THE FUTURE IMAGINED: EXPLORING UTOPIA AND DYSTOPIA IN POPULAR ART AS A MEANS OF UNDERSTANDING TODAY'S CHALLENGES AND TOMORROW'S OPTIONS

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Abstract

The European Union is exploring the future through the lens of Grand Societal Challenges (GSCs). As part of the EU funded project 'Forward Looking Analysis of Grand Societal Challenges and Innovative Policies' (FLAGSHIP) we take an innovative interdisciplinary approach to the analysis and critique of the way Europe's GSCs have been framed, by inquiring into how the detailed qualitative content analysis of popular art can enrich the interpretation and the underlying problem definition of GSCs, and hence the search for solutions for a 'better future'. Popular art provides materials for thinking about the paradoxes of progress, the transformations in the main future societal challenges and the transformations of the future that will be brought about by science and technology. Filmic and literary representations are means of transmitting cultural codes and values, thus they reflect cultures and ideologies of specific historical moments and societies. They provide alternative perspectives of the central challenges of future societies. Therefore aim is to ask: 1) What concerns and challenges are envisaged in popular art texts that engage with the notion of future? 2) How are these concerns and challenges framed and how do they enrich our understanding of the GSCs identified for today's societies? 3) What are the predominant differences and what do they reveal of today's framing of GSCs? The inquiry involves the selection of 64 between novels and movies produced over the last 150 years. A detailed analytical framework is defined in order to carry out a content analysis of these items that can reveal how GSCs have been problematized in popular art. The analysis of the detailed records for each film and novel reveals the importance of long-lasting concerns and cultural formations contained in utopias and dystopias, and their complex intermixing; and the presence of major, archetypal visions of the future and of popular paradigms of the future which may constrain our imagination. It suggests that the EU definition of GSCs gives far less attention to the dimension of values, hope and purpose of life, compared to what is imagined in popular art's envisioning of possible or desirable futures. The analysis concludes with a discussion about the tension between imagination and archetypal ways of thinking about the future, and how to rethink some of EU's GSCs.

Keywords: Future, Fiction, Imagination, Grand Societal Challenges, FLAGSHIP

1) Introduction

The way problems and challenges for the future are framed determines – to a large extent – what and how we search for answers and solutions, and what we decide to

prioritise (including in terms of public and private funding for research and policy implementation). Today's historical context of multiple, interrelated, crises underpins a widespread concern, curiosity and interest about the future, and provides the backdrop to the European funded project on forward looking analysis (FLA): *Forward Looking Analysis of Grand Societal Challenges and Innovative Policies* (FLAGSHIP).[1] As a contribution to FLAGSHIP, this specific inquiry explores the notion of future challenges through the comparison of how they are being framed in the European Union's evolving discourse on Grand Societal Challenges (GSCs) (EC 2007)[2], and by popular art in the form of fiction devoted to the future (science fiction, speculative and creative fiction). It asks: What kind of concerns and challenges are envisaged in popular art texts engaging with the notion of future? How are these concerns and challenges framed and how do they enrich our understanding of the GSCs identified for today's societies? Are there significant differences in the way art and GSC policies frame humanity's concerns and challenges when thinking about the future? If yes, what do such differences reveal of current GSC policies?

1.1) Fiction, future visions and forward-looking techniques

Outside the more traditional and techno-scientific fields of FLA, cinema and literature offer ways embodying, telling, imagining, and symbolising 'futures' that can provide alternative views of how the main challenges facing societies in the present and into the future are being understood and framed. Popular art, in the form of fiction draws on the desire to reflect upon the past and present by imagining more or less plausible futures – often resulting from the extrapolation of tendencies and trends in the artists' social, environmental and economic context. The texts of popular art, which in our study arise from both novels and films, can offer a form of social and historical critique through their analysis of social structure, power, politics, and agency.

Filmic and literary representations are means of transmitting cultural codes and values, thus they reflect cultures and ideologies of specific historical moments and societies. "*[They] not only provide a conveniently simple model for describing the general direction of society, but at the same time, they supply a frame-work for*

[1] www.flagship-project.eu
[2] Most recently defined here: http://ec.europa.eu/programmes/horizon2020/en/h2020-section/societal-challenges

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understanding historical and current event." (Clardy, 2011:44). Literature and cinema are excellent means to convey future visions that more theoretical approaches wouldn't be able to do, exactly because of their narrative configuration (Ricoeur, 1990). The narrative allows engaging of the reader/viewer and, simultaneously, provides a very detailed way of looking in to reality: "*A gifted writer can make an alternative future and its inhabitants live for us. In conversations with those characters we can experience meaningful insights into our construction of the present and our thoughts about the future*." (Schultz, 1995:14).

Narrative can also be propaedeutic to ethics because it presents imaginary and plausible situations in which we can imagine ourselves facing dilemmas, options, and possible answers. Literature and cinema about the future takes this dimension in to yet another level, allowing us to envision possible solutions when facing adverse scenarios (Ricoeur, 1990).

In terms of traditional scenario building, what would then be the place for imaginary fiction? Can imaginary discourse be considered as an innovative input to FLAs? Methods intended to examine the future include three main approaches: predictive techniques (a more quantitative approach) inquiring about future scenarios through calculation tools, based in the information we have now; exploratory techniques, envision what future will be like, by extending into the future the present trends, and normative procedures, designing more desirable futures and conceiving the best ways to achieve them. Artistic discourse can contribute in predicting and exploring potential risks, identifying warning signals, and it can also identify promises and threats in normative terms, harnessing the capacity for imagination and speculation beyond reason and instrumental analyses. As Ogilvy & Schwartz argue,

> "Scenarios are narratives of alternative environments in which today's decisions may be played out. They are not predictions. Nor are they strategies. Instead they are more like *hypotheses of different futures specifically designed to highlight the risks and opportunities involved in specific strategic issues*" (Ogilvy & Schwartz, 2004: 1).

