Chapter 12
Ethical Implications Regarding the Adoption of Emerging Digital Technologies: An Exploratory Framework

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Abstract The purpose of this contribution is to develop an exploratory framework to analyse the ethical implications of the adoption of emerging digital technologies (EDT) by society. We posit that the exponential growth and dynamics of change of technologies such as artificial intelligence (AI), big data and the Internet of Things, among others, are of such magnitude and depth that many of the phenomena generated in the process of adopting these technologies have not been studied with sufficient breadth, scrutiny and critical analysis, particularly in the contexts of emerging economies. In order to develop the proposed framework, we draw on the principles of complex systems to analyse the interactions of relevant agents of the digital ecosystem under study. Our exploration identified a set of strongly related implications circumscribed to education, ethical and moral development, and regulation. It is suggested that the proposed framework may provide an initial platform for formal discussions and conversations towards understanding and applying EDT in a balanced and ethical manner.

Keywords Digital technologies · Digital ethics · Policy and regulatory frameworks · Technology adoption

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12.1 Introduction

The seductive and glamorous nature of digital devices, systems, and applications has captured the attention of users who have become increasingly dependent on the functionalities offered by a plethora of digital applications for a growing number of human activities. Furthermore, intense competition between large producers of digital technologies – both hardware and, especially, software – has led to unstoppable innovation, affecting in turn other no less disruptive disciplines such as genomics, nanotechnology, and biotechnology, to mention the most significant. Given the overwhelming and pervasive nature of this scenario, it is essential to understand and reflect and act on the implications of technology–society interactions in order to fully leverage the potential benefits of digitisation for social well-being and sustainable development (Benería et al. 2016; International Labour Office 2019; International Labour Organisation 2018; International Telecommunication Union 2018; Kenney et al. 2015; Mazzucato 2018; Stiglitz et al. 2009). The objective of this chapter is to identify implications that require immediate and urgent attention and explore a framework centred on the importance of applying ethical and moral principles as society adopts and appropriates EDT.

The impetus for digitising all human activities with applications, prioritising cost reduction, efficiency, productivity, precision, agility and real-time solutions without taking into account their unintended consequences and ethical and moral implications is creating significant concerns in academic and government circles (Acemoglu and Restrepo 2019; Brynjolfsson and McAfee 2017; Frey and Osborne 2017; Nanterme 2016; Silver and Hassabis 2017). These applications have already created profound transformations in the modus operandi of individuals, communities and institutions. Furthermore, with the emergence of COVID-19, society as a whole is on the verge of a great metamorphosis with even deeper social repercussions. The rapid spread and adoption of EDT such as AI, machine learning, big data and analytics, and other related technologies has already led to essential advances in science and technology with great potential for social benefit. However, taking into account the speed and exponential nature of this process and its confluence with the disruptive nature of COVID-19, the ethical and moral aspects involved in the applications of EDT have become essential to urgently respond to the pressing needs of this new scenario (Bostrom and Yudkowsky 2014; Conn 2017; Etzioni and Etzioni 2016; The European Parliament and the Council of the European Union 2016; The Lancet 2018). Given the complexity of this ‘new normal’, it is essential to understand the benefits, risks, opportunities and consequences involved in adopting EDT with a human focus, at a time when society is under pressure to cope with a devastating global pandemic. The creation of comprehensive education, reskilling-upskilling, and ethical and moral development programmes thus becomes essential to mitigate undesirable impacts on employment and other socioeconomic damage (AINow 2018; Article 19 2018; Chatila 2019; Institute of Electrical and Electronics Engineers 2017; New and Castro 2018; United Nations General Assembly 2015). It is also urgent to develop regulatory models to set standards to defend public interests in
safeguarding the privacy and flow of knowledge before, during, and after a health and environmental crisis such as COVID-19.

This chapter is organised as follows. Section 12.2 deals with the sociological perspective of the ethical and moral development of EDT. In Sect. 12.3, we briefly discuss the ethical implications of EDT. Section 12.4 explores the importance of ethical perspectives in EDT in the current corporate landscape. Section 12.5 describes the proposed framework and a series of recommendations which may be implemented in emerging economies. Finally, we offer our conclusions, emphasising an urgent need to address the ethical and regulatory implications of adopting EDT.

