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Assessing emerging issues. The external and internal approach

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ABSTRACT

This article analyses emerging issues trying to find elements to assess the possibility that they become a relevant trend in the future using a twofold perspective for that purpose. On the one hand it considers the external approach, that is, the analysis of visible signals linked to the emerging issues that in an early stage are called "weak signals". On the other hand, it tries to study emerging issues taking into account their internal motivations. In this case the aim is to value the social, economic or other kind of reasons that are hidden under emerging issues. A post-structuralism perspective (CLA, causal layered analysis) is used to address this objective.

This double approach allows to consider emerging issues in a holistic way, taking into account what is visible and what is not so apparent. In order to offer conclusions and results a real use case is included analyzing the emerging issues showed in the report "Informe de la Sociedad de la Información 2013" (one of the references about information society situation and ICT trends in Spain).

1. Introduction

Getting an in depth understanding of the environment and its changes is one of the main management goals for any organization, mainly when it is necessary to make decisions with long term implications, that is, with a strategic nature. This is a common problem that all organizations have to deal with in one or another moment of its life, though some companies traditionally have not paid enough attention to it. Growth in competitiveness among the companies and faster changing conditions of the environment due to new technologies irruption is changing this situation, what forces to reconsider environment surveillance processes as a main source of data to feed strategy.

For this reason, foresight capability is seen as one of the aspects that make the difference for the success of any company, in many scholars (Hines, 2003) and corporate foresight "the art of the long view" has become a relevant task in modern organizations (Schwartz, 1991). Though these activities can be considered quite diverse, a holistic approach is necessary grouping them as part of an integrated process. In academic literature this is sometimes referred to as corporate foresight, conceiving it as a set of practices connected to management, organizations, strategy and technology (Pettigrew et al., 2002). These processes require some kind of structure within the organizations, at least in large organizations, in order to give them support and visibility. There is a debate about the best way to set up this unit and even if it should be a unit separated from the rest (Battistella, 2014), so that diverse models and classifications about its structure can be found in literature. One kind of structure that is gaining importance in the field of corporate foresight is the Observatory, an organizational model that

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includes specialized tasks addressed internally that can be distinguished from other kinds of units such as think tanks or outsourcers because of culture and management style (Daheim & Uerz, 2008). Nowadays, observatories are springing up in the organizations with the aim to surveillance the environment, activity commonly known as scanning. They can be found in the administration, in sectorial industry lobbies, in big corporations. There are many methodologies to do this scanning such as STEEP (Social, Technological, Economical, Environmental and Political), PEST (Political, Economic, Social and Technological) . . . , nevertheless it is a process not very formalized that depends too much on each organization's way of working and sometimes they fail to consider how the conjunction of those various angles should be combined into a sense-making whole. One key objective of these observatories is the detection of new phenomena that in Foresight literature are called "emerging issues", a process that is usually informal, even messy and often serendipitous. It is believed that these emerging issues do not occur all of a sudden and they are preceded by some kind of signals usually known as weak signals that are defined as "first symptoms of strategic discontinuities, i.e. symptoms of possible change in the future, acting as warning signs or signs of new possibilities" (Ansoff, 1984).

This paper dives into the process of emerging issues assessment, considering for that their signals and their internal motivations, and establishes a debate to obtain conclusions and orientations to carry out this task. It is organized into 7 sections. After the introduction, the necessity and role of observatories is raised in section two. In the third section, the emerging issues and other foresight concepts are explained. In sections 4 and 5 the external and internal analysis of emerging issues are studied. Section 6 develops the use case of SIE 2013 emerging issues based on the previous approaches. Section 7 summarizes the results and proposes new lines to continue the research.

2. The Surveillance necessity in organizations: the surge of the observatories

The capacity of an organization to adapt itself to the changing environment is paramount for its survival. For this reason, during the last century a high number of methodologies and theories intending to manage environments of uncertainty have been developed to orientate their activities. First models presupposed that it was possible to know with anticipation the different alternatives that could happen in the future, these alternatives usually called "states of the nature" are defined as "exhausted and mutually exclusive lifting of those aspects of nature which are relevant to this particular choice problem and about which the decision-maker is uncertain" (Luce & Raiffa, 1958). These models, from which Maximax, Maximin and Laplace's criteria are the greatest exponent, are still used in planning and construction of scenarios. They manage the uncertainty by estimating a probability for each of the alternatives, but they do not deal with the number and nature of the alternatives.

