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Weak signals as a flexible framing space for enhanced management and decision-making

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This paper revisits theories of weak signal analysis using the concepts of 'framing' and 'meta-framing' to provide an enriched methodological environment for management and decision-making in turbulent contexts. This attempt takes place within the effort that futures studies have deployed to cope with the need to be 'early' in change processes, and is intended to improve firms' preparedness regarding uncertainties, threats and opportunities. The weak signal notion is one of the metaphors coined to accomplish that, thanks to the seminal role played by Igor Ansoff in the 1970s and 1980s, and the inputs of more recent continuators who have shaped a wide methodological environment. After over 20 years of weak signal exploration, some pending issues suggest the need to re-open some basic hypotheses as well as the use of a wide-angle lens to review the Ansoff legacy and its relevance for management and decision-making. The concepts of framing and meta-framing are the means that will allow us to do this by adding a more reflexive dimension to weak signal analysis, taking account of analysts' and commissioning organisations' own biases, and enhancing firms' robustness against possibly disruptive futures. Pragmatic managerial orientations of how to make use of methodological blends involving reflexive steps will be outlined, also suggesting diverse tracks for further research on weak signal theories and their contributions to both futures studies and strategic management.

Keywords: weak signal; framing; constructivism; paradigmatic biases; reflexivity

1. 'Weak signal', a metaphor to tackle the need to be 'early' regarding changes and uncertainties

The history of futures studies is already quite substantial. Each generation of futurists had to cope with particular historical and epistemological challenges, appraised as being more or less successful and relevant by futurists of the following generations. For quite some time, long-term foresight issues (i.e. anything from 20 to 300 years ahead) have been fashionable. Shorter-term concerns were somehow embedded in longer-term development as parts of forecasting or system dynamic outcomes. It took the visionary efforts of some analysts to raise shorter-term futures, or shorter anticipation and response time capabilities regarding future changes, as theoretical challenges in their own terms.

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In that evolution of the discipline, let us emphasise the prominent role of Igor Ansoff, pioneering the field in the 1970s and 1980s[1] and some 15–20 years later (between 1995 and the time of writing – 2008) that of a larger group of analysts, with a clear stronghold in the Finnish arena of futures studies. These more recent contributors explored further the weak signal issue, but essentially building upon Ansoff's work, always displaying a high respect for weak signal theory's roots.

Without putting too much emphasis on the critique tone, this paper aims at examining options that still remain open for discussion, as a way to re-enforce the weak signal approach. We will thus go across the contributions of Ansoff and others, and pinpoint strengths and original features, but also, in a further section, some weaknesses. We will propose conceptual solutions to make the mainstream approach to weak signal management more robust, envisaging a diversity of options and methodological blends hopefully enriching firms' 'futures' sensitivity.

The need to be 'early' on processes of change has been handled so far mainly through the concept of weak signal and to a lesser extent by the notion of 'early warning' (see for that, Gilad 2003), as well as neighbour ideas which have flourished in other languages, such as 'Früerkennung' or 'Frühauflärung' in German (early detection, early insight) or 'les faits porteurs d'avenir' (facts they may help shape a new future) in French. Let us not forget 'wild cards', which in futures studies usually stand as tokens for surprises, and which are often treated as near equivalent of, or as having tight relationships with weak signals (weak signals as advanced forms of wild cards or wild cards as being simply a particular kind of weak signals).[2] In this conceptual paper, the broad attempt at being 'early' in detecting changes will be analysed through the notion of weak signal. More suggestions will be made in the concluding section.

As we shall see in Section 4, the first thing to remember is that the notion of weak signal does not necessarily correspond to a real event or process, but is only a metaphor, building upon information theory to help us tackle a hypothetical relationship that we, as individuals, organisations or societies, develop with our environment and its emerging characteristics. Most of this relationship passes by as a series of perceptions, representations and models of how the world functions, not only physically but also in socio-economic, cultural and political terms. This activity is, most of the time, routinely carried out and tends to stabilise, for a given period of time, on certain paradigms (or dominant models) that somehow shape this perceptive and representational capability at both the micro- and macro-levels of our reality. What we call a 'weak signal' is usually not a direct warning message but, at best, a series of perceptions of issues, events or processes that might constitute an indication of further developments, possibly impacting our lives in the future.