12.2 A Sociological Perspective of the Ethical and Moral Development of EDT

Technological development and the adoption of EDT are strongly linked to changes in market dynamics, production processes, and in general, to changes in society; therefore, a reflection through an academic lens with a critical analysis of ethical implications, such as the sociological, anthropological or economic perspective, is essential. As Müller (2020) points out, the ethics of EDT often focus on various types of concerns, like AI systems as objects, issues of privacy and manipulation, human–robot interaction, employment and the effects of autonomy, ethics for AI systems and artificial moral agency. As a result, a change in ethics will extend to traditional work between people and EDT. Given the complexity of the analysis, it becomes pertinent to provide a reflective framework for the nearly boundless scope of the EDT landscape.

Some sociological perspectives discuss how to approach the study of current and future developments of these technologies. In this regard, Rezaev and Tregubova (2018) argue that the new processes and changes in EDT are not only a reality of everyday life but represent a transformation into a new form of sociality, which they call ‘artificial sociality’ (2018: 93). The authors also argue that research in AI-based technologies, for example, is flourishing outside disciplinary boundaries, meaning they call for an approach based on multidisciplinary and interdisciplinary theories and methodological frameworks.

One challenge is to develop a unified vision of the interactions between people and technology and how technology will change people. A disciplinary approach from the exact sciences, the humanities or the social sciences, from their own theoretical and methodological frameworks, may neglect the holistic vision required for society to understand and adopt EDT. In that respect, for example, the adoption of automation is likely to cause changes in job structure, altering the way individuals work and the types of jobs available. Therefore, a disciplinary view would lead to a reductionist approach in an area inherently and evidently interrelated with other fields of knowledge. We posit that a critical and interdisciplinary analysis stressing the importance of the ethical and moral components of EDT adoption and the
associated social transformation is a fundamental factor in a people-centred vision for the future of work.

Although there is a variety of approaches to the study of the implications of adopting EDT, one dominant theme is the ethical transformation of work and employment through changes in labour structures, human-machine collaboration, labour and wage polarisation, unemployment and the work of the future (Autor 2010; Böhm 2019; Goos et al. 2014; Schmitt et al. 2013). The current tendency to debate the implications of EDT is geared towards boosting the automation and digitisation of economic sectors, particularly in industry, to optimise production systems with little human intervention.

There has recently been a considerable increase in literature around the theme of social, legal and ethical acceptance with respect to substituting or complementing the labour force with EDT (Stone et al. 2016; Van der Zande et al. 2019). In this regard, it has been argued that even as EDT continues to deliver social and economic benefits that are broadly shared across society, it will raise ethical and social dilemmas and challenges for the economy and society as well. One clear example is presented in Stone et al. (2016), who describe how ‘robots and other AI technologies have already begun to displace jobs in some sectors’ (2016: 6) and how ‘as a society, we are now at a crucial juncture in determining how to deploy AI-based technologies in ways that promote, not hinder, democratic values such as freedom, equality, and transparency’ (2016: 6).

One implication of the adoption of EDT relates to the development of new skills in the workforce; companies engaged in processes of technological change and innovation have to involve employees, with a view to labour market inclusion as an ethical compromise, to make responsible decisions in adopting new technology and adapting to technological change with a people-centred vision. According to Bonekamp and Sure (2015), it is possible that in the near future, the adoption of EDT in production systems will impact the workforce, organisation and work structure, changing how human factors contribute and add value to many industrial value chains while productivity gains through automation require fewer humans for the same output.

Since classic automation replaced human muscle, major labour market disruptions have occurred. In this sense, fear of technological unemployment is a phenomenon that has existed for several centuries and has been documented to become more acute in times of radical technological change (Keynes 2010). For some authors, the adoption of EDT is not without drawbacks, considering that these technologies could dominate the working world (Nabi 2019), leading to a widespread fear of losing employment and increasing inequalities (Ernst et al. 2019).

