandated by the government, the agencies, and some treaties. Consequently, these standards are verified and tested against a recognized quality system in calibration laboratories. In order to thoroughly grasp the concept of measurement, metrology is divided into three subfields. These three subfields in metrology are: scientific or fundamental metrology, applied or industrial metrology, and legal metrology. Each of these subfields is distinctly different from the other. Scientific Metrology is the organization and development of measurement standards and their maintenance. Industrial Metrology is the adequate functioning of measurement instruments used in industry as well as production and testing processes. Legal Metrology is the measurements that influence economic transaction, health and safety.

Metrology is a set of technologies to acquire and manage data which constitutes both the process and vehicle of measurement. Data are essential component of smart manufacturing. Modern metrology has been developed to support trade and eliminate technical barriers between nations. Metrology helps nations trust in the measurements carried out in each country thus avoiding so-called double testing: those who make measurements to check the compliance of any item and those who buy should re-measure to make sure that item is compliant with specifications. International technical and scientific cooperation and the mutual acknowledgment of measuring capacity have allowed to go beyond “double-testing”, es-

tablishing a common platform for development. Europe is investing 80 billion euro annually in measurement (0,8% of EU GDP) with an impact on the economy of around 250 billion euro. The development of innovative sensors to monitor specific parameters and consequently to understand how to calibrate, how to bring reference samples into the field to ensure universal traceability, has increased the reliability of metrology and the use of big data and their associated model-based processing. As the accurate inline measurements is the most pressing requirement of model-based processing moving beyond “sample inspections”, measurement will be increasingly oriented to “contactless” methods based on high-frequency optical and electromagnetic technology, in the THz or infrared range. Significant efforts are put into the ability to simultaneously acquire the intensity and spectrum of electromagnetic signals for process metrology purposes with the capacity to compensate interference between measurement point and remote sensors (by placing reference systems near the production line to check measurement capacity accurately and periodically. Another key factor is the availability of connected sensors leveraging next-generation Wi-Fi networks developed for the Internet of Things and 4G or 5G mobile networks of connected sensors that provide a significant redundancy of measurements and data. A huge number of sensors enables distributed measurements, repeated over time and space, and more robust statistics with big data. The big benefit of industrial applications can be achieved using sensors based on low-power technology and secure communication networks. Miniaturisation and engineerisation of sensors improve the capacity to generate, process and interpret data thus cutting industrial function previously considered crucial as quality control and measurement.

Another benefit of big data is reductive maintenance which minimizes downtime and unplanned stoppage. Through big data analytics smart systems monitor the conditions and health of equipment and notify when action is required.

## 2.5 Security Strategies

The issue of network security in high automation factories and beyond relying on smart devices is topical and the concept of Industry 4.0 itself can be deployed only when such systems effectively communicate with each other.

In metrology privacy means being able to generate data and secure them through an encryption system that minimizes possible interaction and undesired interference by unauthorized actors with no access credentials. In the industrial domain, this is important not only for the security of data flows between different departments or division of a company across non-physical links, but also for communication between different manufacturing organisations. Information flows (incoming and outgoing data) of a global corporation must be adequately protected and safe from interference.

Quantum physics (for which Heisenberg's uncertainty principle is applied), describing the behaviour of the matter, radiation and mutual interactions, you can build secure systems for data encryption, so that they are not immediately intelligible. The benefit comes from the dual wave-like and particle-like nature of the matter and radiation described in quantum mechanics. If two fundamental quantum states are encrypted and an act of reading data in either state is performed, by virtue of the wave-particle du-

alism, this action changes the other state as well. As a result, such system external interference in data to be detected, therefore protecting the information flow exchange.

## 2.6 The age of quantum computers

Data protection techniques are based on encryption through algorithms with longer keys which simply increase the number of possible combinations to prevent decryption. Constantly rising, computing power forces to use longer keys to prevent data decryption risks. Quantum computers, being currently developed in the labs of advanced countries, are the biggest threat to current encryption systems, as they can efficaciously decrypt keys of any length. As the name suggests, these counters are based on quantum bits (Qubits) that can store more information than the two states of conventional bits, as they encrypt the quantum state of a particle, achieving much higher computing speeds than traditional electronic equipment. While the quantum universe threatens data security, as a result of quantum computer developments, it can also offer a solution: quantum cryptography where security is based on the laws of nature, is immune to security risks generated by quantum computers.

## 2.7 Imaging techniques

Any camera is basically a measurement instrument since each pixel (picture element) provide information about luminance and colours. Transforming a camera into an

instrument that provides data from a metrological point of view requires the availability of traceable samples. The hyper-spectral imaging combines three colour parameters with information about light spectrum composition. On a microscale, the same technology is used for microscopy. In biology fluorescent substances are used as markers to study specific functional activity of a cell. In thermographic cameras, instead, each pixel corresponds to a temperature value. By analysing the infrared radiation spectrum is possible to measure the temperature. In turn, optical surface metrology is extensively used today to check peculiar surface features such as finishing, texture and structure by means of optical interferometric profilometers. Below this limit, the Nano metrology domain uses atomic force and electronic microscopes together. Following recent developments, contactless measurement technology is becoming more and more important. In recent years, coordinate measurement machines (CMM) have evolved toward contactless optical probes besides conventional probes.

## 2.8 Reshaping working environments

Metrology and automation in general will change the workplace structure. Measurement tasks and in general monotonous routine tasks are increasingly replaced by automated processes and robots. Collaborative robot systems offer an entirely new form of cooperation between human and machine. Intelligent assistants ensure a high level of reliability and productivity creating more freedom for areas of work in which their creativity is required. Even Industry 4.0 will not succeed

without human labour when it comes to overseeing the automated process, but the “how” is set to change. The control elements for managing the machines will thus become much more important. With their user-friendly interfaces, they ensure that processes run efficiently and can be controlled safely.

Software experts will be able to use technologies with the utmost precision while technicians can exploit measurements. If these learning technologies are integrated into areas of work, then they help employees with the application and can boost motivation and the willingness to assume responsibility. Automation solutions can take over dangerous, monotonous or strenuous tasks, operate in areas not fit for humans, increase productivity and secure wage-intensive locations. On the path towards Industry 4.0, experts in measuring and imaging technology can offer solid support. There are various software solutions to enable both communication between measuring systems and interfaces to common software applications. Measuring data is recorded quickly, through the multi-sensory mode, and optionally prepared for further use. This cuts complex programming tasks and costs for systems integration allowing additional competences to be employed in the technology development field. There is a newly-launched business area, 3D measuring, which represents an increasing demand for work and competences in cost-effective measuring and automation solutions. The systematic further development of application solutions in metrology, as well as interdisciplinary cooperation in a network of research institutions and business will bring about new jobs in automation and big data processing. Various measuring tasks are being successively integrated into production line. Sensors installation, serving for

continual quality testing along the manufacturing line is a further sector requiring high-profile competences. Since intelligent measuring technology ensures seamless operation along the fully-automated process chain, new job opportunities are growing in metrology.

Additional new jobs are required to improve maintenance effectiveness. The Internet of Things combined with Big Data analytics aims at the digitalization of all industrial process stages, simulating the related phenomena and activities with increasing accuracy. As a result, new technological jobs are required along with a new training supply.