In order to understand more fully the originality of such a relationship between the present and the future, let us examine what some established definitions of weak signals reveal. Ansoff formulated the idea that they are symptoms of possible change in the future. This broad perspective was presented some years later by Coffman (1997), who paid a more detailed attention to conditions and stages of evolution of weak signals. According to him, a weak signal is an idea or trend with potential impact on a business or its environment, which may be new or surprising from the signal receiver's vantage point (a perception which may differ for others), thus making it difficult to identify and isolate from other less relevant indications; this difficulty explains in particular why some people may scoff at weak signal suggestions, which are in fact indicators for firms and organisations. It is worth mentioning the proposal of Kamppinen, Kuusi, and Söderland (2002), who see in a weak signal an individual event or a group of inter-related events, which may not seem important initially, but develop into significant phenomena in shaping the future. Finally, let us also stress the interesting comment made by Mannermaa (2004) reported

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by Hiltunen (2007), who relates how the seemingly small aspects of reality represented by weak signals can be connected to big impacts later on.

Drawing upon these proposals, and bearing in mind firms' management and decision-making needs, we see three key issues worth examining:

(1) 'Surprise for some, not for others': it is important to understand how this can be. Is the reason for such a variation lying in the intelligence of some 'above average' players as opposed to less smart ones? Or is there another problem, still to be identified, which can justify this statement? We will attempt to answer this question in stages.
(2) 'Weak then strong', but also 'small then big': this makes sense, as faintly perceptible events or facts that can grow and then have a big impact are the only ones which should retain a firm's strategic attention. As a matter of fact, small signals with small impacts are of no interest as it happens all the time; big signals with small impacts can be, in principle, neglected; big signals with big impacts correspond, most likely, to processes which should have been cared for earlier (fitting the strong signal profile). The only other option worth considering is the gradual increase of the signalling strength, along with gradual increase of impact, but this is typically the situation that strategic planning is supposed to help handle, corresponding to a monitoring or dashboarding activity that any enterprise in its market struggle must continue. To sum up, the 'small then big' sequence is the only weak signal profile that management should focus on.
(3) Patterns of evolving 'from weak to strong' signal: If there are numerous models of change, the question is which ones fit best the analysis of weak signal paths and, more generally speaking, the early detection scheme? Among the main patterns likely to satisfy a broad usage of the weak signal notion, it is convenient to make a distinction between expected forms of the change process, where weak signals are only the first occurence of a typical signature (first snowfall for the yearly coming of winter for instance) and completely open-ended dynamics, for which we have no clear idea of how they will develop and for which, of course, weak signals are also more difficult to envisage. Another useful distinction to stress is the opposition between narrow, strict and well-documented causation models and more hybrid or complex aggregations of change processes. As an example of a narrow causation, let us mention the deterioration of traditional food habits in regions until now little touched by the fast food trend and its multiple health consequences; as an illustration of an open-ended and complex process, let us consider the case of mobile telecommunications development, which is much more than just transportable telephones. Finally, the speed of change can also vary quite a lot, with gradual and even-paced processes on the one side and various forms of accelerations on the other, mainly exponential (the Google type) or spousing the sudden pace shift. In this particular category, there are several possible sub-patterns, including the famous 'butterfly effect', which is quite important for the modelling of climate change, as well as in the financial domain.

Beyond these generic issues, however, there are still some fundamental questions to address: are weak signals real things or particular perceptions? How to sort out the good ones from the less significant ones? Does the fact that weak signals can be surprises only to some people come rather from insufficient information, bad modelling or unsuitable methodologies? Did the enhancements proposed by Ansoff's more recent continuators overcome most of the problems to be tackled (strategic surprises), or should we consider that some important issues are still pending? These are the questions we want to address and for which tentative answers will be provided in the following sections.

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2. A strong theoretical programme pursued over three generations of futurists

2.1. *Ansoff's seminal contribution*

Igor Ansoff was already a star in the field of management when he proposed new concepts for tackling uncertainties and surprises. He was for instance the first one to coin the concept of strategic planning. During the 1970s and the 1980s, he developed a complementary set of theories and methodological tools to cope with what he called 'turbulent environments', 'strategic discontinuities' and 'strategic surprises'. Before that, futures studies were dominated by ideas that we could somehow deduce the future from past and present. Main approaches were then: (1) forecasting, envisaged in the strict sense of calculating possible trajectories based upon past series of data; (2) Delphi exercises, making good use of multi-expert knowledge to put next steps of a given problem into perspective; (3) simulations, based upon some form of systems thinking; and (4) scenario developments, often combining several of these methods. With Ansoff's new conceptual proposal, the idea emerges that the past is not always a fast track to envisage futures, at least not as the result of incremental and continuous development. As soon as we leave the past behind, many things can happen which may surprise even the most renowned specialists. In reality, Ansoff does not get totally away from the idea that the past is important to understand the future. He only suggests that some futures have, at present, little evidence of what they may become or help shape, such that they are often hard to identify. Hence, the notion of weak signal that an organisation must learn how to capture and make good use of, before the signal becomes too strong.