The effect of technologies on labour supply, as discussed in the literature, is profound. Frey and Osborne (2017) estimated in their study that around 47% of total employment in the United States is at risk from computerisation, with routine jobs exhibiting higher unemployment rates. Additionally, the authors documented a change in the structure of the labour market: routine jobs in industry, particularly low-income ones, would enter into a dynamic of reallocation of labour supply due to their flexibility and physical adaptability.
As Nabi (2019) points out, in developed economies approximately half of jobs in the automotive sector have been affected by EDT, and particularly by AI, which has led to job losses. The author adds that this phenomenon is not alien to emerging economies. Indeed, Chui et al. (2017) report that, in Mexico, 51.8% of the labour force might be affected or displaced by the adoption of EDT. Furthermore, Minian and Martínez Monroy (2018) evaluated the vulnerability of employment due to the adoption of new technologies and estimated that 63% of total employment would be at risk of being automated. Although the authors did not take into account economic, political or social factors – that is, they exclusively estimate technical feasibility – they did consider that automation would cause massive unemployment. As a result, to mitigate the adverse effects on employment, upskilling and reskilling initiatives should be implemented as an ethical compromise for the workforce.

However, what seems to be happening currently in the labour market as a result of the adoption of EDT is job polarisation. This phenomenon is a significant trend that has taken place in the labour markets of advanced countries in recent decades. Studies such as Autor (2010) and Böhm (2019) have shown an increase in high- and low-wage occupations, as well as a proportional decrease in traditional middle-wage occupations. This phenomenon has had adverse effects in the expulsion of labour from routine cognitive jobs and a decrease in wages for the least qualified workers in the labour force. The authors agree that the forces underlying this labour polarisation are found in technological change biased by occupation, global trade processes, changes in industry, offshoring, and labour force migration, among others.

As we have argued, general advances in EDT have already enabled significant changes in the workplace and the future of workforce demographics. The relation between EDT and humans is not only changing the workplace but everyday life as well. In this context, ethical and moral issues must be analysed, for example, whether humans will still be accommodated in the workplace or whether they will be replaced by EDT in the interest of efficiency and cost-saving.

Therefore, part of the debate in the literature on EDT adoption focuses on the ethical and regulatory challenges relating to how, where and why these technologies integrate into social structures, industry, the economy or politics. For Tijani and Wahyudi (2008), the development of EDT, specifically the field of AI, has led to deep concern and discussion about the possible consequences and the main ethical implications of the current and future implementation of these technologies. The main issues identified by authors include determining liability when an autonomous system fails and gaps in legal systems that are ill-prepared for such scenarios.

Similarly, Ernst et al. (2019) cite as one ethical problem the change produced in the workforce by automation and the spread of autonomous machines that acquire skills much faster than human beings, meaning that the human factor could cease to be a limiting factor in the development and evolution of EDT. Consequently, until regulations and the legal system catch up, companies must work to establish ethical guidelines that address transition distress arising from EDT as the labour force is complemented by or substituted with these new technologies.

Lucivero et al. (2011) argue that EDT provide opportunities, but their plausibility requires careful evaluation if complaints about their functionality or adoption, or the
manner in which they address social problems, are to be avoided. The authors offer a series of ‘ethical tools’ regarding EDT: one could ‘investigate the history of a particular technology as well as the uncertainties and challenges at stake in current developments. All this is necessary to imagine more in detail whether and how the final technological product will work and to rule out at least some expectations on potential uses and applications as too futuristic’ (2011: 139).

Regarding the growing tendency of EDT adoption by society and companies, Wright and Schultz (2018) recommend (1) recognising that the proper adoption of EDT benefits organisations, as well as the well-being of all concerned; (2) minimising disruption, investing in the workforce and retaining technology-displaced workers through the development of upskilling strategies; (3) reducing social inequalities, particularly those that derive from gaps in accessing resources such as technology or education; (4) self-regulation and supervision, through collaboration by organisations maintaining ethical business practices and (5) creating new jobs, taking into account that employment goes far beyond the workplace and its economic function; that is, jobs provide pride and meaning and contribute to the well-being of communities.