In fact, imaginary fiction embodies simultaneously a warning dimension, representing future risks, by taking things to an extreme form, and an innovative potentiality, allowing us to visualize alternative scenarios, towards more desirable futures. Imaginary fiction allows us to be in power of a vision that panoptic visions of research and planning cannot provide: speculative fiction "*gives us, often divergent, images, options, arenas of possibility that lie beyond reason and instrumental analysis… and*

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feed our capacities for speculation, imagination and social innovation" (Collie, 2011: 425). By providing a detailed picture of the type of future being envisioned, these narratives can form collective imaginaries, and can provide alternative meaningful visions able to support policy making, or to help question assumptions and ideals of progress and underpinning future scenarios. As Booker states, "imaginative literature is one of the most important means by which any culture can investigate new ways of defining itself and of exploring alternatives to the social and political status quo." (Booker, 1994:3).

1.2) Future, progress and Grand Societal Challenges

Crucially for this inquiry, fiction can help us to think about the transformations implicit in GSCs discourses, and the potential paradoxes of ideas of progress driving both the framing of the challenge (and problem definition), and the choices of policy solutions for a better future. By identifying a range of films and novels that have had a significant impact on how we imagine the future, we can explore how these imaginary futures can help to reshape frames, allowing us to see 'other' major trends, paradoxes and emerging issues, that can further enrich policy-making, namely by (re)establishing priorities, as is traditional in scenario building (Schultz, 1995). The aim is to see how fiction can provide alternative frames and understandings to enrich the so called-GSCs of the 21st century (Boden et al 2010a-b; EC 2012: 15ss)(EC 2010) and the resulting rationale and agendas for the European Research Area (ERA) and Horizon 2020 (see footnote 2).

The Grand Societal Challenges (GSCs) or Grand Challenges (GCs) approach is widely referred to in European policy making and is one of the principles guiding ERA and Horizon 2020. This approach has been developing over the last decade, marked by a Green Paper (*The European Research Area: New Perspectives*), adopted by the Commission on 04 April 2007, (EC 2007) identified six 'ERA dimensions', and subsequent shift to make ERA meaningful and relevant to Europe's citizens and political leaders:

> 'The proposal we make is to focus continued effort on ERA by engaging with a series of Grand Challenges that capture the political and public imagination and connecting ERA with these challenges… These challenges are both economic and more broadly concerned with social and environmental goals. This approach can shift perceptions as well as focus from deficit to opportunity' (EC 2008: 5, 36).

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The identification of GSCs for the future of Europe came from the work of the Bureau of European Policy Advisors of the European Commission (BEPA), with contributions from institutes including the Joint Research Centre-Institute for Prospective Technological Studies (JRC-IPTS). The aim was to map the 'main trends ahead and possible disruptive global challenges in the future and to examine how the EU could position itself to take an active role in shaping a response to them', adapting to situations before they occur and, crucially, to be able to 'shape the future' (Boden *et al.* 2010: 1). More contributions came from research projects such as iKnow, an FP7 project aimed at 'interconnecting Knowledge on issues and development potentially shaking or shaping the future of science, technology and innovation (STI) in Europe and the world' (Ravetz *et al.* 2011: 9), which proposed 21 Grand Challenges resulting from extensive discussions by iKnow partners with science, technology and innovation policy expertise. Finally, the new research agenda for ERA, known as Horizon 2020, was structured around seven Societal Challenges:[3]

- Health, demographic change and wellbeing;
- Food security, sustainable agriculture and forestry, marine and maritime and inland water research, and the Bioeconomy;
- Secure, clean and efficient energy;
- Smart, green and integrated transport;
- Climate action, environment, resource efficiency and raw materials;
- Europe in a changing world - inclusive, innovative and reflective societies;
- Secure societies - protecting freedom and security of Europe and its citizens.

The list of GSCs used in FLAGSHIP was based on a combination of available sources at the time of the project's call for proposals in 2011, and is detailed in the next section.

Focus on GSCs provides orientation for science, technology, and innovation policies, seeking to address multi-level complexity of actors, trends and tensions (Kuhlmann & Rip, 2014). In doing so, GSCs also establish and induce notions of human and social progress with implications in the ways societies evolve. Hence, the way they are framed matters significantly. Challenges are organized as open-ended missions concerning the socioeconomic system as a whole, inducing or requiring system transformation. As an approach, they presuppose and reinforce the central role of science and technology in the shaping of the societies of the future, and for this

[3] http://ec.europa.eu/programmes/horizon2020/en/h2020-section/societal-challenges

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reason "]t]he agenda-setting, coordination and conduct of science, and the ways in which scientific knowledge is diffused and used, are critical" (Keenan et al., 2013). This agenda faces criticisms such as that of narrow innovation-focused utilitarianism, or insufficient focus on Social Sciences and Humanities (SSH) (Mayer et al, 2013). As argued in the Vilnius Declaration, innovation "is driven not only by technological advances, but also by societal expectations, values and demands" (Mayer et al, 2013, p.25). This inquiry is a contribution towards a pluralistic critique of the way GSCs are framed, organized and of the progress principles they represent.

In the next section of this paper we outline the methodology for selecting and analysing the texts of fiction, followed by a detailed account of the results of their content analysis, and a discussion of the results for our understanding and framing of GSCs.

2) Methodological approach: selection and content analysis

Fictional films and novels about the future are a prolific field. We have focused on texts that interpret the future of humanity on Earth, and have selected 64 items that have had a very significant and lasting impact on the public imagination and are representative of some of the major literary and cinematographic works. Novels and films were chosen using a methodological framework that combined and pondered different kinds of criteria, in order to ensure the relevance, quality, influential character and diversity of the final text list.