Still, the multi data rate technology in the 2.4 Giga Hertz frequency range makes it possible to transmit high data rates and large data sets in the shortest possible time. The spread spectrum transmission and a multiple transfer of the records ensure transmission reliability and a fast and trouble-free measurement process. Data transferability therefore is an additional area where jobs are demanded. Metrotomography is a contactless inspection technique for low-density materials, acquiring a full set of information, from geometry to porosity, up to possible interference or other issues inside an assembled part. It is becoming an established method in stamping because it can cut mould and die setup time by up to 80% and increase the efficiency of production process. This innovative aspect of metrology will promote new competences, jobs and new start-ups in metrology.

### **3. The future of work without Labour**

#### **3.1 Global unemployment**

In 2019 the ILO will celebrate its 100th anniversary and in 2015, during the International Labour Conference, the future of work centenary initiative was launched by Director General Guy Ryder. The rationale underpinning the future of work initiative stems from the fact that it is difficult for the ILO (or any comparable international organization) to address all the implications of transformational change in its regular day-to-day activities. The overview of key trends with a view to informing and facilitating dialogue is offered through Issue Note series on Technological change, Labour Supply, Employment relationships and Social contract. In 1919, the founders of the ILO stated that they were “moved by sentiments of justice and humanity as well as by the desire to secure the permanent peace of the world”. In 1944, the Declaration of Philadelphia stated that “the war against want requires to be carried on with unrelenting vigour”.

The initiative that will culminate in 2019 should give expression to those same sentiments and point the way to how that war can be carried on, with the same vigour, but also performing the tasks and applying the methods required by radically changed circumstances in the world of work (G.Ryder, The future of Work centenary initiative, ILO, 2015). The ILO has the capacity to consign poverty to history, to provide decent work and living standards uni-

versally, and to extend protection from the risks of working life to all. However, that potential is yet to be realized. The problems of unemployment, underemployment, inequality and injustice are becoming more, not less, acute.

Countries around the globe are facing the twin challenges of repairing the damage caused by the crisis and creating quality employment opportunities for new labour market entrants. Unemployment, Vulnerable employment, working poverty and Inequalities are increasing. Global unemployment levels and rates are expected to remain high in the short term, as the global labour force continues to grow. In particular, the global unemployment rate is expected to rise modestly in 2017, to 5.8 per cent (from 5.7 per cent in 2016) – representing 3.4 million more unemployed people globally (bringing total unemployment to just over 201 million in 2017). And while the global unemployment rate is expected to hold relatively steady in 2018, the pace of labour force growth (i.e. those in search of employment) will outstrip job creation, resulting in an additional 2.7 million unemployed people globally.

In turn, vulnerable forms of employment are expected to remain above 42 per cent of total employment in 2017, accounting for 1.4 billion people worldwide.

Progress in reducing working poverty rates is slowing and the number of workers earning less than US\$3.10 per day over the next two years is expected to increase by around 3 million per year in developing countries. As the recent ILO Global Wage Report 2016/17 highlighted, the gap between men and women, in hourly wages, which reaches as high as 40 per cent, continues to persist despite improvements in equal pay legislation in a number of countries.

At the same time, in light of exacerbating global uncertainty, the risk of social unrest or discontent has

heightened across almost all regions. The ILO's social unrest index, which seeks to proxy the expressed discontent with the socio-economic situation in countries, indicates that average global social unrest increased between 2015 and 2016. In fact, between 2015 and 2016, eight out of 11 regions experienced increases in the measure of social discontent, most notably in the Arab States. Discontent with the social situation and lack of decent job opportunities are both factors (among others) that play a role in a person's decision to migrate.

Due to the so-called secular stagnation, global unemployment will rise by an additional 1 million by 2018. Within the aforementioned relentless decline in decent work, a new class of workers is emerging who lacks the seven forms of labour-related security namely, labour market security (income-earning security), employment security, (protection against arbitral dismissal), job security (ability to obtain employment contract), work security (social protection), skills reproduction security (opportunity to gain skills at work), income security (assurance), representation security (collective voice). Guy Standing calls these forms of insecurity "precariat" (G. Standing, *Precariat*, Bloomsbury, 2011), who are beneath other working classes such as Manual employees, Salaried Professionals (professional-technicians) and Rentiers. According to Standing, we are in the middle of the global transformation, the painful construction of a global market system: market liberalization, commodification of work, privatization of industry, labour market liberalization. The global system is the most unfree market system ever created, done in the name of the free market. More and more income is going to rentiers, people who are getting returns from property, from assets that are financial,

physical or natural. There is a new regulatory architecture that has been constructed in the last 30 years, at the top of which is the intellectual property rights regime. Under WIPO, millions of patents, copyrights, brand names have been established guaranteeing monopoly incomes to the possessors. Every single patent guarantees the owner of a patent 20 years of monopoly income, which amounts to 20% of GDP, globally. This is not a free market. In addition, States have been shifting public resources to give subsidies to the rentiers to attract them to the country or to keep them in the country. The growth of subsidies has been draining public expenditures, obliging government to cut benefits and services to the population, leading to the collapse of the income distribution system. The share of income going to capital and rent is going up while the share to labour has been falling rapidly as a global phenomenon. The functions income distribution is getting profoundly worse. Unemployment and wages. Profit and wages. Real wages decline.

The same for the relationship between productivity and wages.

Debt is becoming the hallmark of our age. A systematic aspect of exploitation: a source of rental income being sucked out of workers. There is a system, through financial institutions which has created a mechanism to increase debt. The outcome of this system is the global class fragmentation: plutocracy, elite serving the plutocracy, salariat, proletariat, precariat.

Precariat are accustomed to accepting unstable labour, they have to do work that it is not recognized and remunerated. Official statistics ignore that type of work. In addition, precariat has no occupational identity They live in an unsustainable debt. One mistake, one illness, on accident and they plunge in the poverty trap.

Precariat is the first mass group in history which is systematically losing every type of rights, civil, cultural rights, economic rights, social rights, political rights. If you are in the precariat you are a supplicant, asking for favours. We live in a state of revolt where we want the revolt, but we are not sure how to revolt.

Yanis Varoufakis follows the same line of thought highlighting the end of the social democratic model which was based on two assumptions: i) Income distribution among working class (income security, pension, health) and ii) Distribution between capital and labour.

The process of financialization dismantles the social model while financial capital depletes industrial capital and labour capital.

The rise of machines adds to the massive dismantling effect, impacting on employment. (Y. Varoufakis at YouTube: <https://youtu.be/BvgdtF3y0Ss>)

Varoufakis points out the narrative of the dominant paradigm where private production of wealth is appropriated by the state for social purposes. In reality, our wealth production is collective, and it is privately appropriated. The iPhone technologies represent the evidence of private appropriation of collective wealth since technology were created by government grant.

In Varoufakis' opinion, basic income should be considered as a dividend of the private appropriation of the common goods. Illusory separation between market and state needs to be dissolved, since there is no market without state, no capitalism without state and no state without private firms. Hence, basic income replaces the social safety net which entraps citizenship and impedes free will.

