



# **Megatrends and the transition from a managed to an entrepreneurial economy in Europe**

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## List of abbreviations

**COS** – Dutch Consultative Committee of Sector Councils  
**CSIRO** – Commonwealth Scientific and Industrial Research Organization  
**EC** – European Commission  
**EEA** – European Environment Agency  
**ESPAS** – European Strategy and Policy Analysis System  
**EU** – European Union  
**EUISS** – European Union Institute for Security Studies  
**FIRES** – Financial and Institutional Reforms to build an Entrepreneurial Society (FIRES) in Europe  
**FRIDE** – Fundación para las Relaciones Internacionales y el Diálogo Exterior  
**GDP** – Gross domestic product  
**GFF** – Global Futures and Foresight  
**IFR** – International Federation of Robotics  
**IMF** – International Monetary Fund  
**NATO** – North Atlantic Treaty Organization  
**NIC** – National Intelligence Council  
**OMC** – Oxford Martin Commission for Future Generations  
**R&D** – Research & development  
**SME** – Small and medium-sized enterprise  
**UN** – United Nations  
**USA** – United States of America  
**WEF** – World Economic Forum

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## 1. Executive summary

In line with the stated objectives of the FIRES project, this report aims to bridge the gap between history and the future by providing insights and considerations for connecting the more historical analyses under FIRES with its forward-looking institutional reform proposals to promote European entrepreneurship. The specific aim is to identify, through a literature review of relevant studies, various ‘megatrends’ that drive the need for promoting an entrepreneurial society in Europe as well as the desirability thereof, now and into the future. Whereas the analysis of megatrends lacks a stringent theoretical framework or terminology, there appears to be a consensus among reviewed literature attempting to identify these strands of global exogenous change: the impacts on society will be pervasive and significant – even if the nature of the latter’s concrete consequences may vary from ‘negative’ to ‘positive’, according to the qualitative analytical perspective taken by any respective study.

However, forecasts as to trends’ exact consequences are not set in stone. Thus, neither should policymakers enable rigid or ossified policy frameworks on account thereof. Instead, the current report’s findings on megatrends, and their relation to European institutions and forward-looking proposals to promote entrepreneurship, go towards the view that in preparing Europe for the future policymakers should strive to lay solid institutional foundations of a flexible society - in which growth and productivity are firmly grounded in adaptability and inclusiveness, whatever may come. What at first appears to be a tidal wave of potentially negative effects in the wake of any megatrend, can then be channeled into valuable opportunities for reform in the present, and for success in the future. For example, forecasts of cross-sector job loss due to technological automation can lead to scenarios of high unemployment and a host of negative consequences. Conversely, and in alignment with the aims of the FIRES project, the predicted impacts of automation can also present an opportunity to reflect - and fundamentally restructure labour, financial and knowledge institutions so as to be adaptive to this new technological trend, by engendering widespread entrepreneurship among Europe’s citizens. Through institutional reforms to promote an entrepreneurial society that is intrinsically agile and adaptable, Europe’s institutions will, as a natural corollary, also be transformed in a manner that allows for flexible and beneficial accommodation of pervasive megatrends.

Such a view underlies the entire FIRES project: an entrepreneurial society is a flexible society that can roll with the punches. The promotion of entrepreneurship as a high-level priority for European policymakers thus stands out as a way in which to ensure Europe’s society and economy can adapt to the effects of many foreseeable and unforeseeable future trends with large impacts, be they ‘positive’ or ‘negative’. Therein lies part of the value of promoting a society rendered more resilient by the rekindled entrepreneurial spirit of its citizens. In this way, Europe can reform itself to withstand the detrimental effects of the coming tide of change, while positioning itself to gain – and create – the many beneficial opportunities that will arise. It is this view the current report aims to support. A transition to an adaptive entrepreneurial economy and the promotion of widespread entrepreneurship can ensure Europe and its people will prosper in the wake of turbulent change.

The report provides a systematic review of the literature on megatrends and focuses on two trends more in-depth which are relevant in the context of the FIRES project. First, the report introduces and



discusses the idea of megatrends. On the basis of a literature review, it then provides an overview and a mapping of existing studies and provides for each study a synoptic factsheet. Building on those findings and a number of consultations, the report then casts light on two megatrends in more detail, namely technological innovation and demographics. Finally, the report summarizes the main findings for the FIRES project.



## 2. Introduction

This report aims to bridge the gap between history and the future, providing insights and considerations for connecting the more historical analyses in the FIRES project on the one hand, with its forward-looking reform proposals to engender an entrepreneurial society in Europe on the other. The specific goal is to identify, through collection and review of relevant literature, ‘megatrends’ that drive the need for, and desirability of, promoting more entrepreneurship in Europe, now and into the future. Careful policy planning will be essential in order to stave off the potentially negative impacts of these trends while simultaneously allowing Europe to gain the positive benefits they may hold. In alignment with the aims of the FIRES project, reforms to European institutions to promote entrepreneurship can be an important and flexible tool for policymakers to induce a resilient European economy that can adapt to whatever megatrends might arise.

As will become clear, all megatrends are transversal and affect many domains by definition. They all have a role to play in crafting suitable and well-adjusted policies. Thus, an overview of all megatrends in referenced literature is given in this report for the sake of completeness, while two megatrends receive particular and in-depth attention in separate sections: technological advances and demographic changes. These megatrends are particularly relevant in general, since they comprise myriad separate trends and drivers and promise to bring large-scale, pervasive change in nearly all areas of European life. In particular, they show significant impacts on knowledge, welfare and labour institutions which also lie at the heart of, and intersect with, aims of institutional reforms to promote an entrepreneurial society. Even though such mega-change may have both considerable negative or positive impacts on European society, many of the effects will depend on the policy frameworks that are put in place to accommodate the transitions. In sum, megatrends will inexorably manifest themselves over the coming years and decades. The question is: how does Europe anticipate and react to them?

The report aims to bring to light important – on the basis of a systematic review of the literature - considerations, links and trends that should be at the forefront of evaluations by policymakers in appraising proposals and stipulating policies – particularly regarding financial, welfare and labour institutions. It provides these as reasons which underscore the pressing need to move towards an entrepreneurial society in Europe and the desirability thereof. To start, the report introduces the idea of megatrends and briefly outlines a number of important caveats to be borne in mind while conducting megatrend analyses. On the basis of a literature review, it then provides an overview and a mapping of studies as well as of the megatrends contained therein that will have a global and, in particular, a European impact. Building on those findings and a number of consultations, the report focuses more clearly on the potential effects of two identified megatrends – technological advances and ageing demographics - on the future of Europe and how stimulating entrepreneurship in Europe can offer a powerful tool to accommodate their impacts. Lastly, the report bolsters aims for reforms under FIRES by summarising calls by various actors for reform of knowledge, financial or welfare institutions in the studies under review, before presenting a brief conclusion.

### 3. Megatrends: an introduction

The term ‘megatrends’ was coined by Naisbitt in his 1982 book of the same name<sup>1</sup> to describe a number of large, society-wide changes then professedly taking place in the United States of America (USA) and on a global level. Since, the term has been used in futures and foresight research, trend analysis and other domains and was entered into the Oxford English Dictionary in 2001 under ‘mega-’ as “an important shift in the progress of a society or of any particular field or activity; any major movement.”<sup>2</sup>

Through qualitative trend analyses and searching for patterns, focused on change within social, political, institutional, environmental, commercial, etc. areas, megatrends offer an extremely broad overview of the system under study as a basis for formulating scenarios of future developments or for foresight by interpretation of drivers and dynamics. There is no consensus on a general methodology in analyzing megatrends and quite a bit of heterogeneity exists between studies (see section 3.1). A stylized representation of an approach common to several megatrends studies, as identified in policy literature<sup>3</sup>, is presented in table 1. Table 1 shows the different steps which are taken in a trend analysis.

**Table 1: How to identify megatrends<sup>4</sup>**

<b>Step 1: The setting</b>
• Assumptions regarding time and space are laid out.
<b>Step 2: Defining societal spheres</b>
• Society is categorized by defined and workable parts. The categories could be: authority, wealth, communication, production, technology and science, social relations, cultures and values.
<b>Step 3: Trends in each sphere</b>
• A set of trends in every category is created based on all possible kinds of information. It is a working process based on an equal amount of research, common sense and imagination.
<b>Step 4: Pattern in each sphere</b>
• The most general trend or pattern in each sphere is defined by content analysis.
<b>Step 5: Identifying megatrends</b>
• The qualitative changes crossing all spheres are identified as megatrends.

<sup>1</sup> J. Naisbitt, *Megatrends*, New York, Warner Books, 1982, 290p.

<sup>2</sup> See: The Oxford English Dictionary, “June 2001 update”, available at <http://public.oed.com/the-oed-today/recent-updates-to-the-oed/previous-updates/june-2001-update/> (last accessed 19 May 2017).

<sup>3</sup> S. Svendsen, “A Futurist’s Toolbox”, UK Cabinet Office – Performance and Innovation Unit - *Strategic Futures Team*, 2001, 8-9.

<sup>4</sup> Ibid.

## 3.1. Heterogeneity

### 3.1.1. Definitional heterogeneity

The above approach is not without difficulties<sup>5</sup> for valid research and study, however. Predominant among ostensible problems is (i) the paucity of a rigorous and shared academic framework for megatrend analysis and, consequently, (ii) the diffuse and rather vague nature of different methodologies, terminologies and definitions employed by a variety of actors - also apparent in the list of selected studies, below. As an instrument in the field of foresight, therefore, megatrends may lack a stringent theoretical basis,<sup>6</sup> but, as will be shown, also exhibit considerable convergences.

Identified definitions of megatrends differ to varying degrees in their exact terminology.<sup>7</sup> Thus, megatrends have been defined, *inter alia*, as “large-scale, high impact and often interdependent social, economic, political, environmental or technological changes”<sup>8</sup>; as “large, transformative global forces that impact everyone on the planet [...] by having far-reaching impact on business, society, culture, economies and individuals”<sup>9</sup>; as “large-scale and high-impact social, economic, political, environmental or technological long-term change processes with decisive and critical implications”<sup>10</sup>; as larger forces with a worldwide relevance of at least twenty years, while being highly salient to the economic, security, social and environmental responsibilities and policy choices of governments<sup>11</sup>; or as important shifts in the evolution of society that tend to persist over the long term, at times with impacts that are not immediately evident, that can be positive or negative, and often generate profound and potentially permanent changes to the way societies are governed.<sup>12</sup>

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<sup>5</sup> R.A. Slaughter, “Looking for the Real ‘Megatrends’”, *Futures* 1993, 827.

<sup>6</sup> K.A. Piirainen and R.A. Gonzalez, “Theory of and within foresight – ‘What does a theory of foresight even mean?’”, *Technological Forecasting & Social Change* 2015, 191-192.

<sup>7</sup> See also: K. Cuhls, A. Bunkowski and L. Behlau, “Fraunhofer future markets: From global challenges to dedicated, technological, collaborative research projects”, *Science and Public Policy* 2012, 233-235.

<sup>8</sup> European Environment Agency (EEA), 2015, *The European Environment – State and outlook 2015: Assessment of global megatrends*, EEA, Copenhagen, Denmark, 5 (hereinafter EEA, 2015).

<sup>9</sup> Ernst and Young (EY), 2015, *Megatrends 2015: Making sense of a world in motion*, EY Global Limited, London, UK, 1 (hereinafter Ernst and Young, 2015).

<sup>10</sup> European Environment Agency (EEA), 2015, *Global megatrends assessment: Extended background analysis complementing the SOER 2015 ‘Assessment of global megatrends’*, EEA, Copenhagen, Denmark, 5 (hereinafter EEA, *Extended Background Analysis*, 2015).

<sup>11</sup> KPMG and Mowat Centre for Policy Innovation, 2014, *Future state 2030: The global megatrends shaping governments*, KPMG International and Mowat Centre for Policy Innovation, Toronto, Canada, 6 (hereinafter KPMG and Mowat Centre, 2014).

<sup>12</sup> Oxford Martin Commission, 2013, *Now for the long term – The report of the Oxford Martin Commission for Future Generations*, Oxford Martin School (OMS), Oxford University, UK, 13 (hereinafter Oxford Martin Commission, 2013).

For a large part, this definitional heterogeneity can be explained by the mostly qualitative nature of megatrend research. As such trend analyses are strongly dependent at all stages on the observer,<sup>13</sup> megatrends are necessarily assessed in numerous ways, with different thematic foci and through the examination of a multitude of drivers, wherein multiple diverging perspectives can be equally valid.<sup>14</sup> To be sure, “there is no single monolithic interpretation of the world,” and many of the sometimes opaque value-based assumptions or perspectives underlying studies on megatrends evade purely empirical analysis.<sup>15</sup> Consequently, megatrends can be perceived in a contrasting manner by various stakeholders or societal groups. For example, the continued growth of the global population can be interpreted as either a boost or as a burden to economic development, or the trend of increased urbanisation can be thought of as a cause for growing pressures on ecosystems or as an opportunity for more resource-efficient lifestyles.<sup>16</sup> Beyond any single qualitative perspective, however, all agree that population dynamics and urbanisation constitute megatrends that will have significant effects.

Indeed, all identified definitions of ‘megatrends’ and the varied group of actors that drafted them do share a similar pragmatic view: megatrends will have important and inexorable impacts. Broadly and for the purposes of further reading, we will therefore employ a definition that covers the most salient aspects: megatrends are “[...] developments, which in a specific time and space setting, have the potential to change society across all societal spheres, e.g. politics, economics, technology, values, social relations and across all levels of society, e.g. structures, actors and individuals.”<sup>17</sup> To be sure, from a pragmatic perspective, all those studying megatrends agree that these trends hold large importance and will require massive changes to the way societies are organised. The message is clear: no matter the exact terminology, business as usual is no longer a viable strategy.

### 3.1.2. Methodological heterogeneity

The heterogeneous nature of the selected studies is further compounded by differences in the methodologies they utilize to form their predictions and projections. Although the methods of research are robust and mostly evidence-based across the board, their variability makes it hard to translate findings from one study directly to the others and *vice versa*.

For instance, the joint study by the European Strategy and Policy Analysis System (ESPAS) and Rand employed two phases. The first phase involved desk-based review of literature and data on major trends. In the second, threefold phase, experts in the identified relevant fields were consulted. First, was a three-round Delphi survey with 412 experts consulted in the first round and with 116 remaining experts in the third round. Building on those findings, came a series of interviews with academics, thinkers and policymakers from the private or third-party sector. Finally, an expert

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<sup>13</sup> S. Svendsen, “A Futurist’s Toolbox”, UK Cabinet Office – Performance and Innovation Unit - *Strategic Futures Team*, 2001, 9.

<sup>14</sup> EEA, *Extended Background Analysis*, 2015, 7.

<sup>15</sup> R.A. Slaughter, “Looking for the Real ‘Megatrends’”, *Futures* 1993, 845.

<sup>16</sup> EEA, *Extended Background Analysis*, 2015 5.

<sup>17</sup> S. Svendsen, “A Futurist’s Toolbox”, UK Cabinet Office – Performance and Innovation Unit - *Strategic Futures Team*, 2001, 8.

seminar was organised to present to and discuss the preliminary findings between more than 60 participants.<sup>18</sup> Similarly, the analysis in ‘The Global Risks Report 2016’ by the World Economic Forum (WEF) is based on the participative contributions of “almost 750 experts and decision-makers in the World Economic Forum’s multistakeholder [sic] communities,” comprising respondents “from business, academia, civil society and the public sector [that] span different areas of expertise, geographies and age groups.”<sup>19</sup>

Another method is employed by the Commonwealth Scientific and Industrial Research Organization (CSIRO) in their 2012 study. They utilise a self-curated trends database that draws upon data and information by “the Australian Bureau of Statistics, the World Bank, the International Monetary fund, the United Nations, the Organisation for Economic Cooperation and Development, the Asian Development Bank, Local, State/Territory and Federal Government reports and datasets, industry reports, academic journals, internal CSIRO datasets and other miscellaneous sources.”<sup>20</sup> The trends database is further enriched by successive sector-specific foresight studies. Here too, a final participative phase ensures that the foresight material and megatrend predictions have been presented and discussed at over 50 conferences and seminars “to academic, government, community and industry audiences.”<sup>21</sup>

Others, such as the Ernst and Young report ‘Megatrends 2015: Making sense of a world in motion’, do not explain their methodology. Upon examination, the research appears to be analytical in nature, relying on a variety of sources, ranging from academic to journalistic, to describe key megatrends and predict possible impacts. In a similar vein, the Oxford Martin Commission for Future Generations (OMC) does not provide sufficient information to ascertain the exact methodology used in ‘Now for the Long Term: The Report of the Oxford Martin Commission for Future Generations’. The research appears partly analytical, based on a large number of enumerated references, and partly participative, owing to contributions to meetings, reviews and workshops by a large group of experts who are identified in the acknowledgements.<sup>22</sup>

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<sup>18</sup> See: European Strategy and Policy Analysis System (ESPAS) project and Rand Europe, 2013, *Europe’s societal challenges - an analysis of global societal trends to 2030 and their impacts on the EU*, Rand Europe, Cambridge, UK and Brussels, Belgium, and ESPAS, Brussels, Belgium, 5 (hereinafter ESPAS and Rand Europe, 2013).

<sup>19</sup> World Economic Forum (WEF), 2016, *The global risks report 2016 – 11<sup>th</sup> Edition*, WEF, Geneva, Switzerland, 11 (hereinafter WEF, *The Global Risks Report*, 2016).

<sup>20</sup> Commonwealth Scientific and Industrial Research Organization (CSIRO), 2012, *Our future world: Global megatrends that will change the way we live - The 2012 Revision*, CSIRO, Dickson ACT, Australia, 26 (hereinafter CSIRO, 2012).

<sup>21</sup> Ibid.

<sup>22</sup> See: Oxford Martin Commission, 2013, 67-85.

### 3.2. From heterogeneity to congruence: large impact of megatrends

Conversely and notwithstanding the nebulous theoretical foundations of megatrends, or foresight studies in general,<sup>23</sup> there does appear to be congruence in relevant literature and studies on the all-encompassing and long-acting nature of megatrends. Indeed, the above definitions all point to large-scale changes that profoundly affect society - or societies - as a whole, and throughout all societal spheres, over a long – or longer – time period. Thus, *all* ‘megatrends’ appear to be applicable, by definition, to *all* areas within the explicitly defined time and space setting.<sup>24</sup> Even so, the spatially and temporally large domains under study, and the uncertain and chaotic interrelationships between underlying drivers and trends, engender a multitude of ways in which megatrends can be identified or interpreted. Consequently, megatrends are not mutually exclusive, nor are they completely exhaustive as a means of foresight or futures study.<sup>25</sup> It is, therefore, impossible to *unambiguously* determine their effects on a chosen field.<sup>26</sup>

However, reviewed literature does converge on the overarching matter of importance and significance of megatrends, divorced from more particular differences in the qualitative appraisal of their effects or the methodology whence they came. That is to say, whereas the character of the impacts of the megatrends may vary from ‘negative’ to ‘positive’ consequences according to the perspective and qualitative dimensions of the particular study, most studies agree the impact is *always* large and pervasive. Perhaps most importantly for the current report, then, is the view under the FIRES project that an entrepreneurial society is an adaptive and flexible society. Therefore, promoting entrepreneurship as a frontline European policy choice comes to the fore as a well-suited manner by which to ensure Europe’s society and economy can adapt to the effects of many future trends, whether foreseeable or unforeseeable, whose impacts will be invariably large, whether ‘positive’ or ‘negative’. To be sure, a society rendered more flexible by the entrepreneurial spirit of its citizens can mitigate or avoid potential negative consequences while being poised to gain – and create – benefits from large-scale, exogenous future change.

### 3.3. Megatrends, entrepreneurship policy and FIRES

Nevertheless, the study of megatrends and foresight scenarios remains a valuable exercise. Although there is little and only nascent research that takes a long-term meta-view of past initiatives in evaluating how undertaken foresight has influenced entrepreneurship policy specifically,<sup>27</sup> the inclusion of foresight activities, the study of megatrends among them, does - cautiously - appear to

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<sup>23</sup> See: K.A. Piirainen and R.A. Gonzalez, “Theory of and within foresight – ‘What does a theory of foresight even mean?’”, *Technological Forecasting & Social Change* 2015, 191-201.

<sup>24</sup> S. Svendsen, “A Futurist’s Toolbox”, UK Cabinet Office – Performance and Innovation Unit - *Strategic Futures Team*, 2001, 8.

<sup>25</sup> N. Singh, B.P. Bartikowski, Y.K. Dwivedi and M.D. Williams, “Global Megatrends and the Web: Convergence of Globalization Networks and Innovation”, *The Data Base for Advances in Information Systems* 2009, 14-15.

<sup>26</sup> EEA, *Extended Background Analysis*, 2015, 5.

<sup>27</sup> M. Rhisiart and D. Jones-Evans, “The impact of foresight on entrepreneurship: The *Wales 2010* case study”, *Technological Forecasting & Social Change* 2016, 113.

have a positive impact on the successful implementation of policies to stimulate entrepreneurship. In one of the only studies of its kind, Rhisiart and Jones-Evans connect the prosperous growth in entrepreneurial activity in Wales over the past twenty years to the 1993 'Wales 2010' foresight exercise that "recognized the country's historical and institutional weaknesses in this area, galvanizing diverse coalitions of societal actors and laying down pathways to effective implementation."<sup>28</sup> The assessment of evidence, the anticipation of future conditions and the setting of aspirations appear to have been vital steps to arrive at an actionable policy that continues to invite more entrepreneurial activity.<sup>29</sup>

As follows from all of the above, while assessing future impacts of megatrends in the context of FIRES and proposals for policies aimed at encouraging innovation and entrepreneurial activity, it is impossible to predict desirable future states with complete certainty. Even more so, when the intention is to transform a system as complex, and as influenced by a panoply of drivers, as the European Union's (EU) economy.<sup>30</sup> Accepting also that it is not possible to arrive at a single authoritative account of the world or society, a considerable focus throughout the remainder of the FIRES project should be on developing interpretative criteria by which to arrive at a suitable view of the dynamics of change within identified large trends and how to marry these with the goal of promoting an open and entrepreneurial society and with the broader European policy framework.<sup>31</sup>

It is of critical importance for policymakers, as well as for proposals emanating from FIRES, not only to be mindful of the different perspectives underlying the megatrends in existing studies that will serve in the following literature review. They must also elucidate a proper perspective of their own, centered on institutional reforms with a view to rekindle entrepreneurship, by which those trends can be evaluated and weighed. A selection must be made of (studies on) megatrends and their concomitant impacts that seem most salient for the purposes of FIRES. The lessons they engender should inform the ways of thinking about the reforms to be advanced. After all, that is also the purpose of this report.