This section provides an initial approach that explores a framework for analysing the ethical implications resulting from the adoption of EDT by society, particularly in the labour market. As a result, we argue that the innovation and development of EDT in certain organisations and economic sectors would result in disenchantment, with all the risk that comes with the adjustments and mismatches associated with their adoption. In this sense, we believe that workers should have the right to ethical control over the implementation of technology in their workplace. Therefore, ethics committees must be formed with a focus on protecting the interests and rights of workers threatened by technological substitution.

As discussed, the implementation of some EDT will replace the human labour force; some jobs will disappear, but new jobs will be created. For this reason, the impact of EDT on employment is ambiguous, meaning it is not possible to predict the future of work. However, unfortunately, the adoption of EDT is unlikely to benefit the entire workforce. In this sense, most of the discussion in the literature reviewed centres on the demand for certain types of skills or abilities, while demand for others is likely to decrease significantly, resulting in job polarisation and affecting or benefiting people’s wages.

Given these scenarios, a prudent approach would be to recognise that the promotion of EDT must go hand in hand with policies and processes that address associated ethical implications, values and expectations to guarantee that the technological benefits are fairly distributed. We admit that social and ethical acceptance are essential factors that should mediate the adoption of EDT in labour markets.

Finally, we posit that a critical and interdisciplinary analysis stressing the importance of the ethical and moral components of EDT adoption and the associated social transformation is a fundamental factor in a people-centred vision for the future of work.
12.3 Ethical Implications of EDT

The pace of innovation and technological change in AI and related technologies is of such magnitude that their consequences are not easily discernible. On the one hand, it must be acknowledged that there are many applications currently available that have greatly benefited and had a significant impact on health, commerce, industry, culture, and so forth. On the other hand, the implications associated with a fast and, in many cases, blind adoption of these powerful technologies have not been studied or discussed with sufficient depth and critical analysis (Bossmann 2016; Kamm 2007; Latonero 2018; Nalini 2019). Based on our analysis of techno-social interactions and review of literature, reports and interviews with thought leaders in different areas of human endeavour, we identified a set of implications strongly related and circumscribed to education, regulation, and ethical and moral development. Addressing these three aspects is becoming crucial to accomplish a balanced and beneficial adoption of digitisation and to compensate for and mitigate the undesired effects of the current techno-centric environment.

As part of the construction of our framework, we identified a set of implications strongly related to education, regulation, and ethical and moral development. We argue that comprehensive policies and strategies regarding these three fundamental elements may support the development of patterns in adopting digitisation for the benefit and socioeconomic advancement of society, both at local and national levels. We acknowledge that there are other implications that escape the scope of this first stage of our research; however, we suggest that our analysis might provide an initial platform for formal discussions and conversations on the balanced adoption of EDT by society. The implications we integrate into our proposed framework are cybersecurity and privacy, health, economic control of interconnected systems, human behaviour and social interaction, pace of innovation and technology, and work of the future/the future of work. Figure 12.1 shows the interplay of education, regulation, and ethical and moral development and select implications from a connectivity perspective. This list is not exhaustive and other implications could be included in our initial proposal; nevertheless, this list provides the groundwork for a more in-depth analysis. Similarly, the weights assigned to the techno-social interactions depicted in Fig. 12.1 do not describe a concrete case or project; it is just an essential graphical representation to highlight the levels of interaction involved. Figure 12.1 also stresses the importance of privacy and data protection, which is a concern of enormous impact and interest for governments and regulatory entities. The emergence of COVID-19 has led to a myriad of applications to monitor social distancing, which employ EDT to support efforts to control the pandemic.

Though these applications provide valuable real-time information to control the spread of potential infections, there is legitimate public concern about privacy. In this respect, ethics and moral development are crucial to designing technologically advanced tools for protection and prevention before, during and after the pandemic (Aldama 2020; Griggs 2020; ITU 2020a, b, c, d, e; Lund et al. 2020).
In recent decades, the corporate orthodoxy has been to maximise shareholder value, which is embedded in the concept of value-based management. In short, the strategies deployed to accomplish this goal pursue increased returns on capital or profitable growth, either by obtaining a larger market share or by cutting costs to a minimum, ideally without compromising the quality of products or services. This goal has shaped how companies run their operations and the intended or unintended consequences of actions taken to deliver higher dividends to shareholders (Lazonick and O’Sullivan 2010; Rappaport 1998; Young and O’Byrne 2001).