### 3.2 World without Work

The end of work seems a futuristic concept, but it has become a real history for cities such as Youngstown (US), Middlesbrough (UK) or other cities in Europe, where the steel industry or textile industries collapsed. Youngstown, in particular, lost 50,000 jobs and more than 1 billion in manufacturing wages in 1977 after the closure of its Campbell Works mill (see <https://youtu.be/Ni4bwCfa-SU>). The city has become a metaphor for the decline of labour, the disruption of social cohesion due to cultural and psychological breakdown, such as depression, spousal abuse and suicide. Mental health centre populations tripled within a decade while 4 prisons in 1990s were built. Technologist and futurists take this example to warn that the economy is near tipping point, not for pollution, greenhouse gas emissions, or climate change but for the lack of work. According to Derek Thompson (D. Thompson, A World without work, *The Atlantic*, July 2015), futurists imagine self-driving cars snaking through the streets and Amazon drones dotting the sky, replacing millions of drivers, warehouse stockers, and retail workers. The capability of machines continues to expand exponentially, while human competency remains the same. Thompson points out that the continuous increase in computer capabilities associated with their price decline, will lead to the risk of the disappearance of work. Assuming that saving work is more important than saving jobs, what might happen to industriousness, America's unofficial religion? The risk as well as opportunities of technological progress over unemployment was highlighted by Keynes who forecast that technological progress might allow the reduction of the working week.

The Millennium employment outlook, however, seems opposite to that economic regime of the Sixties, where technologies had the power to put back to work those who had been put out by the introduction of new machines, as John Kennedy said. The “end of work” argument was highlighted by a group of scientists who argued to President Lyndon Johnson that the computer revolution would create a separate nation of poor, unskilled, and jobless who would not be able either to find work or to afford life's necessities (D. Thompson, cit). Today, two group of scholars are growing: those who confirm the Luddite Fallacy (the Luddites were a group of English textile workers who violently destroyed machine because they feared that these new machines were taking their jobs and livelihoods) and those who bellies in the rights of Luddites. Even if the end-of work is not imminent, the Technological Job Displacement exerts a slow but continual downward pressure on the value and availability of work with effects on wages and on the share of prime-age workers (25-54 years old) with decent jobs.

Economists at the University of Chicago (see Brent Neiman, *The Global Decline of the Labour Share*, *Quarterly Journal of Economics*, 2014, No 129) have estimated that the decline of employment is the result of businesses replacing workers with computer and software. The comparison between AT&T and Google documents Neiman's findings. In 1964 AT&T was worth 300 billion in today's dollars with 800,000 workers while Google is worth 400 billion but with only 55,000 workers. Yet, the share of prime-age workers in US has been trending downwards since 2000. This age group, especially men who are at peak of their abilities and less likely than women to be primary caregivers for children or relatives, should almost all be working. This is why the employment rate of this group is

considered the key statistic for understanding the decline in the workforce. Since 2000, the number of manufacturing jobs in US has fallen by 30% (5 million). In turn, the real wages of “college jobs” have fallen by 8% since 2000 and the number of college jobs who are underemployed is higher than it was in 2007 (T. Cowen, *The Great Stagnation*, Dutton Adult 2011, see the website Marginal Revolution University).

The impressive dexterity of Computer and Information Technology complements the demise of the working man. In this regard, it is worth noting the time differential between Technology Innovation and its impact on labour. Observing the robotic revolution in 1960 or the personal computer revolution in 1980, a timeframe of 10 years is confirmed as well as that occurring after the introduction of the iPhone in 2005 which had effects on hotel jobs ten years later by helping homeowners rent out their apartment through Airbnb.

While there no doubt that technology destroys jobs, some doubts arise in quantifying those created. Observing the exponential growth in computer power with modest growth in job complexity and cognitive tasks, some economists emphasize the end of jobs. Industrial restructuring in Europe over the recent years prospects a society with less work and urges social science to study alternative employment opportunities, such as social innovation, circular economy, community jobs, leisure jobs (R. Skidelsky, *How much is enough?* Rowan Williams, 2013). It unquestionable that the majority of jobs do not possess those characteristics raised by positive psychology such as a sense of purpose current and identity, autonomy, meaning. This job dissatisfaction forced a group of academics and economists, the so called post-workists, to theorize the end of labour.

Lynn Hunnicutt, in particular, (L. Hunnicutt, *Redefining the Paradigm*, The New American Colleges, 2015) highlights the re-emergence of school as cultural centres rather than job-preparation institutions, going back to the original Greek meaning of school: teach people to be free. Accordingly, post-work proponent to be free from work. Regrettably, this vision is not experienced by jobless people or unemployed workers since studies have shown that unemployed feel a sense of social isolation. When people want to work, they feel miserable if they cannot. Studies on unemployment show that the impact of unemployment goes beyond the loss of income extending on health, mental distress and social isolation. When workers identify themselves with work, the lack of work impact on their identity leading to social marginalization. Transition from work to leisure should consider the full social cost in terms of cost for health services and those costs linked to criminality and social degradation at large. In this respect, the entire social protection (unemployment benefits, social insurance, social assistance) system should be reinvented not in terms of social nets, because a net is not always beneficial, especially for fishes, but in terms of universal rights and citizenship.

The other side of Computer refers to its positive effect due to the opportunity offered toward creativity. Scholars at Harvard University (L. Katz, *Race between Education and Technology*, Harvard University Press, 2008) see the next wave of automation returning to a new form of artisanship or artistry. This is the case of digital design and the so-called 3-D printing, such as Rhinoceros, where machines construct complex objects, in the past made by artisans. There is a growing number of start-ups, the so called “makerspaces” which exploit the opportunity offered by 3-D printing. Thompson reports

the case of the Columbus Idea Foundry, a converted shoe factory equipped with machines, such as 3-D printing to make gifts and jewellery and a purposed built industrial space allowing lay people to be entrepreneurs. This kind of industrial sites combine production, learning and social networks. The uploading of 500,000 hours of YouTube Video, 500 million new Facebook photos every day provide data and information that have economic value and can be transformed in economic activities. It worth noting that activities carried out in centres like Columbus Idea Foundry allow the achievement of missing goals in business like factories, such as independence, a sense of purpose and competency development. Columbus idea Foundry can be seen as a good practice of post-wage arrangements in a world of work where fewer full-time jobs are replaced by machines. Contrary to the belief that as some jobs are eliminated more will be created by innovation, the new Millennium is presenting a new world where technology continues to accelerate the reduction of work demand. Artificial Intelligence makes most jobs obsolete and redundant. Office workers are replaced by office automation, while robots are going to replace blue collars jobs and high unemployment is expected. This scenario is well described by Martin Ford (M. Ford, *The rise of Robots, One World* Ed. 2015) recalling the historical conversation between Henry Ford II, Employer and Walter Reuther, Unionist. Ford, showing new machines suggested buying robots to pay union costs, while Reuther replied: how are you going to get them to buy your cars? If technological progress will continue as predicted, the image of cities such as office buildings will change since the decline of work make these buildings unnecessary. Sooner or later, unemployment and social degradation due to technology

progress will be a key issue for governments, contrasting what Adam Smith called the invisible hand to refer to the social order arising from the individuals' selfish actions. rather, what seems urgent would be the visible hand of public intervention. The role of the State, in fact, will be stronger than in the past, in order to balance inequalities sprang off by automation and technological job displacement. The new dawn of social innovation has arrived, and public intervention should support this shift toward a life with less work by providing local community centres and public spaces where people can meet, learn skills and build networks and by ensuring decent life on a universal basic income.