Let us thus examine the essentials of Ansoff's contribution (in particular 1975, 1982, and 1984), envisaged not chronologically but as a meaningful whole. Ansoff developed the convenient and yet original idea that, in our selective and interpretative activities, we tend to introduce filters, that help us make sense of what we perceive and take action accordingly. He thus imagined applying three types of filtering operations so as to transform the information flow of perceived weak signals into usable knowledge. In fact, what he had conceived for the strategic management of organisations was something that we all do normally but subconsciously; but of course, in Ansoff's perspective, this mundane habit is deployed within a consistent methodological framework. The almost unnoticed filters of our daily lives have thus become, with Ansoff, a rather ambitious programme for selecting and interpreting emerging signals and the related decision-making and strategic endeavours. Let us summarise this already well-known process as follows:

For an organisation wanting to cope with uncertainties and possible strategic surprises, any clue from its environment, such as a new phenomenon or event, in order to become a meaningful reality, has to pass through three different filters; at the end, the objective is to have effective decision-making options.

(1) The observation filter (or surveillance filter) defines the area that we can observe and collect data.
(2) The cognitive filter (also called mentality filter) is used for evaluating the novel issue that has passed the observation filter, and in particular its relevance for the firm.
(3) The power filter is engaged when it comes to involving decision-makers and their particular experience and interest, as well as any players who has been in the analytical process for a while and having a role to defend.

This filtering mechanism is quite expressive, but by itself insufficient. Ansoff provides us with a complementary framework that shows how the organisation can gradually cope with weak

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signals, suggesting a life cycle of how problems emerge and become noticeable. Also, in a second stage, what type of attitude and, finally, what response should be given to each successive level of manifestation.

Beside this progressive perspective on how weak signals can turn into strong ones and nevertheless be effectively managed by an organisation, Ansoff views the firm's responses as being tightly related to the state of knowledge. He thus divides the responses into two main groups: responses affecting the firm's relationship with the environment and responses modifying the internal dynamics and structure of the firm. For both of them, he sees three increasingly stronger strategies: one that improves the firm's awareness and understanding, one that increases the firm's flexibility and one that allows the firm to directly tackle threats or opportunities.

Although the response time of the firm is always given by its initial level of preparedness and flexibility, the idea of progressive shaping is key to Ansoff's handling of weak signals. It has been presented as the interplay between the firm and its changing environment, the outcome of which is translated into weak signals but also, increasingly, stronger signals. Formulated in knowledge terms, this gradual construction involves the successive stages of: (1) sense of a threat or opportunity, (2) increased knowledge of sources, necessary responses and possible outcomes, and (3) awareness from the firm that it must act, and not let signals become too strong; otherwise the firm may be too late in recognising new trends or discontinuous developments.

2.2. *Further contributions*

Although Ansoff developed throughout the years an impressive framework for taking weak signals into account in the strategic activity of firms, some academics and consultants have tried to improve his theory. Tracing back all their contributions would be a survey in itself, but some basic orientations can be identified, giving us a broad appraisal of how attractive Ansoff's legacy has been, and also how diversified the weak signal perspective has now become, a phenomenon that Ilmola and Kuusi (2006) see as a 'Renaissance' of weak signal analysis. Let us mention in particular the following inputs:

- A more precise description of the links between weak signals and information theory (e.g. Coffman 1997)
- The making of tools to facilitate weak signal generation and analysis (see Fountain Park[3])
- Multi-criteria analysis as a broader perspective for weak signal management (see Könnölä, Brummer, and Salo 2005)
- A fully-fledged information life-cycle view making sense of weak signals (see, e.g. Choo 2007), starting with such key stages as idea creation and elite awareness
- The sign as semiotic interplay: referring to the sign as a substitute for real life events and possible weak signals. This approach allows for distinguishing between endo- and exo-signs, and give a key role to the intervention of 'interpretants' for the decisive sense-making steps (see for that, Hiltunen 2008)
- Classification matrices: they aim at proposing a convenient and suggestive 2×2 dimensional mapping of weak signals. Let us mention in particular the attempt of Morrison and Wilson (1996), who distinguish between low/high certainty or uncertainty and low/high impact (a suggestion also close to Mannermaa 2004) and Kuosa's perspective (2005), who proposed confronting signals that are connected to a known trend or on the contrary to no known trend, to events which are to be differentiated between partly to completely expected