During the last years, it has been made clear that organizations cannot assume that they know all the possible future states of nature. This leads to the necessity of implementing processes to detect new phenomena with the power to change the environment affecting an organization. These phenomena, named in a generic way as "emerging issues" have been acquiring importance as subject of study, which has raised an important research activity about their nature, their detection and their classification. This development has driven to the definition of a great number of concepts and terms, whose boundaries are at current not well defined, giving rise to several debates about the limits and the sense of each one of them.

Once the importance of emerging issues is understood, it acquires special interest to design structures and methods to capture and filter properly these phenomena as far in advance as possible, which implies to introduce the notion of filters. In this case a filter must not be considered as a kind of glasses to pick up pertinent signals objectively placed in the environment. These filters in one way or another rely on internal cognitive knowledge structures so the signals meaning depends to some extent on actor's (person, organization . . .) mental models: a signal can mean something for one actor and lack of interest to others because "Cognitive systems interact with their environments, but it is the cognitive system – and not the environment – that determines how and in what way it interacts" (Seidl, 2004). This situation is more common in the cases of unexpected signals as is the case of a weak signal, which is by definition unstructured information and its implications to the organization are at an early stage very hard to define (Ilmola & Kuusi, 2006).

One approach to cope with filtering was developed by Ansoff (1984) who divided this activity in several levels. In the first place he considered a filter at environment level he called "Surveillance filter" that has the objective to filter the information that enters in the organization. Later, inside the company, mentality and power filters only let pass the most outstanding information so that the organization can make appropriate decisions.

From these three filters, the first has a special importance as it allows the organization to capture from the environment the relevant information (at least relevant to its cognitive knowledge structures) that can be useful for business development, a critical activity that in large organizations is faced with setting up some kind of structure (independent or not). This fact was considered some decades ago, for instance it was proposed in the model of viable organizations from Beer in 1972. In particular, subsystem 4 in its model named "intelligent subsystem" is in charge of environment surveillance in order to obtain relevant information to adapt the organization to external changes (Beer, 1972).

3. Foresight, terminology associated to "emerging issues"

At present, there is a considerable standardization activity about foresight theory and concepts. In this field the "The Millenium Project"[1] community stands out with 3500 members spread out in 49 nodes throughout the planet that address

[1] http://www.millennium-project.org/.

methodological and practical issues offering advice to administrations and corporations. This entity publishes a methodological compendium, "Futures Research Methodology" that in its last edition in 2012 developed 39 methodologies. Though the number and depth in the development of these methodologies, it is manifest that is a field that requires a huge systematization and formalization activity as it happened in the economy field during the XX century.

Emerging issues focuses on phenomena close to the moment they are very first notice. The idea was developed by Molitor in the late 1950s and early 1960s and presented in his article "How to anticipate public-policy changes" (Molitor, 1977), " . . . at bottom are certain structural forces that gain momentum over time and give rise to what I term issue environments". He considered public-policy authorities should be aware of these phenomena in order to prepare new regulation in advance for future changes in the environment. He continued developing this concept in later articles (Molitor, 1981, 2003).

In literature "emerging issues" term appears generally besides other terms such as: Weak Signals, Wild Cards, Trends, Megatrends, and even in some occasions is mixed with them (Hiltunen, 2010; Coffman, 1997b; Heijden, 1997).

Though this lack of definition in the limits and nature of the terms, it can be considered quite consensual the high level definition offered by Saritas and Smith (2010) about the concepts more commonly used in foresight arena (Table 1).

This confusion affects other terms too, for example some authors even use in a synonymous way the concepts of weak signals and trends (Groddeck & Schwarz, 2013) when in principle are quite distant.

There are important differences with regard to the sense of the terms too. Some authors consider "weak signals" as events in themselves, so that there would not be a clear frontier between them and the "emerging issues". This thesis is defended by numerous experts (Coffman, 1997c; Harris & Zeisler, 2002) and even by Ansoff himself. On the contrary other experts (Brabandere, 2005; Nikander, 2002) keep more faithfully to the concept of signal and distinguish clearly the event or "emerging issue" and the signal or "weak signal". Weak signals are assimilated to the meaning of "early warnings" (Nikander & Eloranta, 2001) too. Some authors deny the existence of this sense of warning and claim that when thinking about an event that occurred previously people desire to see warnings (Ashley, 1989). This is more in line with the constructivist point of view "Weak signals have to be conceptualized cognitively, i.e., as cognitive phenomena, determined by the structures of the cognitive system (Seidl, 2004)".