A new model of society is needed based on part-time jobs in the new economy that allows independence, the strengthening of interpersonal relationships, reduction of greenhouse gas emissions, part-time green jobs that combine environment protection with social care and support the good life, the Aristotelian ultimate goal of life. While a prospect of a future with no work seems hopeless, a future of less work could bring a glint of hope. If this is the case, the redesign of work organisation should be part of the fourth revolution. After a society driven by machines (industrial revolution), the subsequent society managed by the economy of scale (second revolution), followed by society depending on Information technology (third revolution), the fourth industrial revolution inspired by Artificial Intelligence and Big Data, could reinvent work, take advantage of good work and good life.

### 3.3 Work and Labour

In the ILO, being an International Labour Organisation, there is an ongoing discussion about the difference between Labour and Work, a separation highlighted by the Marxist tradition where labour was associated with exploited work, an epistemological category opposed to work. In the English language the word becomes either work or labour depending on the relative context.

According to Frayssé (O. Frayssé, *Work and Labour as metonymy and Metaphor*, Triple C, N0 12, 2014) the words work and labour belong to a galaxy of representations that comprises many words, and a complete vision of the galaxy is required to help us choose the right definition/translation in each instance. In his words, the organization of this galaxy enables one to identify the sometimes hidden and unconscious dimensions of the work/labour concept.

In part 1 of *The Capital (Commodities and Money)* (K. Marx, *The Capital*, Penguin, 1993), the distinction of two separate words for different aspects of labour are pointed out, underlining that work can be used for all productive activities, regardless of theory social context, whereas labour is associated with what makes these productive activities useful for capital (surplus value). In this sense, one cannot substitute work for labour when speaking of Labour Unions as well as one cannot say she is looking for labour, when in quest of employment. Frayssé compares the different use of the word “work” in Adam Smith’s *Wealth of Nations*, highlighting the coexistence of different meanings: tasks to be done = division of labour; nature of the tasks = work; the amount produced = labour. As a result, labour and work are synonymous, since division of labour consists in parcel-

ling work. Labour is defined “work to be done”, whereas commodities are “work done”. The distinction between work and labour becomes sharp when Smith’s focus is on labour as the measure of (exchange) value.

The ILO’s founding documents (Versailles Treaty, 1919, art 427 and 1944 Philadelphia Declaration) reaffirming that labour is not a commodity, are rooted in the aforementioned distinction and express the view that people should not be treated like commodities, capital or a mere factor of production or even resources. Instead, people who work for a living are human beings and treated with dignity and respect. The comparison between Marx and Smith leads to a conceptual distinction between work producing goods as use values and involving a concrete experience or hardship, and labour generating exchange values which can be measured through market bargaining. Here work and labour cannot be used interchangeably.

The Shakespeare’s comedy *Love’s Labour Lost*, in which a king and three of his friends promise to study and not become involved with women, explains the omnipresence of work and labour in human life.

In Frayseé’s words, the ever-growing commodification of everything makes it necessary for workers to sell their labour power to obtain access to nature’s untransformed bounties, such as a fresh breeze of clean air or a drop of pure water, silence or an unspoilt landscape.

The appropriation by capitalists of the exchange value generated by activities not designed for the purpose of creating exchange values, as we can see in data mining, give these activities the character of unpaid labour, as prosumers and social network users realize that their activity is profitable to others and start demanding compensation for something they were doing for free, there-

by accepting the commoditization of whole aspects of their private lives, which now look like work/labour to them. The aforementioned consideration goes beyond the lexical distinction between work and labour and extends the reasoning to the distinction between the haves and have-nots in our society.

### 3.4 Digitisation of the labour market

A report by the economist (The Economist, Shaping the future of work, 2016) highlights that the digitisation revolution has the potential to raise global income level and improve the quality of life for population around the world. In The Economist's words, to date, the primary beneficiaries have been those that either have the skill set to invent and produce these technologies or those that have the financial means to afford access to the digital world. Ordering a cab, booking a flight, buying a product, making a payment, listening to music, watching a film, or playing a game—any of these can now be done remotely. In the future, technological innovation will also lead to a supply side miracle, with long-term gains in efficiency and productivity. Transportation and communication costs will drop, logistics and global supply chains will become more effective, and the cost of trade will diminish, all of which will open new markets and drive economic growth. Digitisation, mobility, big data, cloud computing, and analytics, and other drivers of transformation are expected to have a significant impact on jobs, ranging from significant job creation to job displacement, and from heightened labour productivity to widening skills gaps.

The Report focuses on the gap between skills offered

by education systems and those demanded by employers. The issue is not only on soft skills such as critical thinking, the ability to communicate effectively or collaboration or adaptation to changing priorities, but the preoccupation touches even the hard skills associated with the new jobs. It is confirmed that the demand for highly skilled workers has increased while the demand for workers with less education and lower skills has decreased and recognized that the current mismatch between business needs and education system supply has stemmed from the restructuring process since 1970s in US and 1980 in Europe. Technological advances have revolutionised industries, changing the nature of the tasks and the kind of activities employees engage in. The most in-demand occupations did not exist 10 years ago, and the velocity of change is expected to speed up. It is taken for granted that the education system should support industry rather than being a public service forming awareness capability, the exercise of freedom or the achievement of human rights. This kind of false narrative reaffirms the Achilles (education) and Tortoise (Technology), without considering acceleration (aims of education system). Notwithstanding this false narrative, it is acknowledged that at all career levels, employees are increasingly required to integrate knowledge from a number of areas and work in teams to find innovative solutions to problems.

Technology goes hand in hand with Talent and without talent, which depends on computerization, economic development will stagnate. In turn, Technology depends on big data, that is the massive amount of digital data from any digital source, such as Facebook or You-tube. The sheer volume and variety of data and the velocity at which data is processed and exchanged has converted

data into big data affecting new digital jobs on one hand and displacing routine jobs on the other (The Economist, cit). In-memory technology is used to extract value from big data, employing sophisticated algorithms to store data “in-memory” to allow for real time processing with practically no time lag. The new cultural environment is “hyperconnectivity” (multiple forms of digital communication we are engaged in) which has exponentially increased the volume, variety, and velocity of data, thus making data more valuable. The use of big data in Artificial Intelligence, robotics, quantum computing, will impact not only in the work organization but also in our way of lives. The use of big data has generated sophisticated algorithms to better manage robotics, understand and orient customers, replace routine jobs. Smart cities deploy the use of big data to improve many aspects of our daily lives such as optimizing traffic flows based on real time traffic information (The Economist, cit.), while governments can exploit big data to make better decisions by acting based on patterns and need revealed by analysing large volumes of data. If big data can support government decisions and help public institutions redesigning labour market ecosystem, there is also concern about the impact of technology applications on routine jobs.

