Communications of the Association for Information Systems

Volume 39 Article 27

12-2016

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Recommended Citation
Loza-Aguirre, Edison; Lesca, Nicolas; Haddad, Hatem; and Caron-Fasan, Marie-Laurence (2016) "Getting a Clean Shot on a Blurred Target: Improving Targeting for Strategic Scanning through Action Research in 10 French Organizations," *Communications of the Association for Information Systems*: Vol. 39 , Article 27.
DOI: 10.17705/1CAIS.03927
Available at: http://aisel.aisnet.org/cais/vol39/iss1/27

Communications of the Association for Information Systems

Research Paper ISSN: 1529-3181

Getting a Clean Shot on a Blurred Target: Improving Targeting for Strategic Scanning through Action Research in 10 French Organizations

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Abstract:

Targeting comprises defining the part of the business environment that corresponds to organizations' strategic objectives and priorities. Targeting is not an easy process because it includes the interaction of managers who come from different organizational units that might have a fragmentary and blurred understanding of the overall issue. Through an action research, we designed and evaluated a GSS to help managers target strategic scanning in fuzzy contexts. Evaluations through interventions in 10 French organizations allowed both participants to achieve relevant targets and researchers to propose four major improvements to targeting activities: 1) use suggested lists of actors and topics as starting points to trigger and facilitate discussions, 2) define actor and topic importance to produce useful targeting results, 3) evaluate the organization's perceived capacity to be informed early enough, and 4) define a mechanism to signal scanning relevancy in the short, mid-, or long term. From a management perspective, our results help managers in their strategic scanning activity by 1) identifying information needs for strategically scanning fuzzy subjects, 2) reducing risk of strategic scanning failure, 3) enabling organizations to assess their scanning capabilities, 4) identifying scanning priorities according to a temporal horizon, and 5) fostering teamwork participation.

Keywords: Strategic Scanning, Information Needs, Targeting, Group Support Systems, Action Research, Information System Prototyping.

This manuscript underwent peer review. It was received 03/29/2015 and was with the authors for 17 months for 4 revisions. Jean-Fabrice Lebraty served as Associate Editor.

1 Introduction

Strategic scanning refers to "the acquisition and use of information about events, trends, and relationships in an organization's external environment, the knowledge of which would assist management in planning the organization's future course of action" (Aguilar, 1967, p. 1). Strategic scanning is a crucial activity to help managers make decisions (Lesca, Caron-Fasan, & Falcy, 2012; Walters, Jiang, & Klein, 2003). Accordingly, it contributes to the intelligence stage of the decision making process by gathering information from the business environment to help identify discrepancies and unknown or unexpected problems, formulate answers, or choose an implementable solution among multiple alternatives (Simon, 1991; Turban & Aronson, 1998). In this sense, strategic scanning helps one reduce decision uncertainty and take action (May, Stewart, & Sweo, 2000).

Strategic scanning has two complementary modes of acquiring data (Lesca & Caron-Fasan, 2008; Vandenbosch & Huff, 1997): one is "focused search", which managers can use when they are already involved in a decision making process and they need reliable and non-ambiguous information to understand the context, choices, and implications of their decisions. Thus, in this mode, a specific question bounds the overall scope of the information search (Choudhury & Sampler, 1997). The other mode is "scanning", which managers use when they have no prior specific questions or decisions likely to guide them when searching for information. Instead, they continuously monitor information that could eventually help them anticipate changes in their organization's business environment or reveal threats and opportunities (Aguilar, 1967).

In this research, we are interested in the scanning mode. Since managers in this mode have a vague idea of what to look for, they may encounter difficulties in limiting the search spectrum. These difficulties can lead to undesirable situations such as an overabundance of irrelevant information, which can exacerbate the problem of data overload (Xu, Ong, Duan, & Mathews, 2011) and become a hindrance (Bettis-Outland, 2012), overwhelm managers and make them overlook or miss important information (Albright, 2004; Dean & Webb, 2011; Garg, Walters, & Priem, 2003), and, consequently, paralyze analysis and decision making (Li, 2011; Stanley & Clipshain, 1997). Thus, information acquisition can be ineffective if managers do not delimit the scope of their searches in line with their organization's strategic objectives and priorities (Yasai-Ardekani & Nystrom, 1996). Research refers to delimiting one's search scope as "targeting", and one typically performs it prior to acquiring data (Choo, 1998; Gilad & Gilad, 1988; Lenz & Engledow, 1986; Lesca & Lesca, 2011). However, unveiling information needs is not an easy process (Choo, 1998). Sometimes, it means that managers who come from different units of the organization and who might initially share neither the same interests nor the same vocabulary or who might have a fragmentary and fuzzy understanding of the overall issues they need to scan need to interact with each other