Though a wider debate about this theme is out of the scope of this article, the previous enumeration highlights the high number of interpretation differences of terms and concepts, aspect that suppose an implicit problem for their practical usage. A more in detail analysis about conflicts and limits among these concepts can be found in Elina Hiltunen's thesis, Weak Signals in Organizacional Futures Learning, (Hiltunen, 2010).

4. External analysis of emerging issues: their signals

The traditional method to value the maturity and the possibilities for an emerging issue to become a consolidated trend is to look at its signals dissemination. Molitor in his research about public policy considered that any emergent phenomenon implies a process of dissemination in two axes. Firstly, it begins as events and pass to other fields such as intellectual authorities, literature, organizations to end up reaching the governments. Secondly, in each one of these fields, signals follow an S-curve pattern (Molitor, 1977) so that several of these S-curves take place simultaneously. This is in line with the generally accepted idea expressed previously that any emerging issue "sends out" some signals, called "weak signals" when it is in an early stage. In this analysis two approaches about these signals are considered to reach conclusions from them: Igor Ansoff's weak signals model and signals presence in Internet media.

4.1. Igor Ansoff's weak signals model

In order to find the rationale or at least some rules that link emerging issues and weak signals some approaches can be used. The oldest and perhaps the most extended is the classification of these signals according to the model of state of the knowledge under discontinuity proposed by Ansoff, who presented a first version of this idea in 1975 (Ansoff, 1975) and developed it later (Ansoff, 1984).

This model uses a classification of 5 levels considering the level of concreteness of the signal: (1) sense of threat/opportunity, (2) source of threat/opportunity, (3) threat/opportunity concrete, (4) response concrete, (5) outcome concrete. The concreteness is in this way the key feature to assess the maturity level of an emerging issue. Though this model seems to

Table 1
Foresight main terminology.
Source: Saritas and Smith (2010).

Trends	Are those change factors that arise from broadly generalizable changes and innovation
Drivers of change	Are those factors, forces or events—developments which may be amenable to changes according to one's strategic choices, investments, R&D activities or foresight knowledge and strategies
Wild card	Are those surprise events and situations which can happen but usually have a low probability of doing so—but if they do their impact is very high
Discontinuities	Discontinuities are those situations—impacts where over time and extending beyond single events, change is rapid and fundamentally alters the previous pathways or expected direction of policies, events and planning regimes
Weak signals	They refer to the early signs of possible but not confirmed changes that may later become more significant indicators of critical forces for development, threats, business and technical innovation

Table 2
Molitor and Ansoff signals approach.
Source: Own elaboration.

	Molitor	Ansoff
Research field	Public policy	Organizations strategy
Research aim	Development of public policies in advance	Strategy response in organizations
Emerging issue approach	Environmental issue	Strategic issue
Strength of signals	Classification according to the whole life cycle	Weak and strong signals. Five levels
Underlying concept of maturity	Level of dissemination (from elites to the mainstream)	Level of concreteness
Dissemination mathematical model	S-curve	No model

show weak signals as objective symptoms, a cognitive valuation is to some extent deducted from Ansoff's ideas as he considers that creativity is required in their detection (Ansoff, 1984). Later some authors have stand out this fact, for instance Coffman claims that weak signals "are new and surprising from the signals receivers' vantage point" (Coffman, 1997a), or Hiltunen is considering implicitly interpretation when applying semiotics to her vision of weak signal as a future sign (Hiltunen, 2008).

Ansoff's vision shows important similitudes with Molitor's model as it supposes an underlying dissemination process of signals before an emerging issue is risen. Nevertheless, both models present important approach differences (Table 2).

4.2. Signals presence in Internet media

Ansoff's model is useful to classify weak signals and to have a global vision of the signals associated with an emerging issue but does not consider quantitative aspects like the impact of signals in media. For that reason new criteria should be added to enrich the analysis. Bibliometric approach has been linked to emerging issues identification by several researches (Schiebel, Hörlesberger, Roche, François, & Besagni, 2010), in this case we propose the utilization of the general Web as source of information. With that aim we will use the number of hits in web searches (i.e., by means of Google search engine), a parameter widely used to measure the impact of any fact. This approach reminds the differentiation between weak signals and strong signals that some authors consider. Strong signals concept is as old as weak signals as they were contemplated by Ansoff himself (Ansoff, 1975). They have been regarded by several authors later (Holopainen & Toivonen, 2012; Holopainen and Toivonen, 2012). Nevertheless, it is not clear the threshold to separate weak and strong signals as the dynamics of information dissemination on the web are not clearly known yet (Pentland, 2014), and for that reason this division will not be considered.