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- Weak signals and wild cards: several kinds of relation are envisaged between these two concepts, from authors who envisage them as broad synonyms to others who consider that wild cards are weak signals that we cannot ordinarily think of (see Mendonça et al., 2004) and have to be generated thanks to specific procedures (Petersen 1999)
- Systemic transactions: in recent years, some authors have re-enforced the relationship of weak signal with system analysis, pursuing an already established tradition (Coffman 1997); most interesting in that domain is the work deployed by Snowden and colleagues (2002, 2005) to value particular configurations, allowing situations to evolve from specific transitional states of organisation to others; a creative perspective open to promising, as well as dangerous, outcomes to take care of

Other significant efforts continuing Ansoff's contribution are the various suggestions for finding weak signals. Mendonça et al. (2004) provide indications of where to look for, starting with the most obvious targets, while Steinmueller (2004, 2006) and Hiltunen (2007),[4] emphasise the importance of diverse social actors including those living at the fringes of society (social movements, artists, sexual minorities, 'deviants', youth, etc.). This goes in the same direction as Day and Schoemaker's (2006) recommendation to consider weak signals and change management issues by paying great attention to what they call the 'Periphery' (another interesting metaphor).

3. Pending problems

3.1. *A constructivist critique of the Ansoffian tradition*[5]

Examining the literature on weak signal, one is struck by how most authors end up forgetting that the concept they use is only a metaphor. As a matter of fact, in most cases, no one is sending signals to us. The same can be said of companion concepts such as filters and noise. The trend, so far, has been to 'naturalise' weak signals,[6] as if they were objects or features in their own right, waiting to be discovered, instead of considering them as the expression of the paradigmatic capacity of the analyst, whoever it may be, to organise perception and interpretation in a certain way. In the Ansoffian tradition, weak signals are portions of reality isolated as meaningful, picked up to become part of an interpretation, and then, eventually, strategic activity. The process through which these things called weak signals by analysts actually come into existence and are then turned into useful information for individuals or organisations is simply never envisaged as a research problem. In other words, habits, models, assumptions and models for constructing weak signals out of billions of other possible perceptions is not part of the analysis. What makes someone decide, without knowing the future, that a particular weak signal is likely to have a more or less certain fate, a greater or lesser impact or tighter or looser connections to known trends (see comment on the mapping of weak signal proposed by Morrison and Wilson 1996; Mannermaa 2004; and Kuosa 2005), is somehow black-boxed.

In a constructivist perspective, it is just the opposite: what makes us identify some features as weak signals and evolve with them, is indeed an important issue. In particular, there is a need to better understand how our goals, interests, expectations, fears or aspects of our training background, not to speak of the different styles of maintaining oneself in power and embedded in one's culture or psychology, may orientate our selection and bias our interpretation of weak signals. Yet, in spite of the so-called 'cognitive filter', there is hardly any provision in the weak signal literature for a reflexive thinking about the path to one's own findings or their further treatment. Expressed in constructivist terms, all the weak signals suggested by the Ansoffian perspective are

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merely 'candidate weak signals', hypotheses or starting points for an exploratory reflection, for firms wanting to cope with disruptive problems, changing environments and innovative forms of learning. This deficit of reflexive precautions in the analysis of early stages of change has several consequences.

3.2. *Vision troubles, knowledge management or complex issues*

The first problem is the vulnerability of an organisation which finds all sorts of weak signals, works on them, but is unable to question itself on the 'whys' and 'hows' of its choices. In the absence of such a reflexive stage, finding weak signals may just be a way of producing false positives or false negatives (just as working through Ansoff's gradual uptake of weak signals is no guarantee of success). One good way to understand this paradox is Holling's image of Moebius loops (2004), in which one may have the impression of coping with continuous change signals, but having, in reality, a crucial difficulty escaping a basic problem of entrenchment. The financial crisis, due to the collapse of the US subprime market since autumn 2007, through which all risk experts (bankers and quotation institutes in particular) have ended up converging towards the same beliefs and mutually re-enforcing choices, is a good example of that problem. The US$50 billion fraud by Bernard Madoff, ex-president of Nasdaq, also involved the indulging and friendly attitude of the US Securities and Exchange Commission. These examples have demonstrated how specialists can be inhibited by their own desires, as well as cumulative and converging (but false positive) signals and beliefs.