Recently nearly two hundred of the top companies in America, including Apple, Pepsi, and Walmart, among many other well-known companies, issued a statement that redefined the purpose of a corporation to a more inclusive goal that further integrates customers, employees, suppliers and communities as a commitment to a broader spectrum of stakeholders (Anderson et al. 2004; Business Roundtable 2019; Grewal et al. 2010; Gruca and Rego 2005; Matzler et al. 2005).

However, so far, it is uncertain how this declaration translates into specific actions and how each company is going to implement these mechanisms to provide value for their stakeholders. These actions are especially critical when companies develop their business around EDT, and ethical issues and social consequences are
not fully discussed or foreseen before they are deployed (Freeman 1991; Sternberg 2000; White 2001).

Public trust in EDT is a vital issue since the general public does not understand the technical complexities of associated products and services. Nevertheless, the consequences have a strong impact on users who fear losing control over EDT, with one frequently cited practice being the gathering of personal data without the user’s consent.

Providing sufficient information is a sine qua non-condition to ensure fairness of use and secure data privacy; further progress with AI therefore requires that consumers trust the technology and that they and their data will be treated fairly. Transparency facilitates such trust.

Another condition is the predictability of the technology; consumers must be familiar with all the uses of the technology they are accessing. They must trust there are no hidden agendas to gather information without user consent (e.g. spyware) or use the hardware capacities of devices for undisclosed purposes.

One excellent example of attempts to operationalise the supervision of EDT is the ethics board that Google set up as recently as 2019. The Advanced Technology External Advisory Council (ATEAC) aimed to examine the ethics around AI, machine learning and facial recognition. Unfortunately, disputes over the profiles of its board members shut the committee down only a week after its creation. Even though Google has internal AI principles that guide its developments, an external entity like the ATEAC would add a second necessary layer to a critical area with consequences that reach far beyond Google’s facilities (Buchanan and Ess 2009; Zeng 2015).

There is a strong record in implementing worldwide standards with external entities like the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), and the International Telecommunication Union (ITU), to mention a few with broad influence across different sectors. The aforementioned entities are shaped by general business needs but are also nurtured by insights from the public interest, which ultimately reflect the zeitgeist of today (Murphy and Yates 2009; Roht-Arriaza 1995; Wirth 2009).

Most successful processes have been nurtured by a variety of stakeholders that ultimately deliver a balanced output in terms of point of view, interests and desired outcomes. If this process is implemented by only one actor – in this case, the business sector – all other inputs are neglected, the process is biased in favour of business interests and, as argued above, maximizing shareholder value will be prioritised over other outcomes (Cragg 2002; Goodpaster 1991; Weiss 2014).

Building an independent entity to set up guidelines in the ethics surrounding corporate use of EDT is a long-term strategy, but one that can ultimately provide a much more sustained outcome. A one-sided approach may be contested when issues affect stakeholders that have not participated in setting the guidelines for EDT-related products or services. Since firms have not shown a clear intention of pushing forward with this agenda, it may ultimately fall to a government initiative or an NGO to establish, in the public interest, an agenda to build consensus.
Examples in specific technologies like AI have proven that external entities have played a key role in setting up guidelines as an ethics framework. A good example can be found in the document ‘Ethics Guidelines for Trustworthy Artificial Intelligence’, developed by the Independent High-Level Expert Group on Artificial Intelligence set up by the European Commission. Even though the guidelines are not mandatory, a key outcome can be found in that they summarise this broad subject in three components: lawful, ethical and robust. One example of companies nurturing this kind of entity is the Partnership on AI, a consortium set up by companies in the sector to ‘develop and share best practices, advance the public understanding, provide an open and inclusive platform for discussion and engagement and identify and foster aspirational efforts in AI for socially beneficial purposes’.