In this paper, two variables are considered to measure the impact in media: strength and growth. Both are measured by using the number of hits found by the search engine according to Eqs. (1) and (2).

$$\text{Strength} = \text{Number of hits in Period}_a \tag{1}$$

$$\text{Growth} = \frac{(\text{Number of hits in Period}_a - \text{Number of hits in Period}_{a-1})}{\text{Number of hits in Period}_{a-1}} \tag{2}$$

The aim of these equations is to look for any threshold that can help to discriminate an emerging issue with high possibilities of becoming a consistent trend from those that are evanescent. If it is not possible to detect a threshold a confidence interval could be acceptable.

5. Internal analysis of emerging issues: emerging issues internal motivations

The principle of this approach is that it is not possible to capture the whole importance of a signal by studying its external aspects, and internal aspects and interpretation are required. This statement is in line with Peirce's semiotic principles that consider a sign as a triadic structure with object, representamen (or sign) and interpretant, and highlights the importance of interpretation in the process of signification. In the case of foresight this interpretation is in terms of future impact as shown by the concept of future sign introduced by Hiltunen (2008) where the object is the emerging issue, the representament the weak signals and the interpretant is the sense made of the future potentiality. It is interesting to underline the change in the nomenclature from signal to sign. From a semiotic point of view, a signal has a dyadic sense, including signifier and signified (is more similar to the way a computer works). However, a sign has a triadic sense as it includes interpretation. Though from that point of view it would be more interesting to change the name from "signal" to "sign" and from "weak signal" to "weak sign" from now on, the first terms will be used for consistency along the paper.

Considering interpretation immediately moves us to look for the final reasons of this interpretation that are sometimes hidden. A model that fits with this approach is the one offered by Senge (1990) that states that when analyzing any situation the visible aspects must be considered like the tip of the iceberg, and true reasons on which they are based are under the surface.

Table 3
CLA (Causal Layered Analysis) layers.
Source: Inayatullah (1998).

Litany	Quantitative trends, problems, often exaggerated, often used for political purposes—(overpopulation, for example) as usually presented by the news media
Systemic causes	Includes social, technological, economic, environmental political, and historical factors (rising birthrates, lack of family planning, for example)
Discourse/ worldview	Supports and legitimates the systemic causes (population growth and civilizational perspectives of family; lack of women's power; lack of social security; the population/consumption debate, for example)
Myth/metaphor	These are the deep stories, the collective archetypes—the unconscious and often emotive dimensions of the problem or the paradox

In the futurist arena, a model with some similarities because considers the deep motivations when analyzing trends or emerging issues is the CLA (Causal Layered Analysis) (Inayatullah, 1998). This method considers a six pillars process approach to the future (mapping the present, anticipating the future, timing the future, deepening the future, creating alternatives, transforming the present), being emerging issues analysis included in pillar 2, anticipating the future (Inayatullah, 2008). It offers a post-structuralism approach that uses a deconstruction methodology based on Michael Foucault's vision of hidden powers and motivations. When analyzing any phenomenon, CLA considers four layers through which the analyst must move in order to truly understand a social situation or a trend. The first level refers to facts or news as they appear in the media. Though this is only the superficial face of any event, is the only type of information that traditional methods consider. CLA goes beyond that and claims that it is necessary to dive into internal causes that rule behavior reaching the engrained myths in society, though it is not obvious to find the link. These four levels are: litany, systemic causes, discourse/worldview, myth/metaphor (Table 3).

Weak signals are included in litany layer but they are only the visible part of the emerging issues. Under them, systemic and deeper motivations must be identified. On the one hand this means that some subjectivity is introduced in the method but on the other hand it implies that it is possible to consider the hidden reasons that drive the change. Another advantage is that once the forces that foster an emerging issue at each level (systemic causes, worldviews and myths) are identified and their relation with it is understood, it is possible to give some kind of objectivity to the subjectivity. In this way, it is possible to assess if an emerging issue has strong drivers or internal motivations that will foster its future development, and also to identify factors that can act in the opposite direction. This analysis shows a reference framework to assess emerging issues considering different layers and different forces within each layer, standing out relations and oppositions among layers and between them. It allows the identification of common internal motivations between different emerging issues and their analysis from different angles widening the perspective of the analyst. It also allows the identification of non-obvious aspects on which to act in order to ease or to hinder an emerging issue. On the other hand the application of this method requires a holistic approach by the analyst that must have a good understanding of the issue itself, the society challenges, the culture of the country, and the metaphors engrained in people. This supposes to deal with very heterogeneous information, sometimes contradictory and always arguable. For that reason it requires experience and the access to uses cases developed by experts. In this regard, the book CLA 2.0 Transformative Research in Theory and Practice collects the best practices with this methodology until now (Inayatullah & Milojević, 2015).