These issues have important managerial consequences. Some firms or industrial sectors may recognise a salient feature, but fail to take it into account as important. For instance, Polaroid was able to observe the arrival of digital photography but failed to perceive how disruptive it would be to the company. Similarly, the Swiss watch industry of the 1970s produced the first electronic watch but failed to envisage its market significance and lost two-thirds of its manpower in the 1980s. In general, disruptiveness (but that is what weak signals are for) is difficult to perceive because it is dissonant to our dominant mode of thinking, in the sense explored by Festinger (1957), a problem also diversely emphasised by Levinthal and March (1993), Mannermaa (2004) and Ilmola and Kuusi (2006).

This myopia may be increased by the overall importance of the power filter, to take up Ansoff's concept. The question was originally raised as to how firms' leaders could trigger an internal process of identifying and then interpreting, and finally enacting, weak and progressively stronger signals, but many studies show that the reasons why a firm would start a foresight exercise or maintain a high level of alertness regarding change can be quite diverse (see Gruber et al. 2003). Freeman and Pattinson (2007), for instance, have examined the various strategies behind the start of a foresight exercise and also the forms of interferences that top manager introduce in the foresight exercises which they commission. Far from being open-ended, it is not infrequently biased. This observation, based on consistent fieldwork and findings, should not be viewed as a mistake or lack of intelligence. It reflects, rather, how difficult it is to support a thoroughly open reflection on changes to come. In this sense, one has to recognise that Ansoff's various filtering steps are not equal, the power filter playing often the most important role, dictating back how the other two filters of the Ansoff script should be conceived and applied (and also how weak signals are selected).

This bias limits the importance of the 'knowing vs not knowing' issue (having access to the 'perfect information' or not). Whistle-blowers of the Challenger space shuttle catastrophe were fired (see for other examples, Morel 2002); in this case, the power filter was indeed the key

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problem (just as in the Chernobyl case, there was no room for risk awareness). Without some reflexive moves, it seems difficult to compensate the weight of intentions and strategic objectives of the firm (sometimes embedded in its culture, but also the functioning of the commissioned analysts). We can observe such a collective bias today, for instance in many foresighters' preferential attitude towards such dynamics as Open Source, Web 2.0, or wireless computing expansion, in which we can hardly distinguish the results of analysis from optimistic profiling of specific socio-technological developments. However, this type of rethoric is also converging with the expectations formulated by political leaders – who commission the analysts – regarding these particular Information Society dynamics.

Another problem is that most weak signals of 'important changes to come' do not necessarily appear as simple forms such as words, sentences, images or events, but rather as bundles of concepts and processes, systemic transitions, hybrid patterns of shifting influences, cultural change dynamics, etc. In others words, the most challenging changes we are confronted with involve complex processes with no easy clue to deciphering them. If we take as the referential unit not the firm but larger organisational or societal settings, for instance, global economics and politics enter the picture. A firm's strategic problem may be related to the rise of China and India as competitors in its traditional market, or be linked to emerging environmental taxes that have little to do with the firm or its specific domain of activity. How about larger issues such as international cybercrime or climate change? There are grounds to think that the Ansoffian scheme, with its filters and gradual response approach is just too simplistic to really deal with such complex and open-ended types of changes. It is particularly acute with highly disruptive innovations or transformations of the environment. We are here confronted by large scale but serendipitous changes which go beyond, both in terms of magnitude and depth, what Bower and Christensen (1995) mean by 'disruptiveness' (i.e. a form of radical innovation, process or business model change involving new products and new markets); disruptiveness, in the broader sense often implies a major deviation from current mindset or even a real paradigmatic shift, not just within one firm or sector of activity, but in society as a whole.

4. The notions of framing and meta-framing

4.1. *Establishing the condition for a reflexive distance*

As we have suggested in the previous section, one of the ways to reduce unpleasant aspects of the paradoxes and shortcomings identified so far is to consider weak signals, whatever they may be, as 'candidates' (or in other words, as hypotheses). The possible evolution of this status resides not only upon external forms of signalling, who would confirm its first evidence, and help build a case for stronger signals, but also in the possibility for the analyst (and perhaps his constituency) of: (1) framing some candidates so as to make sense of them in terms of weak signals (this is something one does inadvertently, most of the time) and (2) taking some reflexive steps to analyse the underlying principles and implications or his particular framing options, what we will call, from here on, 'meta-framing'. This does not solve entirely the series of problems evoked so far, but tends to transform paradoxical issues into reasonably working perspectives.