Organizations have already used computer-based systems for strategic scanning to support information scanning (e.g., CI Sider (Chen, Chau, & Zeng, 2002) and analysis (e.g., Abima (Lau, Liao, Wong & Chiu, 2012), BizPro (Chung, 2014)). However, no computer system currently provides support to target strategic scanning. Currently, if managers perform targeting, they use paper and markers, which makes it time consuming and entirely unfriendly. Thus, we need to develop a computer system that supports and improves targeting by facilitating collective efforts and confronting fuzzy contexts. In this continuation, group support systems (GSS) could bring some solutions to address these needs.

By following an action research approach, we examine:

RQ: How can we improve the targeting for strategic scanning by using a group support system?

For this purpose, we designed, implemented, used, and evaluated a meeting room system, a subset of GSS focused on supporting face-to-face groups that employs an adaptation of a proved targeting method. Resulting outputs would allow one to focus one's data-gathering efforts and, thus, facilitate one's ability to identify relevant information sources to scan or feed automated tools for information search. We developed and used the system in real situations. From our interventions, we refined both the system and the targeting method.

In Loza-Aguirre, Caron-Fasan, Haddad, and Lesca (2013), we present preliminary results of this study. Specifically, we report our experience in building and evaluating the system's acceptability. Here, we go further in theorizing and illustrating the contributions from participants using it to identify their information needs in a context they judged as fuzzy. From our fieldwork, we propose two new constructs and method

improvements of a proved targeting method (Lesca & Lesca, 2011). Our results shed new light on our understanding of targeting and reports improvements that managers can use in practice.

This paper proceeds as follows. In Section 2, we explore the strategic-scanning targeting process and discuss how a GSS could help managers with this task. In Section 3, we detail the action research methodology we followed in this research. In Section 4, we present the changes we introduced in the targeting method and the system that implemented them. In Section 5, we details our field experience with the system. Finally, in Section 6, we discuss the study's limitations and future work possibilities and conclude the paper.

2 Related Work

2.1 Targeting Strategic Scanning

Targeting comprises delimiting strategic scanning's scope by defining and outlining "the part of the environment that corresponds to organizations' strategic objectives and priorities over a given period" (Lesca & Lesca, 2011). Even though some authors (Batistella & de Toni, 2011; Mayer, Steinecke, Quick, & Weizel, 2013) have suggested that organizations should scan their entire business environment, in practice, organizations do not have the capacity and the resources to do so (Hasse & Franco, 2011). Worse still, conducting a 360-degree scan does not guarantee one will obtain useful results, and it can even lead to information overload.

In the past, researchers have proposed various methods to perform targeting. Some methods resort to limiting the number of consulted information sources (El Sawy, 1985; Zhang, Dang, Chen, Thurmond, & Larson, 2009). Others propose limiting the topics to scan by monitoring only key trends or specific critical events (Gilad, 2003; Kim et al., 2013; Mayer et al., 2013; Nanus, 1982; Wei & Lee, 2004) or by limiting the number of emerging issues one tracks (El Sawy & Pauchant, 1988; Stubbart, 1982). Another method suggests listing specific competitors to scan (Gilad & Gilad, 1986). One final method proposes a holistic approach by identifying and interrelating relevant topics and actors to scan (Lesca & Lesca, 2011). In this study, we focus on this latter method, called the "target method", because it is the most inclusive for two reasons: first, because it refers to not only competitors but also all the other actors from the business environment that can affect the organization's future; and, second, because it does not only deal with actors and topics to scan in an isolated fashion but also considers the interrelationships among them.

The target method (Figure 1) defines an actor as a natural or legal person whose decisions and actions could influence the future of the organization and its activities. A topic is a center of interest when considering the organization's future. Not all the topics have relation with all actors, and, correspondingly, not all the actors have relation with all topics. Consequently, in a "target matrix", participants identify only the crossings between actors and topics (AxT) that are relevant and important for them as Figure 2 shows. Using the target method for strategic scanning results in a nominative list of actors, a precise list of topics, and a target matrix with the AxT to scan.

Nonetheless, existing targeting methodologies, such as the target method, are limited in offering avenues for guiding participants to identify their information needs in cross-cutting situations when participants do not share the same view of the overall issue they wish to scan or do not have a clear understanding of it. This last case may even prevent individuals from beginning discussions for targeting strategic scanning. Likewise, existing targeting methodologies say nothing about how to define priorities to scan, which could guide the subsequent information gathering and analysis. Apart from these methodological limitations, we lack tools to support targeting. As such, managers must use time-consuming paper and marker practices to identify their information needs and priorities for strategic scanning.