6. Use case: internal and external analysis of SIE 2013 emerging issues

In this section the emerging issues identified in the Information society report in Spain (Informe de la Sociedad de la Información en España) are considered, in particular the edition of year 2013, (from now on SIE2013).[2] These emerging issues are those that were considered by authors as the ones with the highest potential to impact in the future. In this section, they are analyzed under the framework developed previously in order to find common elements that could be used to create rules to identify emerging issues with high potential of becoming trends. This analysis was carried out in a two-day workshop with the authors one of whom is author of this article.

6.1. Use case description

Firstly, it must be mentioned that SIE2013 has a wide orientation targeting specialist people and the layman. It shows the most important facts in the ITC field that occurred along the year. In this regard it includes hundreds of general data about networks, subscriptions to connectivity, services, implications in people life . . . and it includes other data more orientated to describe trends in this field too. Within these trends, some are continuation of previous year trends, but it includes the three new trends that are rising that are considered with the highest potential to impact in society, a concept that can be assimilated with the term called "emerging issues" along this paper. The process to select these trends involves several groups of experts from inside and outside the organization and a dense schedule of meetings and think tanks. Reports from

[2] http://www.fundacion.telefonica.com/es/arte_cultura/publicaciones/sie/sie2013.htm?soc=twitterpro.

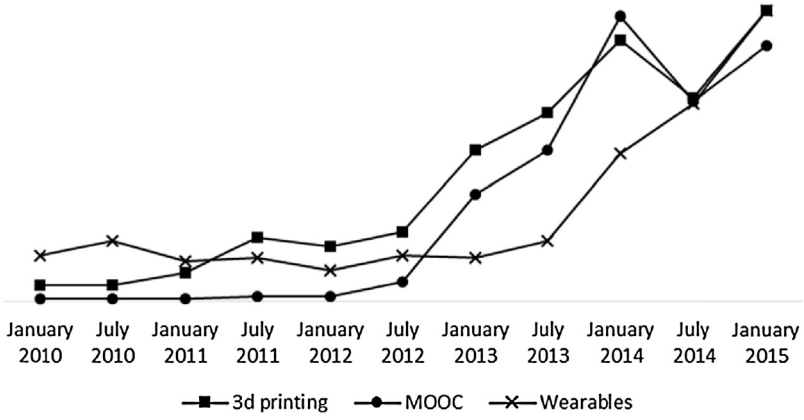

Fig. 1. Timeline evolution of searches on Google.
Source: Own elaboration. Based on Google Trends Tool.

cutting edge companies, personal experiences, scenario analysis were considered. After that, analysis of information retrieved by search engines was considered as complementary information.

The following emerging issues are included in SIE2013:

- Wearables: it refers to clothes and complements with process and connectivity capacity so they can participate in PAN (personal area networks).
- Future manufacturing: it refers to the fact that manufacturing can be considered as a digital process more, so that properties and models of digital world can be applied.
- New educational models: it refers to new educational models, mainly MOOC (Massive Open Online Course), in which ITC play a disruptive role.

The reasons and motivations for the election of these "emerging issues" are well exposed in the report SIE2013[3] and in the presentation of that report.[4] Due to the mainstream audience of this report, these phenomena were emerging during the 2013 first semester but near to take off in the S-curve, as it has been confirmed by the increase in the interest in terms associated to these emerging issues in the following two years (Fig. 1), which implies that they have turned into trends.

A description of arguments to choose them is included in the report as there were initially other candidates. In the workshop the descriptions were analyzed with the authors of the report in which 20 weak signals were identified.