Big data (plural as the Royal Statistical Society recommends) are among technological drivers of change presented in the 2016 World Economic Forum Report (WEF, The Future of Jobs, Workforce Strategy for the Fourth Industrial Revolution, 2016). Mobile Internet, Big Data, Robotics, Artificial Intelligence, Advance manufacturing 3D, Biotechnology, are all shaping the fourth industrial revolution that is already impacting on society and employment. Concurrent to the technological revolution are a set of broader socio-economic, geopolitical, environ-

mental and demographic drivers of change, each interacting in multiple directions and intensifying one another as highlighted by Klaus Schwab and Richard Samans (WEF, cit). With their words, as entire industries adjust, most occupations are undergoing a fundamental transformation. While some jobs are threatened by redundancy and others grow rapidly, existing jobs are also going through a change in the skill sets required to do them. The debate on these transformations is often polarized between those who foresee limitless new opportunities and those that foresee massive dislocation of jobs. The proposal of the WEF to face the technological change and the talent shortages follows the “reskilling hypothesis” in that today’s workers should be adapted to the new labour demand and the education system reformed. However, mass unemployment and growing inequalities need something more than an adaptation strategy. Businesses should take an active role in re-training programmes while government should act to support individual lifelong learning and to create enabling environments towards an inclusive society. It is acknowledged that the drivers of transformation currently affecting global industries are expected to have a significant impact on jobs, ranging from significant job creation to job displacement, and from heightened labour productivity to widening skills gaps. Expected employment effects foreseen by the World Economic Forum, involve a considerable growth rate in Computer and Mathematical job areas, as in Engineering, and a remarkable decline in Office and Administrative Jobs as well as Manufacturing and Sales. Major impact affects the core curriculum content of academics and higher education institutions. Nearly 50% of subject knowledge acquired during a four-year technical degree is obsolete. The WEF Future of Jobs Survey shows the skills family areas of the fourth industrial revolution,

pointing out the relevance of Cognitive rather than the Physical Abilities, the importance of Content skills rather than process skills, as basic skills and the role of system skills, complex problem solving skills together with technical and social skills, as cross-functional skills. Finally, envisaged workforce strategies are reported in order to meet the Talent and Skills challenges brought about by expected business disruptions.

### 3.5 Labour Market of the future

Technologies reshape the workplace, transforming our homes and change work organization and societal interactions. Implications are expected for the business model at large with related concern about the capacity to rebalance the economy and deliver sustainable development as asked by 2030 United Nations Agenda. The expected disruptive impact on jobs of advances in robotics, artificial intelligence and 3-D printing is a focus for reliable forecasting. Regrettably, the study of future change is destined to be inaccurate even when a robust methodology combining the statistical analysis (forecasting) and the scenario studies based on subjective predictions (foresight) is applied. The Future of work: jobs and skills in 2030, (UK Commission for Employment and Skills, 2014) falls within the foresight methodology and offers a focus on labour market changes that can be considered a reference study on the issue. Thirteen trends were selected and their impact on labour market is studied by distinguishing changes resulting from trends and related disruptions and creative destruction of the labour market, using Schumpeter's hypothesis. Ten key disruptions were selected according to their plausibility and probability.

Four development paths were identified (combining the extrapolation of trends and disruptions) to describe coherent and plausible stories merging technology and socio-economic variables. First scenario (business as usual) is characterized by greater business flexibility and incremental innovation with moderate growth. Second scenario (the great divide) shows a divided society due to the robust growth driven by high-tech industries which reinforces the economic division between the haves and have nots. Third scenario (skills activism) foresees technological innovation and automation of white-collar jobs with repeated large-scale job losses and extensive government-led skills programmes. Finally, the fourth scenario (innovation adaptation) is a stagnant economy where productivity is improved through ICT solutions. Needless to say, alternative scenarios are not mutually exclusive. For each scenario, the situation, the employers' and employees' behaviour, the education providers and policy makers strategies are described. Labour market implications of aforementioned scenarios have been linked to seven economic sectors (Health, Professionals, Retails, Education, Manufacturing, Digital, Construction). Salient results are recalled below (see UK Commission for Employment and Skills, 2014).

Significant increases in the number of jobs in health and social care are due to demographic factors (ageing population), social trends (working parents requiring child-care), and opportunities will emerge with investment in medical research and innovation. It is anticipated that the increase in job opportunities will attract a range of individuals (from those entering the labour market for the first time to those transferring from other sectors). The adoption of technological innovations within the health and care sectors is expected to change the profile

of many jobs. Migrant workers are expected to fill high- and low-skilled job gaps.

Developments in the professional and business services sector are likely to be linked closely to globalisation and internationally traded services, the adoption of technological innovation, and providing solutions to new or increased social demands (such as an ageing population). One of the major influences is likely to be the automation of professional jobs and the impact of ICT using smart algorithms.

Jobs and skills in the retail and logistics sector will be impacted by the increased use of ICT in work processes (both back office and customer facing), the continued impact of the Internet in multi-channel retailing, and social consumption patterns (including satisfying 'green' consumer choices). Overall, a growing population will probably drive growth in the demand for both low- and high-skilled jobs within the retail and logistics sector. Data and technology enable new service models for retailers, allowing for increasing sophistication in segmentation and customisation through customer profiling.

The development of market-based and employer focused education is expected to become an increasingly important driver for the sector. Social trends and enabling technologies create a need for increasingly personalised modes (in structure and content) for learners. This is particularly the case for Further Education and Higher Education, where higher fees focus the minds of learners on employability questions and return on investment. Online and blended learning techniques will become more widespread and sophisticated to match the expectations of fee-paying learners.

Whilst a full rebalancing of the economy (where manufacturing re-assumes a larger proportion of

the economy) is less likely, a stabilisation in manufacturing employment levels is plausible. Within a globalised production environment, the demand for low-skilled labour in UK manufacturing will continue to decrease. One of the major uncertainties facing the sector is the degree to which additive manufacturing or 3D printing will revolutionise production and supply chains.

Changes in technology are expected to drive productivity and the development of new business models in the Creative and Digital Sector. The sector will have a significant impact on other sectors such as digital and creative solutions applied in different business processes and fields. Alongside expected improvements in productivity that come with the application of ICT tools, companies will seek to incorporate digital platforms as a core part of their innovation processes (for example, in open innovation platforms).

Whilst it is plausible that the sector will continue to experience the (cyclical) impacts of the economy as a whole to 2030, there are several key drivers that are likely to shape employment and skills demands. The growing population of the UK will sustain demand for construction jobs although the building of new housing relies on an enabling regulatory environment. Resource efficiency is another key driving factor for the sector, both in the creation of new housing stock and in improving existing stock. Whilst some of the sector will continue with established techniques and approaches, new technologies (for example, energy and materials) will change work needs for both construction, maintenance and repair.