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<sup>28</sup> Ibid., 118.

<sup>29</sup> Ibid., 117.

<sup>30</sup> See: K. Colwell and V.K. Narayanan, "Foresight in economic development policy: Shaping the institutional context for entrepreneurial innovation", *Futures* 2010, 295-296. See also: J. Wonglimpiyarat, "National foresight in science and technology strategy development", *Futures* 2007, 718-728.

<sup>31</sup> R.A. Slaughter, "Looking for the Real 'Megatrends'", *Futures* 1993, 849.



## 4. Identifying existing studies on megatrends

The first phase in the drafting of the current report on megatrends is to identify and map, on the basis of existing studies those megatrends that are likely to influence proposed institutional reforms emanating from FIRES. The inventarisation of studies followed a snow-ball procedure by first selecting the most recent and comprehensive study on the basis of which other studies could be identified. To that end, the extensive, up-to-date references and the list of existing studies on megatrends in the ‘Global megatrends assessment’ report by the European Environment Agency (EEA)<sup>32</sup> of 2015 were chosen as a starting point. Building on that foundation, additional or more detailed studies on specific megatrends, or updates to the referenced base studies when available, were obtained through searches on the internet, in libraries or reference catalogues, and through desk research. The list of those selected studies that serve as the primary basis for the overview and mapping and subsequent selection of particular megatrends, and for the latter’s more detailed analysis, is shown at the end of this section.

The EEA’s report and its references were selected as a primary basis for the current report because of a variety of reasons. Not least among which is its explicit understanding of the abovementioned heterogeneity and difficulties in conducting holistic megatrend research. The EEA commenced its study of global megatrends and their relevance for Europe in 2007 and established a group of experts in 2009 to conduct a robust meta-study. The study utilizes a cross-disciplinary perspective and includes stakeholder consultations. In addition, it compiles existing information and data sourced from a wide variety of actors and organisations, ranging from EU institutions, over private or corporate business consultancies, to governmental agencies and academic institutions from diverse international backgrounds.<sup>33</sup> Through a call for evidence, a list of relevant existing studies was drafted and consequently subjected to thorough literature reviews and analyses that were incorporated into distinct fact sheets for each of the studies.<sup>34</sup> The fact sheets contain a summary of (i) each study’s contents and characteristics, (ii) the studies’ objectives and target audience, and (iii) an assessment of the studies’ methodologies and methodological transparency.<sup>35</sup>

Mindful of both the characteristic heterogeneity as well as of the complex interrelationships and uncertainties inherent to the study of global megatrends, the EEA explicitly opts for “an open, exploratory, participatory, integrated and interdisciplinary approach to analysis, drawing on a variety of methodologies.”<sup>36</sup> That awareness of the distinct levels of analysis and the different methods of inquiry,<sup>37</sup> makes for a robust selection and contributes to the differences between the chosen studies. The majority of the studies nonetheless include input by experts, e.g., through peer-review, workshops or expert meetings, and are of a predominantly analytical nature - consisting of expert desk-based research and literature reviews. While most studies are also marked by an exploratory

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<sup>32</sup> See: EEA, *Extended Background Analysis*, 2015, 9.

<sup>33</sup> Ibid., 8.

<sup>34</sup> See: European Environment Agency (EEA), 2015, *Global megatrends assessment: Annex 1*, EEA, Copenhagen, Denmark.

<sup>35</sup> EEA, *Extended Background Analysis*, 2015, 9.

<sup>36</sup> Ibid., 7.

<sup>37</sup> R.A. Slaughter, “Looking for the Real ‘Megatrends’”, *Futures* 1993, 844.



nature, some adhere to more normative outlooks so as to support suitable policy or the planning of solutions to identified trends.<sup>38</sup>

On the one hand, choosing the EEA's assessment on existing megatrend studies and its references as a starting point for the current report is further supported by the explicit goal "to stimulate thinking, spark discussion and thought, and encourage strategic decision-makers in Europe to consider emerging threats and opportunities, and ensure that policy is 'fit for the long term'."<sup>39</sup> The assessment takes an expressly global-to-European perspective, with special attention paid to the European Union (EU), to ensure that enacted European policies are relevant, adequate and resilient with a view to the future.<sup>40</sup> Evidently, such a perspective is highly similar and relevant to the goals of the current literature review on megatrends in the context of FIRES, which is largely why the studies identified by the EEA were taken as a primary basis for further research in the present report.

On the other hand, the EEA's assessment necessarily takes an environmental perspective to its analysis of megatrends and their possible impacts. That might, at first glance, appear to make its references less suited to current purposes. However, as shown in the general overview and mapping below, and despite the methodological and organisational diversity of the referenced studies, numerous analysed (mega)trends recur and appear substantially similar over different studies - albeit in modified form or with different terminologies. Thus, this rather points to the robustness and general applicability of the different and diffuse forecasts and serves to ensure general cross-validation of their results. To be sure, as identified megatrends are ostensibly all-encompassing, their effects are by definition not limited to extrapolation *vis-à-vis* a purely environmental perspective. They can be extrapolated or applied, with careful consideration of the chosen drivers and contexts within the existing studies, to any impacted area – especially when most studies agree the effects of megatrends will be large, regardless of whether they are characterized as 'positive' or 'negative'.

Table 2 lists those studies, selected for the above reasons, that serve as a primary basis for further research in the current report.

**Table 2: List of selected base studies for megatrend mapping and overview**

List of selected base studies for megatrend mapping and overview	
1	Dutch Consultative Committee of Sector Councils (COS), 2008, <i>Horizon scan report 2007 – Towards a future oriented policy and knowledge agenda</i> , COS, The Hague, Netherlands.
2	Commonwealth Scientific and Industrial Research Organization (CSIRO), 2012, <i>Our future world: Global megatrends that will change the way we live - The 2012 Revision</i> , CSIRO, Dickson ACT, Australia.
3	European Environment Agency (EEA), 2015, <i>The European Environment – State and outlook 2015: Assessment of global megatrends</i> , EEA, Copenhagen, Denmark.
4	Ernst and Young (EY), 2015, <i>Megatrends 2015: Making sense of a world in motion</i> , EY Global Limited, London, UK.

<sup>38</sup> EEA, *Extended Background Analysis*, 2015, 9-11.

<sup>39</sup> EEA, *Extended Background Analysis*, 2015, 5.

<sup>40</sup> *Ibid.*, 7.

5	European Strategy and Policy Analysis System (ESPAS) Project, 2015, <i>Global trends to 2030: Can the EU meet the challenges ahead?</i> , ESPAS, Brussels, Belgium.
6	European Strategy and Policy Analysis System (ESPAS) Project, Chatham House and Fundación para las Relaciones Internacionales y el Diálogo Exterior (FRIDE), 2013, <i>Empowering Europe's future: Governance, power and options for the EU in a changing world</i> , Chatham House, London, UK, FRIDE, Madrid, Spain and Brussels, Belgium, and ESPAS, Brussels, Belgium.
7	European Strategy and Policy Analysis System (ESPAS) Project and European Union Institute for Security Studies (EUISS), 2012, <i>Global trends 2030 – Citizens in an interconnected and polycentric world</i> , EUISS, Paris, France, and ESPAS, Brussels, Belgium.
8	European Strategy and Policy Analysis System (ESPAS) Project and Rand Europe, 2013, <i>Europe's societal challenges - an analysis of global societal trends to 2030 and their impacts on the EU</i> , Rand Europe, Cambridge, UK and Brussels, Belgium, and ESPAS, Brussels, Belgium.
9	European Commission (EC), 2009, <i>The world in 2025 – Rising Asia and socio-ecological transition</i> , EC - DG Research & Innovation, Brussels, Belgium.
10	Global Futures and Foresight (GFF), 2012, <i>The Future Report 2012</i> , GFF, London, UK.
11	KPMG and Mowat Centre for Policy Innovation, 2014, <i>Future state 2030: The global megatrends shaping governments</i> , KPMG International and Mowat Centre for Policy Innovation, Toronto, Canada.
12	National Intelligence Council (NIC), 2012, <i>Global trends 2030: Alternative worlds</i> , NIC, Washington DC, US.
13	Oxford Martin Commission, 2013, <i>Now for the long term – The report of the Oxford Martin Commission for Future Generations</i> , Oxford Martin School (OMS), Oxford University, UK.
14	Oxford Martin School (OMS) and CITI GPS, 2014, <i>Future opportunities, future shocks: Key trends shaping the global economy and society</i> , OMS, Oxford University, UK, and CITI Perspectives and Solutions (CITI GPS), Schiphol, Netherlands.
15	World Economic Forum (WEF), 2016, <i>The global risks report 2016 – 11<sup>th</sup> Edition</i> , WEF, Geneva, Switzerland.

As mentioned, there seems to be a considerable level of consensus,<sup>41</sup> across different actors throughout these different studies, on the most important megatrends acting on society and its spheres *as a whole*, as well as on the invariably large impacts they will have. Going forward, it is therefore of utmost importance for those formulating future proposals under FIRES to look at the variety of identified megatrends from a perspective of potential institutional reforms and what the latter aim to achieve, both for entrepreneurship and in light of particular trends. As an overarching consideration and policy implication, a focus on promoting adaptability and flexibility, arguably intrinsic to an entrepreneurial society, in concert with reflection on which institutional reforms might facilitate such aim, could contribute to a resilient Europe that can withstand, even prosper, in the face of change.

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<sup>41</sup> See also: K. Cuhls, A. Bunkowski and L. Behlau, "Fraunhofer future markets: From global challenges to dedicated, technological, collaborative research projects", *Science and Public Policy* 2012, 234.

## 5. Megatrends in selected studies: a synopsis and selection of case studies

### 5.1. A summary of key studies on megatrends

The current section provides a **synopsis**, in the form of summary tables, of *all* of the megatrends that come to the fore in the selected base studies, in order to facilitate easy overview and additional research by the community of researchers aiming to advance more detailed policy proposals for the promotion of entrepreneurship. Although the large variety of trends cannot be construed into a coherent terminology due to definitional and methodological heterogeneity and qualitative differences in approach and emphasis, a number of trends clearly stand out across all mapped studies. In general terms and in no particular order, these are: ageing, technology, urbanisation, resource use, global security issues, health and mobility.

The factsheets below summarize the main megatrends identified on the basis of the 15 relevant studies. For each study we provide the title of the study, who conducted the study, the year of publication, a short description of terminology, definition and/or classification as used in the study and a listing of the key megatrends (based on the title and term used in the study) and a short description of the megatrend (in case it is not evident from the title).

## Factsheets: Synopsis of reviewed megatrend studies

<b>1 Horizon Scan Report 2007 – Towards a future-oriented policy and knowledge agenda</b>		
(The Dutch) Consultative Committee of Sector Councils for Research and Development (COS)		2008
Megatrends	Ten ‘clusters’ of ‘problems’ and ‘opportunities’ in interconnected fields and domains	
1	Infrastructure for the future	
	Reflection upon the organisation of services that have an infrastructural character (e.g., food, energy, traffic and transport, housing and communication)	
2	Changing economic and political world order	
	The modern face of globalization appears to feature stagnating established developed economies, such as Europe and the United States, while emerging economies, such as the BRIC-countries, are on the rise on the world theatre.	
3	A global approach to dangerous infectious diseases	
4	Labour and education in a new context	
	The organisation of education and the labour market will have to respond to changes in order to avoid tensions and to take advantage of social and economic opportunities	
5	Opportunities for robotics and inter-connectivity	
6	Two related transitions: creating and utilising space	
	The utilisation of rural and urban space and related considerations	
7	Handling conflicts and security policy constructively	
8	The ‘engineerable’ and self-mutating human	
9	Accelerating the development of new energy sources	
10	What does ‘the graying of society’ mean?	
	Global population growth is slowing and demographics in certain key economic areas are ageing	

<b>2 Our Future World – Global megatrends that will change the way we live - The 2012 revision</b>		
Commonwealth Scientific and Industrial Research Organization, Australian Government (CSIRO)		2012
Megatrends	Six ‘megatrends’: significant shifts in environmental, economic and social conditions that will play out over the coming decades	
1	More from less	
	How will companies, governments and communities discover new ways of ensuring quality of life for current and future generations within the confines of the natural world’s limited resources?	
2	Going, going, ... gone?	
	Human actions influence declines in global biodiversity and global climate change	
3	The silk highway	
	A shift in the world economy from west to east and from north to south (‘Asian Century’)	
4	Forever young	
	Many OECD countries have an ageing population, with effects on lifestyles, services, the labor market, knowledge, healthcare, social security etc.	
5	Virtually here	

	The world is increasingly interconnected in an online virtual world (e.g., online services, sources of information, shopping, teleworking, e-business)
6	Great expectations
	A consumer, societal, demographic and cultural megatrend: the rising demand for experiences over products, personalised services, and the rising importance of social relationships

3 The European Environment – State and outlook 2015: Assessment of global megatrends		
European Environment Agency (EEA)		2015
Megatrends	Eleven ‘megatrends’: large-scale, high-impact and often interdependent social, economic, political, environmental or technological changes	
1	Diverging global population trends	
2	Towards a more urban world	
3	Changing disease burdens and risks of pandemics	
4	Accelerating technological change	
5	Continued economic growth?	
	A combination of rapid economic growth in developing or emerging economies and much slower growth in advanced economies	
6	An increasingly multipolar world	
7	Intensified global competition for resources	
8	Growing pressures on ecosystems	
9	Increasingly severe consequences of climate change	
10	Increasing environmental pollution	
11	Diversifying approaches to governance	
	The need for global coordinated action on key issues gives rise to international agreements and increasing roles for business and civil society in governance, but this raises concerns about effectiveness, coordination and lack of democratic and transparent authority from non-state actors	

4 Megatrends 2015: Making sense of a world in motion		
Ernst & Young (EY)		2015
Megatrends	Six ‘megatrends’: large, transformative global forces that affect everyone on the planet [...] by having a far-reaching impact on business, society, culture, economies and individuals	
1	Digital future	
	Fueled by the convergence of social, mobile, cloud and big data, increased interconnectivity, and growing demand for instant access to information, technology is disrupting all areas of the business enterprise	
2	Entrepreneurship rising	
	The growth and prosperity of all economies remains highly dependent on entrepreneurial activity while entrepreneurship itself is also changing	
3	Global marketplace	
	Rapid growth markets will catch up with mature economies due their own nascent middle	

	classes and competition between economies will become increasingly fierce while they remain interdependent
4	Urban world
	The number and scale of cities continues to grow across the globe driven by increasing urbanization
5	Resourceful planet
	An increasing global demand for renewable and non-renewable, scarce resources and concomitant risks of further environmental degradation
6	Health reimagined
	Changing demographics, imminent chronic-disease epidemics, etc. put health systems and players under increasing cost pressure, necessitating the move beyond delivery of healthcare to the 'management of health'

5 Global Trends to 2030: Can the EU meet the challenges ahead?		
European Strategy and Policy Analysis System (ESPAS)		2015
Megatrends	Five 'key global trends': the main trends that will shape the global geo-political, economic and social systems of coming decades	
1	A richer and older human race characterised by an expanding global middle class and greater inequalities	
2	A more vulnerable process of globalisation led by an 'economic G3'	
	The U.S., China and the EU will dominate, with China expected to rise to first place while the world economy in general shifts towards Asia	
3	A transformative industrial and technological revolution	
	A technological revolution based on new industrial production, bio-scientific, communication and digital processes will transform societies	
4	A growing nexus of climate change, energy and competition for resources	
5	Changing power, interdependence and fragile multilateralism	

6 Empowering Europe's Future: Governance, power and options for the EU in a changing world		
European Strategy and Policy Analysis System (ESPAS)		2013
Chatham House		
Fundación para las Relaciones Internacionales y el Diálogo Exterior (FRIDE)		
Megatrends	Four clusters of 'trends' with subsets up to 2030	
1	Interdependence, complexity and shifting power	
	1 The new age of interdependence and shifting powers [The loss of relevance of nation-states through globalisation] 2 Cumulative power shifts [China and India first overtake EU, then US] 3 Opportunities, threats and disruptions [Growing entanglement of trade, resource, security, climate and technology issues]	
2	Conflict and vulnerability	
	1 Conflict trends [Exacerbated possibility of intra-state wars and conflicts and consequent	

	inter-state wars in regions with extreme resource shortages] 2 Terrorism and organised crime 3 The intersection of climate, resources and conflict 4 Cyber-security and space [Future cyber warfare and weaponisation of space] 5 Military capabilities [Growing number of actors with advanced military capabilities]
3	Power and powers
	1 Power and politics in the augmented world [Power centers, networks, flows of finance, information and knowledge will multiply, expand and connect, constraining the power of many large international actors] 2 Major powers – fragility and renewal [Diffusion of power and crises of politics, domestically and internationally, are likely to affect prospects for international cooperation and could intensify international competition]
4	Competition, cooperation and governance
	1 Geopolitical competition [Increasing military and security aspects and strategising in geopolitical competition] 2 A new normative divergence? [Competition of ideas in a polycentric world: doubts about traditional liberal, market-based democracy at the basis of the international order] 3 Managing the global commons [Towards governability or ungovernability of the global commons] 4 Emerging challenges in security governance [Nuclear proliferation, cyber warfare and weaponisation of outer space] 5 A revival of regionalism? [Regionalism and overlapping cooperation may grow in importance but will take many shapes] 6 The future of international cooperation [Growing disorder in the international system will make cooperation harder but not impossible]

7 Global Trends 2030 – Citizens in an interconnected and polycentric world		
European Strategy and Policy Analysis System (ESPAS)		2012
European Union Institute for Security Studies (EUISS)		
Megatrends	Three main 'global trends' with three subsets each: major, existing trends that are likely to shape the future and must be taken into account by the EU	
1	The empowerment of individuals: a global human community but a growing expectations gap	
	1 The empowerment of individuals: key drivers 2 Converging values and demands, but risks of extremism 3 Demands for political participation, but dangers of populism	
2	Greater human development but inequality, climate change and scarcity	
	1 A rising middle class, but persistent poverty and inequality 2 Climate change and scarcities: the challenges to human development 3 Human security: protecting citizens	
3	A polycentric world but a growing governance gap	
	1 A power shift to Asia, but greater uncertainty 2 Diffusion of power, but dangers of fragmentation 3 Global initiatives, but a governance gap	

8 Europe's Societal Challenges: An analysis of global societal trends to 2030 and their impact on the EU		
European Strategy and Policy Analysis System (ESPAS)		2013
RAND Europe (RAND)		
Megatrends	Five clusters of 'global societal trends' with subsets: discernible patterns of change with a global reach	
1	The rise of the global middle class	
	1 Decreasing inequality between countries 2 Rise of a new global middle class 3 European and U.S. share of global middle class declines over coming decades 4 European and U.S. middle class is on the decline 5 Relationship between inequality and the future strength and composition of the global middle class is uncertain 6 Global middle-class growth will engender flourishing democratic and 'self-expression' values	
2	A globally expanding and ageing population	
	1 Population growth, led by middle-income and lower-income countries 2 Population ageing, initially in high-income countries and subsequently in the rest of the world, starting with middle-income countries 3 Transformations in the structure of families and in household sizes in developed economies	
3	Employment and the changing labour force	
	1 Global population growth and ageing 2 Changes in labour force participation and growing vulnerabilities in the work place 3 Diverging demand and supply of skills and patterns of employment creation 4 Influence of technological developments on working environment	
4	Evolving patterns and impacts of migration	
	1 Migration will continue to be a complex phenomenon, with a variety of factors influencing people's decision to migrate (provided their decision is voluntary) and evolving diversity in patterns and types of migration 2 Internal migration will continue to be closely related to urbanisation 3 Uncertain future attractiveness of the EU as a destination for migrants	
5	Connected societies, empowered individuals	
	1 Vast regional disparities in the areas of health, education and living standards 2 Social innovation is progressively gaining more weight on policy agendas 3 While the provision of basic human rights has improved, global disparities will remain strikingly high 4 Despite the sustained pace of growth in connectivity, most online platforms remain national or local 5 The focus on education of policymakers across the world is slowly shifting to more reliable predictors of social inclusion and labour market success 6 The impact of an enhanced flow of information remains inherently uncertain	

<b>9 The World in 2025: Rising Asia and socio-ecological transition</b>		
European Commission (EC), Directorate-General for Research, Socio-economic Sciences and Humanities		2009
Megatrends	Three 'trends', three 'tensions' and two 'major transitions' up to 2025	



1	<b>Trends</b>
	<p>1 The Asian century [Asia, with increasing inequalities, becomes the premier producer and exporter of the world]</p> <p>2 Poverty and mobility of men and women [Extreme mobility in connection to immigration, infectious diseases and inequalities]</p> <p>3 Increasing scarcity of natural resources, vulnerability of the planet [Energy production, scarce raw materials and extreme water shortages]</p>
2	<b>Tensions</b>
	<p>1 Tensions between the current methods of production, of consumption, and the future availability of non-renewable resources</p> <p>2 Tensions between a general and simultaneous process of increasing economic interdependence and differentiation</p> <p>3 Tensions between spatial proximity in the context of accelerated urbanisation and cultural distance</p>
3	<b>Major transitions</b>
	<p>1 Stabilizing the world, recognising new key actors [Towards a multi-polar world, world governance and new universalism]</p> <p>2 Draw on the ecological and demographic challenges to invent a new development model [Towards a new socio-ecological production model]</p>