Still, there remain issues of interpretation in implementing day-to-day operations within those broad guidelines. Even though the products and services are not inherently good or bad, EDT technologies are often used for questionable purposes, including military use, big data that frequently do not respect privacy rights, and government surveillance, to mention but a few contemporary controversial uses.

The discretionary use of these technologies then poses a question of regulation that falls outside the remit of such an entity. Nobody questions the necessity and pertinence of setting up these groups to provide guidance regarding the general behaviour expected of stakeholders, but this kind of organisation is not a substitute for a regulatory entity able to enforce specific regulations.

Corporate compliance mechanisms must be put in place, both internal (corporate whistle-blowers, ethics committees and board supervision) and external (an ethics agency, government laws and industry regulations), and which in conjunction ensure proper outcomes from EDT (Acemoglu et al. 2007; European Commission 2019; Floridi 2018; Hall and Khan 2003; Parente and Prescott 1994).

12.5 Towards a Framework to Study the Ethical Implications of EDT

A new global condition is emerging. Unlimited and ubiquitous connectivity in conjunction with other societal, cultural, economic, geopolitical and environmental factors including the disruptive effects of the COVID-19 pandemic are defining the nature and dynamics of this new scenario. Digitisation and globalisation constitute forces that have moulded the way society currently operates. In order to acquire an integrated approach towards an understanding of the implications of digitisation and its impact on society, we draw on the proposal of Rolando García (2006) and Castañares Maddox (2009), which in turn is a methodology for interdisciplinary research, providing theoretical and empirical foundations for understanding the dynamics of a complex system (See Fig. 12.2). The digitisation of society in the current context, as the Fourth Industrial Revolution converges with COVID-19,
provides fertile ground for research. From a complexity science perspective, emergence, self-organisation and non-linearity, among other phenomena, define the dynamics of this ecosystem. This perspective provides alternative views of reality that derive from the connectivity, interrelatedness and interactions of all agents involved.

Following Rolando Garcia’s and Castañares Maddox’s approach, the process for constructing our framework starts once the key question is posed, namely how can EDT systems be designed and developed for social benefit and progress? How can ethical, moral and regulatory elements be included as crucial components of EDT design and development? We start constructing the proposed framework by identifying the scope and telos of the specific digital project. At this stage, the research question surrounding the design and development goal(s) arises from contrasting the observed and desired conditions of the context: the design, development and deployment of EDT projects require an understanding of the context. In other words, reading the social reality of this context is crucial. This understanding includes a detailed analysis of historicity and cultural, socioeconomic, environmental and governance factors. Therefore, to avoid techno-centric solutions, we propose that digital intervention should consider the socio-technical and socio-environmental conditions of a given context (Serrano-Santoyo and Rojas-Mendizabal 2020). In this respect, social progress, community well-being, sustainable development and improvements in quality of life become emergent properties of the system (context) when designers consider ethical and moral

Fig. 12.2 Digitisation of society as a complex dynamic system
development elements in their projects to transition from the observed to the desired condition, as a result of interactions among all the agents of the system.

The process of raising relevant and pertinent questions around the specific EDT project provides the linchpin for developing an epistemic frame conducive to unifying the vision around developing this project while involving all agents. This unity of vision is fundamental to establish goals and objectives and to define the desired condition of the context after the project is deployed. In responding to the key questions, an action frame must emerge from the conceptual frame, with concrete tasks to carry out (see Fig. 12.3). Interaction among all the agents of the context, along with a continuous observance of the planning-reflection-action triad, will produce a learning environment conducive to the accomplishment and possible adjustments of the components of the desired condition. Emergent properties of the system unfold under the evolving dynamics of the interactions between agents of the ecosystem under consideration (see Fig. 12.4). The attributes of this ecosystem, such as resilience, collaboration, adaptability, and interdisciplinary focus, among others, are traits of complex dynamic systems. As can be seen in Fig. 12.4, this ethical ecosystem will consist of three layers: the strategic, the tactical and the operational level. The upper or strategic level consists of national and international government entities in charge of policies and guidelines regarding the development, design and consumer adoption of EDT (strategic agents). The tactical level considers development companies and the providers and suppliers of EDT devices, systems and processes. At the operational level, developers, designers and individual consumers become the grassroots agents of this structure. The desired condition will emerge from the quality of the inter-level and intra-level interactions of this ecosystem. We have applied this methodology in digital health projects and projects aimed at reducing the digital divide in rural and digitally challenged contexts (Rojas-Mendizabal 2017).