The selection process include a step by step approach: texts about the future were initially listed using relevant online sources, and then classified and ranked according to quality, influence, regional diversity and thematic coverage, and organized by historical timeline. The procedures ensured a wide coverage, and guaranteed the conditions to select among major literary and cinematographic works, those which have had a very significant and lasting impact on the public imagination.[4]

[4] Relevance was guaranteed by the presence of the films and novels on specific online databases, the reference on thematic lists and articles, and by the coverage of specific identification parameters. Texts were initially identified and listed using online sources. *IMDB, LUMIERE, Cineuropa* and the *National Film Preservation Board* were the sources used for films. With respect to novels, sources were *librarything*, *goodreads*, and *isbndb*. Relevant "Best off" lists, web articles related to utopia/dystopia literature and cinema, thematic exhibits/cycles and scientific articles/essays were also considered. Other criteria was used to score each of the texts identified: quality (number of nominations and awards concerning literary or film merit); influence (number of countries of release, number of editions, number

Through the consultation of abstracts, resumes and plots texts were scrutinised and classified for their relevance to the themes central to the GSC as framed in the FLAGSHIP base documents (2013) (see Table 1). Those with high coverage of GSC-related topics were prioritised.

Table 1 The list of GSCs used for the selection of texts

GSCs/Focus	Sub dimensions	n. texts selected for relevance
Financial, Economic Development	World geo-politics	20
	Economy & finance	27
	Consumption & behavior	31
	Labour market	24
Innovation and technology, resource efficiency	Information	42
	Technological development	58
	Science	44
Demography, social change, skills and empowerment	Population development	25
	Family and fertility	21
	Mortality	14
	Health	28
	Migration	23
	Education and human capital development	25
	Social stratification and discrimination	44
	Gender	32
	Empowerment	10
Environment and Externalities (resource efficiency)	Ecological systems disruption & Air quality/pollution	38
	Biodiversity and oceans	30
	Water management	10
	Land use	12
	Energy and natural resources	21
	Food	33
	Representations of Nature	36
Global & Territorial Governance	European Politics	9
	Security and conflict	41
	Human rights and Citizenship	32
	Global societies and geopolitics	27
	Political systems	27

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A historical timeline was also introduced to establish the correspondence between historical moments and fiction (Table 1a). The year of 1815 was chosen as the starting year because Mary Wollstonecraft Shelley wrote a year later the first most

of translation languages), regional diversity (due to the prevailing position of American production on contemporary popular culture, the diversification of contexts of production was intentionally a pursuit) and thematic coverage (number of topics covered within GSCs). The final score of each text considered the sum of all the previous indicators and allowed the ranking of the texts and the final selection.

popular Science Fiction novel. So we have a science fiction novel more than 100 years before Hugo Gernsback invented the term in 1926, and 1815 is a year full of significance in Western history. The historical timeline is conceived, like a map, to understand the influence of socio-political events on popular culture on their reflections on historical moments. A map that follows the ideas of Arno Mayer (1981), Eric Hobsbawn (1994) for the concepts of 19th century as a Long-century and Short 20th Century, 1914–1991, Reinhard Koselleck with his studies on Utopia, Progress, Emancipation and the works of Enzo Traverso on the violence in the 20th century.

Table 1a: Texts by historical timeline

Historical timeline	n	%
1815-1917 Conservative Order to Ancien Regime's Fall	6	9,4
1918–1945 Between the wars and II World War	4	6,3
1946–1973 Cold War period to Oil Crisis	12	18,8
1974–1989 Oil Crisis to the Fall of Berlin Wall	13	20,3
1990–2001 Post-communist period to September 11 attacks	10	15,6
2002– 2013 Post- 9/11 till nowadays	19	29,7
Total	64	100,0

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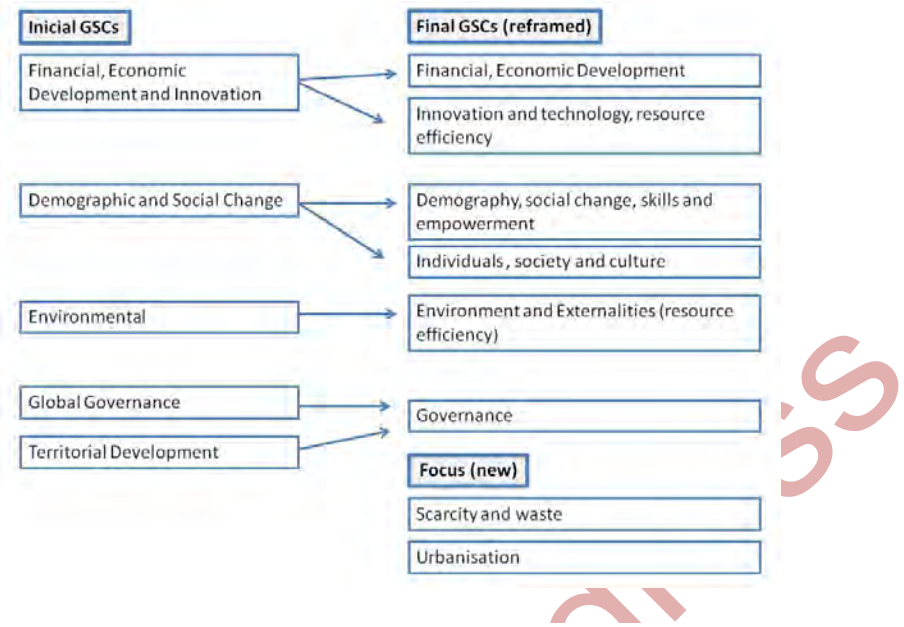
The final text selection correspond to the best classified 27 novels and 37 films, 64 texts in total, covering all historical periods, and with a particular incidence in the last decade (30% of the texts), while respecting the historical dynamic of text production and distribution (see appendix).

Content analysis methods were applied to examine systematically both the explicit and the implicit meanings of the 64 selected texts. The guidelines for the content analysis were set through a list of content descriptors closely related to the FLAGSHIP GSCs. These were broken down to a set of specifically observable dimensions and sub dimensions, organized in an extensive matrix (developing from Table 1).

Figure 1: Initial and final GSCs list



Based on the pilot test of two films and two novels, we found that in order to address the complexity and richness of the texts, the original list of GSCs had to be reframed and a number of aspects were added, including two specific 'focus' areas: Scarcity and Waste, and Urbanization. The initial and final GSCs lists are depicted in figure 1. Similarly, the internal dimensions, constitutive of each GSC, were also enlarged and redefined. The most significant change was the break up of the GSC on demography and social change to include a new set of dimensions for a new GSC 'individuals, society and culture':

- Happiness & Wellbeing
- Systems of beliefs
- Connectedness
- Progress & Future
- Identity
- Meaning of Life
- Conceptions of the human
- Entertainment & Art.