<b>10 The future report 2012</b>		
Global Futures and Foresight (GFF)		2012
Megatrends	'Key drivers of change' and their potential consequences and implications in twelve interconnected fields	
1	<b>Globalisation</b>	
	Economic opportunity shifts east and south as emerging economies overtake advanced economies and Asian cities are set to be consumer pacesetters and hubs of innovation. Emerging top 100 companies could drive major change in commercial and economic power map of the world. Significant business model changes may be needed to adapt to new realities of globalization	
2	<b>Economies</b>	
	Foreign investment will flow predominantly to China, India and Brazil, while debt issues in the West will suppress consumer and government spending. New industries will grow around environmental, bio-, nano- and other technologies and will be fundamental to growth in the EU. 'Production with services' business model is better suited to high-cost economies of the EU	
3	<b>Population</b>	
	Mass economic and climate related migration is to be expected. Consumers and employees are becoming older and more ethnically diverse in many European markets. Increasing productivity in ageing markets is essential for their economies. Losing smartest talent to more attractive economies will impact R&D and innovation	
4	<b>Urbanisation</b>	
	Governments may struggle with funding necessary huge infrastructure investments and new business and funding models will emerge. The future of global economy lies in Asian cities,	

	while European city growth will be low, especially due to carbon dioxide reduction policies. Global cities have more in common with each other than other towns and villages in their own country
5	<b>Energy</b>
	Over one billion people have no access to electricity, presenting huge opportunities for growth and new markets. Energy efficiencies will drive building and transportation design and regulation. Low-carbon energy generation and consumption will impact business models, investment and consumer behavior. Increase in oil demand due to transportation, instigating strategies to reduce transportation energy use and develop new transportation methods
6	<b>Environment</b>
	Overuse of resources will have great effects, with an already certain increase of temperature of 1.4 degrees. Energy generation, access, cost and usage will become vital. Waste and recycling will become critical issues due to increased urbanisation. Meat consumption at present levels in developed countries will be hard to sustain
7	<b>Business models</b>
	Social networks and new communication mediums are vital for intra- and inter-business knowledge sharing. Purposeful business can increase employee engagement and productivity and trust by consumers and stakeholders. The Cloud will support new business models
8	<b>Technology</b>
	A shift from desktop and laptop computing (online world) to mobile systems (apps) will be a dramatic . New business models and analytics are vital to remain relevant in increasingly virtual world. Automation and artificial intelligence will raise unemployment, especially among the less skilled. Resource constraints will force change and breakthrough innovation in many areas
9	<b>Work</b>
	Longer life expectancy will change the working lifestyle. Talent recruitment and retention will become increasingly strategic in light of shortages and four available generations of workers. Work-based training will rise due to talent mismatches and shortages. Strategic foresight and global talent networks will identify issues in advance
10	<b>Outsourcing</b>
	Outsourcing will require grappling with high geographical dispersal and out-of-the-box solutions. Outsourcing of knowledge-based work will increase and outsource service providers will become smaller and more niche. Huge potential of growth in Asia due to vast populations and education. R&D is increasingly outsourced and outsourcing firms will become strategic partners
11	<b>Regulation and legislation</b>
	Climate change regulations will impact all businesses, especially in Europe. Government policy will be highly influenced by energy and debt. A decrease in foreign talent and increase in older workers will put retraining and continuous learning at a premium and pension policies will change dynamically. Regulation will seek to limit concentration of outsourcing
12	<b>Government</b>
	Governments will increasingly use internet and cloud services to serve citizens' needs. Business partnership with government will be key in shaping the workforce of the future and to address society's needs. Volunteering will become an important aspect in government services, especially in elderly-care services. More effective use of information in healthcare will be vital to ensure usage of the most effective remedies and interventions

11 Future State 2030: The global megatrends shaping governments		
KPMG Mowat Centre for Policy Innovation		2014
Megatrends	Nine 'global megatrends': larger forces with worldwide relevance of at least 20 years and highly salient to the economic, security, social and environmental responsibilities and policy choices of governments	
1	Demographics	
	Ageing populations in some areas and large youth populations in saturated labour markets in others	
2	Rise of the individual	
	By 2022 more people will be middle class than poor, with increased demands for transparency and participation	
3	Enabling technology	
	New technological advances will test governments' abilities to harness benefits and provide oversight	
4	Economic interconnectedness	
	Globalisation will continue to see increased international trade and capital flows, but optimum economic benefits may not be realized	
5	Public debt	
	Public debt will act as a significant constraint on fiscal and policy options, limiting governments' capacity to respond to major challenges	
6	Economic power shift	
	Emerging economies will lift millions out of poverty and exert more influence: global power will be rebalanced	
7	Climate change	
8	Stress on resources	
	Population growth, economic growth and climate change will stress natural resources. Sustainable resource management will be at the center of government agendas	
9	Urbanisation	
	Almost two-thirds of the world population will reside in cities by 2030	

12 Global Trends 2030: Alternative worlds		
National Intelligence Council (NIC)		2012
Megatrends	Four 'megatrends': those factors that will likely occur under any scenario	
1	Individual empowerment	
	Individual empowerment will accelerate owing to poverty reduction, growth of the global middle class, greater educational attainment, widespread use of new communications and manufacturing technologies, and healthcare advances	
2	Diffusion of power	
	There will not be any hegemonic power and power will shift to networks and coalitions in a multi-polar world	
3	Demographic patterns	

	The demographic arc of instability will narrow. Economic growth might decline in ageing countries. Sixty percent of the world's population will live in urbanised areas; migration will increase
4	Food, water, energy nexus
	Demand for resources will grow substantially because of global population growth. Tackling problems pertaining to one commodity will be linked to supply and demand for the others

13 Now for the Long Term: The report of the Oxford Martin Commission for Future Generations		
The Oxford Martin Commission for Future Generations, Oxford Martin School (OMS)		2013
Megatrends	Seven 'megatrends': important shifts in the evolution of society that tend to persist over the long term, at times with impacts that are not immediately evident. They can be positive or negative but often generate profound and potentially permanent changes to the way societies are governed	
1	Demographics	
	Changes in the world's demography, i.e. population, age, lifespan, distribution and activities of people	
2	Mobility	
	Increased socioeconomic mobility, i.e. rise of the global middle class and urbanisation, especially in emerging markets	
3	Society	
	Increasing economic inequality, and generational and gender divides as key barriers to economic growth and poverty reduction	
4	Geopolitics	
	A shift of economic power to emerging markets, transnational shared networks, increased demand for legitimate governance and a decline of inter-state violence with persistent, potentially devastating tensions and the potential for cyber, nuclear or biological warfare	
5	Sustainability	
	Sustainability will have to grapple with the inseparability of water, food, energy and climate [scarce resource management] and increasing tensions and inequality related to increased urbanization	
6	Health	
	A transition from high fertility and high mortality to low fertility (excluding sub-Saharan Africa), an ageing population, an epidemiological shift from infectious diseases associated with malnutrition, famine and poor sanitation to degenerative and chronic diseases associated with longevity, urban and industrial lifestyles and the resurgence of resistant infectious diseases in a globalised world	
7	Technology	
	A continued increase in computing power and growth of the internet contribute to a faster, smarter and more personal and participatory world, but differences in internet access and its quality can exacerbate inequality. Technological advances revolutionise our lives and offer possibilities to tackle challenges, but also maximize vulnerability and create profound questions (e.g., artificial life, genetic enhancement, privacy, global division of labour)	

14 Future opportunities, future shocks: Key trends shaping the global economy and society		
Oxford Martin School (OMS)		2014
CITI Global Perspectives and Solutions (CITI GPS)		
Megatrends	Six 'key drivers of change' of global opportunity and risk: 'winds of change' with their own direction, speed and intensity	
1	Globalisation	
	A choice for the global community between a more inclusive and resilient globalisation with shared prosperity or the reversal of globalisation by a storm of isolationism, protectionism and cascading systemic risks	
2	The age of ageing	
	Advanced economies must adapt to face demographic reality of an ageing population or stagnate. Emerging markets are entering a demographic window with a solid base for labour and a much smaller population of dependents that can ignite large growth if harnessed properly	
3	Frontiers of technology in the 21 <sup>st</sup> century	
	Technology is advancing at an increasing pace with key trends in nanotechnology, biotechnology, mobile networking, faster and more accessible internet, 3D printing, the spread of sensors and the automation of labour. Technology is a double-edged sword: it can unleash new potential, level the playing field and lift people out of poverty or it can wreak havoc through its misuse or impact on human capital	
4	Economics	
	The world economy as a whole will experience positive growth, with only modest growth in advanced economies, particularly in Europe, due to unfavorable demographics and macroeconomic weaknesses. Continued higher growth in emerging markets, especially in Asia	
5	The butterfly defect: systemic risk in a global village	
	Rapid global changes create systemic risks with aftershocks potentially felt far away from any given epicenter, i.e. supply chain risk in interconnected markets, cybersecurity and risks to physical network infrastructure, disruptive natural disasters and climate change and global deadly pandemic or infectious diseases	
6	Global governance: why it's failing and what we can do	
	The lack of resilient global governance institutions in an increasingly multi-polar world is of concern at the juncture of rapid global change: their mandates and capabilities have not evolved as quickly as the challenges they face	

15 The global risks report 2016, 11 <sup>th</sup> Edition		
World Economic Forum (WEF) – Global Competitiveness and Risks Team		2016
Megatrends	Thirteen ‘trends’: a long-term pattern that is currently taking place and that could contribute to amplifying global risks and/or altering the relationship between them	
1	Ageing population	
	Driven by declining fertility and a decrease in middle and old age mortality, populations in developed and developing countries will continue to age	
2	Changing landscape of international governance	
	A change in the landscape of global or regional institutions (e.g., UN, IMF, NATO), networks or agreements	
3	Climate change	
	In addition to natural fluctuations in climate, the climate will change due to direct or indirect changes in the global atmosphere due to human activity	
4	Environmental degradation	
	Concentrated pollutants and polluting activities and processes will cause a deterioration in the quality of air, soil and water	
5	Growing middle class in emerging economies	
	Populations in emerging economies will see a growing share of middle-class income levels	
6	Increasing national sentiment	
	Nations’ national and international political positions under stress due to increasing national sentiment among populations and political leaders	
7	Increasing polarisation of societies	
	Diverging or extreme religious or political views will make it difficult to reach agreement on key issues within and between countries	
8	Rise of chronic diseases	
	Recent societal gains in life expectancy and quality of life are threatened and long-term costs will rise due to the increase in chronic diseases	
9	Rise of cyber dependency	
	An increasingly virtual world and digital interconnection of people, things and organizations will make them more dependent on the cyber realm	
10	Rising geographic mobility	
	Lowered regulatory barriers and better and faster means of transport will increase the mobility of people	
11	Rising income and wealth disparity	
	The socioeconomic divide between the rich and the poor will continue to increase	
12	Shifts in power	
	Power will shift from developed to emerging markets and developing economies, from states to non-state actors and individuals, and from the global to regional levels	
13	Urbanisation	
	The population of urban areas will continue to increase, resulting in larger cities	

## 5.2. Selection of case studies

Two megatrends for in-depth discussion were chosen from the recurrent themes identified in the synoptic tables above on the basis of their perceived importance, implications, transversal impact, and direct relevance for EU entrepreneurship within the context of larger global change - as supported by findings from research extending beyond the aforementioned base studies, from discussions and from targeted consultations. In the next part, the report will therefore highlight and cluster in more detail some of the most interesting and empirically supported trends and drivers that appear to form the common substance of two particular megatrends: technological advancement (cf. *infra*, Megatrend 1 - A technological revolution: automation and the digital economy) and ageing demographics (cf. *infra*, Megatrend 2 – Demographics: an ageing population).

Invariably, these two megatrends will have large impacts on labour, knowledge and financial institutions – indeed, those institutions also targeted for comprehensive reform by forward-looking proposals to promote entrepreneurship in Europe under FIRES. More concretely, automation will require widespread restructuring of labour markets to provide new opportunities for labour market participants, and of social welfare systems to accommodate increasingly volatile modes of employment. In fact, the concept of ‘employment’ itself is likely to drastically change. So too, reform of knowledge institutions and innovation infrastructure is necessary and desirable to adaptively equip Europe’s people with training and knowledge necessary to remain productive and competitive on global as well as European and local scales. Likewise, ageing will present a need for society to change the way (i) in which people ‘work’ and finance is provided in order to take care of themselves and each other, (ii) in which they can productively contribute into old age, and (iii) in which they and everyone else can learn to be so. Hence, ageing also goes to the heart of labour, welfare and knowledge institutions and how they should be transformed.

Evidently, these two megatrends and the areas they will impact thus have strong interrelationships and will affect each other and any policy aiming to steer them in the right direction. In addition, trends underlying one megatrend may also drive others. That is to say, more detailed analysis of ‘health’, however defined or circumscribed, will inevitably bear strong correlation to ‘ageing’. In the same manner, ‘technological advances’ will also have a role to play in, for example, ‘urbanisation’, ‘resource use’, a ‘green economy’ or ‘combating climate change’. The report cannot discuss all of the identified megatrends,<sup>42</sup> but partly due to their transversal nature, a focus on ageing demographics and technology, implicitly at least, contains a link to other megatrends as well as to motivations underlying aims to promote an entrepreneurial society in Europe and *vice versa*.

In light of the above, reshaping institutions to accommodate any of the trends underlying the two particular megatrends in isolation, carries the considerable risk of those institutions thereafter being maladapted to the trends and drivers of the other one(s). The current report provides an in-depth analysis of these two megatrends. It should be read from the perspective that centers on the need for, and desirability of, more entrepreneurial spirit in Europe in the face of large-scale exogenous

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<sup>42</sup> For a comprehensive review and analysis of megatrends in relation to the ‘green economy’, see: EEA, 2015 and EEA, *Extended Background Analysis*, 2015.

change represented by megatrends. The latter will manifest in some form and stress present-day European institutions to their limits. Institutions will have to change to keep pace. Thus, policy implications of megatrends intersect clearly and fundamentally, at the institutional level, with proposals for institutional reforms to promote entrepreneurship.

What should become clear from this report, is that through widespread policies focused on igniting entrepreneurial potential and on transitioning Europe to an entrepreneurial economy, many - if not all - of the potentially negative impacts of the identified megatrends, technology and ageing among them, can be made into opportunities for European success. Indeed, as a high-level policy goal with a holistic and broad potential for application, promoting flexible and adaptive entrepreneurship appears well-suited as an answer by policymakers to many of the important, exogenous and inexorable trends identified below- not in isolation, but as a whole.



## 6. Megatrend 1 - A technological revolution: automation and the digital economy

At a fundamental level, expected and unexpected scientific and technological breakthroughs in domains such as bio- and nanotechnology, advanced materials, information and computing technologies or robots and automated manufacturing “will deliver change in all areas of everyday life by 2030.”<sup>43</sup> As a consequence of advances in these ‘enabling technologies’ we may, for instance, expect: a transformation of the way we communicate; a continued surge in big data; a new paradigm for manufacturing; novel social service models; a blurring of the boundary between public and private spheres; new methods for security and policing adapted to an increase in cybercrime; or a transformed concept of transportation.<sup>44</sup> More important still, are perhaps the changes these developments will enable that we do not yet foresee.

The Oxford Martin School and CITI GPS summarise the general dynamics underlying these changes:

Some technological advances, such as mobile Internet technology, are significant but emerge as extensions resulting from the compounding application of earlier inventions. Others, such as nanotechnology, genetic advances and 3-D printing reflect new leaps that are yet to have a broad impact in society. Together, the results of the horizontal spread arising from widespread application of advances and previous inventions, and the refreshing of these waves through vertical leaps arising from new inventions, will exert a powerful influence over global economic trends in the coming years and decades.<sup>45</sup>

Emerging technologies are thus poised to disrupt established ways of doing business or work under present economic paradigms (cf. *infra*, Figure 1) as well as the functioning of society itself. Disruption will not only occur through radical change or the transformation of technological capabilities at some point in the future, but is already exerting its effects through gradual evolution of key technologies in a variety of domains. In turn, technological transitions are not isolated from other spheres of society, or concurrent megatrends, and can augment opportunities and risks associated therewith.<sup>46</sup>

The convergence of technological advances in distinct fields may even mark the beginning of a new ‘industrial revolution’ wherein existing value chains and the global economic order will be fundamentally transformed and modes of competition, performance across industry, organization of

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<sup>43</sup> European Strategy and Policy Analysis System (ESPAS) Project, Chatham House and Fundación para las Relaciones Internacionales y el Diálogo Exterior (FRIDE), 2013, *Empowering Europe’s future: Governance, power and options for the EU in a changing world*, Chatham House, London, UK, FRIDE, Madrid, Spain and Brussels, Belgium, and ESPAS, Brussels, Belgium, 32 (hereinafter ESPAS, Chatham House and FRIDE, 2013).

<sup>44</sup> KPMG and Mowat Centre, 2014, 23.

<sup>45</sup> Oxford Martin School (OMS) and CITI GPS, 2014, *Future opportunities, future shocks: Key trends shaping the global economy and society*, OMS, Oxford University, UK, and CITI Perspectives and Solutions (CITI GPS), Schiphol, Netherlands, 30 (hereinafter OMS and CITI GPS, 2014).

<sup>46</sup> World Economic Forum (WEF), 2017, *The global risks report 2017 – 12<sup>th</sup> Edition*, WEF, Geneva, Switzerland, 46 (hereinafter WEF, *The Global Risks Report*, 2017).

labour, accumulation of capital, manufacturing activities, and the ways of doing trade could be subject to drastic change.<sup>47</sup> Moreover, rather than being limited to separate and, perhaps, unforeseen developments in discrete sectors, disruptive innovations in different areas of technology and science will likely merge and speed up technological progress,<sup>48</sup> further adding to the unpredictability of foresight scenarios.

Whereas all studies appear to agree the impacts of identified technological megatrends will be significant by definition, “the exact nature and extent of technology-enabled societal transformations remains largely speculative. Uncertainties surround the actual extent of diffusion and convergence, environmental and health impacts and the social acceptance of several of these technologies.”<sup>49</sup> A particularly relevant example of widespread yet somewhat speculative effects with regard to entrepreneurial reforms envisioned under the FIRES project, is emerging technologies’ potential to disrupt the foundations of existing labour markets and policies across sectors and geographical regions. Subsequently, those effects might lead to economic downturns, unemployment, growing inequality and, ultimately, to social instability.<sup>50</sup>

**Figure 1: Important technologies for future manufacturing activities<sup>51</sup>**

Big data and knowledge based automation	These will be important in the on-going automation of many tasks that formerly required people. In addition, the volume and detail of information captured by businesses and the rise of multimedia, social media and the internet of things will fuel future increases in data, allowing firms to understand customer preferences and personalise products.
Internet of things	There is potential for major impacts in terms of business optimisation, resource management, energy minimisation, and remote healthcare. In factory and process environments, virtually everything is expected to be connected via central networks. Increasingly, new products will have embedded sensors and become autonomous.
Advanced and autonomous robotics	Advances are likely to make many routine manufacturing operations obsolete, including healthcare and surgery, food preparation and cleaning activities. Autonomous and near-autonomous vehicles will boost the development of computer vision, sensors including radar and GPS, and remote control algorithms. 3D measurement and vision will be able to adapt to conditions, and track human gestures.
Additive manufacturing (also known as 3D printing)	This is expected to have a profound impact on the way manufacturers make almost any product. It will become an essential ‘tool’ allowing designs to be optimised to reduce waste; products to be made as light as possible; inventories of spare parts to be reduced; greater flexibility in the location of manufacturing; products to be personalised to consumers; consumers to make some of their own products; and products to be made with new graded composition and bespoke properties.
Cloud computing	Computerised manufacturing execution systems (MES) will work increasingly in real time to enable the control of multiple elements of the production process. Opportunities will be created for enhanced productivity, supply chain management, resource and material planning and customer relationship management.
Mobile internet	Smart phones and similar devices are positioned to become ubiquitous, general purpose tools for managing supply chains, assets, maintenance and production. They will allow functions such as directed advertising, remote healthcare and personalisation of products. Linked technologies include battery technology, low energy displays, user interfaces, nano-miniaturisation of electronics, and plastic electronics.

<sup>47</sup> European Strategy and Policy Analysis System (ESPAS) Project, 2015, *Global trends to 2030: Can the EU meet the challenges ahead?*, ESPAS, Brussels, Belgium, 33 (hereinafter ESPAS, 2015).

<sup>48</sup> ESPAS, Chatham House and FRIDE, 2013, 32.

<sup>49</sup> ESPAS and Rand Europe, 2013, 82.

<sup>50</sup> WEF, *The Global Risks Report*, 2017, 46.

<sup>51</sup> The Government Office for Science – Foresight, 2013, *The Future of Manufacturing: A new era of opportunity and challenge for the UK – Summary Report*, The Government Office for Science, London, 21.

How, then, to choose on which technology trends to focus for our current purposes? In view of the consideration that “information technologies, and the automation and manufacturing technologies, may get the biggest traction and become the centerpiece of the technology revolutions out to 2035,”<sup>52</sup> the following section casts light on salient aspects of the highly interrelated trends of automation and digitalisation – two domains identified in, and touted by, the selected studies as carrying the potential for large impacts. Indeed, another report notes in more concrete terms: “drones delivering goods, driverless cars, computers offering medical diagnoses, fully automatised manufacturing lines and call centres, self-serving kiosks, algorithms replacing accountants, machines replying to emails, computerised legal and tax assistance as well as programmes writing news stories are just some examples of digitalisation and automation that may destroys [sic] more jobs than they create.”<sup>53</sup>

Summarising, technological advances will drastically change the way people work or are employed. Whole sectors of existing jobs are at risk of being made obsolete – ‘destroyed’. However, by promoting an entrepreneurial economy, Europe’s individuals can become more resilient, flexible and self-reliant. These entrepreneurs can develop new ideas and use technology together with resultant labour reserves to provide old and new services and goods in new ways. Drastic change is on the horizon, but by ensuring there is a healthy entrepreneurial spirit, Europe can adapt to and benefit from the technological surge.