This claim becomes notably effective when it comes to tracing and tracking 'candidate weak signals' in time and space and evaluating whether they might have already become 'strong' (signals) or even more comminatory injunctions. In this approach, there is barely any possibility for a weak signal to exist outside of some vision- or scenario-building effort, hopefully involving the analysis of its underpinning rationale. In such a weak signal, 'construction' process, the implicit

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choices we make and decisions we come to, including all the embedded features and parameters which make them sustainable in time, constitute precisely what we call a framing operation. It means a certain way to select features, shape them into a consistent set of references or perspective, supported by more or less explicit boundaries, time considerations or contextual sense-making links and analysing at some point the assumptions underpinning our early detection activity (see for that Adam 2006). This set of characteristics, most often implied in the identification and interpretation of weak signals, once established as a domain of analysis, allows for the status of weak signals to become an important part of their sense-making potential. This is the substance of what we call meta-framing.

In reality, we do some form of framing activity all the time – in everyday life, in science, in managing organisations, in publicity and in political debate. Business cycles are also types of framing configurations, system modelling too, just as are Ansoff's filters. We are framing our world as a normal form of apprehending our environment and construct some mastery over it as a routine means of survival. We simply do not assess the implications of what we do. We are thus quite self-referential in our contextual interpretations and tend to naturalise what we observe, neglecting (1) the biases that we may convey, often not being aware of them, and (2), for our own convenience or/and by limitation of ours, the fact that we are constantly part of a multiple reality (others may make different selections and interpretations). If we manage to identify, in addition, the assumptions and conditions that we co-produce within our framing performance (i.e. the meta-framing level), then we can get a new degree of freedom in selecting, interpreting and combining our (weak signal) evidence into future-making activity. This is why it is important to understand what this notion of framing really involves.

4.2. *Framing: the history behind the notion*

Traces of the 'framing' notion can be found in earlier works, but the researcher who has really taken this concept up and promoted it to full status on the social science scene is Gofmann (1974), in his work 'Frame analysis; an essay on the organization of experience'.

Frame and frameworks are said to be more or less synonyms to context, background, setting, situations, etc., but as Gofmann goes on, it is clear that some specific attributes are at stake when using the particular notions of 'frames' and 'framing'. In particular, frames are supported and put in perspective in a quite differentiated manner by a whole series of other concepts like keying, events, tracking, fabrication, roles, rules, strips, etc.

A frame is a 'schemata' of interpretation of experience, allowing individuals to recognise events and build meaningful perception of what they capture (Gofmann 1974, 21). Framing brings together the activities of locating, perceiving, relating events, scenes or processes, as known patterns of meaning or 'labelling'. It always involves, even if unnoticed, some level of organisation (a perspective, an approach, or even a more strongly structured configuration activity). 'Framing however, organizes more than meaning, it also organizes involvement' (1974, 345), and there is no need to insist that this dimension is of great interest for management as well as policy-making. In all cases, framing is a way to sort out some forms of meaning, out of multiple realities, with more or less flexible boundaries, anchoring features and communicational implications. Finally, let us say that framing mechanisms are numerous: transformation, fabrication, connection, disconnection, confusion, etc. – it can generate false positives or false negatives (alerting, for instance, is a sort of framing). It is not surprising therefore, if a wide array of disciplines have, after Gofmann, taken up the notion of framing, including in the area of strategic management (see for that Kaplan 2004).

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The link between this framing activity and weak signals is that most of weak signal identification and processing resembles a framing treatment allowing us to: (1) come up with options, (2) explore and test most promising meanings and implications, (3) elaborate responses to cope with strategic pressure.

In the case of a firm facing the kind of changes likely to take place within its specific environment, the tactics of top managers may be to play with Ansoffian schemes to exert a certain pressure and attempt to change the environment rather than to change themselves, or to go for minor adaptations, aligned to their competitors' moves. In this narrow type of context, the risk is limited for problems obviously not linked to global issues (although it is always difficult to establish, even afterwards, to what the firm' success or failure is really due). Finally, let us not exclude the possibility that some weak signal careers follow the Ansoffian scheme, but again, provided that some framing makes it consistent and feasible, and are captured by the organisation. Any major shift, on the contrary, will make the Ansoffian scheme less than effective in addressing emerging issues, as most of the indications are related to complex and broader types of changes and probably requiring important paradigmatic realignment in the short or medium term. In this case, framing is not sufficient and a true reflexive step is needed to diminish risks of false positives and negatives.