6.2. SIE2013 external analysis of emerging issues: Igor Ansoff's weak signals model

Classifying weak signals according to Igor Ansoff's model described previously requires an in-depth scanning activity to ensure that all weak signals are included. In this use case the SIE2013 argumentations of the emerging issues are used as source, as that is the information considered by the authors to select those emerging issues. The next table classifies those weak signals according to Igor Ansoff's model (Table 4):

The conclusions obtained from this analysis are:

- Most weak signals identified are of type 4, (11 signals, 55%), followed by type 1 and type 2 (3 signals each one, 15%), type 5 (2 signals, 10%), and type 3 (1 signal, 5%).
- Emerging issues are not selected by a unique signal but by a structure of signals that is different in each case. In this use case, all emerging issues have signals of type 1, 2 and 4; a more in depth analysis about if that can be considered a rule of potentiality of an emerging issue would be interesting.
- The fact that a signal is more concrete (higher level) does not mean that it has a greater weight to select an emerging issue. For instance, the weak signal "Forecast about contribution to Europe GDP of application of big data to industry" is classified in level 5 but it has less relevance for authors than "Personalized manufacturing affordable in cost and in time".
- The impact in media is an important factor for all emerging issues that suggests that they are in the point of turning into trends.
- Signals gain importance by accumulation of evidence. For example, in the signal "Smartwatches from first level companies: Samsung smartwatch, Sony smartwatch, Qualcomm Toq smartwatch . . . ", is the accumulation of companies

[3] http://www.fundacion.telefonica.com/es/arte_cultura/publicaciones/sie/sie2013.htm?soc=twitterpro, pages 20–24.
[4] http://www.slideshare.net/FundacionTelefonica/presentacion-del-informe-sie-2013/1, slides 16–24.

Table 4
Igor Ansoff's model applied to SIE2013 weak signals.

	Type (1) sense of threat/ opportunity	Type (2) source of threat/ opportunity	Type(3) threat/ opportunity concrete	Type (4) type response concrete	Type (5) outcome concrete
Wearables	Wearable boom in media	Base technology development: M2M, SmartCities		• Some eHealth personal devices on the market with good results: Fitbit, Jawbone . . . • Important manufacturing companies join the movement: Nike+ • Prototypes of clothing including sensors and connectivity: Rest Devices, Sproutling • Smartwatches from first level companies: Samsung, Sony, Qualcomm Toq . . . • Prototype Google Glass at 1500 dollars	
Future manufacturing	3D manufacturing boom in media	Personalized manufacturing affordable in cost and in time	General electric unleash 1,000 patents to be used by inventors	• Big companies using 3D manufacturing, i.e., Boeing producing 200 types of pieces • 3D printers priced under 1,000 dollars • Important robot improvements: baxter, tesla utilization of robots • 48% of US producers are thinking about bringing back production	Forecast about big data application to industry contribution to GDP
New educational models	Boom of MOOC courses in media	New initiatives to digitalize content		• Outstanding educational entities adopting MOOC • MOOC enrolment soar	Pilot testing of digital school bag in 45 schools in Spain, implying a reduction of 80% in cost

to this trend that really contributes to the validity of this signal. The same happens with the signals "Some eHealth personal devices on the market with good results: Fitbit, Jawbone . . . " or "Prototypes of clothing including sensors and connectivity: Rest Devices, Sproutling)".

Though the utility of this classification to obtain a global vision of signals and their maturity is manifest, this approach reveal important limitations as a criterion to select emerging issues. Besides the subjectivity, this example shows that there is not a strong relationship between the degree of concretion of a signal and its relevance to warn that something disruptive will happen. One conclusion that is a limitation too is that the valuation of the potential of an emerging issue does not depend on a unique signal but on an accumulation and a structure of signals whose logic it is not easy to discover.

6.3. SIE2013 external analysis of emerging issues: signals presence in Internet media

Using search engines to quantify the diffusion of concepts in Internet media implies first the effort to find the correct words to include in the query, that is, pertinent terms that capture weak signals main idea. Sometimes, several terms are required to capture it or even the utilization of a semantic ontology. In some cases a term or combination of terms that capture the specific and differential idea of a signal are not found, which is one of the limitations of this approach. Referred to the SIE2013 use case, the terms used in the queries, the number of hits both in 1S2013 and 1S2012, and the calculated growth are showed in Table 5. Strength and growth are calculated using Eqs. (1) and (2) stated previously where the period considered is the first semester of 2013 (the period when the emerging issues where detected) and the same period of 2012 to calculate the % of change.