## 6.1. Automation: a sampling of key technological trends

The latter half of the 20<sup>th</sup> century and the beginning of the 21<sup>st</sup> century have seen a surge of developments in computer-driven automation in industrial and public sectors. Continuous technological progress, including unpredictable and interrelated advances, will no doubt contribute to increasingly sophisticated automated systems that can perform any number of complex tasks and may progressively lessen the need for human involvement in a broad category of labour or other activities. Novel production and manufacturing technologies, together with increased global connectivity and integration, will lead to new capabilities and opportunities,<sup>54</sup> but may also render a portion of existing job profiles obsolete while creating entirely new ones.<sup>55</sup>

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<sup>52</sup> Atlantic Council, 2016, *Global Risks 2035: The Search for a New Normal*, Atlantic Council, Washington DC, United States, 31 (hereinafter Atlantic Council, 2016).

<sup>53</sup> European Parliamentary Research Service (EPRS) – Global Trends Unit, 2016, *Global Trendometer: Essays on medium- and long-term global trends – autumn 2016*, EPRS – Global Trends Unit, European Union, Brussels, Belgium, 28 (hereinafter EPRS, *Global Trendometer*, 2016).

<sup>54</sup> “We can expect that the application of robots and intelligent systems will influence traffic and transportation, warfare, environmental planning and housing, agriculture, environment, education, political and judicial systems and countless other areas. If these systems become widespread in the next twenty years, the character of a portion of the future opportunities and problems that concern us now will change dramatically.” Dutch Consultative Committee of Sector Councils (COS), 2008, *Horizon scan report 2007 – Towards a future oriented policy and knowledge agenda*, COS, The Hague, Netherlands, 52 (hereinafter COS, 2008).

<sup>55</sup> See also: ESPAS and Rand Europe, 2013, 26.

Fundamental governance and policy implications arise in relation to these growing trends, such as the ostensible need to identify and promote a new knowledge base and educational framework in step with new developments, or the large impact advanced robotic systems will have on the global as well as regional economies. The economic impacts of advanced automation are difficult to predict in particular, since the nature of human labour as employed in current economic models might not be suitable to describe the production processes of the future,<sup>56</sup> while “employment could be vulnerable to substitution by computer-driven equipment over the next two decades, in fields such as transportation and logistics, administrative support, and production.”<sup>57</sup> The current section therefore provides an overview of a number of key technological trends clustered under the umbrella of ‘automation’.

### 6.1.1. Industrial robots

A number of studies point to the application of robotics already having a profound effect on manufacturing environments (see Box 1). Millions of **industrial robots** are in use around the world today, not in the least because digital computer-controlled automated robotic systems can perform a large variety of physical tasks and may fulfil myriad industrial functions. Robotic systems are well-suited for the completion of routine tasks, since they often possess better sensory and mechanical capabilities than humans, contributing to increased precision, faster production times and fewer errors. Moreover, without the human need for rest or sleep, robots can operate for 24 hours a day, 7 days a week<sup>59</sup> and they can do so in much more hostile environments.

#### Box 1: Global demand for industrial robots<sup>58</sup>

“In 2015, robot sales increased by 15% to 253,748 units, again by far the highest level ever recorded for one year. The main driver of the growth in 2015 was the general industry with an increase of 33% compared to 2014, in particular the electronics industry (+41%), metal industry (+39%), the chemical, plastics and rubber industry (+16%). The robot sales in the automotive industry only moderately increased in 2015 after a five year period of continued considerable increase. China has significantly expanded its leading position as the biggest market with a share of 27% of the total supply in 2015.”

Together, those factors enhance productivity and usually drive down costs when compared to their human counterparts. A clear illustration of why many manufacturers claim that robots are already more cost-effective than humans in various industrial applications, is the simple example of a US\$250.000 automated system that can replace the duties of two machine operators, each earning US\$50.000 per annum. “Over the 15-year life of the system, the machines yielded [US]\$3.5 million in

<sup>56</sup> COS, 2008, 26.

<sup>57</sup> Oxford Martin Commission, 2013, 24.

<sup>58</sup> International Federation of Robotics (IFR), 2016, *Executive Summary World Robotics: Industrial Robots*, IFR, Frankfurt am Main, Germany, 11, available at [https://ifr.org/img/uploads/Executive\\_Summary\\_WR\\_Industrial\\_Robots\\_20161.pdf](https://ifr.org/img/uploads/Executive_Summary_WR_Industrial_Robots_20161.pdf) (last accessed 19 May 2017) (hereinafter International Federation of Robotics, 2016).

<sup>59</sup> Information in the current paragraph taken from National Intelligence Council (NIC), 2012, *Global trends 2030: Alternative worlds*, NIC, Washington DC, United States, 90 (hereinafter NIC, 2012) and OMS and CITI GPS, 2014, 31.

labor and productivity savings.”<sup>60</sup> The rate of utilization of automated robotic systems in a range of industrial processes and the extent of their economic impact can therefore be expected to increase.

**Figure 2: Robotics technology**<sup>61</sup>

AUTOMATION AND MANUFACTURING TECHNOLOGIES				
Technology Focus	Current Status	Potential for 2030	Issues	Impact
Robotics	Robotics is already in wide use in defense and manufacturing.	Robotics will eliminate human labor in some applications. Blurring between industrial and service robots will occur.	Researchers must reduce the cost of robots and improve their intelligence. As robots spread they will face much greater public scrutiny.	Total automation may become more cost effective than using large levels of labor or outsourcing to developing countries.

To be sure, the International Federation of Robotics (IFR) estimates the global market value for factory automation robots to be at least US\$35 billion as of 2015. The automobile industry, in particular, has been an important driver of growth in demand and innovation in automation technology. Other sectors, such as the electronics industry, are now increasingly retooling and automating their existing manufacturing processes.<sup>62</sup> Thus, old ways of manufacturing are slowly but surely being replaced, along with the jobs they created. Here, increased entrepreneurship can engender individuals, from the manufacturing sector or elsewhere, to develop new modes of being productive and novel ways in which to utilise the resources and talent that will become available.

### 6.1.2. Service robots and computerised systems

The advancement of robotics and computerised systems, including advanced software, will also allow for the automation of categories of jobs hitherto relatively unaffected. Even though the effects of automation were in the past largely limited to blue-collar sectors, white-collar jobs – e.g. accountants, data analysts, etc. - will increasingly come under pressure.<sup>63</sup> Apart from industrial processes, and in addition to software solutions for myriad functions, the consumer robotics market is booming and professional and personal service robots are more and more prevalent in mainstream society.<sup>64</sup> Here too, stimulating entrepreneurial creativity can help to utilise the freed up talents and resources in novel ways, not unlike how typists and switchboard operators of old now occupy completely new positions and functions within the office space.

<sup>60</sup> J. Markoff, “Skilled Work, Without the Worker”, *The New York Times* 2012, 18 August, 2012, available at <http://www.nytimes.com/2012/08/19/business/new-wave-of-adept-robots-is-changing-global-industry.html> (last accessed 19 April 2017).

<sup>61</sup> NIC, 2012, 91.

<sup>62</sup> International Federation of Robotics, 2016, 15.

<sup>63</sup> Ernst and Young, 2015, 13.

<sup>64</sup> Global Futures and Foresight (GFF), 2012, *The Future Report 2012*, GFF, London, UK, 71 (hereinafter GFF, 2012).



With regard to the labour market, robots “may play a key role in changing employment by taking on a growing range of service sector jobs” and they are, for example, “increasingly being used for personal care of older people — an application becoming common in advanced Asian economies such as Japan and Korea [...] and one that may be adopted globally as the numbers of the elderly grow in Europe and around the world.”<sup>65</sup> Further looking to Asia for indications of what the future may hold, South Korea is taking steps toward the explicit policy goal of having a robot in every home by 2020 – e.g., a robotic housekeeper that helps with everyday chores – while in Japan, robots conduct traffic at roadwork sites or otherwise feature in day-to-day life.<sup>66</sup>

Meanwhile, in Europe, the use of robots in caring for the elderly or the handicapped - e.g., performing certain caretaker functions to assist with daily living - might similarly contribute to alleviating some of the problems associated with an ageing population (cf. *infra*). However, the application of robots as caretakers is likely to confront society and policymakers with ethical questions that may have to be resolved in order to avoid what could be seen by some as a regression into “a more individualistic society in which people do not consider it important to look after the aged.”<sup>67</sup>

Moreover, for nonindustrial robotics to make their way into general society a number of technical obstacles need to be surmounted with regard to their intelligence and cognitive abilities, their behaviour in response to contingencies, as well as their interactions with humans. Less tangible, but no less important, are potential barriers in the form of intense media scrutiny or an unfavourable reaction by the public that could impede the development and implementation of robots or computers fulfilling services traditionally offered by humans.<sup>68</sup> Finally, although cost is an evident driver for suppliers to develop and offer robotic or computerised systems, it is also an important impediment to widespread uptake of the new technology by consumers or professional service providers. Arguably, the cost per unit must decrease by an appreciable amount if widespread adoption is to become a feasible prospect. Here too, increased entrepreneurial activity can help ensure benefits are larger than costs. Stimulating individuals to be entrepreneurs can promote rapid uptake of new technology and innovative processes, while sharing a common mindset at the base of an entrepreneurial society that is amenable to novel developments.

An additional peculiarity arises with regard to costs and the labour market in the near future that should not be underestimated. If the cost of human labour remains relatively low in comparison to implementing any of these new technologies, it will limit a comprehensive shift to automation, at least in some sectors. Less-paying, though often very demanding, jobs might hence be somewhat shielded from being replaced, whereas “the jobs-of bookkeepers and accountants, for example, require skills and training, so they are scarcer than simple cooks. But the activities they perform cost

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<sup>65</sup> EEA, *Extended Background Analysis*, 2015, 76. See also: J. Manyika, M. Chui, J. Bughin, R. Dobbs, P. Bisson and A. Marrs, “Disruptive technologies: Advances that will transform life, business, and the global economy”, *McKinsey Global Institute*, 2013.

<sup>66</sup> GFF, 2012, 71-72.

<sup>67</sup> COS, 2008, 52. See also: A. van der Plas and M. Smits, “Beyond speculative robot ethics: a vision assessment study on the future of the robotic caretaker”, *Accountability in Research* 2010, Vol. 17(6), 299-315.

<sup>68</sup> NIC, 2012, 90-92.

less to automate, requiring mostly software and a basic computer.”<sup>69</sup> Disruption of non-manufacturing and service sectors will no doubt accelerate along with technological advances and keep pace with decreases in cost,<sup>70</sup> which will in turn contribute to a polarising effect of concentrating demand for human labour at the extreme ends of the skill spectrum.

Promoting an entrepreneurial society may ensure there are ample new opportunities for those whose work has been automated, while providing significant social benefits. If entrepreneurship is widespread and based on policies that take into account fairness and equality, polarisation need not be a foregone conclusion. For those that are temporarily unable to capitalise on a successful entrepreneurial venture, be it long- or short-term, a further strengthening and reasoned restructuring of Europe’s protective labour regulations and social welfare institutions can provide a suitable and fair mechanism by which to provide everyone a decent standard of living. These institutions could hence be adapted to support - not punish - those whose entrepreneurial endeavour has for the time being not come to fruition, without stifling the engine of innovation and creativity that lies at the heart of entrepreneurship and is, arguably, more easily accessed by those not preoccupied by being denied a decent and dignified standard of life.

### 6.1.3. Autonomous vehicles

In much the same vein as service robots, public acceptance is likely to be paramount in a societal transition from human-piloted modes of transportation to autonomous vehicles, such as self-driving automobiles and public transportation or autonomous delivery of goods. As stated by the European Environment Agency, “self-driving cars are also an application of robotics: these use a variety of sensors to navigate crowded city streets. The prospect is reduced congestion, as autonomous vehicles can space themselves more efficiently than humans; reduced emissions through optimal driving; and fewer accidents, injuries and death. Self-driving cars can also free time for former drivers, who could spend travel times in leisure or work activities. [...] Autonomous vehicles could transform both passenger and freight systems — but raise a number of challenges, including legal issues as well as the impact of computer viruses on safety.”<sup>71</sup>

The impact of driverless transportation on European society is likely to be considerable in view of the fact that the average car owner in Europe is at the wheel for approximately 300 hours per year. In addition, the concomitant use in such vehicles of integrated sensor systems and telematics, together with smart grids as well as increased digitalisation and interconnectivity, can help provide real-time data for detailed analysis and the streamlining or distribution of traffic through control routing centres, while reducing the need for additional infrastructure.<sup>72</sup> As noted, however, key questions regarding safety and reliability of ubiquitous autonomous transportation remain that will require

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<sup>69</sup> EPRS, *Global Trendometer*, 2016, 28.

<sup>70</sup> WEF, *The Global Risks Report*, 2017, 14.

<sup>71</sup> EEA, *Extended Background Analysis*, 2015, 73. See also: H. Hodson, “The four main roadblocks holding up self-driving cars”, *New Scientist* 2015, 20–21.

<sup>72</sup> OMS and CITI GPS, 2014, 32-34.

stringent, flexible and up-to-date oversight by regulators,<sup>73</sup> but entrepreneurial citizens can contribute to stimulate novel ways in which to utilise, employ and improve the technology.

#### 6.1.4. Additive manufacturing

Another emerging technology, closely linked to both automated manufacturing as well as digitalisation, and highlighted in those studies that focus in more detail on technological trends, is additive manufacturing, or **3D printing**. “This process makes three-dimensional solid objects from digital models. Additive technology allows more rapid prototyping of parts and complete products, offering greater room for experimentation and a shorter design-production cycle. It can also produce shapes that would be otherwise impossible or impractical to produce. [...] Future advances in layering techniques and materials are expected to enable increasingly complex goods to be printed at lower costs.”<sup>74</sup> Additive techniques are thus bound to have a profound impact on processes in product design, development and manufacturing, as shown in Figure 3. Both incumbent companies as well as entrepreneurial start-ups will benefit from reduced costs and flexible design capabilities.<sup>75</sup>

Figure 3: 3D printing technology<sup>76</sup>

AUTOMATION AND MANUFACTURING TECHNOLOGIES				
Technology Focus	Current Status	Potential for 2030	Issues	Impact
<b>Additive Manufacturing/3D Printing</b>	Additive manufacturing is in use for creating models and for rapid prototyping in the automotive and aerospace industries.	Additive manufacturing begins to replace some conventional mass-produced products, especially high value products.	Material quality and cost are the limiting factors for the acceptance of additive manufacturing by industry.	Both advanced and developing economies will benefit from the flexibility, speed, and customization of additive manufacturing.

Advancements in the way a variety of materials can be utilized as ‘building blocks’ could have profound impacts on industries looking to incorporate novel bio- or nanomaterials. However, widespread adoption of the technology may also engender disruptive effects in many existing sectors, retail and logistics among them.<sup>77</sup> From a more macro-economic perspective, if barriers are surmounted, tailored or highly customised production of goods may fundamentally alter consumption patterns, promote smaller-scale localised production, and minimise the use of resources, thereby possibly bolstering Europe’s regional economies<sup>78</sup> and decreasing its reliance on

<sup>73</sup> NIC, 2012, 92.

<sup>74</sup> EEA, *Extended Background Analysis*, 2015, 73.

<sup>75</sup> OMS and CITI GPS, 2014, 35.

<sup>76</sup> NIC, 2012, 91.

<sup>77</sup> For a more comprehensive overview of the technology and its effects, e.g., see: T. Campbell, C. Williams, O. Ivanova and B. Garrett, “Could 3D printing change the world? Technologies, potential, and implications of additive manufacturing”, Atlantic Council of the United States, 2012.

<sup>78</sup> EPRS, *Global Trendometer*, 2016, 32-33.



outsourcing to low-income mass-production in developing economies.<sup>79</sup> Conversely, developing countries might reduce their reliance on imports from developed economies, lessen their need for industrial infrastructure when compared to traditional manufacturing, and more rapidly become competitive in a number of sectors – e.g., ‘leapfrogging’<sup>80</sup> - through the use of 3D printing techniques in combination with increased global digitalisation<sup>81</sup> (cf. *infra*).

Additionally, the spread of 3D printers could have a democratizing effect on manufacturing, allowing individuals to create a range of products and designs through home printing or through collaboratively establishing “large numbers of micro-factories akin to preindustrial revolution craft guilds, but with modern manufacturing capabilities. Such local micro-factories could manufacture significant amounts of products, especially those for which transportation costs are traditionally high or delivery times are long, and in the process shorten and simplify supply chains.”<sup>82</sup> Paradoxically, the delivery of raw materials for additive purposes to a larger number of self-reliant manufacturers might also lead to increased traffic.<sup>83</sup> Evidently, these developments may in turn interact not only with trends in autonomous transportation, but could also undermine the competitive positions of manufacturing industries increasingly reliant on automated factories, mentioned above.

Likewise, the use of computers and digital means for 3D printing increases the potential for individuals to themselves manufacture various products *in situ*<sup>84</sup> and establishes an intrinsic, compounding connection to pervasive digitalisation trends,<sup>85</sup> explored in more detail in the following section. To be sure, some analysts “believe direct digital manufacturing (DDM) will represent the biggest share of the 3D printing market. Additionally, the recent ‘Maker’ movement has created a flood of consumer curiosity and interest which we believe will materialize into a significant new market segment. We see the addition of those two opportunities as more than tripling the addressable market and believe as customer awareness of the technology’s capabilities evolves, demand for print systems, materials and custom parts will accelerate.”<sup>86</sup>

The democratization of manufacturing capabilities may thus make entrepreneurs of us all. Through increasing availability of targeted education and possibilities for training, anyone could design products, be it for fame, profit, or both. The capability of *in situ* manufacturing by individual consumers, or groups of like-minded consumers, where feasible, may see mass markets shrink - along with traditional factory manufacturing based on such markets. The challenge for policymakers lies not in combating the advent of the new technology, but in enabling citizens and society to recognise and seize the large opportunities and new ways of doing things that arise in its wake. Promoting an entrepreneurial mindset, inherently linked to creativity and innovation as it is, can help

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<sup>79</sup> For a European perspective, see: President’s Science and Technology Advisory Council (STAC), 2014, *The future of Europe is science*, European Commission, Brussels, Belgium.

<sup>80</sup> E.g., see: KPMG and Mowat Centre, 2014, 22.

<sup>81</sup> NIC, 2012, 93.

<sup>82</sup> Ibid.

<sup>83</sup> EEA, *Extended Background Analysis*, 2015, 76.

<sup>84</sup> Atlantic Council, 2016, 32.

<sup>85</sup> GFF, 2012, 72.

<sup>86</sup> OMS and CITI GPS, 2014, 36.

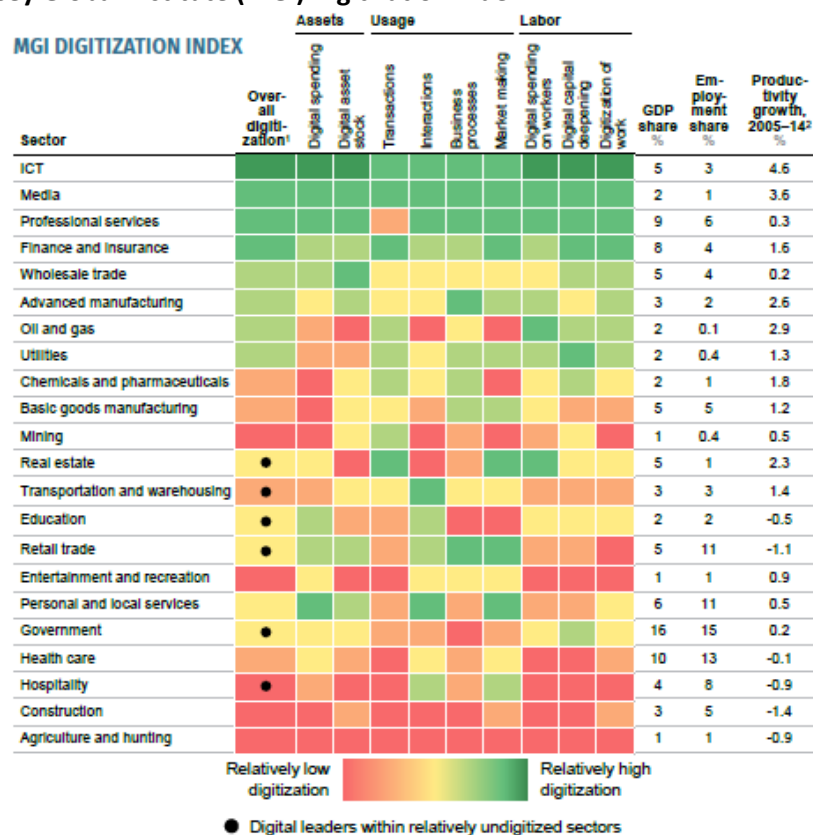
surmount this challenge in a manner that is adapted to every individual's own needs, values and tastes and is flexible with regard to a foreseeable and unforeseeable future.

## 6.2. The digital economy

### 6.2.1. Globalisation is going digital

The critical importance of trends in digitalisation on a global scale is conveyed in certain terms by ESPAS: "digital is not a sector of the economy but the future economy. One sector after another is being digitalised. After music and reading, large services in banking and healthcare are about to follow in a process already very visible to everyone. After blue-collar job delocalisation in industry, white-collar employment in services will now be massively affected. Given the economies of scale involved and the transnational nature of those services, any countries [sic] tax base can be eroded quickly, if the regulatory frame is not adapted. Europe is still largely divided by 28 different sets of regulation and therefore does not profit sufficiently of its own home market."<sup>87</sup> The index in the following figure, composed by the McKinsey Global Institute on the basis of datasets from a large collection of sources, underscores the massive impacts digitalisation can -or will - effect across all sectors.

Figure 4: McKinsey Global Institute (MGI) Digitization Index<sup>88</sup>



<sup>87</sup> European Strategy and Policy Analysis System (ESPAS) Project, 2016, *Preparing Europe for the next twenty-five years*, ESPAS, Brussels, Belgium, 14 (hereinafter ESPAS, *Preparing Europe*, 2016).

<sup>88</sup> Ibid.

Further economic analysis by the McKinsey Global Institute indicates worldwide trade in goods – e.g., finished or intermediate goods and commodities – has declined relative to increases in world GDP for a number of reasons. So too, there has been a significant reduction in cross-border financial flows between national financial markets – e.g., lending, foreign direct investing or equities and bonds. However, at the same time, global flows consisting of information, communication, transactions, multimedia and intracompany traffic, have soared to unprecedented levels and can now be said to form the backbone of every kind of cross-border flow.<sup>89</sup> In short, influenced by widespread digitalisation, the form, nature, mechanisms, drivers and effects of economic globalisation are in the midst of a profound paradigm shift, as summarized in the table below.