In this paper, we improve targeting to overcome such constraints by using a computer system. Since targeting can be either an individual or a collective effort, the system should be adapted to both uses. In this context, GSS seems to fit this requirement (see Section 2.2).

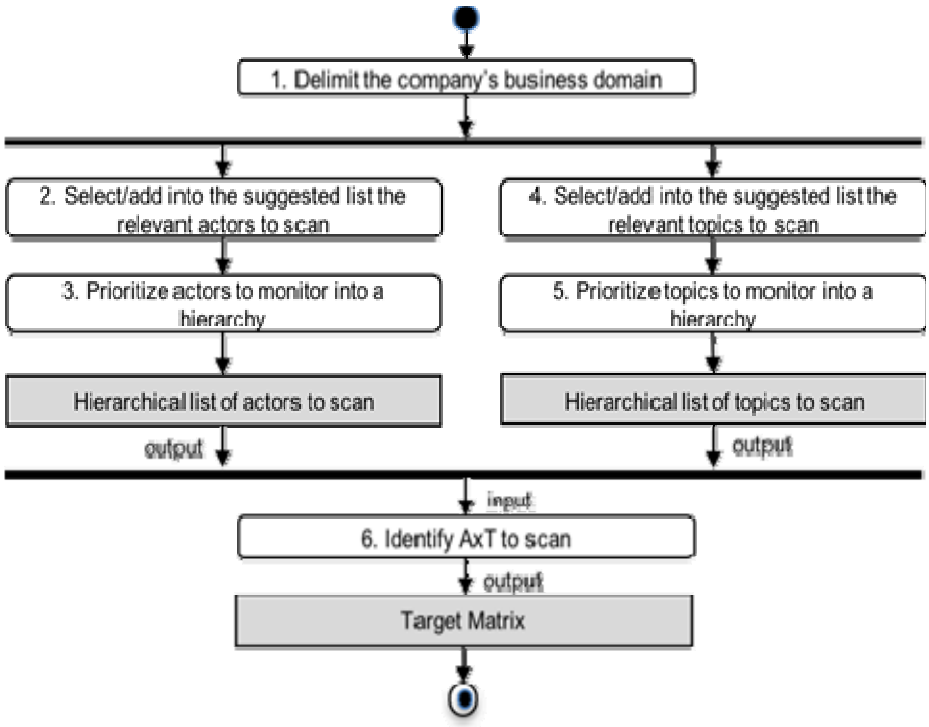

Figure 1. Target Method (Lesca & Lesca, 2011)

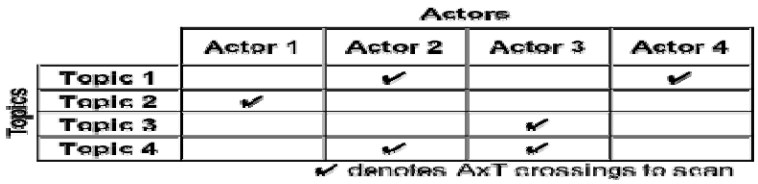

Figure 2. Target Matrix Example According to Target Method (Loza-Aguirre et al., 2013)

2.2 Using GSS to Target Strategic Scanning

Previous studies have proposed several systems for strategic scanning. Concerning information gathering, Elofson (1993) proposes an artificial intelligence-based system to improve trust relations between managers and information agents and to capture the heuristics that managers use to classify threats and opportunities. Chen et al. (2002) deal with information overload coming from the Internet by collecting, indexing, and categorizing webpages from previously specified websites in real time. This system provides an up-to-date and comprehensive view of the user's website interests. Srivastava and Cooley (2003) present a Web business intelligence system to gather information from the Web and deliver relevant information to users according to suitable user profiles. Zhang et al. (2009) develop Web-crawler programs for monitoring, classifying, and filtering online news in the context of syndromic surveillance.

Researcher have also conducted other efforts to help managers analyze collected information. Lau, Liao, Wong, and Chiu (2012) implemented an adaptive business intelligence system to support evolutionary learning, domain-specific sentiment analysis, and business relation mining to aid decision makers under different mergers and acquisitions scenarios. Chung (2014) developed an intelligent system that extracts and categorizes factors that can influence market reactions. The system extracts these factors from textual papers and reports using text-mining procedures. Palomino, Taylor and Owen (2013) combine elements of text and data mining, forecasting, and optimization to systematically search for trends, opportunities, and challenges on the Web that might affect the probability of achieving management goals.