Some qualitative conclusions drawn from these data are:

- There is a high range in the number of 1S2013 hits (from 10,300 to 8,980,000) that implies that the number of hits is not a fundamental factor to select an emerging issue. The main statistical values that describe this variable are $\mu = 2{,}533{,}350$ and $\sigma = 3{,}489{,}430$. This leads to the 95% confidence interval [0;5,450,590], too wide to be useful.
- Related to growth, all signals show a high rate, in some cases over 300%. So there is some evidence that emerging issues weak signals have a high growth rate presence on the Internet, though a high growth rate does not mean that a signal is associated to an emerging issue (think for that in most marketing campaigns of products). In this case the main statistical values are $\mu = 2214$ and $\sigma = 1685$, and the 95% confidence interval is [8053; 36,222]. As appreciated, this variable gives some evidence about if a fact is associated to a high potential emerging issue that is near to become a trend, but it is not conclusive.

Table 5
Strength and growth of signals in the web applied to SIE2013.

		Strength of the signal		Growth pace
	Search term	Google hits 1S2013	Google hits 1S2012	% Change 1S2013/1S2012
Wearable	"Smartwatch"	5,710,000	1,720,000	232%
	"Google glass"	8,980,000	2,260,000	297%
Future manufacturing	"3d printing"	4,790,000	733,000	553%
	"Fablab" OR "makerspace"	102,000	40,900	149%
	"Industrial internet"	10,300	4440	132%
	"Baxter" AND "robot"	31,700	20,100	58%
	"Open hardware"	30,800	22,600	36%
New educational models	"MOOC"	612,000	148,000	314%

So, though presence, strength and growth in Internet media can give some clues about whether an emergent phenomenon has high potential, they are not conclusive to discriminate at least with the data of this research.

6.4. SIE2013 internal analysis of emerging issues: post-structuralism approach

The internal analysis of emerging issues has been carried out applying CLA method focusing on the hidden layers (Systemic Causes, Discourse/worldview and Myth/metaphor) and not on the weak signals (litany). So the first task carried out was the identification of causal factors, this is, different myths or narratives, worldviews and systemic causes that can influence the evolution of SIE2013 emerging issues. From these visions it is interesting to highlight those that have a positive influence (Table 6) as they can act as drivers of the emerging issues meanwhile other visions that can work in the opposite direction were also identified in order to best understand the complexity and the frictions of the process.

This table of drivers gives valuable information for the strategy analyst to identify non-obvious aspects that must be enhanced to encourage the evolution of the emerging issues. It is also useful to detect relations among them, for instance from this table can be deducted that emerging issue 2 (Future Manufacturing) and emerging issue 3 (New educational models) have a lot of common internal foundations (5 out of 7 systemic causes are shared among them). It is also observed that when one goes to deeper levels, the causal factors are more common, which reflects that the commonalities of these emerging issues are very deep (5 out of 8 Myths are shared by all emerging issues).

As commented previously factors do not act in an independent way and there is a causal effect among layers in the sense that the factors identified in one layer are the foundations of the others placed in layers situated above as suggested by the metaphor of the iceberg. Depends on the point of view of the analyst based on his experience to value that relations and their strength. So, in the use case considered authors have identified as weak signals (the litany) those signals that fit with their conceptual model of the underlying layers. For instance, considering only the positive factors identified in the previous table, the weak signal "Some eHealth personal devices on the market with good results" is related to systemic causes such as "ageing" or "health cost soaring". The same happens from one layer to other, i.e., systemic cause "ageing" is related to worldview "self-control of life", or worldview "My world first" to the Myth "I am unique". This implies to consider all these factors as a complex structure (a kind of gestalt) where it is also possible to identify contradictions between driver's layers, for instance systemic cause "Market national barriers are blurring" works in the opposite direction than the Myth "Defense of tribe". These drivers also clash with other possible factors within layers reflecting different stakeholder's interests and different worldviews and myths. For instance the Myth "Open is better" has to fight against "Big brother dystopia" and "Free is better" against "Everything has a price". At the level of discourse or worldviews there are important tensions too, for instance "Education, a fundamental right" against "Education as status" or "Constructivist approach of knowledge" against "University as knowledge keeper". At systemic cause's level the contradictions are clearer and associated with different stakeholders interests, for instance Administrations are worried by health cost soaring, medical staff by stability of employment, and ICT (Information and communication technology) companies by technology deployment.

In the case analyzed, these two approaches have been used by Telefonica to obtain a big picture of the situation of these emerging issues and the causal factors that drive them. The external approach was useful to understand that these phenomena were near to take out and for that reason to place them in the center of the surveillance radar. The internal approach helped to stand out the drivers and other factors that work in the opposite direction. These tensions and contradictions offered information that was used to see phenomena in a holistic way and to decide action. For instance, it was detected that the tension between "Open is better" and "Big brother dystopia" was able to define the success or failure of these emerging issues. These narratives were contradictory in principle but a solution was proposed at systemic level that consisted of fostering technologies that allow open data but giving the user the possibility to manage their data, to define who can see them, to delete them... This approach gave place to the elaboration of the Digital Manifest.[5]

[5] http://www.digitalmanifesto.telefonica.com/manifesto/.