**Table 3: Comparison between globalisation in the 20<sup>th</sup> and 21<sup>st</sup> century<sup>90</sup>**

Globalisation in the 20 <sup>th</sup> century	Globalisation in the 21 <sup>st</sup> century
Tangible flows of physical goods	Intangible flows of data and information
Flows mainly between advanced economies	Greater participation by emerging economies
Capital- and labour-intensive flows	More knowledge-intensive flows
Transportation infrastructure is critical for flows	Digital infrastructure becomes equally important
Multinational companies drive flows	Growing role of SMEs and individuals
Flows mainly of monetized transactions	More exchanges of free content and services
Ideas diffuse slowly across borders	Instant global access to information
Innovation flows from advanced to emerging economies	Innovation flows in all directions

Thus, in addition to technology ever more enabling the substitution of humans by machines and software, an increasingly global digital future will disrupt all areas of business enterprise across all industries and in all geographic regions. This change of ‘mega’-proportions is powered by converging phenomena, such as cloud services, the Internet of Things, big data, mobile connectivity and a rising demand for instant access to information. Simultaneously, it also presents societies and policymakers worldwide with important challenges, *inter alia*, related to new models of competition, transparency and privacy concerns, and cybersecurity threats.<sup>91</sup> Concerted development, mastery and application of digital technologies will be indispensable elements of economic and industrial competitiveness between global actors - dooming those that fail to adapt to state-of-the-art capabilities in an agile manner and, perhaps, cutting them off from global markets altogether.<sup>92</sup> Such agility and adaptability, first and foremost, comes from entrepreneurial spirits that embrace novel opportunities, as well as from the system that surrounds them supporting experimentation and the swift replacing of good with better ideas.

<sup>89</sup> McKinsey Global Institute (MGI), 2016, *Digital Globalization: The New Era of Global Glows*, MGI – McKinsey & Company, (s.l.), 4 (hereinafter MGI, *Digital Globalization*, 2016).

<sup>90</sup> Ibid., 5.

<sup>91</sup> Ernst and Young, 2015, 7-13.

<sup>92</sup> ESPAS, 2015, 33-34.

Conversely, and also particularly relevant for proposed reforms under FIRES, digital globalisation can have considerable enabling effects on efforts to engender successful entrepreneurship and *vice versa*. If adequate framework conditions to acquire necessary skills are provided,<sup>93</sup> SMEs and entrepreneurial digital start-ups can benefit from digital trends by utilising existing digital infrastructure and easily accessible internet platforms<sup>94</sup> to address a global customer base, concomitantly expand their market presence, and quickly become worldwide competitors. At the same time, an entrepreneurial society can be agile and adaptable and seize on this dynamic trend, thereby ensuring digitalisation will have largely positive effects. Instead of fears of potentially negative impacts, such a society would welcome new future developments and could flexibly benefit from them. The following sections therefore provide a synoptic overview of some of these looming developments as well as concurrent risks and opportunities.

### 6.2.2. Converging technological trends in digitalisation

In unison with the aforementioned developments in automation, a number of new technologies, or novel implementations of existing technologies, both drive the global trend towards pervasive digitalisation and form important elements thereof. Taking inspiration from analyses by the EU Cluster Observatory<sup>95</sup> and the EU Digital Entrepreneurship Monitor,<sup>96</sup> we may list the following examples that should be given adequate weight in the design of reforms of European entrepreneurship policies to be promulgated under FIRES in particular, and underscore the need to move towards an adaptive entrepreneurial society in general.

#### A The Cloud<sup>97</sup>

The term ‘cloud’, or ‘cloud computing’, encompasses services delivered and consumed in real time over connected networks – e.g., the internet. The Cloud provides users with ubiquitous network access, standard interfaces and shared standard services. Offering software as a service product to both consumers and businesses is the predominant driver of a growing public cloud market, while private cloud services may also be developed and offered to single enterprises or customers. Cloud services allow for flexible scaling in step with evolving needs and the reduction of cost - for instance, through helping businesses focus on core capabilities rather than having to spend valuable time and effort on in-house IT-related activities.

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<sup>93</sup> E.g., see: Organisation for Economic Co-operation and Development (OECD), “Skills and Jobs in the Internet Economy”, *OECD Digital Economy Papers No.242*, 2014.

<sup>94</sup> MGI, *Digital Globalization*, 2016, vii.

<sup>95</sup> EU Cluster Observatory, see: <http://www.clusterobservatory.eu/index.html> and <http://ec.europa.eu/growth/smes/cluster/observatory/> (last accessed 21 May 2017).

<sup>96</sup> EU Digital Entrepreneurship Monitor, for analyses see: <https://ec.europa.eu/growth/tools-databases/dem/monitor/business-opportunities> (last accessed 19 April 2017).

<sup>97</sup> Unless stated otherwise, all information in the current section is with reference to: Digital Entrepreneurship Monitor, July 2013, *Business opportunities: Cloud*, European Commission and European Cluster Observatory, 2015, *Case Study: Framework Conditions to Support Emerging Industries in the Area of Digital-based Services*, Ref. Ares(2016)2007225, European Commission, 6-7 (hereinafter European Cluster Observatory, 2015).

In its detailed report on the Cloud, the EU Digital Entrepreneurship Monitor lists security and data protection as well as legal jurisdictional uncertainties as the main barriers to more widespread use of cloud services by EU companies, including SMEs, a category that is intrinsically bound to promoting entrepreneurship. In addition, the latter category may particularly benefit from “network effects and lowered barriers of access for sophisticated, IT-intensive applications,”<sup>98</sup> thereby considerably shrinking the technology gap between large and smaller businesses.

## **B Mobile computing<sup>99</sup>**

Building on the widespread penetration of mobile devices – e.g. smartphones and tablets – businesses, both supply-side and demand-side, as well as private consumers, increasingly use a variety of flexible and mobile services and capabilities which lie at the nexus of people, processes and technology. The significant potential economic benefits deriving from omnipresent and instant availability of these services are nonetheless hampered by barriers to adoption relating to security, limited interoperability of devices or services, and insufficient familiarity by potential users. In addition, “legacy IT infrastructures are not ready for ‘mobile first’ strategies. Remedying this will require major investments and large-scale restructuring efforts. To address the changing market dynamics, technology companies are shifting their application development priorities.”<sup>100</sup>

Nevertheless, future growth is projected with two to three billion users, hailing for the most part from developing countries, slated to enter the digital global marketplace via mobile connectivity.<sup>101</sup> Heightened saturation of mobile technology could have considerable positive effects on productivity, with more general estimates by the McKinsey Global Institute on its global economic impact ranging from \$3,7 trillion to \$10,8 trillion by 2025<sup>102</sup> - fruitful grounds for nimble European entrepreneurs.

## **C Big Data<sup>103</sup>**

The term and concept ‘Big Data’ describe an ever-growing amount of data as well as the technologies necessary to collect, store, manage and analyse the exceptionally large quantity of information. Driven by increased digitalisation, Big Data can quickly operationalize massive volumes of

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<sup>98</sup> T.E. Barker, 2016, *Into the Clouds: European SMEs and the Digital Age*, Future Europe Initiative, Atlantic Council, Washington DC, United States, 3.

<sup>99</sup> Unless stated otherwise, all information in the current section is with reference to: Digital Entrepreneurship Monitor, July 2013, *Business opportunities: Mobility*, European Commission and European Cluster Observatory, 2015, 7.

<sup>100</sup> Ernst and Young, 2015, 9.

<sup>101</sup> J. Manyika, M. Chui, J. Bughin, R. Dobbs, P. Bisson and A. Marrs, “Disruptive technologies: Advances that will transform life, business, and the global economy”, *McKinsey Global Institute*, 2013, 29.

<sup>102</sup> OMS and CITI GPS, 2014, 30. More generally, see: J. Manyika, M. Chui, J. Bughin, R. Dobbs, P. Bisson and A. Marrs, “Disruptive technologies: Advances that will transform life, business, and the global economy”, *McKinsey Global Institute*, 2013.

<sup>103</sup> Unless stated otherwise, all information in the current section is with reference to: Digital Entrepreneurship Monitor, July 2013, *Business opportunities: Big Data*, European Commission. and European Cluster Observatory, 2015, 7.

heterogeneous information and create, e.g., novel avenues for value creation, increased revenue, enhanced services, a reduction in costs or an increase in productivity. As an overarching and, arguably, constitutive element of digitalisation, it is a multifaceted and complex phenomenon with wide ranging impacts, characterized by the ‘four Vs’:

- Volume: very large volume of information;
- Variety: large variety in sources and formats of data;
- Velocity: speed of processing, analysing and delivering data;
- Value: costs of Big Data technology and the value it creates.

Important barriers to increased saturation of Big Data in Europe include unfamiliarity of companies with ways in which to utilize data and information to transform their business models, privacy concerns, organisational and cultural resistance, and general doubts. In addition, there is a degree of apprehension in sharing sensitive corporate or proprietary data. The most significant barrier, however, is the lack of sound security, governance and risk management procedures, compounded by a lack of a sufficiently skilled workforce to both implement and analyse the necessary technologies. Entrepreneurial individuals could engender novel ways in which to channel this technological potential toward increased productivity and to overcome current hurdles and gaps, thereby also creating societal value.

#### **D Social Media and Business<sup>104</sup>**

Propelled by the digital wave, both large companies and SMEs are looking toward narrowing the gap with consumers and prospects while also empowering customers in new roles. Social media platforms provide businesses with new forms of interactions and information gathering to support their decisions and allow them to shift from traditional make-sell-models to more flexible frameworks that integrate new actors into the value chain. In sum, ‘social business’ corresponds to companies establishing social connections and more informal ways of communication as part of their business strategy. However, it also follows that companies will be under a microscope for their actions and “the role of technology, media (social and traditional news), and access to information will force companies to think very quickly how to handle crisis situations.”<sup>105</sup>

While the immediate impact of social business on external relationships and interactions with customers over a range of communication channels can be witnessed, foremost, along traditional marketing lines – e.g., increasing brand awareness or promoting products – the importance of customer communities as integral parts in the formulation of businesses’ strategies is expected to rise. On the supply side, specialised businesses may flourish that create and leverage such communities, provide social integration of e-commerce or offer social marketing services. However, inadequate understanding of how social media can improve the efficiency of internal business processes, such as enhanced modes of intracompany collaboration and knowledge management,

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<sup>104</sup> Digital Entrepreneurship Monitor, July 2013, *Business opportunities: Social Media*, European Commission and European Cluster Observatory, 2015, 8.

<sup>105</sup> T.R. Guay, *The Business Environment of Europe: Firms, Governments, and Institutions*, Cambridge, Cambridge University Press, 2014, 323.

remains a common barrier to more comprehensive adoption and increased productivity throughout the majority of EU companies. Once more, widespread entrepreneurial creativity and efforts to reform knowledge institutions can help transform current barriers into future opportunities.

### 6.2.3. Policy implications: risks and opportunities of digitalisation

#### A Risks

If part of the aim under FIRES is to build a resilient digital economy and to subsequently benefit from the long-term and widespread gains it might deliver, adequate framework conditions must be provided to channel new economic and social dynamics through tailored, novel approaches to leadership, governance and attitudes.<sup>106</sup> Equally, “today’s regulatory and policy frameworks need to be reappraised to ensure they achieve the best balance between openness and the rights and obligations of intellectual property ownership in this changing environment. They also need to consider what further action needs to be taken to address the threat of cyber-attack, which increasingly threatens information-rich products and services.”<sup>107</sup> Indeed, the majority of mapped studies that focus on digitalisation, in one form or another, echo similar concerns and point, on the one hand, to a number of more tangible risks – e.g., threats to intellectual property, counterfeiting and cybercrime - that will accompany the rise of connectivity and will require timely attention of policymakers and regulators.<sup>108</sup>

“The biggest risk to all the emerging technologies is the lack of a safe and secure Internet.”<sup>109</sup> The rise of cyber dependency underscores that pervasive digitalisation<sup>110</sup> forms a double-edged sword that also maximises vulnerability of both public and private services by providing fertile ground for the activities of cybercriminals.<sup>111</sup> As a direct consequence, data breaches are rising in both frequency and size.<sup>112</sup> Global estimates by the Center for Strategic and International Studies put the annual costs of intellectual property theft and cybercrime between US\$375 billion and US\$575 billion.<sup>113</sup> Virtual crime and threats to cybersecurity could be especially onerous for small businesses, vital to entrepreneurship, in particular, by placing on them additional costs should their ICT-systems

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<sup>106</sup> See: World Economic Forum (WEF), 2016, *The Global Information Technology Report 2016: Innovating in the Digital Economy*, WEF, Geneva, Switzerland, 12 (hereinafter WEF, *Innovating in the Digital Economy*, 2016).

<sup>107</sup> The Government Office for Science – Foresight, 2013, *The Future of Manufacturing: A new era of opportunity and challenge for the UK – Summary Report*, The Government Office for Science, London, 23.

<sup>108</sup> E.g., see: KPMG and Mowat Centre, 2014, 23.

<sup>109</sup> Atlantic Council, 2016, 32.

<sup>110</sup> WEF, *The Global Risks Report*, 2016, 87.

<sup>111</sup> Oxford Martin Commission, 2013, 23.

<sup>112</sup> Ernst and Young, 2015, 12.

<sup>113</sup> For the comprehensive analysis, see: Center for Strategic and International Studies (CSIS) and McAfee, 2014, *Net Losses: Estimating the Global Cost of Cybercrime — Economic impact of cybercrime II*, CSIS, Washington DC, United States.



be breached.<sup>114</sup> Potential security concerns will only amplify as more and more devices are interconnected through the ‘Internet of Things,’ offering new vectors for devastating cyberattacks.<sup>115</sup>

On the other hand, mindful of the ostensible democratisation and individual empowerment due to increased connectivity,<sup>116</sup> policymakers aiming to advance reforms will also have to be conscious of significant but less tangible changes in social practices or public opinion. To be sure, the mere fact “that the internet can serve as an organising tool, bypass the traditional political process and allow people to rally around certain issues marks a paradigm shift in politics and policy.”<sup>117</sup> Furthermore, the shift to a fundamentally digital economy is likely to transform societies into ‘knowing’ societies, where the accumulation and dissemination of massive amounts of personal data may, *inter alia*, trigger mistrust of and aversion to technological innovation and the digital society due to the public’s concern over losing control of personal information. Additionally, concerns regarding the potentially unlimited lifespan of sensitive data may necessitate putting in place firm limits on its continued existence.<sup>118</sup> Those considerations are all the more relevant in view of the fact that critical services, including energy, food, financial institutions and hospitals, more and more rely on digitalised platforms and computer-based processes.<sup>119</sup> Regulators should therefore ensure data remains secure and provide guarantees to prevent unwarranted manipulation.<sup>120</sup>

## **B Opportunities at the nexus between digitalisation and innovation**

Given the search for novel approaches to stimulate innovation in concert with entrepreneurship is a cornerstone of the FIRES project, it will prove instructive to shortly reflect on the interplay between digitalisation and innovation.

On the basis of a perceived slowdown in the rate of technological progress, some commentators, occasionally dubbed ‘techno-pessimists,’ argue that the era of major innovation has passed and the growth of productivity has peaked. While their arguments deserve fair and balanced reflection in any process aiming to formulate new policies, the current section will summarily focus its attention on the findings of those analysts on the other side of the techno-divide, the so-called ‘techno-optimists,’ who maintain that the revolution in digital information technologies will continue to drastically impact the economy in myriad ways.<sup>121</sup> To be sure, incidentally, one can take a negative or positive qualitative perspective to the following trends and be dubbed either a pessimist or optimist, without

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<sup>114</sup> CSIRO, 2012, 19.

<sup>115</sup> EEA, *Extended Background Analysis*, 2015, 77.

<sup>116</sup> E.g., see: European Strategy and Policy Analysis System (ESPAS) Project and European Union Institute for Security Studies (EUISS), 2012, *Global trends 2030 – Citizens in an interconnected and polycentric world*, EUISS, Paris, France, and ESPAS, Brussels, Belgium, 32 (hereinafter ESPAS and EUISS, 2012).

<sup>117</sup> ESPAS and Rand Europe, 2013, 67.

<sup>118</sup> GFF, 2012, 70.

<sup>119</sup> EPRS, *Global Trendometer*, 2016, 28.

<sup>120</sup> ESPAS, 2015, 36.

<sup>121</sup> For a summary of the positions of so-called ‘techno-pessimists’ and ‘techno-optimists’, see: Organisation for Economic Cooperation and Development (OECD), 2015, *The Future of Productivity*, OECD Publishing, Paris, France, 34 (hereinafter OECD, *The Future of Productivity*, 2015).



denying the existence of the basic objective trend itself: both are sides to the same coin. In any case, according to proponents of the positive view, the increasing digitalisation of economic activities contributes to four innovative trends in particular<sup>122</sup>:

- (i) improvements in real-time analyses of business activities;
- (ii) rapid and less costly methods of experimentation in business;
- (iii) facilitating the broader sharing of knowledge; and
- (iv) faster and more accurate scaling-up and reproduction of innovations.

Although each of these trends could be considered to be significant by themselves, their effects are augmented when they operate in concert – e.g., improved analysis benefits from active experimentation and increased dissemination of knowledge, while experimentation is more valuable and effective if its results can be rapidly scaled up. Nonetheless, unleashing the full potential of new capabilities unlocked by emerging technologies will require a new approach and novel organisational structures.<sup>123</sup> For example, in the transition to an entrepreneurial society, a focus on open-source knowledge and a fundamental revision of the current regime of intellectual property rights could contribute to maximising the positive impact of new capabilities and to promoting innovation.

Along the same lines, the World Economic Forum, in the comprehensive ‘Global Information Technology Report 2016: Innovating in the Digital Economy’, touts the ability for businesses, across all sectors and industries, to rapidly scale as a crucial precondition for successful innovation in a digital economy that is increasingly reliant on networks. Innovation must be accompanied by fast and large scaling – i.e., of the customer base - to benefit from self-reinforcing network effects and from winner-take-all dynamics engendered by capturing the largest network, while simultaneously capitalising on premier access to up-to-date information from market participants for purposes of self-optimisation. Significant scaling will likewise provide competitive advantages by allowing first movers to define precedents and set industry standards.<sup>124</sup> In addition, the report lists the following ways, as reproduced in table 4 below, in which digitalisation impacts innovation and which may also significantly benefit from being embedded within an adaptive, flexible entrepreneurial society that enables rapid uptake and dissemination of novel knowledge:

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<sup>122</sup> For further reading, see the comprehensive treatise detailing these trends and their interactions: E. Brynjolfsson and A. McAfee, *Race Against The Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy*, Lexington, Digital Frontier Press, 2012, 92p.

<sup>123</sup> OECD, *The Future of Productivity*, 2015, 34.

<sup>124</sup> WEF, *Innovating in the Digital Economy*, 2016, 7.

**Table 4: Direct and indirect impacts of digital technologies on innovation<sup>125</sup>**

Digital technologies directly drive innovation	Digitalisation augments competition-driven innovation
<b>R&amp;D and basic research</b>	<b>Increasing market size</b>
New technologies augment tools used in research, decrease costs of previously unaffordable research activities, allow more accurate inference on the basis of larger datasets, enable extensive and widespread collaboration, including crowdsourcing.	Technology acts to integrate markets by reducing communication costs and increasing matching efficiency, thereby increasing competitive pressures. Low-cost online platforms allow access to a global consumer base.
<b>Product and process innovation</b>	<b>Reducing barriers to entry</b>
Digital technology makes possible new products and services, and re-engineering production systems give cost and quality advantages. <sup>126</sup>	New online services -e.g., cloud computing or online marketing – significantly decrease fixed costs for start-ups and SMEs, facilitating entry and scaling, and competition with large incumbents.
<b>Business model innovation</b>	<b>Acquiring/leveraging knowledge of consumer preferences</b>
Digital technologies allow firms to reimagine current business models within the emerging network of people and machines, giving price and quality-of-service advantages over incumbents. New opportunities for matching people to needs and for leveraging networks for decentralised information gathering to create continuously re-optimising systems. Market-making appears superior to incremental improvements for existing products.	Big Data is giving firms the opportunity to target products so as to more closely align with consumer preferences based on more accurate information. This can act like a quality upgrade from the point of view of the consumer, and therefore increases pressure on other firms to innovate themselves.

Lastly, attention is given in literature, with respect to reinvigorating innovation, to the large role of industrial clusters or innovation hubs and resulting synergies<sup>127</sup> which may induce a more beneficial economic climate.<sup>128</sup> Although such clusters are usually envisaged as geographical entities or in a geospatial manner, increased digital connectivity may lessen the impact of particularised cultural, institutional and policy differences between EU Member States, so vital for FIRES. One contributing and more concrete aspect is that “the increasing availability and use of new technologies may influence the organisation of work in companies and can facilitate further spatial and organisational distribution of the workforce. The nature of organisational governance structures may also change and workers may become increasingly mobile and not bound to one physical workplace.”<sup>129</sup>

<sup>125</sup> Ibid.

<sup>126</sup> For an extensive analysis, supported by case studies over a wide range of industries, see: Ibid., 37-49.

<sup>127</sup> For European perspectives on statistical information, analysis and mapping of clusters and cluster policy, the work of the EU European Cluster Observatory is particularly enlightening. See: <http://ec.europa.eu/growth/smes/cluster/observatory/> (last accessed 21 May 2017).

<sup>128</sup> E.g., see: T.R. Guay, *The Business Environment of Europe: Firms, Governments, and Institutions*, Cambridge, Cambridge University Press, 2014, 314-319.

<sup>129</sup> ESPAS and Rand Europe, 2013, 26.