The resulting matrix of FLAGSHIP Grand Societal Challenges and additional focuses (hereafter GSCs/Focuses), and their related dimensions provided the basis for a

template used for the content analysis of the 64 texts (Denzin, 2004). The 64 templates were then used in a second interpretative and descriptive analysis to build hierarchies of themes, interpret collected observations, account for major patterns within each dimension, leading to a final meta coding system (Berg, 2001). The list of final patterns is rooted in the observed data, and was debated and agreed between all members of the interdisciplinary team, incorporating different views and theoretical references. It expresses the ways in which the FLAGSHIP GSCs/Focuses are represented in the fictional films and novels about the future. It describes and synthesizes major characteristics and tensions of the future societies portrayed in fiction.

Final categories were registered in an overall database that linked all the information collected concerning each one of the texts, using *SPSS* software. The database allowed a final analysis of the frequencies of the categories (how often each of the content descriptors has been observed), the relative weight of each GSC/Focus, and patterns in the texts analyzed, and the possibility to track the historical evolution of the themes and issues. This contributed to develop a meaningful and more articulated picture of the way GSCs are expressed in future's fiction. It also allowed the summarizing of the data and the comparison between different historical periods and archetypal visions of the future, as we will see.

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3) Results: major patterns arising from fiction

3.1) Major concerns and challenges envisaged in fiction about the future

What does the analysed data show about fiction's alternation between the utopian and dystopian impulses? In order to characterize the future looking to our 64 texts, we used the archetypal views proposed by Clardy (2011), which provide us with a more detailed framework of analysis, and allow for a summarized view of the overall texts analysed. Each of the texts can have elements of more than one archetypal vision (table 2).

Table 2: Share of the 64 texts representing an Archetypal vision of the future

Archetypal visions of the future	Explanation	%
Collapse	the natural or non-natural motivations behind the civilizational decadence or ruin	40,6
Anti-utopia	as the portrait of the dark side of the utopian projects	39,1
Dystopia	the complex, chaotic scenarios and borderline societies	37,5
Apocalypse	the more prophetical or religious approaches related to the end of times	21,9
Conflict & Revolution	description of a society in constant warfare	15,6
Utopia	the benefits of a rational/ equalitarian systems and the rebirth of new forms of utopia	12,5

The analysis of the data allowed us to discover three major impulses in the literary and filmic production about the future over last 150 years: anti-utopia (the downside side of utopian projects), dystopia (the fragmented and chaotic experiences of complex technological societies) and collapse (the natural or non-natural motivations behind the civilizational decadence or ruin). In the first, we find novels such as Zamyatin's "We" (1921), Huxley's "Brave New World" (1932) or, more recently, Lowry's "The Giver" (1993), or films as "Logan's Run" (1976) and Minority Report (2002). Classified as dystopia is Foster Wallace's "Infinite Jest" (1996), as well as Anderson's "Feed" (2002), along with the films "Code 46" (2003) and Brazil (1985). In the collapse view we find Atwood's "The Handmaid's Tale" (1985) or "Blade Runner" (1982), among others.

Other, somewhat less representative views included: utopia (the benefits of rational/ equalitarian systems and the rebirth of new forms of utopia[5]), conflict and revolution (description of a society in constant warfare), and apocalypse (the more prophetical or religious approaches related with the end of times). Utopia systems can be found in the societies depicted in Westerfeld's "Uglies" (2005), as well as "Appleseed" (2004). Conflict and revolution include Cronin's "The Passage" (2010), or "Children of Men" (2006). Apocalypse societies are found in McCarthy's "The Road" (2006), and "Avatar" (2009), as examples.[6]

Table 3 provides an overview of the results of our analysis, showing the patterns of concern about the future arising most frequently throughout all 64 texts analysed, listed under the correspondent GSCs/Focus in which they were identified. The

[5] New forms of utopia generated from new currents of thought, e.g.: technology lovers, neo-classical economists, cyber-libertarianism, and futurists.
[6] From this point on, direct references to the analyzed texts will be made by using the title. Years of production and author/director are referenced in Appendix.

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overall content analysis process includes 6 GSCs and 2 Focus themes (as in figure 1), which are broken down into a total of 43 dimensions of observation, leading to the identification of a range of patterns characterising future societies that were coded in terms of 184 categories.

The patterns in Table 3 represent the major concerns, tensions and characteristics of the societies of the future. The content analysis shows that not all the GSCs assume the same importance. The most frequent patterns of concern are linked to: 1) the *Scarcity* focus, 2) *Innovation and Science/Technology GSC;* 3) *Environment and Externalities GSC*; 4) *Individuals, Society and Culture GSC*; and 5) *Demography, Social Change, Skills and Empowerment GSC*. These items are strongly interconnected and in Table 3 we reorganize them to reflect this, leading to, the final illustration of patterns under four revised GSCs:

a) *Individuals, society and culture*, expressing the patterns connected with individual dignity, values, wellbeing, rights, and identities.

b) *Society and social change*, concerning social conditions, discrimination and the ways societies are structured and hierarchical.

c) *Environment - Technology versus Nature*, related with the complex and contradictory relationships between humans and nature, ranging from fulfilment to destruction.

d) *Science/Technology and society*, concerning the purposes, roles and centrality of technology in the ways societies will organize itself in the future.

We refer to these as "Umbrella GSCs" including a set of highly dominant patterns found in future's fiction. The most frequent pattern, from all texts in all historical periods, relates with the scarcity of human values in the societies of the future (i.e. scarcity of human values is depicted in 50% of the texts). It is followed by the belief in the advancement of technology, and of the use of technology to control nature, for specific purposes or by specific groups. Along the table we will find, in different forms and connected with different "umbrella" GSCs a strong focus on technology, dehumanization, control and manipulation, social inequality and environmental fragility. Those focuses interconnect and cross GSCs, and clearly demonstrate the complexity of the extrapolations made by the futures' narratives. In the remainder of this paper, we focus our analysis of results with reference to the most significant (frequent) patterns marked in bold in table 3.