The proposed framework is shown in Fig. 12.5. It can be seen that the components of the observed condition represent a number of factors affecting emerging economies, which in general depend heavily on foreign science and technology and exhibit an increasing innovation gap, among other cultural and structural factors. We posit that the application of the proposed framework for the development of EDT projects would bring about, to some degree and in due time, social progress and well-being, sustainable development and improvements in quality of life (Nussbaum 2000; Nussbaum 2013; Sen 2000). Arriving at the desired condition while taking into account the centrality of ethical and moral elements is not
Fig. 12.4 Ethical and moral development ecosystem

Fig. 12.5 Exploratory framework to study the ethical and regulatory implications regarding the adoption of emerging digital technologies (EDT)
straightforward; many iterations of the process described in Fig. 12.3 are necessary to fine-tune the strategies involved, and the quality of the interactions among all agents is crucial, as shown in Fig. 12.4.

As mentioned above, many corporations have considered ethical and moral development as a key factor in successfully deploying their products and services for the benefit of consumers and the long-term survival of their businesses. Some of these corporations have created agendas and internal committees to monitor compliance with their ethical regulations. In this respect, corporate social responsibility (CSR) has emerged as a self-regulated business model to support enterprises in their efforts to become more conscientious with respect to their socioeconomic and environmental impacts (Chen 2020). CSR has also been a driver of initiatives to improve interactions and communication between consumers and producers, creating value in supply chains for the benefit of the environment. Nevertheless, in many instances, CSR has also been used as a powerful marketing tool to acquire a stronger market position and increase sales. Our proposal goes far beyond CSR. We argue that incorporating ethical and moral development in designing EDT and other technologies requires a clear and interdisciplinary mindset, with people’s interests at its core, as suggested in the exploratory framework presented in this paper. In such circumstances, social progress and well-being, sustainable development and improvements in quality of life would emerge as a result of interactions among all the agents involved.

Philanthropy and altruism from investors, large corporations and not-for-profit agencies have been an essential source of funding for EDT projects around the world. A good number of these projects have been in the healthcare sector or are related to the 17 Sustainable Development Goals (United Nations Development Programme 2020). Though the philanthropic action behind these funds is praiseworthy and highly commendable, in many instances capacity building and community involvement are lacking, creating paternalistic patterns of development that, in the long run, do not create sustainability or real value for the population (Giridharadas 2019).

As pointed out above, in developing EDT applications with excellent market potential and in a highly competitive environment, ethical and moral aspects are often neglected, or the consequences (intended or unintended) are not analysed with sufficient scrutiny and depth. When a rapid pace of innovation, competition and financial concerns become the main drivers in designing and producing devices, systems and processes, with no oversight as to their ethical and moral implications, this inhibits a culture focused on empathy and service to society. Environments that lack moral and ethical development face the danger of forging a culture imbued with a desire to control everything; ambition for prestige; defensiveness; greed, jealousy and envy; contempt for other peoples’ ideas; and a tendency to manipulate, to mention the most relevant attributes of a highly undesirable ecosystem. We posit that in order to counteract this, a focus on research and development efforts centred on service to society is essential. It is crucial to establish accountability, explainability, equity and diversity policies, together with ethical and regulatory guideline frameworks and codes of conduct, as fundamental components in forming new
ecosystems for a future of work in which human progress is the main driver. Figure 12.6 shows the elements we recommend considering in order to transition from environments with a lack of ethical policies or structures for technology development to environments with strategies in place centred on social progress and well-being, sustainable development and improvements in quality of life. Under these circumstances, we believe that creating fora to inform individuals, communities and institutions about the relevance and urgency of ethical and regulatory processes and guidelines is also an essential contributing factor in achieving a balanced appropriation of EDT by society.