When suitably accounted for and duly incentivised, the use of digital networks can thus contribute to making cluster-forming itself truly pan-European. Strengthened by a clear European vision and a strong European entrepreneurship policy reaping the benefits of digitalisation, European regions can be connected and work together in novel ways. Such a framework might go some distance, for example, in bringing the positive effects of entrepreneurship to more economically stagnant parts of Europe – e.g., in support of efforts by the European Regional Development Fund or digital initiatives in the EU2020 Strategy<sup>130</sup> – and could help prevent “Europe diverging in economic competitiveness with northern countries [...] maintaining their dominance in innovation, and countries bordering the Mediterranean Sea falling further behind with [...] a stagnation of living standards.”<sup>131</sup>

For example, if Europe transitions to an entrepreneurial society with a fundamental revision of current intellectual property regimes and knowledge institutions, knowledge may be disseminated more freely and widely. Easy, pan-European access to information, digital markets and new knowledge, e.g. from Northern Member States, could provide entrepreneurs, e.g. in more Southern Member States, with greater opportunities for successful entrepreneurship and increased productivity. The latter’s success would nevertheless benefit Europe as a whole, thereby establishing a mutually beneficial and integrative mechanism for the benefit of all.

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<sup>130</sup> For a more comprehensive overview and further reading see: P. De Man, W. Munters and A. Marx, “Entrepreneurship policy: a multi-dimensional and multi-level assessment”, Working Paper 16-01, *Financial and Institutional Reforms for an Entrepreneurial Society* (FIRES), 2016, 204pp.

<sup>131</sup> T.R. Guay, *The Business Environment of Europe: Firms, Governments, and Institutions*, Cambridge, Cambridge University Press, 2014, 315.

### 6.3. Effects of converging technologies: the Fourth Industrial Revolution?

Given the significant interplay between, for example, automation and digitalisation, it is important to emphasize that all of the selected studies containing analyses of technological megatrends confirm that converging technology developments will together effect a large, society-wide impact – particularly on the nature, organisation, divisions, role and modes of labour, and on coexisting relations – i.e. between labour and capital.

#### Box 2: The Fourth Industrial Revolution<sup>132</sup>

We are at the beginning of a global transformation that is characterized by the convergence of digital, physical, and biological technologies in ways that are changing both the world around us and our very idea of what it means to be human. The changes are historic in terms of their size, speed, and scope. This transformation—the Fourth Industrial Revolution—is not defined by any particular set of emerging technologies themselves, but rather by the transition to new systems that are being built on the infrastructure of the digital revolution. As these individual technologies become ubiquitous, they will fundamentally alter the way we produce, consume, communicate, move, generate energy, and interact with one another. And given the new powers in genetic engineering and neurotechnologies, they may directly impact who we are and how we think and behave. The fundamental and global nature of this revolution also poses new threats related to the disruptions it may cause—affecting labor markets and the future of work, income inequality, and geopolitical security as well as social value systems and ethical frameworks.

Consequently, a number of authors and influential organisations, the World Economic Forum foremost among them,<sup>133</sup> proclaim that the world is on the cusp of nothing less than a new industrial revolution - much in the same manner in which mass production, the advent of steam power or the discovery of electricity fundamentally transformed economic systems and entire societies in the 18<sup>th</sup>, 19<sup>th</sup> and 20<sup>th</sup> centuries.<sup>134</sup> This looming ‘Fourth Industrial Revolution’ (see Box 2) hence speaks to the essence of the concept in innovation and entrepreneurship fields of ‘creative destruction,’ as it “will not be entirely destructive to the job market [and] new opportunities to develop, service or operate the next generation of software and machines will arise.”<sup>135</sup> Job loss due to automation provides new resources and frees human capital. As the ‘creative’ counterbalance to destructive disruption, these newly regained resources could be put toward enhanced productivity in novel and creative ways by entrepreneurial individuals, be they self-reliant former workers undertaking their own entrepreneurial ventures or new employers in emerging entrepreneurial sectors. Exact forecasts, concepts and definitions describing the disruption by converging technologies vary, but we will very briefly bring to mind some concrete observations.

Estimates of the rate of technological displacement of jobs differ across studies, but the general tendency towards disruption of current paradigms remains a constant. According to one economic analysis of the manufacturing sector in the US for the period between 1997 and 2007, 86 per cent of job losses were the result of rising productivity – while less than 14 per cent are estimated to have

<sup>132</sup> Adapted from K. Schwab, *The Fourth Industrial Revolution*, London, Penguin UK, 2017, 192p. and as cited in WEF, *Innovating in the Digital Economy*, 2016, 4.

<sup>133</sup> World Economic Forum (WEF), 2016, *The Future of Jobs: Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*, WEF, Geneva, Switzerland (hereinafter WEF, *The Future of Jobs*, 2016).

<sup>134</sup> EEA, *Extended Background Analysis*, 2015, 76-77.

<sup>135</sup> Ernst and Young, 2015, 13.

been lost due to trade.<sup>136</sup> Meanwhile, a study by researchers at the Oxford Martin School puts 47 per cent of jobs in the US at present and direct risk due to automation and, additionally, finds “that wages and educational attainment exhibit a strong negative relationship with an occupation’s probability of computerisation.”<sup>137</sup> Those results are largely corroborated through work by the McKinsey Global Institute, stating that as much as 45 per cent of tasks carried out by human workers could presently be automated.<sup>138</sup>

The Organisation for Economic Cooperation and Development (OECD) takes a more conservative and agnostic view on the potential effects of labour displacement in its extensive overview of the changing relationship between labour and capital under influence of technology. It highlights the significant degree of uncertainty that remains to be tackled by policymakers:

From a policy perspective, however, it is not possible with the available data to assess whether the negative relationship between technical progress and changes in the labour share is a long-lasting relationship or is specific to the past decades and will progressively disappear when the process of diffusion of ICT-based technologies slows down. On the one hand, the standard view in the theory of economic growth is that, in the long-run, capital and labour are complements and technical change augments the factor that cannot be accumulated (that is labour). Hence, capital-augmenting technical change and substitutability between capital and labour are likely to be only a temporary phenomenon due to the rapid diffusion of ICT-based technologies and related innovations. [...] On the other hand, a more pessimistic view considers that ICT has changed the nature of technological advances, making them more rapid but incorporated in machines whose main purpose is to replace jobs previously held by certain categories of workers. If this were the case, most workers, and in particular the least educated, would find themselves in a “race against the machine”, thereby increasingly worsening their relative position.<sup>139</sup>

Nevertheless, whatever the specific modalities entailed by rapid advancement in technologies might be, the message is clear: its impact will be global, pervasive and fundamental. The latest results of the World Economic Forum’s Global Risks Perception Survey bear witness to the priority technological disruption should be accorded on policymakers’ agendas. Artificial intelligence – i.e. advanced computer systems and software – and robotics are perceived as the most likely of all emerging technologies to have potential negative consequences, with 46.3 per cent of respondents signalling an urgent need for better and more comprehensive governance.<sup>140</sup> Evidently, when digitalisation and automation converge, the effects are likely to be compounded, a consideration

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<sup>136</sup> As cited in WEF, *The Global Risks Report*, 2017, 14.

<sup>137</sup> See: C.B. Frey and M.A. Osborne, “The Future of Employment: How Susceptible Are Jobs to Computerisation?”, *Oxford Martin School, Oxford University*, 2013, 72p.

<sup>138</sup> M. Chui, J. Manyika and M. Miremadi, “Four fundamentals of workplace automation”, *McKinsey Quarterly* 2016, McKinsey Global Institute, available online at: <http://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/four-fundamentals-of-workplace-automation> (last accessed 16 April 2017).

<sup>139</sup> Organisation for Economic Cooperation and Development (OECD), 2012, *OECD Employment Outlook 2012*, OECD Publishing, Paris, France, 129, citations in original omitted.

<sup>140</sup> For comprehensive background and results of the surveys, see: WEF, *The Global Risks Report*, 2017, 43-47.

supporting predictions of a fourth industrial revolution, which will put an end to the status quo and require new, flexible policies.

To be sure, the EU has not taken a passive stance in the matter. In 2014 it launched the world's largest civilian research and innovation programme in robotics, The Partnership for Robotics in Europe, portending to enable the continued existence of a competitive manufacturing sector in Europe and to create an estimated 240.000 jobs.<sup>141</sup> Nonetheless, profound changes in the composition of employment will "require parallel innovation in business models, organizational processes, structures, institutions, and skills."<sup>142</sup>

It might therefore be expected that any proposals for reform to EU entrepreneurship policy to emanate from FIRES be seriously considered, for they can contribute to direct the sails of Europe to catch the winds of change. More specifically, a transition to a more entrepreneurial Europe and institutions should motivate – and enable – Europeans to act on novel opportunities and developments that present themselves, be they predictable or not. Whether the large, exogenous trend of technological progress continues, slows down or speeds up, comprehensive reform toward an entrepreneurial and, thus, more adaptable and flexible society will make Europe well-equipped to cope with the negatives and to capture the benefits of an ostensible 'fourth industrial revolution'. In sum, the ship of Europe must be made to be seaworthy before setting sail and catching the wind.

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<sup>141</sup> European Commission, "EU Launches world's largest civilian robotics programme – 240,000 new jobs expected", *European Commission Press Release*, 3 June, 2014, IP-14-619, [http://europa.eu/rapid/press-release\\_IP-14-619\\_en.htm](http://europa.eu/rapid/press-release_IP-14-619_en.htm) (last accessed on 19 April 2017).

<sup>142</sup> E. Brynjolfsson and A. McAfee, "Race Against The Machine: How The Digital Revolution Is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and The Economy", Research Brief, *Sloan School of Management, Massachusetts Institute of Technology*, 2012, 5-6, available online at: [http://ebusiness.mit.edu/research/Briefs/Brynjolfsson McAfee Race Against the Machine.pdf](http://ebusiness.mit.edu/research/Briefs/Brynjolfsson_McAfee_Race_Against_the_Machine.pdf) (last accessed 16 April 2017).

## 7. Megatrend 2 – Demographics: an ageing population

A majority of the selected studies underscore the significant impacts of future trends in demographics, on both a global as well as a European level. Apart from megatrends related to, *inter alia*, increased global urbanisation or the rise of a global middle class and a projected shift of economic power centres to Asia, most of them point to two drivers in particular that appear relevant in the context of FIRES: an ageing population and concomitant migration trends.

It is important to here underscore again the complex and interrelated nature of megatrends. They do not operate in isolation. Trends related to an ageing populace or to needs for migration will intersect in complex ways with each other and with the aforementioned technological trends, among others. Moreover, projected effects of demographic shifts together with technological trends seem to compound particularly regarding the labour market. For example, an older populace might be less equipped to benefit from novel ICT developments or to adapt to trends related to the digital economy in an agile manner, but may offer new markets for entrepreneurial solutions.<sup>143</sup> Meanwhile, increased digitalisation and interconnectivity might limit the need for migration in some sectors and at the same time necessitate more comprehensive migration and mobility frameworks to be set up to provide suitable levels of skilled labour in others.

What follows is therefore only a snapshot of broader developments, containing a cursory overview with some of the salient observations found during review of the selected studies, supported by a number of more detailed findings. This section serves as an inspiration and starting point for more detailed analysis to be conducted in the drafting of entrepreneurship policies and European institutional reforms following the FIRES project. However, as uncertainties remain for even a near-future timeframe,<sup>144</sup> overly detailed planning and policy efforts may prove ineffective and even inopportune.

Instead, it may prove a better strategy to focus on strengthening the adaptability and the overall resilience of European institutions, thereby ensuring they are prepared to turn looming foreseeable and unforeseeable disruptions, with uncertain modalities, into certain opportunities for success and growth. Indeed, the goal of strengthening the resilience and flexibility of European institutions in general dovetails wholly with the particular aim of promoting an entrepreneurial society, marked by its adaptable and accommodating nature, that lies at the heart of this report.

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<sup>143</sup> E.g. see: L. Damodaran and W. Olphert, “How are attitudes and behaviours to the ageing process changing in light of new media and new technology? How might these continue to evolve by 2025 and 2040?”, The Government Office for Science – Foresight, *Future of an ageing population: evidence review* 2015. See also: G. Leeson, N. Nanitashvili and M. Zaloznik, “Foresight Trends: Future of an Ageing Population”, *The Oxford Institute of Population Ageing*, 2016, 40-45.

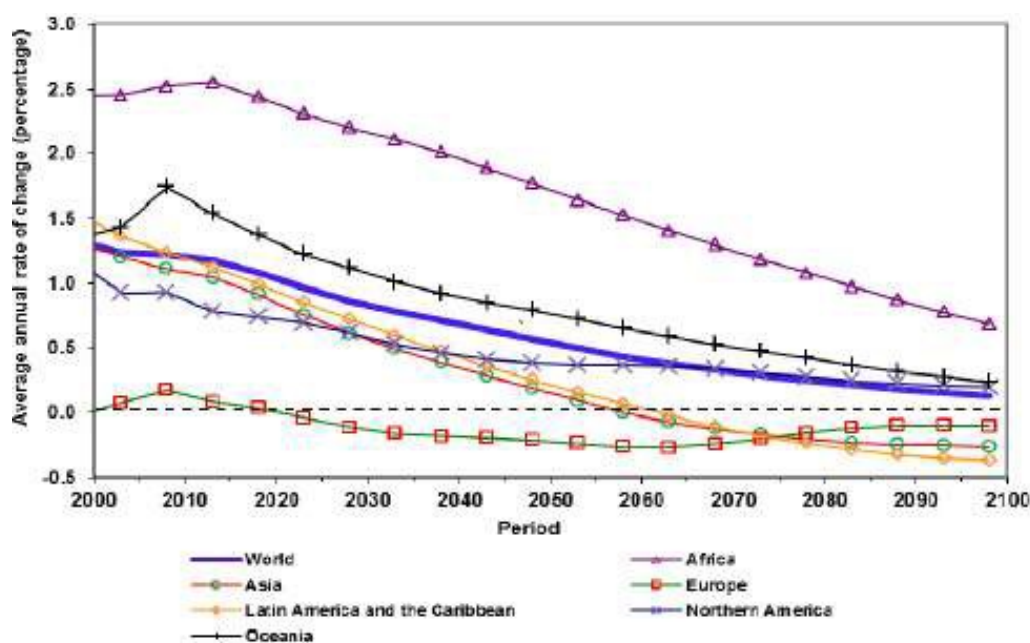
<sup>144</sup> E.g., see: ESPAS and Rand Europe, 2013, 20.



## 7.1. An ageing population: trends

Estimates in the United Nations' authoritative study 'World Population Prospects: The 2015 Revision'<sup>145</sup> put the world's population at 7.3 billion as of mid-2015. Of that group, 12 per cent – or approximately 901 million people – is 60 years of age or older. This segment of the global population is increasing at an annual rate of 3.26 per cent, making it the fastest growing population group on the planet. By 2050, and with the exception of Africa, nearly a quarter or more of the populace in all major areas in the world – 2.1 billion people globally - will consist of 'older' people. These trends will persist through the medium term: as older cohorts of the global population currently alive continue to grow older, an increase in the relative number of elderly people is an inevitability.

**Figure 5: Average annual rate of population change by major area, estimates, 2000-2015, and medium-variant projection, 2015-2100 (%)**<sup>146</sup>



The worldwide occurrence of ageing demographics is the result of two underlying drivers that together contribute to an increase in the proportion of people above a certain age: a decline in fertility, i.e. lower birth rates, and a rise in life expectancy. Thus, as absolute population growth decreases generally over time, there is a clear trend toward higher a proportion of older persons and smaller cohorts of younger people. Since rapid ageing is hence a global phenomenon, Europe too will

<sup>145</sup> For more detailed analyses and information in the current section see United Nations (UN) Department of Economic and Social Affairs – Population Division, 2015, *World Population Prospects – The 2015 Revision: Key Findings and Advance Tables*, UN Doc. ESA/P/WP.241, UN, New York, United States, 1-11 (hereinafter UN, *Key Findings and Advance Tables*, 2015. See also: United Nations (UN) Department of Economic and Social Affairs – Population Division, 2015, *World Population Prospects – The 2015 Revision, Volume II: Demographic Profiles*, UN Doc. ST/ESA/SER.A/380, UN, New York, United States (hereinafter UN, *World Population Prospects*, 2015).

<sup>146</sup> UN, *Key Findings and Advance Tables*, 2015, 3.



have to cope with a growing ageing population.<sup>147</sup> Currently an approximate 24 per cent of its population already comprises people aged 60 or above. That older population is estimated to reach 34 per cent by 2050 and 35 per cent by 2100.

Indeed, the median age in Europe, dividing its population into two halves and providing indications for ageing trends, is 42 years – already the oldest population in the world. Since European policymakers are aware of the large impact an ageing population will have on society – e.g., evidenced by ongoing reforms to national social security systems or fiscal measures in EU Member States – the next section will briefly cast light on a number of relevant considerations for entrepreneurship policy in general, and the labour market in particular, as also listed in the following figure.

**Figure 6: Summary of important trends and drivers of a growing and ageing population**<sup>148</sup>

TREND	DRIVERS	INDICATORS	EVIDENCE BASE (0/+/++/+++/-)	TIME HORIZON	OUTCOMES FOR THE EU	UNCERTAINTY (Low/Medium/High)
Global population growth (driven by middle-income and lower-income countries)	High fertility in developing world; declining mortality (due to medical improvements); empowerment of women and changing values	Fertility rates; life expectancy at birth; 'Ideal' family size across various countries	+++	Mid- to long-term (10–50 years)	Global strain on natural resources and food supplies; migration flows	low
Population ageing in high- and middle-income countries	Increased life expectancy; declining fertility (owing to economic, developmental and value-related factors)	Old-age dependency ratio; average life expectancy; healthcare costs as a proportion of GDP	+++	Short- to long-term (5–50 years)	Financing welfare state models with a shrinking workforce; managing healthcare and pension costs; challenges in provision of services (eg care of the elderly)	low
A youth bulge in parts of the developing world	Past high-fertility rates in the developing world; improving maternal and neonatal health; improved sanitation; declining under-five mortality; Declining prevalence of infectious diseases	Total fertility rate; birth rate; neonatal/child/under-five mortality rate; proportion of 15–24/total population; number of hospitals per 1000 capita; prevalence rates of infectious diseases (dysentery, malaria, etc.)	+++	Long-term	Effects of population growth on migration flows to the EU; possible societal unrest, or pressure for democratic reform; potential sources of radicalisation	low

### 7.1.1. Increased stress on institutions

The spectre of an ageing society looms over all high-income countries, many of them European, and the trends towards ageing appear likely to manifest there in four concrete ways: (i) higher absolute numbers of elderly people; (ii) higher relative proportions of elderly people<sup>149</sup>; (iii) longer life expectancy with longer health expectancy; and (iv) fewer individuals of working age - the notion of which might itself change along with the nature of work and a progressively healthier old age.<sup>150</sup> The structure of Europe's populace is thus bound to drastically change:

<sup>147</sup> E.g., see: United Nations (UN) Department of Economic and Social Affairs – Population Division, 2015, *World Population Ageing 2015, UN Doc. ST/ESA/SER.A/390*, UN, New York, United States, 12-13 (hereinafter UN, *World Population Ageing*, 2015).

<sup>148</sup> ESPAS and Rand Europe, 2013, 22.

<sup>149</sup> E.g., see: G. Leeson, N. Nanitashvili and M. Zaloznik, "Foresight Trends: Future of an Ageing Population", *The Oxford Institute of Population Ageing*, 2016, 19-22.

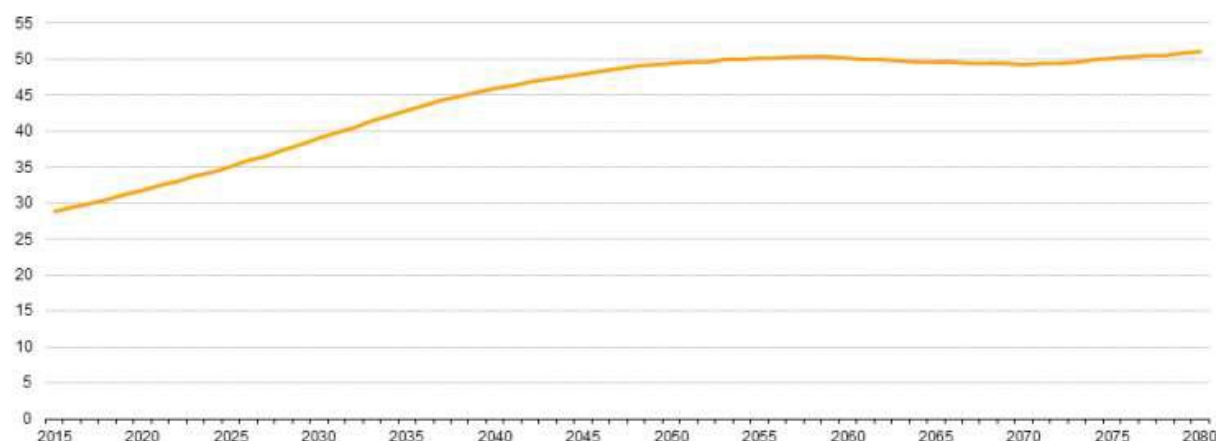
<sup>150</sup> See: ESPAS and Rand Europe, 2013, 17.

the proportion of people of working age in the EU-28 is shrinking while the relative number of those retired is expanding. The share of older persons in the total population will increase significantly in the coming decades, as a greater proportion of the post-war baby-boom generation reaches retirement. This will, in turn, lead to an increased burden on those of working age to provide for the social expenditure required by the ageing population for a range of related services [...] As a result of the population movement between age groups, the EU-28's **old-age dependency ratio** is projected to almost double from 28.8 % in 2015 to 51.0 % by 2080. The total age dependency ratio is projected to rise from 52.6 % in 2015 to 77.9 % by 2080<sup>151</sup> (emphasis added).

Within the context of FIRES, pension and welfare institutional reform might contribute to reduce this dependency. In concert with concurrent reform of financial and labour institutions, serving as a pillar of a comprehensive entrepreneurship policy, capitalised pension schemes could endow older cohorts with capital to support entrepreneurial activity, while providing a suitable income for themselves. Indeed, as the above trend on automation and its reliance on capital signals, the societal role of labour as the only source of income is bound to come increasingly under stress.