Finally, the UK Commission for Employment and Skills Report highlights key messages helping actors to act for fu-

ture skills. Needless to say, as digitalization grows, a significant impact on employment and skills in the decades ahead is expected, at all levels and in all sectors. Work in the future will be more interconnected and network-oriented. What follows is the extract from the Report. Workers and employers will require the competencies to work across different disciplines, to collaborate virtually, and to demonstrate cultural sensitivity. If location-based and time-based work becomes eroded, organisations will need to develop new HR and contractual mechanisms to manage performance, address issues of trust and transparency, and invest in keeping the skills of a largely virtual workforce up-to-date. Successful solutions may be found through combining established disciplines with novel developments, for instance with material sciences and Nano-technologies. The spread of disciplines and jobs across sectors will also stimulate the hybridisation of skills which will provide some individuals with a strong position to compete within an increasingly demanding workplace.

The shrinking middle will challenge the workforce. The high-skilled minority (characterised by their creativity, analytical and problem-solving capabilities and communication skills) will have strong bargaining power in the labour market, whilst the low-skilled will bear the brunt of the drive for flexibility and cost reduction, resulting in growing inequality. Jobs which have traditionally occupied the middle of the skills hierarchy and earnings range, such as white-collar administrative roles and skilled / semi-skilled blue-collar roles, are declining at a significant rate due to changes in work organisation driven by technology and globalisation. There is evidence that new types of jobs are emerging to fill the middle ground, but these have markedly different entry routes and skill requirements.

The future workplace will be multi-generational, with four generations working side-by-side. Traditional notions of hierarchy and seniority will become less important. The skills for leading and managing the four-generational workforce, and for facilitating collaboration across multiple generations and their values, will be in increasing demand.

The complex values of this multi-generational workforce will impact upon employers' ability to attract talent, at all skill levels. Attitudes to corporate social responsibility, or expectations of flexible working conditions, will alter the ways employers recruit. Cross-generational skills acquisition will be important.

The aforementioned study shows that the impact of digitalisation can be anticipated and that disruptions can be mitigated thorough an intelligent government-led retraining programme.

### **3.6 Job susceptibility to computerization**

An inspiring assessment of how susceptible jobs are to computerisation is provided by Carl Benedikt Frey and Michael Osborne (C. Benedikt Frey, M. Osborne, The future of employment, how susceptible are jobs to computerisation? Oxford University Engineering Sciences Department, 2013). Their hypothesis is based on recent advances in Machine Learning (ML) and Mobile Robotics (MR) as the new form of computerisation defined as job automation by means of computer-controlled equipment. Then, they develop a methodology which categorises occupations according to their susceptibility to computerisation. Finally, they estimate the probability of computerisation for 702

US occupations examining the expected impact of future computerisation. The research is rooted in the perennial issue of technological unemployment raised, among others, by Keynes, who explained the disparity between means of economizing the use of labour and the capacity to create new uses for labour. Notwithstanding the disagreement about driving forces behind high unemployment rates, the effect of computer-controlled equipment on the jobless growth is acknowledged.

Benedikt and Osborn point out that computerisation is no longer confined to routine manufacturing tasks bringing the example of autonomous driverless cars. This is the key issue of their hypothesis in that the computer substitution is not limited to manual and routine tasks but is extended to non-routine tasks. Developments in Machine Learning such as Data Mining, Machine Vision, Computational Statistics, and in Mobile Robotics, such as Artificial Intelligence, facilitate the shift of computerization towards complex and non-routine tasks. In short, ML and MR enhance technological capability to replace human tasks towards a jobless growth. Their review of the historical relationship between technological revolution and employment starts off by describing the Queen Elisabeth's refusal against the patent of William Lee's stocking frame knitting machine. In the view of Lee, workers would be relieved of hand-knitting. In the view of the Queen, workers would have lost their job. Contrary to the belief that technological progress brings benefits to a growing share of the labour force, the peculiarity of the nineteenth century manufacturing technologies is that they were deskilling (substituting for skills). The pattern of capital-skill complementarity, emerged in the late nineteenth century as manufacturing production shifted to mechanised assembly lines, continues and pro-

gress in the new millennium thanks the computerisation (ML+MR). Using their words, the expansion in high-skill employment can be explained by the falling price of carrying out routine tasks by means of computers, which complements more abstract and creative services. The result has been an increasingly polarised labour market, with growing employment in high-income cognitive jobs and low-income manual occupations, accompanied by a hollowing-out of middle-income routine jobs. As in other fields, technological revolution is linked to the decline of the computer price which forced employers to substitute labour for computer capital. But there is more. The work computer is able to perform depending on the ability of a programmer to write rule or algorithms that direct the technology in each possible task. If a problem can be specified, then the computer overcomes human effort. In their words, the extent of job computerisation will thus be determined by technological advances that allow engineering problems to be sufficiently specified, which sets the boundaries for the scope of computerisation.

Advances in the fields of ML, MR and AI lead to the so-called technological job displacement, since they turn non-routine tasks into well-defined problems. Handwriting recognition or machine translation algorithms obtained by analysing data from United Nations documents, statutory translated into six languages, exemplify the issue. Going back to big data it is easy to understand that a wide range of non-routine tasks are becoming computerisable. Machine learning algorithms are therefore better able to detect patterns in big data than humans (see session IIIA, C. Benedikt Frey, M Osborne, cit). In addition, the absence of biases brings another comparative advantage of algorithms. In contrast, humans must fulfil a range of task unrelated to their occupation, such as sleeping, which hamper occupational perfor-

mance. The study reports examples of the dexterity of computer, such as the cancer treatment diagnostics at Memorial Sloan-Kettering Cancer Centre, carried out from 600,000 medical reports, using 1.5 million patients' records.

The use of sensors on pipes and water infrastructure to reduce water loss by 50% in cities of Doha, Sao Paulo and Beijing in another example of the computer dexterity.

The impact of Machine Learning on non-cognitive tasks is complemented by the analysis of the impact of Mobile Robotics on non-routine manual tasks. Based on the afore-mentioned assumptions, the susceptibility of jobs to computerisation is carried out considering three profiles: Perceptions and manipulation tasks, creative intelligence tasks and social intelligence tasks.

Finally, the measurement of the employment impact of computerisation is provided using data source of US Department of Labour.

The table below shows the distribution of occupational employment over the probability of computerisation (low, medium and high probability).

In their words "according to our estimate, 47 percent of total US employment is in the high-risk category, meaning that associated occupations are potentially automatable over some unspecified number of years, perhaps a decade or two" (page 38).

Sales, Service and Office and Administrative Support are occupations with a higher probability of computerisation. Carl Benedikt Frey and Michael Osborne conclude their study highlighting that "for workers to win the race, however, they will have to acquire creative and social skills".

It is curious that they use the verb learn for machine and acquire for humans. Regrettably, the "skills acquisition" depends on multiple factors and variables which go beyond algorithms.

### 3.7 Different strategies about the future

The future of work report of the Human Capital Consulting (HCC, PWC, The future of work, a Journey to 2022, 2017) recalls the destructive innovation that are creating new business models and destroying old ones. ICT Technologies, Big Data and Robotics are having huge impact on how people interact and work. Traditional career models pertain to the past while many job titles of tomorrow will be ones, we have not even thought of yet. Excursion to 2022 from 2006 shows the technology progress which brought huge income to some and poverty to others.