Let us finally insist on the fact that framing is, *per se*, non-reflective, but can be deconstructed as a inherent component of knowledge and communication processes which can be examined and even redesigned to incorporate reflective (or meta-level) features.

4.3. *From framing to meta-framing*

By introducing the necessary reflexivity to the possibility of self-questioning, we can transform framing into a more substantial concept: meta-framing. What do we really do when we 'frame'?

(1) We identify a topical context as reference.
(2) We suggest boundaries or contextual clues for validity or scope of usage (in time, space and societal context).
(3) We produce more or less explicit assumptions (actually, they are most of the time implicit).
(4) We build meaning, taking up a piece of information and configuring it as a situated form of knowledge (most of the time tacitly), with a particular perspective or through a particular form of communication.
(5) For complex arrangements (and their understanding), we are also capable of articulating several frames with one another.

All these dimensions, together – and provided that it is reflected upon – define the level we call 'meta-framing', which involves the capacity to establish as legitimate analytical objects (i.e. part of the methodology) these different shaping operations. The key to entering the level of reflexivity which can really make a critical difference in weak signal handling, however, is most probably number (3): making our assumptions as explicit as possible, and part of the weak signal identification process itself (i.e. taking into account the different usages we have of weak signals, according to our diverse roles and contextual interests).

Reflexivity, in that sense, means being capable of not only reflecting upon the 'what' (what is important, might be impacting), but also upon the 'how' and the 'why' (how and why we have come to select and interpret some events a certain way). For a more thorough linkage of reflexivity to futures studies, see Fuller, De Smedt, and Rothman (2006).

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5. Managing change, coping with uncertainties: a pragmatic approach

Meta-framing may seem to be a universal solution, but it has two shortcomings: (1) although a meta-framing activity may help limit self-induced biases, there is no guarantee of identifying all the problems and clearing the situation being analysed, as if we could reach a sort of objective level of observation; (2) engaging in a meta-framing activity regarding uncertainties and strategic questions is quite time-consuming and cannot reasonable be envisaged all the time. A subsidiary question, therefore, is when to 'go for it', or when to rely upon more fluid and straightforward spotting and then processing of 'weak signals', in the Ansoffian style, but at the risk of missing crucial features.

A pragmatic approach has to be devised, suggesting that environmental scanning, along with weak signal analysis and management, as Ansoff and continuators have outlined it, should constitute a 'business as usual' basis, but that periodically, the organisation should be more explorative than just reactive, particularly about its own mindset and vision.

For business as usual, the tips provided by Mendonça, Steinmueller, and Hiltunen (see end of Section 2), cover a wide range of options from typical organisation's attention to modifications of their environment to more atypical actors' behaviour, and also bypassing the generation of wild cards. However, as we have stated that we cannot rely on our capacity to pre-evaluate and discriminate certain from uncertain, and impactless from impactful, weak signals, we must introduce other ways of dealing with uncertainties and emerging futures. In order to get a better chance to pre-evaluate the quality detection of trends as well as both false negatives or false positives, some level of framing and meta-framing analysis is suitable. It prevents us from blindly applying Ansoff filters, and so be capable of better differentiating what belongs on the one hand, to a changing reality to be captured in terms of weak signals, and on the other hand, to intentions and wishes interfering with the proper analytical capability of each of the above-mentioned stakeholders. This level of investment has to be considered for, but not restricted to, crisis-types of situations and, on the contrary, deployed according to several forms of organisational knowledge management and anticipatory moves. If the first activity consists of managing candidate weak signals to the point where a decision can be taken, the second category involves a more open and non-linear form of activity, in which what is managed, in fact, is our framing capacity.

In that perspective, each one of the following suggestions conveys its own lot of epistemic issues and new avenues for new in-depth research, also involving challenging fieldwork. In particular, there is a need for clarifying the respective roles of the various concepts through which the 'early' detection claim has been made in futures studies and strategic management. The weak signal reference was chosen here to keep it simple, but early warnings or near equivalents in other languages, as well as other metaphors (seeds, germs, etc.), and finally the rather inconclusive debates on wild cards, would help deepen the reflection initiated in this paper. At this level, however, we would like to limit ourselves to proposing the following options as a creative and complementary perspective to traditional weak signal theory in futures studies.

- The analyst commissioned by an organisation to identify and interpret weak signals in their early stage should beware of easy picks (the odd, the new and their linear projection into the future) and check for real system dynamics, often multiple and competing; instead of just sequential facts and gradual build-ups.
- This precaution also means that the weak signals of candidates should be routinely stored for further processing, whenever possible, and to engage in various concurrent weak signal analytical activity.