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Table 3: Major patterns describing future societies portrayed in fiction, grouped according to their relevance to four GSCs

Individuals, society and culture
- **Scarcity of human values (50,0%)**
- **Dehumanizing processes (39,1%)**
- **Disrespect of Human Rights (37,5%)**
- Strong homogenization of identities (37,5%)
- Social control and subjective distress (26,6%)

Society and social change
- **Socioeconomic discrimination (based on propriety, education or other) (34,4%)**
- **High stratification and unequal societies (32,8%)**
- Existence of resistance and opposition movements (31,3%)
- Women inequality (31,3%)
- Stratification of workers & occupations (28,1%)
- Absence of consumption (26,6%)

Environment -Technology vs Nature
- **(Near)impossibility to breathe in open air (39,1%)**
- **Technology used for control of nature (39,1%)**
- **Extreme urbanization and vertical density (34,4%)**
- Interconnectedness and resulting fragility (34,4%)
- Species extinction and decline in biodiversity (34,4%)
- Aesthetic/ Spiritual Value of Nature (31,3%)
- Food scarcity, replacement & lack of choice (28,1%)

Science/Technology and society
- **Advanced technology (42,2%)**
- **Technology as a socio-political instrument of control (39,1%)**
- **Technology use restricted to specific ends or for/by elite groups (39,1%)**
- **Technology used for social domination and manipulation (26,6%)**
- **Science as a tool for manipulation, control and rationalization (26,6%)**

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3.2) The other side of 'scarcity': a dehumanized future?

The first and most frequent pattern is the *scarcity of human values*. Literature on scarcity is closely linked to economic theory over centuries, and more recently to environmental studies (Bina, 2013). Resource scarcity is increasingly perceived as one of the greatest security risks of the 21st century, and when related with competition for natural resources – notably for energy and water, is considered a global challenge (Mildner, Richter, and Lauster, 2011). However, the present analysis adopted a much broader definition of scarcity, observing instead the ways in which future societies emphasise any kind of insufficiency, rarity or limited supply.

As a result, patterns of insufficiency are found in relation to: human values, vital human needs, natural resources, but also civil and political liberties and human capital. The scarcity of human values is observable in 32 texts, and can be further explained in terms of the absence of values such as:

- self-direction (*1984*; *The Handmaid's Tale*; *Logan's Run*; *Twelve Monkeys*), dignity (*The Tomorrow File*, *A Clockwork Orange*, *Hunger Games*)
- hope (*Soylent Green*; *On the Beach*; *Blade Runner*; *Children of Men*)
- sentiments and emotionality (*We*; *Do Androids Dream of Electric Sheep?*; *The Giver*), love (*The Handmaid's Tale*)
- identity (*We*; *Uglies*; *Twelve Monkeys*), privacy (*Stand on Zanzibar*; *Minority Report*), idealism and creativity (*Paris in the Twentieth Century*; *Brazil*)
- freedom (*Escape from L.A.*), security and protection (*The Time Machine*; *Mad Max*), equality (*Metropolis*; *Elysium*), peace (*Appleseed*), justice (*Elysium*).

The observation of this specific pattern (*scarcity of human values)* was recorded under the “Scarcity” Focus, but its intrinsic relevance to individual dignity, values and wellbeing, creates a strong link with the scope of the GSC on "Individuals, society and culture".

Closely linked to this are *Dehumanizing processes* depriving individuals or societies of their human qualities. This strong pattern within the same GSC synthesizes the following situations: the human being is seen as means to an end (e.g.: seen as consumer or as a source of energy); situations of submission to mechanical power; and situations of submission to ideology, social control or repression. These situations help explain the loss of meaning inherent to disruptive situations and/or collapsing societies. The most relevant aspect of this nihilistic situation (defined by the collapse of traditional moral values and of religious/spiritual known references) is not the collapse itself, but the resulting loss of meaning accompanied by an inability of give meaning to the new conditions and experiences.

In the GSC "Individuals, society and culture" we also find reference to violation of human rights (37,5%), strong homogenization of identities (37,5%) and social control and subjective distress (26,6%).

3.3) The future is technology

The "Technology and Society" GSC (quadrant of Table 3), reveals the central role that technology plays in fiction narratives. In 27 of the 64 texts the stories rely heavily on technological advancements, namely in the fields of biotechnology, cybertechnology, genetics, robotics, computing and other advanced technologies. While these themes are distributed throughout all the historical periods included in this study, they are particularly frequent in texts from 1990 onwards.

The positive impacts of the pattern on *advanced technology* are imagined and described in terms of empowerment and performance improvement (in the economy or health), echoing specific ideals of progress. Technologies contribute to correct problematic aspects of reality, such as depressive moods and unhappiness, genetic traits, nature limits, and survival challenges. This pattern emerges in novels such as *The Lathe of Heaven*, *Neuromancer*, *The Diamond Age*, or films such as *Logan's Run*, *Code 46* or *Minority Report*. They can lead to new forms of determinism and inequality, namely by the creation of what Atkinson (2007) calls *genetic utopianism*,

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or utopian states through the removal of unwanted elements, genetic abnormalities and crime, rather than through the fulfilment of positive ideals.

Despite its many utopian projects, fiction tends to be critical of technological development, highlighting both planned and un-wanted negative effects, resulting from the use of technology for specific ends and for/by restricted elite groups (which happens in 25 of the 64 texts). Such uses are centred around military and security needs (and to a lesser extent, transportation), often serving exclusively specific elite groups, like the rich and high-powered *Elysium* inhabitants, the dominant corporations of *The Space Merchants*, the oppressive military state in the *Handmaids Tale*, the genetic oppressive state in *Uglies* or *Gattaca*, or the security utopia of *Minority Report*, among others.