Table 6
SIE2013 Emerging issues internal drivers using CLA (causal layered analysis) scheme.

	(1) Wearables	(2) Future manufacturing	(3) New educational models
Systemic causes		(3) Educational cost soaring	
	(1) Health cost soaring		
		(2,3) Economic crisis	
		(2,3) Market national barriers are blurring	
		(2,3) Knowledge specialization	
	(1,2,3) New technologies are prepared for the jump		
	(1,2,3) Ageing		
Discourse	(1) Connectivity is progress		
		(3) Education, a fundamental right	
		(2,3) Local world first	
		(2,3) Self-control of life	
		(2,3) Creative partners between independent human beings	
		(2,3) Constructivist approach of knowledge	
	(1,2,3) My world first		
	(1,2,3) Data as a new material		
	(1,2,3) Technology is nice		
Myth/metaphor	(1,3) Defense of the weak		(1,3) Defense of the weak
	(1) Human-Superpowers		
		(2,3) Defense of tribe	
	(1,2,3) I am unique		
	(1,2,3) Internet connection is the new food		
	(1,2,3) Free is better		
	(1,2,3,) Open is better		
	(1,2,3) Digital is the new alchemy		

7. Conclusions, continuation of the work

Surveillance is an activity of increasing importance, and for this reason many organizations have set up their own observatories. Besides this activity carried out by observatories, a branch of knowledge is being developed around foresight. Though observatories and foresight should go together, there is still an important gap between them because there is a great deal of foresight terminology and methodologies and most of them are not mature enough. This paper analyzes the capability of emerging issues to become consistent trends. Two approaches are considered, one external based on measurable signals, and other internal based on social and economic deep motivations. In the first case two methods are considered, Igor Ansoff's weak signals model and signals presence in Internet media. In the second case CLA method (Causal layered analysis) is considered, and a mathematical framework to value the relevance of emerging issues and the relation between them is developed. These methods are illustrated with a practical exercise based on the emerging issues displayed in the report SIE2013. Considering aspects as difficulty in execution, objectivity and reliability, it is concluded that each one of them has pros and cons, which are summarized in Table 7.

It is concluded that the utilization of these approaches and methods in a complementary way is convenient. Though the analysis of signals seems more objective, in all cases emerging issues have not been detected by one signal but by the sum of lots of them creating a system of signals whose rationale is difficult to find. Deconstruction model seems more powerful than the others to dive into the real causes, as it is the only one that considers the relation among "signals", "emerging issues "and" internal causes.

This paper assesses the meaning of these approaches showing their limits. In order that an organization gains the most benefit of them it is recommended to adopt a holistic approach moving between them. Based on the use case developed, it is shown that Ansoff's approach and presence in Internet media offer a good representation of emerging issues level of

Table 7
Pros and cons of different approaches to analyze emerging issues (obtained from the use case).

Approach	Method	Pros	Cons
External	Igor Ansoff weak signal model	It allows to classify emerging issues easily	It gives more importance to a signal when it is more concrete (this is not always true)
	Impact in media: strength and growth	It allows to classify emerging issues easily, very objective	It does not consider the internal reasons. There is not a clear relationship between these factors and emerging issues importance
Internal	CLA	It considers internal reasons, systemic causes and values. It allows to detect relations among emerging issues	It is subjective

adoption and some indicators about the stage in which they are, so they should be used in first place to value their maturity and to obtain a big picture of the situation. Diving into the internal motivations as CLA does is very useful to detect drivers, relations between emerging issues, contradictions . . . therefore to offer a wide picture of change's dynamics and complexity. For this reason this approach is ideal for strategic planning purposes and to foster the internal debate, as it was showed in the case of Telefónica.

However, the interpretation of signals with regard to hidden society motivations makes it to some extent dependent on the preconceived ideas that the analyst has on the future. In this paper, a framework to understand the potential of trends has been introduced, but at the end, it is always fed by expert's assessment. For this reason, the utilization of models to raise the structure of values in society would limit or at least identify subjective points in this kind of reasoning. With this aim, the utilization of Ferdinand de Saussure's structuralism and Jacques Derrida's deconstruction concepts could help and are lines of enquiry for further research.

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