From the launch of Twitter (2006) to Automated Robots serving in hotels (2022), technology pervades the work of work and the family life. The world of work in particular has been investigated according to the social interaction dimension (Individualism versus Collectivism) and the network organization (Fragmentation versus Integration). Three scenario analysis were obtained. The first one refers to the combination between Individualism and Integration. Here, the big company and globalization take centre stage, consumer preference dominates and the separation between have and have-nots is definitive. Profit, growth and market leadership are driving goals, Economy of scale will drive innovations, while job security is threatened. Second scenario is called Small is Beautiful and combines Individualism with Fragmentation. Small business networks are opposed to global businesses and networks prospering. The driving goal is the maximization of flexibility with a multidimensional business portfolio. Work organisation is dominated by flexibility, autonomy and short-term contract. The third scenario links integration with collectivism and is defined the Green World, where companies devel-

op a social conscience and green sense of responsibility. Consumers demand ethics and environmental credentials as a priority. Society and Business see their agendas align. Common good is the driving goal while ethical values and work-life balance characterize the world of work. Individual wants are replaced by the common good, which prevail over personal preference. Collective responsibility for social and environmental issues overcomes consumer preferences. The afore-mentioned study highlights that the ultimate goal of society (Individual wants versus Common good and Big business rules versus Collaboration and Network) attracting the use of technology and related research and development tasks.

## **4. The future of professionals**

### **4.1 The need to consider Professionals as a collective set**

Although Professionals draw on different bodies of knowledge, their jargon varies and their working practices can be quite diverse, Professionals have many features in common. First of all, they are a solution to the same problem such as insufficient knowledge to cope with all of daily challenges. Professionals have knowledge, experience, skills, and know-how that those they help do not. Second, there is a practical reason for considering a collection of professions together in one category, since each profession has much to learn from one another and an advance in one field of knowledge can be used in many professions such as quantum computing. They can draw analogies from the work of others and carry lessons learned into their own business.

More than this, professionals frequently see the potential and need for fundamental change in others more clearly than in themselves.

In merging different professions into a common category, such as that formed in the Italian Association, the advantage is to encourage practitioners from many fields to think more widely and strategically, and to accept the possibility of change in their own disciplines.

## 4.2 Knowledge and professional tasks as threatening factors for Professionals

The future of professionals is linked to the change in production and distribution of knowledge. The knowledge of professionals is an applied knowledge in that they use knowledge to solve a societal problem. This professional knowledge is a combination of the formal knowledge learned at school, know how, experience and skills learnt during the professional experience and guided by professional bodies. Professional knowledge, contrary to goods, increases with its use, while goods, when consumed, there is less left for others. In addition, professional knowledge is non-excludable, contrary to goods which can be prevented from being consumed unless the price is paid. Most importantly, contrary to goods, professional knowledge, as knowledge *tout court*, can be digitalized, i.e. it can be converted into binary signals and processed electronically.

Professionals operate in a business environment and similarly to all economic processes, their work can be disaggregated into multiple tasks. Professional work is no longer regarded as a monolithic, indivisible lump of activity but instead is broken down into constituent tasks and allocated to other people or systems who are best placed to discharge the work at as low a cost as possible, consistent with the nature and quality of the service required. The nature of knowledge and the disaggregation characteristic of professional knowledge lead to the decline of the current professional firms' model in that professionals are not the only source of expertise, while their tasks are taken on by machines that are becoming increasingly capable.

Prediction of the decline of Professionals is due to the rise of technology and ICTs which transform the way that professional know-how is shared in society.

In the so called 'print-based industrial society', professionals have played a central role in the sharing of expertise, being the main channel through which individuals and organizations have gained access to certain kinds of knowledge and experience. On the contrary, in the 'internet-based society', machines capability will take on many of the tasks carried out by professionals. The new millennium shows an 'incremental transformation' in the way expertise is produced and distributed in society, leading eventually to a dismantling of the traditional professions. In 1995, Richard Susskind made the prediction that lawyers would, in the future, primarily correspond with clients by email. In 2017, for a lawyer to receive their client's queries by post is increasingly a rare event. According to Susskind, Professionals play such a central role in our lives that it is difficult to imagine different ways of tackling the problems that they sort out for us. However, the professions are not immutable. While they are a profession to meet a particular set of needs in a print-based industrial society, in an Internet-based society their role is threatened. As a result, if they are not adapted to Internet-based society needs, they will be displaced by feasible alternatives.

## 4.3 Examples of the displacement effect of technology in liberal profession sector

There are many examples highlighting the decline of professionals in the book of Richard and Daniel Suss-

kind, “The future of the Professions”<sup>170</sup>. More people signed up for Harvard’s online courses in a single year than have attended the actual university in its 377 years of existence. In the same spirit, there are a greater number of unique visits each month to the WebMD network, a collection of health websites, than to all the doctors working in the United States. In the legal world, three times as many disagreements each year amongst eBay traders are resolved using ‘online dispute resolution’ than there are lawsuits filed in the entire US court system. On its sixth birthday, the Huffington Post had more unique monthly visitors than the website of the New York Times, which is almost 164 years of age. The British tax authorities use a fraud-detection system that holds more data than the British Library (which has copies of every book ever published in the UK). In 2014, the US tax authorities received electronic tax returns from almost 48 million people who had used online tax preparation software rather than a tax professional to help them. At WikiHouse, an online community designed a house that could be ‘printed’ and assembled for less than £50,000, built successfully in London in September 2014. The architectural firm Gramazio & Kohler used a group of autonomous flying robots to assemble a structure out of 1500 bricks. The consulting firm Accenture has 750 hospital nurses on its staff, while Deloitte, founded as an audit practice 170 years ago, now has over 200,000 professionals and its own full-scale university set in a 700,000 square-foot campus in Texas. The best-known legal firm in the US is no longer a traditional law firm, rather the legal advice platform legalzoom.com.

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170. R. Susskind, D. Susskind, *The Future of the Professions*, Oxford University Press, 2015.

These developments are connected. They are early indicators of a transformation that we have been studying together since 2010, showing remarkable changes in which expertise in society is shared.

#### **4.4 The future of professionals: effects of digitalisation and artificial intelligence**

In the study of Richard and Daniel Susskind two futures are envisaged. The first one is an incremental transformation where professionals adapt their competences using new technologies. The second future is long term, where technology actively displaces the work of traditional professions. Over time more of the tasks done by professionals are going to be done by increasingly capable systems or machines, or by the two.

In the words of Daniel Susskind, there are two major factors that are shaping this future. Firstly, the failure of “the grand bargain”. This is how the professions traditionally provide services to the exclusion of others, instead of as gatekeepers of knowledge. Not only are their processes expensive and antiquated in our internet-based society, it’s as if there is “an intentional obfuscation” of the work they do. Secondly, Daniel quoting Patrick Winston, one of the fathers of artificial intelligence, highlights that there are lots of ways of being smart that aren’t smart like us. This idea is central to the change of professionals.

A key distinction introduced by digitalization and related technology refers to Jobs and Tasks. Jobs being a set of tasks carried out by competencies, those tasks carried out by machines (robots, pc, smart phone, sensors, etc) displace human work.