Harmful impacts of science and technology in imagined futures are further recorded in the pattern on *social domination and manipulation*. 17 texts portray technology as a means of social domination, rationalization and manipulation by governments and corporations, leading sometimes to the loss of rights and privacy. All this takes place in societies, sometimes depicted as utopic, where everything can be seen and, consequently, where nothing is outside the aegis of the state or the corporation's (Atkinson, 2007); societies with new and higher possibilities of genetic discrimination, social fragmentation, totalitarianism, surveillance, environmental degradation, addiction and mind control (Dinello, 2005).

The concern with social domination through science and technology seems mostly significant in fiction since the beginning of the cold war, but persists into the present. It applies to all domains of social life, such as birth, healthcare, and even pleasure - as in the case of *Tomorrow File*, and to surveillance and capture systems such as those of *Fahrenheit 451*. Science contributes for the reengineering of humanity and to the rational organization of all systems, may it be genetic, reproductive, social, administrative, economic, or others, as presented in *Brave New World*. In *The Lathe of Heaven*, technology can control the content of individuals' dreams. This is also illustrated in the novel *Feed*, where technology guarantees appropriation of mind and emotions:

> *"Everything we think and feel is taken in by the corporations" (p. 48).*

Another predominant pattern concerning science/technology in futures fiction relates with *control of nature*, which we find in the "Environment & Technology vs Nature"

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Grand Challenge quadrant in Table 3. In these texts, technology controls nature and promotes increasingly artificial forms of life, sometimes leading to destruction and chaos. In some cases, technology replaces landscape with an entirely built and controlled environment where nature is rendered invisible, and where technology itself has become a landscape (Fukuyama, 2002), as shown by the existence of "farm" landscapes of artificial meat production or artificial weather in the novel *Feed* (2002). This pattern is found continuously throughout the project's historical timeline. Humanity's increasing alienation from nature is emblematically illustrated early in the 20th century by Forster's *The Machine Stops* (1909):

> *"the civilization that had mistaken the functions of the system, and had used it for bringing people to things, instead of for bringing things to people. Those funny old days, when men went for a change of air instead of changing the air in their rooms!" (p. 5)*

In these narratives, science and technology enable the total reshape of society and absolute control and separation from nature. Illustrations include the neutralization the earth's diurnal revolution (*The Machine Stops*), the growing of human beings in artificial wombs (*Brave New World*), Earth-forming technology (*The Diamond Age*), or climate weather and air regulation (*Feed*). Here technology assumes an almost mystical role. Such control and separation occur predominantly in anti-utopia (together with social domination) and dystopia fiction. Narratives of dystopia futures also include patterns such as the existence of advanced technology, and its use for specific ends and by specific elite groups.

In the same quadrant we also find reference the pattern of *science as a tool for manipulation, control and rationalization* (26,6%). In the selected texts, science is primarily presented as a system at the service of ruling structures (either governments or corporations), working for the enhancement of manipulation, control and rationalization tools covering all aspects of life. Politics and science are essentially merged and the notion of a nation is shaped by its scientific and technological performance (e.g *The Tomorrow File*, *We* and *Brave New World*). Science can be used for prediction and rationalization procedures, and scientific planning may cover all living environments and human populations (namely the workers and working processes). It blurs the boundaries between the human and non human, the natural and artificial, and in doing so, as Danny Witwer, the skeptical character in *Minority Report*, explains:

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"Science has stolen most of our miracles."

Science is what distinguishes the "work of men" from the (imperfect) "work from nature", a way to dehumanize the subjects, accomplish a project of human improvement, abolish chaos and build perfection. Some of the science achievements can include, for instance, the suppression of the ability to see colour in order to abolish discrimination and establish "sameness" (*The Giver*), but at the same time they can create new types of discrimination based on genetics (as in *Gattaca,* that portrays the possibility of genetic hierarchies). This pattern is present in all the historical periods covered, but is more frequent from 2001 onwards, reflecting increasing rationalization and centrality of science systems in dealing with contemporary challenges. A new understanding of the inherent dangers of science and technology seems to become paradigmatic along the years, especially with the rise of consumer capitalism (Hall, 2009).

3.4) Humans and nature: will we be able to breathe in the future?

In the "Environment - Technology versus Nature" quadrant, 25 texts (39% of all texts) contribute to build a pattern that exemplifies the dramatic degradation of the relationship between humans and nature: categorized as "*(Near)impossibility to breathe in open air*". A complex range of human choices in managing nature, often leading to disastrous events linked to industrial production that lead to severe air pollution (and references to nuclear disasters, acid rain or climate change), underpin the imagined future in novels including: *The Machine Stops*, *The Space Merchants*, *Cloud Atlas*; or films such as *Logan's Run*, *Avatar* or *The Day After Tomorrow*, just to mention a few. The common trait of these 25 texts is that humans will find it almost impossible to breathe naturally in the open air. This aspect of the future in fiction is remarkable, not just for its predominance, but perhaps even more so because of the symbolic nature of breathing as the act that ensures life, and which is metaphysically linked to our ability to be conscious of ourselves. It seems to represent the ultimate alienation from nature.

Another major pattern has to do with urbanization, and relates to the extreme density of urban spaces, associated with the verticality of the buildings, and wide development of urban and/or industrial areas. The pattern "*Extreme urbanisation and vertical density*" (present in 22 of the 64 texts) condenses some recurrent visions

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related with futuristic and high-tech scenarios, wide industrial landscapes, and artificial cities, landscapes and features.

Alphaville, *Logan's Run*, *Minority Report* and *Blade Runner* are some of the examples of the ultimate vision of a technological city, where glass and concrete mega-structures are combined with technological devices like vigilance systems, high-speed flying machines and advertisement devices. Those would be mainly the late capitalist settings, where the urban fabric is the visual mirror for technological progress and/or industrial achievement. This category also includes all the cases where either the city becomes an entirely artificial environment or it includes many artificial elements. Like the cases where cities are under glass domes, with no contact with the exterior (*Logan's Run*, *Cloud Atlas*), or cases where natural elements were replaced by artificial green (*The Tomorrow File, The Space Merchants*).