Overall, these demographic considerations are largely supported by the United Nations' more global projections, placing the number of workers per retired person in twenty-four European countries at fewer than three by 2050. As a result, existing social, fiscal and political institutions will come under significant stress in trying to provide adequate healthcare, social security and pension schemes.<sup>152</sup> The following two figures render the problem more visually clear for the EU by showing the forecasted percentage increase in the old-age dependency ratio up to 2080 (figure 7) and the size in percentages of age groups of men and women, in 2015 and forecasted for 2080 (figure 8).

**Figure 7: Projected old-age dependency ratio, EU-28, 2015-2080 (%)**<sup>153</sup>

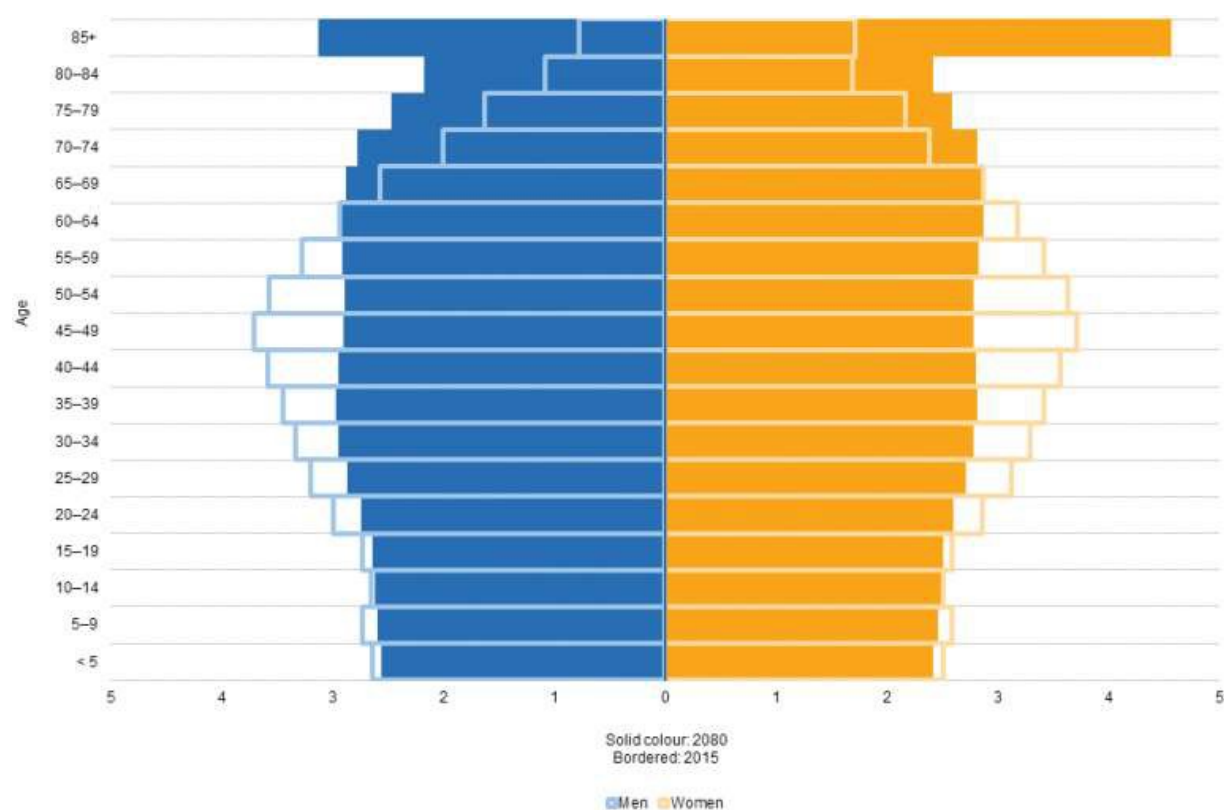


<sup>151</sup> For the quote and up-to-date statistics and projections, see : EUROSTAT, "Population structure and ageing", EUROSTAT, 2016, available at [http://ec.europa.eu/eurostat/statistics-explained/index.php/Population\\_structure\\_and\\_ageing](http://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing) (last accessed on 27 April 2017).

<sup>152</sup> E.g., see: UN, *Key Findings and Advance Tables*, 2015, 7.

<sup>153</sup> EUROSTAT, "Population structure and ageing", available at [http://ec.europa.eu/eurostat/statistics-explained/index.php/Population\\_structure\\_and\\_ageing](http://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing) (last accessed on 27 April 2017).

**Figure 8: Population pyramids, EU-28, 2015 and 2080 (% of the total population)**<sup>154</sup>



### 7.1.2. 'Demographic dividend' for younger regions

Ageing is projected to occur worldwide, but many regions currently house much younger populations and a larger percentage of children and youth than European countries. In sum, Africa, Latin America and the Caribbean, and Asia account for 1.7 billion children under the age of 15 and 1.1 billion young persons between the ages of 15 and 24. With the eventual projected decline in birth rates in these regions, the future proportion of their populations consisting of children will decrease, but the number of people in working-age groups will continue to grow for some time. Therefore, younger regions can expect a relatively high ratio of working persons, so-called 'youth bulges,' in strong contrast to the existing and growing trend of increasing old-age dependency ratios in high-income countries.

The result is a significant shift in the structure of the global working population. Youthful regions may then benefit from a 'demographic dividend',<sup>155</sup> whereby growing numbers of working-age persons may greatly increase their competitiveness and productivity in the global economy.<sup>156</sup> Importantly, these regions' economic and political institutions will need to ensure adequate conditions are

<sup>154</sup> EUROSTAT, "Population structure and ageing", available at [http://ec.europa.eu/eurostat/statistics-explained/index.php/Population\\_structure\\_and\\_ageing](http://ec.europa.eu/eurostat/statistics-explained/index.php/Population_structure_and_ageing) (last accessed on 27 April 2017).

<sup>155</sup> KPMG and Mowat Centre, 2014, 14.

<sup>156</sup> UN, *Key Findings and Advance Tables*, 2015, 7.

provided through, e.g., labour, education and health policies,<sup>157</sup> and opportunities are sufficiently widespread in order to preclude growing instability, which may in turn affect other regions. India is a striking example: over the next twenty years over a million young persons will enter the labour market on a monthly basis.<sup>158</sup>

In any case, it may be expected that large global economic migration streams, discussed below, will form in the wake of economic and demographic shifts, consisting of both skilled and unskilled workers and providing human capital that will be vital for the sustained economic development of high-income countries.<sup>159</sup> Indeed, EU policy will arguably have to develop incentives and the right atmosphere to attract inward migration of all types of workers, not just the unskilled, for which it will be in increasing competition with emerging economies or other developed countries. However, such migrant flows will not necessarily be unidirectional and will be diverse in their types and patterns. For example, the EU faces challenges in retaining its own highly skilled graduates and is losing them to the rest of the world in growing numbers,<sup>160</sup> exacerbating potential problems related to an already shrinking working-age population. In formulating future entrepreneurship policies, Europe could create more attractive conditions and increased productivity, with concomitant benefits, for the skilled and unskilled alike, from within the EU or without.

In order to stay competitive, moreover, the EU will have to offset the effects of its ageing populace and declining workforce by achieving increased productivity through other means,<sup>161</sup> such as taking full advantage of the aforementioned rapid technological advances and the genesis of a digital economy that “has the potential to deliver an inclusive connected progressive society. Realisation of this potential requires political awareness and skill, the ability to harness lessons learned, and viable collaborative approaches developed in the field in times of economic difficulty and unprecedented demographic shift.” Fundamental reforms to knowledge and educational institutions, congruent with those envisioned for an entrepreneurial society, could create an adaptable and flexible populace that can keep abreast of new developments. Arguably, the ultimate reward available to any nation taking this route is the achievement of widespread active participation of an increasingly older, but informed, population in, and the many benefits arising from, a progressively more digital society.<sup>162</sup>

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<sup>157</sup> E.g., see also: Oxford Martin Commission, 2013, 15.

<sup>158</sup> KPMG and Mowat Centre, 2014, 14.

<sup>159</sup> ESPAS and EUISS, 2012, 65.

<sup>160</sup> GFF, 2012, 29.

<sup>161</sup> T.R. Guay, *The Business Environment of Europe: Firms, Governments, and Institutions*, Cambridge, Cambridge University Press, 2014, 311-312.

<sup>162</sup> For quote and information, see: L. Damodaran and W. Olphert, “How are attitudes and behaviours to the ageing process changing in light of new media and new technology? How might these continue to evolve by 2025 and 2040?”, The Government Office for Science – Foresight, *Future of an ageing population: evidence review* 2015, 20.

### 7.1.3. The needs of a shifting labour force

As populations continue to age, the community of workers is becoming truly multigenerational and will span four generations.<sup>163</sup> An increasingly elderly workforce, together with longer working lives, will require careful attention by policymakers. This need is evidenced by labour participation and employment rates of older workers steadily growing in Europe, where elderly individuals more and more remain in the labour market into advanced age.<sup>164</sup> The comprehensive report by the UK Government Office for Science, entitled 'Future of an Ageing Population', lists four considerations especially relevant in this regard, which are reproduced from the report below for their relevance to the wider EU context<sup>165</sup>:

#### 1. Benefits of longer working lives

Longer working lives bring significant benefits to individuals, employers and wider society. Many of the benefits are non-financial, including cognitive and health benefits if work is appropriate in its nature.

#### 2. Variations in the length of working lives

Employment rates among older people vary across the population. The causes of these differences must be addressed to ensure [everyone] achieves the potential benefits of longer working lives.

#### 3. Removing barriers facing an ageing workforce

There are a range of adaptations and approaches to overcoming barriers to working longer and enhancing productivity in the ageing workforce including addressing negative attitudes, health needs, workplace design, technology and adaptations in HR policies and working practices. An important policy question is where the balance of costs lie between the state, employer and worker.

#### 4. Lifelong training, re-training and re-skilling

Longer careers, a more dynamic labour market and the impact of automation of jobs mean that lifetime learning and training will be essential to the future of an ageing workforce. If successful, this can help the [...] workforce, increase productivity and ensure people have higher levels of financial, social and mental capital going into later life. Failure will likely result in skills gaps at the same time as older people are leaving the labour market.

To be sure, calls to provide greater support for those working into older age are echoed by the World Economic Forum. An older labour force will arguably suffer from relatively higher levels of disability, if current paradigms and projections hold – alternatively, advances in, e.g., healthcare or health expectancy may limit a rise in the levels of disability among future ageing populations. In order to

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<sup>163</sup> Ernst and Young, 2015, 29.

<sup>164</sup> ESPAS and Rand Europe, 2013, 24.

<sup>165</sup> For the reproduced as well as additional information, see: The Government Office for Science – Foresight, 2016, *Future of an Ageing Population*, The Government Office for Science, London, UK, 28-41 (hereinafter UK Government Office for Science, *Future of an Ageing Population*, 2016).

prolong meaningful working lives, maintain productivity and activate elderly workers, suitable allowances will need to be implemented that provide for adapted working arrangements, such as designing work infrastructure or reducing work hours to suit the needs of elderly workers. Retirement, too, is hence likely to transform from a singular event into a process with subsequent stages of part-time or self-employment. Policymakers could help provide flexible incentive structures that, for example, entice ageing individuals to defer retirement, support the elderly in looking for work – including starting an entrepreneurial firm or business of their own - or allow for partial payments of pensions to part-time retirement workers.<sup>166</sup>

Such efforts may go some distance in alleviating the stress placed on social welfare institutions arising from an ageing populace and keep people active over longer timeframes. In a concrete sense, tapered retirement models<sup>167</sup> may be suitable to achieve this goal. They could allow for a gradual transition of workers' duties into alternative roles that are less labour-intensive. These models play to the ostensible strengths of older employees, such as mentorship, knowledge sharing,<sup>168</sup> decades of experience, or accumulated capital, that can help in making entrepreneurial activity in older age resilient and robust – e.g., higher probability of survival or increased growth and profit.

In sum, the nature of social protection frameworks will have to evolve together with the populations they serve so as to accommodate imminent demographic shifts. A transition to a more entrepreneurial society, including promotion of elderly entrepreneurship, dovetails with more general labour, welfare and knowledge institution considerations. Policymakers could strive to mobilize the entrepreneurial talent and untapped potential of elderly cohorts and craft institutions to leverage these with valuable knowledge and experience of older entrepreneurs. As part of a broader and widespread entrepreneurship policy, this could allow for a European system in which a diversity of individual needs, of young and old, can be catered to.

## 7.2. Mitigating the impact of an ageing population

### 7.2.1. Improving the existing workforce: lifelong learning and training

Touted by many of the selected studies as a crucial implication for policymakers, the aforementioned novel frameworks should emphasise lifelong training, retraining and reskilling, linked to social rights and benefits. They should engender a flexible workforce and a resilient labour market that: (i) can withstand future disruptions in demands for high- or low-skilled labour with concomitant risks of job

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<sup>166</sup> WEF, *The Global Risks Report*, 2017, 37-38.

<sup>167</sup> E.g., see: R.V. Dawis, "The Minnesota theory of work adjustment" in: S.D. BROWN and R.W. LENT (eds.), *Career development and counseling: putting theory and research to work*, Hoboken, John Wiley and Sons Inc., 2005, 3-23. See also: B. Hesketh, B. Griffin and V. Loh, "A Future-oriented Retirement Transition Adjustment Framework", *Journal of Vocational Behaviour* 2011, 303-314.

<sup>168</sup> CSIRO, 2012, 15.

polarisation in general;<sup>169</sup> and (ii) increases opportunities for an ageing population to participate as productive members of society in particular. In so doing, policymakers can match the evolving needs of individuals and stimulate entrepreneurship, while simultaneously extending a social safety net and active help in dynamically procuring work until later in life.<sup>170</sup> Although the modes, needs and nature of learning ostensibly differ from childhood, over midlife, to later in life, 'The Future of an Ageing Population' report, once again, underscores three general considerations that are equally important in a European context, as reproduced below<sup>171</sup>:

**1. Lifelong learning enhances mental capital and health**

Continuous learning throughout life can bring people a range of benefits. Education and training improve mental capital, which in turn increases resilience later in life. Learning can also help improve physical and mental health, reducing pressure on family and community resources.

**2. Increase financial and technological skills**

Financial and technological skills will be increasingly important as the population ages. Evidence shows that these skills can improve people's retirement savings and their work and health outcomes. However they are particularly problematic for older people to develop and maintain, so may require specific focus from policymakers.

**3. Barriers to participation in adult education**

Participation in organised adult learning is falling. Older people are currently less likely to receive workplace training or participate in adult education, and there are differences in participation across socio-economic groups, genders and ethnicities. Participation rates need to be increased to fully realise the benefits of lifelong learning.

Regarding barriers, important and interconnected institutional factors that might impede initiatives that aim to promote lifelong learning should not be overlooked within a European context. Firstly, there is a potential for geospatial mismatches between demand and delivery of training in Europe. Some regions may require high-level skills with regard to 'knowledge-based' service sectors, while others do not to the same extent or require different sets of training for other sectors. This may see higher concentrations of crucial training infrastructure in some areas with others lacking adequate access. Secondly, disparities are also rendered likely since learning and skills policies - as well as their relevant level of competent authorities - may differ significantly between EU Member States. In turn, this situation becomes even more complex due to varied groups of stakeholders, both public and private, forming new partnerships and novel entrepreneurial ventures, requiring tailored

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<sup>169</sup> E.g., see the comprehensive skill demand and supply forecasts by the European Centre for the Development of Vocational Training, available at <http://www.cedefop.europa.eu/en/events-and-projects/projects/forecasting-skill-demand-and-supply> (last accessed on 29 April 2017).

<sup>170</sup> E.g., see: WEF, *The Global Risks Report*, 2017, 38.

<sup>171</sup> UK Government Office for Science, *Future of an Ageing Population*, 2016, 42-49.



programmes and policies.<sup>172</sup> Proposals under FIRES should therefore strive to include mechanisms to contend with this great degree of ‘variable geometry’.

In that respect, and in the context of entrepreneurship in general - which is strongly linked to nurturing an ecosystem for SMEs in the EU - and for FIRES in particular, an ageing workforce may present SMEs and older self-employed individuals with relatively greater barriers to adequate retraining. Such entities might lack the necessary resources or scale to offer tailored infrastructure or much needed reskilling for older workers by themselves, or may suffer from inadequate access to support services to enhance their human capital.<sup>173</sup> As confirmed by the OECD, these specific considerations will grow in importance in Europe’s transition to a knowledge-based economy, which places a premium on intangible factors and services that are often dependent on up-to-date knowhow. Mechanisms to increase skills for SMEs should thus ideally evolve to be more decentralised and demand-driven: significant structural reforms will be needed to streamline interactions between competent local authorities and enterprises, as well as to increase the role and proximity of universities regarding SMEs’ reskilling needs and innovation processes.<sup>174</sup>

So too, questions will have to be answered by policymakers regarding, *inter alia*, the funding of and responsibility for lifelong training of older labour market participants or entrepreneurs, more often working part-time or in self-employment:

as the number of workers in non-standard work arrangements [...] continues to increase, one important issue confronting workers will be access to traditional workplace benefits such as training. [Such] workers will be less likely to receive structured company-sponsored training and the responsibility of continuous learning and job training will fall to a greater extent on the individual. It is not yet clear how to best develop and disseminate training programs to promote lifelong learning for these ‘non-traditional’ workers. This issue is especially pertinent for older workers, given that they are less likely to be provided with access to training and development programmes in traditional work environments where company-sponsored training is available.<sup>175</sup>

A notable example is found in Denmark, where active labour market policies, often referred to under the umbrella term ‘flexicurity’, are adapted to meeting the challenges of globalisation, while securing economic growth and guarantees for employment. The system incorporates flexible hiring and firing

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<sup>172</sup> M. Hyde and C. Phillipson, “How can lifelong learning, including continuous training within the labour market, be enabled and who will pay for this? Looking forward to 2025 and 2040 how this might evolve?”, The Government Office for Science – Foresight, *Future of an ageing population: evidence review* 2014, 21-22.

<sup>173</sup> See: UK Government Office for Science, *Future of an Ageing Population*, 2016, 39.

<sup>174</sup> E.g., see: Organisation for Economic Cooperation and Development (OECD), 2013, *Skills Development and Training in SMEs*, Local Economic and Employment Development (LEED), OECD Publishing, Paris, France, 3 and more generally throughout.

<sup>175</sup> See: S.J. Czaja and J. Sharit, “Preparing organizations and older workers for current and future employment. Training and retraining issues” in S.J. Czaja and J. Sharit (eds.), *Ageing and Work. Issues and Implications in a Changing Landscape*, Baltimore, John Hopkins University Press, 2009, 259–278.



regulations with guaranteed unemployment benefits, as well as policies that actively guide all unemployed workers to education and new jobs. As a result, ‘flexicurity’ promotes employment security over job security – approximately 25% of Danish workers in the private sector annually change jobs – and this provides employers with a dynamic workforce while offering a substantial social safety net and reskilling opportunities to the unemployed. To be sure, principles of flexicurity already informed European policies in implementing the Lisbon Strategy for Growth and Jobs.<sup>176</sup> Likewise, best practices distilled from these policies may be worthwhile to bolster proposals under the FIRES project that aim to instigate productive and innovative entrepreneurship across the EU.

### 7.2.2. Filling labour gaps: migration?

#### A Politically sensitive climate

Faced with an ageing population and the growing stresses placed on society by increasing old-age dependency ratios, potential solutions that remain available to European policymakers are limited and largely unappealing across the board.<sup>177</sup> an increase in taxation to support existing systems is likely to be unfavourable in light of already heavy tax burdens across Europe; a reduction in social benefits, including pensions and healthcare, appears equally unlikely to find wide support with Member States’ citizens. The same is ostensibly true for increasing the age of retirement and requiring all citizens to work into older age without having, e.g., an individual choice in the matter. Although such changes appear necessary, as mentioned in the previous sections, they will be hard-fought and will likely be protracted political affairs.

A fourth option to deal with demographic change, which seems inevitable by its necessity, is expanding the pool of non-native populations to supplement Europe’s dwindling labour force - either through expanding the boundaries of the EU or through allowing more extensive immigration flows<sup>178</sup>. Here too, both options are highly politically sensitive for a variety of reasons. On the one hand, and except for countries such as Iceland, Serbia or Montenegro, further eastward expansion - e.g., towards Turkey or other countries - appears unlikely in the current political climate. On the other hand, **immigration** from countries outside of the EU Member States is, perhaps, an even more politically sensitive issue. Growing sentiments based on aversion to certain religious and cultural issues, claims of non-assimilation and fears of job loss by native-born citizens are already stoking anti-foreigner attitudes and fuelling a rise in far-right political movements across Europe.<sup>179</sup>

<sup>176</sup> Government of Denmark, “Flexicurity”, *Denmark: the official website of Denmark*, available at <http://denmark.dk/en/society/welfare/flexicurity> (last accessed 27 April 2017).

<sup>177</sup> See: T.R. Guay, *The Business Environment of Europe: Firms, Governments, and Institutions*, Cambridge, Cambridge University Press, 2014, 323.

<sup>178</sup> “The most important traditional drivers of migration – the differences in economic opportunity and/or personal security between source and destination countries – will be increasingly complemented by differences in dependency ratios that encourage changes in immigration policy in many host countries. Climate change may also have more of an influence on future migration flows.” ESPAS and EUISS, 2012, 66. See also: GFF, 2012, 29.

<sup>179</sup> T.R. Guay, *The Business Environment of Europe: Firms, Governments, and Institutions*, Cambridge, Cambridge University Press, 2014, 313-314.

Evidently, divergences in national immigration policies, exacerbated by political sensitivities or otherwise, will only amplify difficulties in achieving EU-wide reforms under FIRES which will also have to account for migration reform.

Indeed, migration is likely to be a necessary tool to complement Europe's workforce, as will be shown in the next sections. Nevertheless, comprehensive entrepreneurship policy reform as envisioned in FIRES may, at the same time, be an optimal route to achieving much needed acceptance of migration policies or a more inclusive and open societal environment. Within a more entrepreneurial Europe, entrepreneurship could be a way by which newcomers find their role in receiving societies. A self-reinforcing policy constellation could be developed wherein promoting entrepreneurship throughout society can foster integration and in which increasing numbers of thus integrated immigrants, in turn, contribute to stoking the entrepreneurial fire of Europe.