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- When the moment arrives to start an open-ended analysis (not envisaged only as a reaction to external pressure), a pragmatic approach should prevail, balancing the most economic solutions, including quick methodological blends, with more explorative and reflexive forms of strategic analysis; as a general principle, short-term threats and decision-making habits (or power relation patterns) should not hinder the need for more in-depth periodic questioning.
- One interesting way of limiting most obvious biases is to start exploratory futures exercises with a backcasting approach rather than forecasting (Robinson 1982), linking weak signals with potential scenarios only as a concluding reflection rather than easy picks pushed into possible unnoticed preferences linked with forward thinking.
- In the case of the forward thinking approach to weak signal treatment, one way of limiting self-induced framing is to link weak signal picks to several cones of possibilities (the options that lie between two extremes) and not just one, thus making the Ansoffian process address questions of different nature, three or four clearly distinct questions defining a level of complexity usually beyond the analyst's control.
- Far from envisaging weak signal analysis as a one-size-fits-all approach, levels and scope of changes that an organisation has to cope with should influence the pragmatic philosophy suggested in this section. Responding to a competitor's move into the market, anticipating next summer's fashion is not an early detection problem of the same kind as dealing with the world financial crisis, the evolution of China's influence on mass-markets, or the impact of the first really severe oil shortage in the investment of energy-sensitive organisations or sectors. Adaptation to the scope and speed of the change envisaged should help match the different levels of possible uncertainties and surprises. Minimally, this means that the firm, as a strategic actor, has to envisage as obvious the evolution of its market and regulatory environment (the Porter-like approach to competitive analysis), but also the dynamics of more global pressures, constantly changing the landscape in which one evolves; hence the need to reflect on assumptions, models and paradigms.
- Uncertainties will remain, and instead of reacting to weak signals, the firm should also envisage no return points or tipping points for ineluctable decisions and actions; in an Ansoffian perspective, this means the *ex-ante* evaluation of when the firm considers that a weak signal will become a strong signal, and therefore force a response.

In all cases, what should prevail, as a generic way to limit one's own biases in the identification and treatment of weak signals, is giving constant attention to diversity (of the environment, the dynamics likely to take place, the interpretations of the same event or issue, etc.), converging in this sense with directions already evoked and suggested by Mendonça, Hiltunen and Steinmueller at the end of Section 2.

6. Conclusion

In this paper, we plead for a constructive re-visit of the very useful concept of 'weak signal'. We have examined the strengths, but also some deficits of the mainstream approach as outlined by Ansoff and continuators. We have emphasised that the main deficit of the work carried out so far in this now well-established perspective lies in the lack analytical reflexivity, a weakness regarding the analyst's own assumptions, boundaries, mindset, expectations and their overall impact in weak signal analysis itself. We drew upon the existing concept of framing, developed and proposed the more provocative idea of meta-framing as a stimulating area for better understanding such biased

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inflections of our own picks and further treatment of weak signals. We finally envisaged several ways of translating all these contributions into open and constructive managerial terms.

We are aware that going against the mainstream is not easy (dominant paradigms know how to strike back!) and that most of our proposals also have some level of paradox, including what we have criticised for the Ansoffian tradition. This is why we welcome – and consider an urgent need – any new research in that direction, not just reaffirming and enhancing Ansoff basics, but truly demonstrating that a re-enforced weak signal theory can help us cope with real challenges, not only for the firm, but also for society as a whole. The 'early' detection claim is of course the main problem tackled in this paper, but beyond that generic question there are more pragmatic issues to deal with, such as those presented in Section 5, but more broadly all discontinuities and radical shifts from current trends, which are key concerns for innovation but also risk management at both the micro-level (the firm, its neighbouring environment) and macro-level (changes impacting the global market and beyond, possibly, the whole of society).

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Notes

1. See in particular Ansoff (1975, 1982, 1984).
2. For a systematic attempt at clarifying the distinction between weak signals and wild cards, see Mendonça et al. (2004) and Hiltunen (2006).
3. See www.fountainpark.com/signals_solutions/
4. Hiltunen (2007) is also engaged in a more creative approach to weak signals, dedicated interact with a variety of actors, using the support of images as windows on possible futures (http://www.flickr.com/groups/weaksignals).
5. On the constructivist side, it is worth mentioning the pioneering attempt of Seidl (2004).
6. A good example of that is Webb (1987) who looks for difficulties of identifying weak signals mostly in problems related with the signalling source.

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