This pattern is, in a certain way, confirmed and highlighted by the existing literature about urban scenarios and science fiction:

> "r*esearch on science fiction cinema and cities highlights a number of issues fundamental to all urban speculation: (...) the alienation produced in subjects in and by built environments; the relationship between built environments and nature; the effects of a centralization of oppressive or controlling power upon individual freedoms (...)*" (Collie, 2011, p. 428).

The data resulting from our research allowed us to verify this link: there is indeed a profound connection between "built environments" and the effectiveness of individual alienation and social collapse. Both in literature and in cinema, urban settings are not only background visual indicators of the eminent social collapse, but also, and most importantly, they are at the very origin of the hostile, awkward, absurd systems in themselves.

Another pattern in the "Environment & Technology vs Nature" quadrant include "*Aesthetic/ Spiritual Value of Nature*". It is depicted in 20 texts, nine of which belong to the post 9/11 fiction (2001 to nowadays). In this pattern nature tends to have a redeeming role and to embody the notion of hope itself. It is seen as an idyllic, poetic dimension, and valued in an aesthetic and spiritual sense, as in *We*, *Fahrenheit 451* or *The Space Merchants*; or envisaged as the last non-corrupted domain, as in Winston's dreams and experience in *1984*. Nature represents an occasional and brief escape from the oppression of the system (e.g.: looking at the moon, cultivating

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flowers - *The Handmaid's Tale*). It is also an escape: the last bastion of freedom, representing redemption and renewal: there is hope that one day one might find the way back to the surface of planet earth, for the enjoyment of the contact with nature – *The Machine Stops*, representing the hope to restore the link between humans' rational and intuitive nature (see also *Children of Men,* and *Brasil*, where nature is a fantasy, an escape from the oppressive life in the city).

Imagined futures relating to this GSC also promote reflexions about themes commonly discussed in today's environmental policy agendas: increasing environmental interconnectedness and resulting fragility (34,4%), species extinction and decline in biodiversity (34,4%) and the threat of food scarcity, as well of its artificial replacement and lack of choice (28,1%), all representative of an impoverishment of the experience of life.

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3.5) Future societies are highly stratified and unequal

The fourth and final quadrant in Table 3 is concerned with the "Society and social change" GSC. In general, the societies in speculative and science fiction are portrayed with high levels of "*stratification and inequality"* (present in 21 texts). One of the main factors of stratification explored in imagined futures is the importance of certain intrinsic traits, such as genetic and human traits (genetic raking, IQ measures, and ability; appearance; being categorised as primitive or evolved, human or not human). The pattern is explored, among others, in: *The Tomorrow File, We, Brave New World, Stand On Zanzibar, The Windup Girl, Gattaca, Distric 9,* and *Appleesed*. In some of these texts individuals are "produced" and conditioned for specific social positions, as is the case described in Huxley's *Brave New World*:

> *"I suppose Epsilons don't really mind being Epsilons," she said aloud. "Of course they don't. How can they? They don't know what it's like being anything else. We'd mind, of course. But then we've been differently conditioned. Besides, we start with a different heredity." (chapter 5)*

Other example of biological stratification come from Dick's novel *Do Androids Dream of Electric Sheep?* :

> *"classed as biologically unacceptable, a menace to the pristine heredity of the race. Once pegged as special, a citizen, even if accepting sterilization, dropped out of history. He ceased, in effect, to be part of mankind." (p.15)*

One more relevant pattern relates to the classic socioeconomic differentiations. We find 22 narratives which portray societies were individuals are differentiated according to wealth (socio economic conditions), professional status (working/not working - not working can also be an indication of power; in public or private sector) or consumer profile (being high/low consumer). In addition, another principle of differentiation and hierarchy compressed in the same category relates with access to knowledge, information, sometimes consciousness and critical thinking, present in more contemporary texts such as *Infinite Jest, The Swarm, Matrix or Minority Report*.

Overall, futures fiction offers a strong representation of the continuity and deepening of the social inequalities, namely through the effects of classic institutions and structures such as property and education.

4) Discussion and implications

> "*We don't know where we are going. We only know that history has brought us to this point […]*
>
> *If humanity is to have a recognizable future, it cannot be only prolonging the past or the present.*
>
> *If we try to build the third millennium on that basis, we shall fail.*
>
> *And the price of failure, that is to say, the alternative to a changed society, is darkness*."
>
> Closing remark, Eric Hobsbawm's *Age of Extreme* (1994)

Having engaged with texts that engaged with very similar themes and dimensions of the future when compared to current discourses and definitions of GSCs (see Introduction) the analysis provided abundant material to compare fiction and policy framing of the challenges ahead. Our qualitative and quantitative content analysis of 64 selected films and novels enabled us to identify major patterns within imagined futures (see Table 3) that suggest the way GSCs are being currently debated and framed may be too narrow, notably in relation to: 1) the risk of increased and renovated processes of control and manipulation, technology based, affecting the relationship with and between nature/environment, individuals and societies; 2) the threat of dehumanization processes and lose of human values; 3) the increasing of the social inequalities and discrimination.

Thus, the concerns and challenges framed in fiction can enrich our understanding of the GSCs identified for today's societies, essentially in two ways.

First, raising what might be considered 'warning signals' in relation to both existing dimensions of the GSC discourse which may lead to one or more of the following dominant impulses: anti-utopia, dystopia and collapse (see Table 2 above). Such warning signals confirm concerns raised in the existing literature on social criticism and future visions in popular culture (Booker 1994) which distinguishes two interconnected traits: on one hand, the praise of the technological/ scientific/ rational model, with its mystification of science and faith in computer science to explain life, present in utopian texts; on the other, the nihilistic and critical tendency that lay behind the dystopian and anti-utopian texts.