Machines will increasingly carry out professional tasks. This is already starting to take place and is expanding beyond the initial area of document review.

When machines can carry out routine tasks, the professionals are left to concentrate on the non-routine, but Artificial Intelligence (AI) is paradigm shift, in that non-routine tasks are automatized. Machines are becoming more adept and start to encroach upon the non-routine and fewer and fewer professional tasks are left for humans. These increasing machines capabilities seem a trend leading to a world without work.

A further issue refers to the assumption of AI which states that machines have to learn to artificially think like human, more particularly professionals, in order to displace the professions.

This is acknowledged as “AI fallacy”. In fact. machines do not need to learn how to think like humans. Machines process information differently. They can process so much information that the result can be better than the one reached when relying upon human judgment.

With the processing power of a computer, certainty of outcome may be increased to the extent that judgment is no longer required. Thus, judgment can be made redundant, just like those trained to use it to an expert level, the professions.

The future of professionals follows the centralization principle supported by computing power under which the knowledge currently curated by the professionals will be in the hands of small number of corporations controlling the entirety of the distribution of professional knowledge.

#### **4.5 Professional role and the power of digitalisation**

A common question raised in the professional world is the following: What I do in my job is exercise judgement and as a machine can't think or reason, it can never exercise judgement, so these particular tasks are safe from automation.

In the digitalisation society, the right question is, ‘To what problem is judgement the solution? Why do we call upon human experts in this particular case to exercise judgment?’ The answer is uncertainty.

As a result, a better question is, ‘Can a machine deal with uncertainty better than a human being? With Richard Susskind words, the answer to that is of course they can. What machines are incredibly good at doing is processing far larger volumes of data than human beings and running algorithms and routines through them.

The first evidence of this was back in 1997 when IBM's Deep Blue beat world chess champion Garry Kasparov. The computer was able to calculate up to 330 million moves per second whereas Kasparov — at best — could consider about 100 moves per go. The computer won through brute force processing power.

In America, Daniel Katz, a law professor, has created a machine that successfully predicts the outcome of US Supreme court decisions. This system knows nothing about the law, it relies on data from past Supreme Court cases. According to Susskind, this lesson isn't just true for judgement but across all faculties of human beings. What machines are good at doing is processing far larger volumes of data than humans and running algorithms and routines through them.

For centuries doctors, accountants, lawyers, teachers and architects have solved problems too complex for

most of us. But today, the future of these professions is seriously in question as artificial intelligence, non-thinking machines and automated systems are poised to do the jobs of human experts at a fraction of the cost.

#### **4.6 Professional model of work**

Observing the literature on the future of professionals, the unsustainable factor is rooted in a model of work, namely advisory work, that rests on increasingly antiquated techniques for creating and sharing knowledge. Professionals are unable to advise themselves because they lack the expertise, skills, know-how and experience or crucially, they lack the intellectual sources to acquire this knowledge for themselves.

The professions are responsible for many of the most important functions and services in society – yet affordable access to their work is low. However, in a technology-based Internet society there will be a wide range of new ways to create and share knowledge that are more affordable and accessible.

Leading professional firms often claim that they strive to bring the best of their knowledge and experience to all of their clients. In practice, this is rarely achieved, according to Susskind. This model of work is often not transparent.

Recipients of professional services, often by the nature of the arrangement, are able neither to evaluate the substance of the guidance they receive nor to judge whether a given profession is best placed to undertake the work. As a result of the obsolete model of work, professions are unaffordable, under-exploiting technology, dis-

empowering, ethically challengeable, underperforming and inscrutable.

A technology-based bias called ‘technological myopia’, accompanies the model of work.

This is the tendency to underestimate the potential of tomorrow’s applications by evaluating them in terms of today’s enabling technologies. This reflects the inability of a sceptic, because of the shortcomings of current technology, to concede that future systems may be radically more powerful than those of today.

#### **4.7 The inevitability of change for professionals**

The inevitability of change for professionals is due to computerisation of their work which began in earnest in the late 1970s, with information retrieval systems. Then, in the 1980s, there were the first-generation AI systems in the professions, when most focus was on expert systems technologies. In the next decade, the 1990s, there was a shift towards the field of knowledge management, when the professionals started to store and retrieve not just source materials but know-how and working practices. In the 2000s, Google came to dominate the research habits of many professionals and grew to become the indispensable tool of practitioners searching for materials, if not for solutions. Today the computerization of professionals’ works is characterised by major progress with Big Data, where extremely large data sets can be analysed computationally to reveal patterns, trends, and associations, especially relating to human behaviour and interactions. Into the 2020s and beyond, professional will all be involved in the second wave of AI system.

A common mistake is highlighted in studies on the future of professionals<sup>171</sup>. This is a tendency to confuse the means with the ends. In a technology-based Internet society, where there are more effective ways to produce and distribute practical expertise that makes less use of personal interaction, the error is to let this veneration for tradition inhibit important change. There is a myriad of other opportunities in life for human beings to enjoy face-to-face interaction with one another. There is no obvious reason why our apparent need for interpersonal contact should have to be satisfied by our accountants and doctors.

#### 4.8 Call to action

There is an appeal for today's professionals to be involved in shaping the circulation of practical knowledge

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171. A. Abbott, *The System of Professions*, Chicago University Press, 1988; R. Abel, *The decline of Professionals*, *Modern Law Review*, 49, 1986; *The future of medicine*, Oxford University Press, 2011; J. Barrat, *Our final invention*, St Martin Press, N.Y., 2013; J. Bing, *The Riddle of the Robots*, *Journal of International Commercial Law and technology*, 3, 2008; G. Brock, *Out of Print*, Kogan Page, London, 2013; H. Campbell, *Digital Religion*, Routledge, London, 2013; M. Carpo, *The Digital Turn in Architecture*, Wiley and Scott, 2013; A. Carr, *The Professions*, Oxford Press, 1933; C. Christensen, *The Innovative University*, Harvard Business School, 2011; D. Cuff, *The Architecture form the outside in*, Princeton Architectural Press, 2010; L. Floridi, *The future of information*, Oxford University Press, 2013; D. Foray, *The Economics of knowledge*, MIT Press, 2006; C. Golding, *The race between Education and Technology*, Harvard University Press, 2009; J. Groopman, *How Doctors think*, Mariner Books, N.Y., 2008; Y. Harari, *Sapiens*, Harvil Secret, 2014.

and to “actively strive” for its affordable, empowering, ethical and transparent distribution.

Of course, one of the issues of most pressing concern to the professions is the timeline for the predicted changes. With a project such as the “artificially intelligent attorney” Ross, IBM reports to be “closer to commercial release than expected”, there is a definite feeling that momentum is building.

Professionals should be prepared to face this change by organizing adequate retraining activities, so that digitalisation and AI are better learnt and by identifying new business models that join technology with creativity and empathy. As far as the future Professionals want, this cannot be different from that shaped by the United Nations 2030 Agenda, which reaffirms the Corporate sustainability and related Sustainability Reporting on Human Right principles, Labour and Environment principle and Anticorruption principle.





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