12.6 Conclusions

The proposed framework may contribute to increasing awareness about the effects and benefits of EDT and, more importantly, help to analyse whether or not society is ready to digest and understand the potentially serious, and probably unintentional, consequences. In-depth analysis, reflection and attention regarding the implications of a balanced adoption of EDT by society must not be postponed or neglected if digitisation is to become a reliable vehicle for integral human progress. Education plays an essential role in developing the skills and attitudes necessary to conform to ethical and moral environments. As stated above, it is vital to encourage dialogue at all levels to acquire a clearer vision of the steps to be taken to include ethical, moral and spiritual factors in standard operations in the design, development and production of EDT for the benefit of consumers and society in general. The specific
steps will depend on the characteristics and dynamics of particular intervention contexts. In this process, community involvement is essential.

A new vision of entrepreneurship is also necessary to bring about cadres of developers, designers and administrators with human values such as empathy, compassion and humility, with mindsets centred on service to society. The ‘new normal’ emerging from the confluence of the Fourth Industrial Revolution and COVID-19 may give rise to new ways of thinking, learning and operating, insofar as the use of EDT is concerned. The changes in the future of work and the work of the future will drive new opportunities while also posing significant challenges for entrepreneurs. The accomplishment of the 17 Sustainable Development Goals set by the United Nations could also trigger social and humane innovation initiatives to improve poverty indicators and the general condition of the world. This ‘new normal’ may generate a new modus operandi in which ethical and moral development is not a choice but a prerequisite for the advancement of science, technology and all fields of knowledge with equity, justice and diversity.

The forces of globalisation and technology change have been disrupted by the confluence of the Fourth Industrial Revolution and COVID-19. Our ethical, moral and spiritual approaches to daily activities and operations in our homes and working environments will be critical to navigating in a sea of ambiguity, unpredictability and uncertainty, and may provide clarity for our decisions and actions. A complexity perspective that includes interdisciplinary and collaborative actions could also support our modus operandi in the ‘new normal’.

In our attempt to provide an integrated analysis of the ethical and moral imperatives in the process of adoption of EDT by society, we included a sociology perspective and a discussion of the current role of ethics and values in the corporate environment, with specific examples. Though there is a broad spectrum of literature available on these themes, our purpose was to identify crucial issues, placing emphasis on the deployment of ethical and moral programmes in the processes and operation of organisations and society.

Social, humane and solidarity innovation initiatives will also play a relevant role in preventing and mitigating the undesirable effects of current and future pandemics and possible environmental disasters. There is still a long road ahead and learning paths remain to be explored. Research and development and innovation become our assets to respond with agility and efficacy to the current pressing conditions. Nevertheless, in this conjuncture, ethical, moral and spiritual development represents a fundamental platform for the development of a more balanced and just society.

The pervasiveness and exponential nature of EDT demand urgent and orchestrated action by all agents in the ecosystem. Ethical and moral development and regulatory concerns are essential to take full advantage of the potentialities and societal benefits of these technologies. Furthermore, human intervention in the creation, deployment and application of EDT is of prime importance. In this respect, at all levels and ages, education must consider the importance of building the moral and spiritual capacities required to design, manufacture, apply, sell and distribute new and current digital technologies. Ultimately, attitudes, skills and actions emerge from our structure of human values. Without integral and proper education focused
on service to society, the deployment of EDT will create undesired outcomes and the prospect of technology as a vehicle for sustainability, equality and progress will become ever more elusive. One final word: complexity provides a vision of the world and how we function in it. Our modest contribution, which attempts to develop a holistic and integrated scheme for incorporating ethical and moral development to EDT applications, is not finished. It is not so much a final product as the beginning of a journey to learn and understand the interactions and dynamics involved in socio-technical systems such as technology adoption and appropriation. Identifying the implications of the adoption of EDT by society and describing the interactions involved in this process, using the principles of complex systems, is an initial step. Models with information about the context and other variables involved are necessary to further study the dynamics of these ecosystems. We have just taken the first step towards this goal.

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