Second, highlighting areas and dimensions that are either poorly defined or even absent from current GSC debates. Here the new GSC category and related dimensions: 'individuals, society and culture' (Section 2), and the –closely linked- unorthodox interpretation of scarcity (Section 3.2), stand out. It suggests that the EU definition of GSCs insufficient attention to the dimension of values, hope and purpose of life, compared to what is imagined in fiction envisioning of possible or desirable futures. Failure to acknowledge the importance of: what makes us, and keeps us, humans; what gives meaning to life and meaningful lives to live; what enables us to develop an identity and sense of connectedness; and last but not least, the role of the arts in contributing to all these traits – may hasten society's fall into 'darkness', to borrow Hobsbawm's (1994) own expression.

Our analysis suggests that the most frequent and significant patterns underlying the four GSC categories analysed in Section 3, are tied together by one dominant trait of the future in fiction: control and manipulation of the people by those holding power.

The dimensions underlying the GSC 'Innovation and Technology' are found to be a major factor in facilitating such control, and in affecting many of the dimensions that make up the 'Individuals, Society and Culture' GSC, by enabling social inequality and stratification, a loss of human values and widespread dehumanisation processes. In turn, control and manipulation, thanks also to powerful technology, affects the 'Environment' and the 'Demography and Social Change' GSCs, leading to potentially anti-utopic and dystopic futures. In this overview of fiction, scarcity – understood here in the orthodox way – plays a major role as trigger. It is scarcity, real or perceived,

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that drives innovation and technology in fiction's futures, while also directly affecting the patterns of social inequality and dehumanization processes. In real world policy discourses, scarcity is central to GSCs framing, but with different interpretations and with an essential link to the economy and the objective of economic growth, which feature far less in fiction about the future. In novels and films, the interplay between these dimensions can trigger a complex series of choices and events leading to collapse, dystopian and anti-utopian futures defined by control and manipulation. Recent and growing reference to the Anthropocene (Griggs *et al.* 2013; Noone 2013; WBGU 2014) seems to echo archetypal concerns expressed in fiction over the last 150 years. This study thus provides an alternative perspective and support to those who have been calling for urgent attention to the economic, social and environmental implications of the Anthropocene.

The insights and suggestions arising from this analysis support, and add urgency, to arguments favouring a more balanced and transdisciplinary research agenda capable of promoting a meaningful engagement between the natural sciences, the social sciences and the humanities. They also raise the less evident but perhaps more fundamental need to engage with the notion of societal progress, and hence with what purpose (and future) we might want innovation and technology to serve.

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Appendix

List of analyzed texts (films and novels)

Text title	Author	Original year	Country
Paris in the Twentieth Century	Jules Verne	1863	France
The Time Machine	H. G. Wells	1895	UK
Le tunnel sous La Manche	Georges Méliès	1907	France
The Machine Stops	E. M. Forster	1909	UK
La police en l'an 2000	no credits	1910	France
Verdens Undergang aka The End of the World	August Bloom	1916	Norway/Denmark
We	Yevgeny Zamyatin	1921	Russia
Metropolis	Fritz Lang	1926	Germany
Brave New World	Aldous Huxley	1932	UK
Things to come	William Cameron Menzies	1936	UK
1984	George Orwell	1949	UK
The Space Merchants	Frederik Pohl and C.M. Kornbluth	1953	USA
On the Beach	Stanley Kramer	1959	USA
A Clockwork Orange	Anthony Burgess	1962	UK
La Jetée	Chris Marker	1963	France
Alphaville	Jean-Luc Godard	1965	France
Fahrenheit 451	François Truffaut	1966	France
Stand on Zanzibar	John Brunner	1968	UK
Do Androids Dream of Electric Sheep?	Philip K. Dick	1968	USA
The Lathe of Heaven	Ursula K. Le Guin	1971	USA
Solaris	Andrei Tarkovsky	1971	USSR
Soylent Green	Richard Fleischer	1973	USA
The Tomorrow File	Lawrence Sanders	1975	USA
Z for Zachariah	Robert C. O'Brien	1975	USA
Logan's Run	Michael Anderson	1976	USA
Ender's Game	Orson Scott Card	1977	USA
The Stand	Stephen King	1978	USA
Dawn of the Dead	George Romero	1978	USA
Mad Max	George Miller	1979	AUST
Blade Runner	Ridley Scott	1982	USA
Neuromancer	William Gibson	1984	USA
The Terminator	James Cameron	1984	USA
The Handmaid’s Tale	Margaret Atwood	1985	Canada
Brazil	Terry Gilliam	1985	UK
RoboCop	Paul Verhoeven	1987	USA
Total Recall	Paul Verhoeven	1990	USA
The Giver	Lois Lowry	1993	USA
The Diamond Age, or A Young Lady's Illustrated Primer	Neal Stephenson	1995	USA
Twelve Monkeys	Terry Gilliam	1995	USA
Waterworld	Kevin Reynolds	1995	USA
Infinite Jest	David Foster Wallace	1996	USA

Escape from L.A.	John Carpenter	1996	USA
The Fifth Element	Luc Besson	1997	France
Gattaca	Andrew Niccol	1997	USA
Matrix	Lana e Andy Wachowski	1999	USA
Feed	M.T. Anderson	2002	USA
Minority Report	Steven Spielberg	2002	USA
28 days Later	Danny Boyle	2002	UK
Code 46	Michael Winterbottom	2003	UK
Cloud Atlas	David Mitchell	2004	UK
The Swarm	Frank Schätzing	2004	Germany
Appleseed	Shinji Aramaki	2004	JAP
The Day after Tomorrow	Roland Emmerich	2004	USA
Uglies	Scott Westerfeld	2005	USA
V for Vendetta	Lana e Andy Wachowski	2005	USA
The Road	Cormac McCarthy	2006	USA
Children of Men	Alfonso Cuaron	2006	UK/USA
Vexille	Fumihiko Sori	2007	JAP
The Windup Girl	Paolo Bacigalupi	2009	USA
District 9	Neill Blomkamp	2009	USA, NZ
Avatar	James Cameron	2009	USA
The Passage	Justin Cronin	2010	USA
Hunger Games	Gary Ross	2012	USA
Elysium	Neill Blomkamp	2013	USA

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