## **B Migration, ageing workforce and innovation**

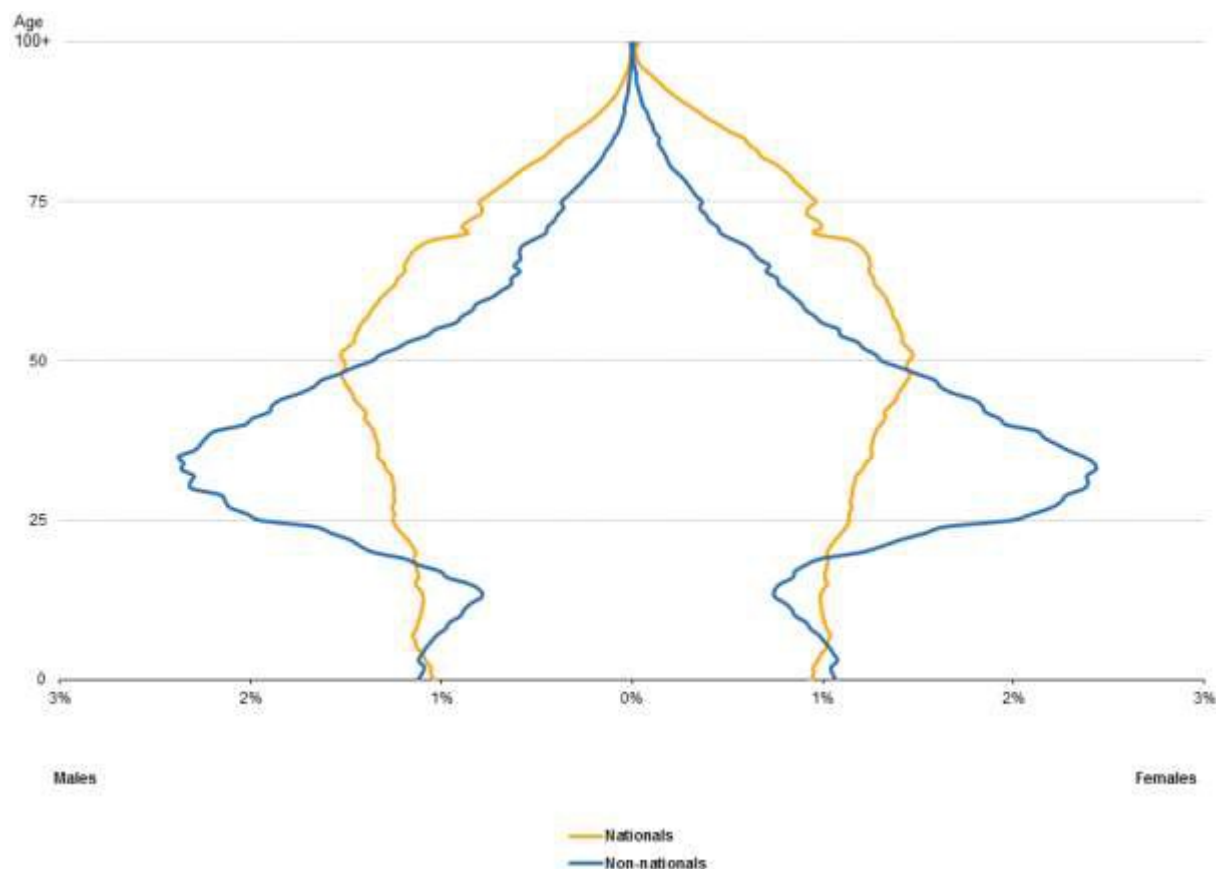
Putting political considerations aside momentarily, "in destination countries, international migration may be used as a tool to solve specific labour market shortages." In concrete terms, EUROSTAT data show that as of 1 January 2016, 35.1 million people born outside of the EU-28 were living in an EU Member State. More important with respect to ageing demographics, is the fact that immigrants into or within the EU are much younger than the total existing populations in their destination countries, as shown in Figure 9, below.

Compare, for example, the median age of the EU-28's total population, at 42.6 years of age, with the median age of immigrants of 27.5 years for results stretching a period over 2015 and 2016. Although this supports arguments that more comprehensive and flexible immigration policies – which could be fostered by concurrent European entrepreneurship policies - can help to alleviate some of its problems through rejuvenation and absolute population growth, the old-age conundrum will likely persist, for "migration alone will almost certainly not reverse the ongoing trend of population ageing experienced in many parts of the EU."<sup>180</sup>

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<sup>180</sup> For the relevant quotes and data in the two current paragraphs, see: EUROSTAT, "Migration and migrant population statistics", available at [http://ec.europa.eu/eurostat/statistics-explained/index.php/Migration\\_and\\_migrant\\_population\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Migration_and_migrant_population_statistics) (last accessed on 29 April 2017).

**Figure 9: Age structure of the national and non-national populations, EU-28, 1 January 2016 (%)**<sup>181</sup>



More specifically, framing migration in an inclusive and entrepreneurial environment can also enable innovation and, consequently, the widespread and diverse entrepreneurial ventures that form part and parcel of FIRES' aims of an entrepreneurial society that is also an open society. Although the EU's single market might already facilitate many of these findings, the OECD underscores in its report on future productivity that migration, in general, enhances diffusion and can propel innovation through various mechanisms. For example, diversity in birthplaces contributes to larger variety in abilities and knowledge, thereby stimulating innovation. Observed effects of migration flows of scientists, meanwhile, refute traditional zero-sum notions of 'brain drain/gain' presumably engendered by migration. Instead, knowledge flows exhibit circular features that might positively impact collaboration and cutting-edge research when enhanced by spatial proximity of origin countries, established service trade, shared language, and congruence in specialisation in scientific subjects. Conversely, these stimulating effects may be hindered by visa restrictions or similar barriers to migration flows.<sup>182</sup>

<sup>181</sup> EUROSTAT, "Migration and migrant population statistics", available at [http://ec.europa.eu/eurostat/statistics-explained/index.php/Migration\\_and\\_migrant\\_population\\_statistics](http://ec.europa.eu/eurostat/statistics-explained/index.php/Migration_and_migrant_population_statistics) (last accessed on 29 April 2017).

<sup>182</sup> See: OECD, *The Future of Productivity*, 2015, 48.

## C An effective European migration strategy

Even as a partial measure, immigration may not be an automatic ‘trump card’ to be used at policymakers’ discretion. As indicated by ESPAS,<sup>183</sup> it is not at all certain whether the EU will remain an attractive proposition for migrants in the future. Highly-skilled economic migrants, arguably essential for a knowledge-based economy, may react unfavourably to real or perceived European policy barriers or the ongoing effects of economic recession, including those in EU Member States. Rather, they might gravitate towards regimes in other developed countries or emerging economies which they consider to be more welcoming or opportune. Therefore, a fundamental and pan-European reframing of policies appears necessary to ensure a carefully tailored migration strategy that is both economically sustainable and humane in its approach.<sup>184</sup> Figure 10 provides an additional summary of trends and drivers that should be addressed by such a strategy. In particular, it underscores the certain need to advance new frameworks for integration and to create an attractive climate for arrivals hailing from a diverse range of migration types and patterns. As mentioned, a transition to an entrepreneurial society could contribute to equip Europe with precisely those tools.

**Figure 10: Summary of important trends and drivers of migration**<sup>185</sup>

TREND	DRIVERS	INDICATORS	EVIDENCE BASE (0/+/++/+++/-)	TIME HORIZON	OUTCOMES FOR THE EU	UNCERTAINTY (Low/Medium/High)
Continued diversity in types and patterns of migration	Personal motivations; social networks; structural factors in both sending and receiving countries (economic opportunities, demography, policies, rights and liberties, integration climate, conflict, environmental conditions, etc)	Migrant status (legal and undocumented)	+++	Short- and long-term	Wide range of migrant types and routes; positively integrating diverse flows in European society?	medium
Integration will be increasingly important, both for new migrants and second-generation communities	Attitudes towards migrants; policy structures in receiving country; labour market structure and conditions; education system; residential distribution of migrants	Unemployment rates, political rights, work force participation and education levels as compared to native populations	+++	Short- and long-term	Integration and social acceptance of migration; attracting skilled migrants; improving the labour market and education outcomes of migrants and their children; discrimination and aggression against migrants; (perceived) well being and livelihood of deprived neighbourhoods	low
The attractiveness of migrants’ receiving climates will help determine the future of international migration trends in Europe	Systemic policies (labour, health, etc); openness of migration policies (both real and perceived); integration climate; economic conditions; employment opportunities	Migration flows to Europe as opposed to other major destinations (ie US, Canada, Australia), particularly among high-skilled migrants with greater choice	++	Mid- to long-term	Supporting the ‘right’ types of migration; competing with other international destinations, accounting for short- and long-term considerations; skills gap; encouraging integration climates	medium

Finally, an effective European migration strategy would also include goals pertaining to increased stability, prosperity and security for all, and is likely to be assessed by a number of criteria, such as the rate of immigration flows, the security and protection of the EU’s borders, the ability of migration to contribute positively to economic growth, the success of promoting integration, tackling root causes of ongoing refugee crises, or the fulfilment of international obligations arising from, e.g., international humanitarian law. In conclusion, then, “the challenge is complex, and has economic, social and geopolitical dimensions. Policies on migration will overlap policies in many other areas.

<sup>183</sup> ESPAS and Rand Europe, 2013, 31.

<sup>184</sup> ESPAS, 2015, 9.

<sup>185</sup> ESPAS and Rand Europe, 2013, 32-33.

This points to a need for strategic policy packages, and for broad agreement on the division of labour, burden sharing, and distribution of competences across EU institutions, Member States, and other relevant bodies.”<sup>186</sup> Therefore, any comprehensive reforms undertaken with regard to knowledge, financial and labour institutions to shift to a more entrepreneurial society could - and should - integrate these complex and varied dimensions in accomplishing their goal of making Europe more resilient, future-proof and inclusive.

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<sup>186</sup> European Parliamentary Research Service (EPRS) – Global Trends Unit, 2016, *Migration and the EU: A long-term perspective*, EPRS – Global Trends Unit, European Union, Brussels, Belgium, 6.

## 8. The need for institutional reforms in reviewed literature: a preliminary assessment

The previous sections already contain salient implications and recommendations for proposed reforms under the FIRES project. More holistic review reveals, additionally, that institutional reforms are generally encouraged or even deemed imperative by many of the selected studies on megatrends, despite their diffuseness in methodology or terminology. In simple terms, the studies appear to go towards the view “that ‘business as usual’ is no longer a viable development path for Europe,”<sup>187</sup> or as put succinctly by the Oxford Martin Commission for Future Generations: “20th century structures and institutions are poorly equipped for 21<sup>st</sup> century challenges, and suffer from legitimacy, authority and effectiveness deficits.”<sup>188</sup>

Almost invariably, the large challenges presented by megatrends are simultaneously cast as great opportunities for renewal and innovation across nearly all sectors of society. This short final section therefore contains the identification of areas with relevance to FIRES that require new and innovative policies or reformed institutions according to the selected studies – with a redundant focus on chosen megatrends to justify their more detailed analysis in this report. Simultaneously, it highlights, as a final layer of precaution, the complex and multifaceted interrelations between various megatrends and the necessarily multidimensional, overlapping nature of policies that wish to harness them.

According to the Oxford Martin Commission, key megatrends impacting the **labour market** are **globalisation** and **automation** – or, more generally, technological **innovations** – since “many manufacturing activities, along with other key supply chain activities, have moved to emerging economies. Labour-saving technologies are rendering an increasing number of jobs obsolete [and] technological innovation has driven down demand for low and medium skill labour,” however, simply “protecting jobs in areas being replaced by technology is not a viable long-term solution.”<sup>189</sup>

Compounding these effects, according to a study by the European Strategy and Policy Analysis System (ESPAS) and Rand, is the reality of “a **shrinking and ageing workforce** [that] will also have considerable consequences on the composition of EU labour markets and, by extension, **employment policy**”<sup>190</sup> (emphasis added). More precisely, the Global Futures Foresight (GFF) study projects “the EU labour force is going to rise slightly until 2020 as more women are joining the workforce, but after that a decline of almost 12 percent will be recorded by 2060. The EU labour force will decline by around 68 million workers by mid-century if trends persist.”<sup>191</sup>

At the nexus between technological **innovation** and an **ageing workforce**, another challenge presents itself as “an older workforce may be less able to learn and adapt to changes in innovation

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<sup>187</sup> EEA, *Extended Background Analysis*, 2015, 6.

<sup>188</sup> Oxford Martin Commission, 2013, 44.

<sup>189</sup> *Ibid.*, 24.

<sup>190</sup> ESPAS and Rand Europe, 2013, 81.

<sup>191</sup> GFF, 2012, 76.

and technology.”<sup>192</sup> At the same time, future investment in technology is touted as crucial “not only to generate higher-value economic growth, but also to help Europe overcome the challenge of a shrinking and ageing workforce.”<sup>193</sup>

Additionally, “economic models and political systems built upon a desire for ‘full employment’ may require revision”<sup>194</sup> as a more fluid view of **employment** develops, wherein people expect to partake in a **portfolio of activities**, including paid and unpaid employment (e.g. internships, volunteering, care for children or the elderly). In turn, that development “may lead to a different view on economic output and performance generated by the workforce, and shift tax and regulatory burdens away from labour in order to facilitate an inclusive, productive and flexible workforce fit for this century.”<sup>195</sup>

This apparent paradigm shift is also predicted by the Dutch Consultative Committee of Sector Councils (COS) in their future oriented policy report on The Netherlands area: “The pattern of life is changing. Various phases of life such as work and learning are becoming more interwoven. Stacking studies, jobs and relationships is becoming more normal. To what extent will this continue as our life expectancy rises? More and more people will have to follow a non-linear career path and the labor value of youth will change. If the education system doesn’t follow these trends and, for example, offer differentiated studies in a more flexible manner, we might see problems in both education and the labor market.”<sup>196</sup>

To be sure, these **labour** trends coincide with the cited necessity of a revised future view on **education and training** throughout the EU. ESPAS states: “Notwithstanding massive budgets in nations and regions, important skill mismatches, digital illiteracy and early school dropout persist, resulting in the exclusion of many young or aged workers from the labour market. Inadequate linguistic training remains a brake on labour mobility. Lasting excellence and participation of all in the labour force should become the main objectives of education and life-long training.”<sup>197</sup>

On the one hand, the Oxford Martin Commission adds that technological **innovation** will impact **educational requirements**, “as demand for employees to reskill quickly to keep pace with technological change continues.”<sup>198</sup> On the other hand, advances in **digital technology** also appear to have a large future impact on **educational opportunities**. According to ESPAS and Rand, the “trends in technology and informal systems have improved the accessibility of education. Online courses and distance learning will reduce the need to be physically located near the education institution, offering low-cost opportunities for high-quality education to students in developing countries or

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<sup>192</sup> ESPAS and Rand Europe, 2013, 75.

<sup>193</sup> ESPAS, Chatham House and FRIDE, 2013, 82.

<sup>194</sup> Oxford Martin Commission, 2013, 24.

<sup>195</sup> Ibid., 24-25.

<sup>196</sup> COS, 2008, 24.

<sup>197</sup> ESPAS, 2015, 78.

<sup>198</sup> Oxford Martin Commission, 2013, 24.



remote areas,” while “a revolution in teaching and learning methods, monitoring performance and providing access is looming for the education sector.”<sup>199</sup>

To stem the coming tide of, for example, an **ageing workforce**, technological **innovation**, **globalised competition**, or **job loss** and **economic stagnation**, a focus on renewed policies on **entrepreneurship** comes to the fore across many of the selected studies. These considerations dovetail with arguments for comprehensive institutional reforms to foster entrepreneurship: “the crucial role of entrepreneurs to foster growth and job creation should be encouraged. The risk-averse cultures still found in many parts of Europe hamper this role. Many countries on the continent are considered bureaucratic and unforgiving for risk-takers if they fail. The conditions need to be created that embrace innovation and harness technological progress to the needs of economic and social life, education and teaching at the heart of an innovation-based entrepreneurial society.”<sup>200</sup>

Opposite an **ageing populace** and its relationship with **technological advances**, is the assessment by Ernst and Young (EY) that “the face of entrepreneurship is also changing — across the world, entrepreneurs are increasingly young and/or female,” and that “many of these new enterprises are digital from birth.”<sup>201</sup> Meanwhile, **education** intersects with **entrepreneurship** through a “boom in entrepreneurial education”<sup>202</sup> over the past four decades. Concomitantly, the direction of **investment flows** towards the creation of high-value-added goods and services is also essential with respect to disruptive technological change, as “the potential for horizon technologies to reshape the economic and social landscape has significant implications for EU innovation policy, market regulation and education.”<sup>203</sup>

To be sure, **financial** reforms appear necessary as “access to funding remains the primary obstacle for entrepreneurs from all markets. The public and private sector each have an important role to play in creating entrepreneurial ecosystems that, in addition to funding, are essential to promoting entrepreneurial success.”<sup>204</sup> To partially address that problem, envisioned policies are deemed necessary so as to create “a range of mechanisms and institutions to provide entrepreneurs with financing options,”<sup>205</sup> in addition to “mentoring, tax incentives and a reduction in red tape.”<sup>206</sup> One study adds that “to bolster innovation in high-value manufacturing and services to achieve sufficient scale and scope, European investment in R&D will need to rise towards the 3% of GDP envisaged by the **Europe 2020 strategy**”<sup>207</sup> (emphasis added).

More concretely, another study emphasizes the necessity of “an alliance of public and private **investments** that would attract private savings, stimulate job-creation and sustain the European

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<sup>199</sup> ESPAS and Rand Europe, 2013, 83.

<sup>200</sup> ESPAS, 2015, 58.

<sup>201</sup> Ernst and Young, 2015, 4.

<sup>202</sup> Ibid., 18.

<sup>203</sup> ESPAS, Chatham House and FRIDE, 2013, 82.

<sup>204</sup> Ernst and Young, 2015, 4.

<sup>205</sup> Ibid., 21.

<sup>206</sup> Ibid., 18.

<sup>207</sup> ESPAS, Chatham House and FRIDE, 2013, 83.



social market economy” (emphasis added), while adding that **regulatory and institutional reforms** are necessary because “analysts see two main causes for the shortage of investment: the growing importance of the financial sector and the lure of short-term profit.”<sup>208</sup> Entering an **ageing populace** into the investment equation, reveals another area of challenge and opportunity, through the “substantial build-up in savings that will have to be invested in the European economy and elsewhere. However, with ageing populations in most of the emerging economies, the European Union will not be able to benefit fully from its savings by investing abroad, as Japan did when emerging countries were booming economically.”<sup>209</sup> Consequently, a dual strategy is envisaged to stymie possible negative impacts that entails (i) **structural reform** in order to develop profitable **investment** opportunities within the European economy and (ii) economic partnerships with trade partners to guarantee **foreign direct investment** channels for European businesses.<sup>210</sup>

With regard to specific aims in the FIRES project, **financial institutions** could be remolded to make sure accumulated capital finds its way to European citizens, young and old, undertaking decentralized entrepreneurial ventures and contributes to entrepreneurship and innovation across sectors and spheres. Reform of **knowledge institutions** can engender widespread sharing of information, best practices, training and innovative processes to ensure necessary knowledge is disseminated, at all levels and across age groups, to help entrepreneurs succeed. **Labour institutions** can be reshaped so as to conform to a new reality wherein employment paradigms are bound to change in a drastic way, by instituting a framework enabling Europeans to take up creative and flexible modes of entrepreneurship - even into old age or when hailing from outside of Europe. Those who were employees in traditional labour market relationships under the status quo, can be increasingly self-reliant and independent entrepreneurs who support a diversified and inclusive European society that thrives on innovation. Indeed, by setting their sights on an Entrepreneurial Europe, policymakers can make a future-proof and flexible European economy that is resilient in the global, regional and local domain - whatever may come.

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<sup>208</sup> ESPAS, 2015, 53.

<sup>209</sup> *Ibid.*, 51.

<sup>210</sup> *Ibid.*

## 9. Conclusion

Megatrends analysis may lack a stringent and shared theoretical framework or terminology. Yet, as became evident from a literature review spanning the most relevant megatrends studies, those attempting to identify the strands of global exogenous change agree the impacts on society will be pervasive and significant – even if the nature of the latter may vary from ‘negative’ to ‘positive’ according to the analyst’s qualitative perspective. However, forecasts are not set in stone, so neither should policy enable rigid and ossified frameworks. Instead, policymakers should strive to lay solid institutional foundations of a flexible society in which adaptability and inclusiveness are grounds for growth, whatever may come. What might at first appear to be a tidal wave of negative effects in the wake of any megatrend, could then be channeled into opportunities for reform and success in the future.

Such a view underlies the aims of the FIRES project: an entrepreneurial society is a flexible society that can roll with the punches. The promotion of entrepreneurship as a high-level priority for European policymakers stands out as a way in which to ensure Europe’s society and economy can adapt to the effects of many foreseeable and unforeseeable future trends with large impacts, be they ‘positive’ or ‘negative’. Therein lies part of the value of promoting a society rendered more flexible by the rekindled entrepreneurial spirit of its citizens. In this way, Europe can reform itself to withstand the detrimental effects of the coming tide of change, while positioning itself to gain – and create – the many beneficial opportunities that will arise.

Indeed, the above report shows there is a considerable need to transform European institutions, in any case and along myriad vectors, to accommodate the future. Since they intersect clearly on the level of institutional reform, both teleologically and pragmatically - and as shown by way of the examples of megatrends related to technology and demographic ageing - forward-looking proposals aiming to reform institutions to transform Europe into an entrepreneurial society can allow policymakers to integrate these varied considerations into a coherent and adaptive economic and societal system. Promoting a fundamental but cognisant shift among its citizens from ‘European workers’ to ‘European entrepreneurs’, will not only increase Europe’s resilience to coming megachange without sacrificing its historical progress. It can also engender an open economy that encourages productive contributions by older persons and immigrants hailing from outside of Europe, or by people whose present jobs are likely to disappear due to technological developments. Therefore, financial and institutional reforms to build an entrepreneurial society appear to be financial and institutional reforms for a strong Europe of the future.

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