All these systems propose solutions for searching and analyzing information in strategic scanning. However, to date, no research has focused a system to help managers target their information needs in strategic scanning. We address that gap by studying a computer system to assist them in this activity.

When individuals collectively perform targeting, some members from an organization work together in meetings to share their understandings of strategies, issues, and priorities; to discuss expectations and information needs; to identify common objectives to scan; and to build an actionable representation of the organization's environment to scan. As such, one should be able to use the system in both individual and group scenarios.

GSS refers to computer systems created in the design-oriented field of computer-supported cooperative work (CSCW). Thus, GSS are computer systems that support and coordinate the work of groups of collaborating individuals. Several studies have largely proven them as valid systems to help and improve teamwork (e.g. Anson, Bostrom, & Wynne, 1995; Nunamaker et al., 1989). One can classify GSS by following a time/space comparison as Table 1 shows.

Table 1. GSS time/space comparison (Johansen, 1988)

Space	One meeting site (Same place/co-located)	Multiple meeting sites (Different places/remote)
Synchronous communication (same time)	Face-to-face interaction: public computer displays, meeting rooms, etc.	Remote interactions: shared-view conferencing systems, chats, Instant Messaging, virtual worlds, collaborative editors, video conferencing, etc.
Asynchronous communication (different time)	Ongoing tasks: team rooms, shift work groupware, project management; etc.	Communication and coordination: structured messaging systems, workflow management, version control, meeting schedulers, blogs, wikis, etc.

Meeting rooms are a subset of GSS fit for face-to-face interactions (i.e., synchronous co-located) that facilitate and capture participants' common understandings. Meeting rooms combine face-to-face verbal interaction with technology to make meetings more interactive, effective, and efficient, while keeping an account of the process and results (Dix, 2004; Stair & Reynolds, 2012). Since, in practice, collective targeting is a process usually performed on a same place/same time basis, we are interested in such systems. Meeting room systems characteristics would allow one to improve interactivity during discussions via using visual instruments.

3 Research Method

In this study, we examine how one can improve strategic scanning's targeting via using a specialized GSS. By following an action research methodology, we study the effects, in real scenarios, of using a GSS that implemented an adaptation of the target method. In turn, we use the learning from interventions with the GSS to propose improvements to the target method.

3.1 Research Context

This research is a part of a larger project on building strategic scanning to reduce greenhouse gas emissions and design sustainable supply chains. Two French agencies sponsored and financed this project. The project aimed at helping managers to develop practices of strategic scanning, identify opportunities, and overcome difficulties associated with starting, maintaining, and developing sustainable supply chain (SSC) initiatives.

In recent years, SSC has emerged as a new approach that tries to integrate sustainable development concerns in supply chain activities. Therefore, a SSC is "one that performs well on both traditional measures of profit and loss as well as on an expanded conceptualization of performance that includes social and natural dimensions" (Pagell & Wu, 2009, p. 38). This perspective argues that one needs to not just be efficient when managing material fluxes; rather, one needs to consider both these activities' ecological footprint (e.g., greenhouse gas emissions, waste management, energy consumption, etc.) and social concerns (e.g., respect of human rights, guarantees of good and safe working conditions, response to the stakes of local communities) all along the supply chain.

In practice, SSC initiatives confront prohibitive barriers such as cost concerns, absence of legitimacy, little customer and stakeholder interest, poor supplier commitment, absence of guidelines and monitoring

frameworks, and non-inciting regulation. Besides these, lack of external information (e.g., changes in legislation, evolution on customers' demands, adoption of new social or ecological directives) is an important obstacle preventing SSC initiatives (Seuring & Müller, 2008; Walker, di Sisto, & McBain, 2008). From this perspective, strategic scanning can help managers satisfy their need for external information concerning SSC issues.

However, identifying information needs for conducting strategic scanning in a SSC context is not easy for two reasons. On the one hand, as an emerging subject, SSC does not yet have a consensus framework, and the understanding of its implications is neither stable nor clear (Carter & Rogers, 2008; Pagell & Shevchenko, 2014). Indeed, managers are mostly worried about operational issues concerning their daily activity and, thus, tend to orient their attention only to environmental and economic aspects and leave social issues aside (Pagell & Wu, 2009; Seuring & Müller, 2008). Thus, we need an effective approach to targeting strategic scanning for SSC that helps managers overcome their limitations to understand SSC, broaden their vision of SSC by including actors and topics they had never thought of before, and identify their information needs for strategic scanning.

On the other hand, since the context of SSC has a broad scope and also because initiatives on this matter such as reductions in energy consumption and materials are generally crosscutting issues along the organization (Carter & Rogers, 2008), identifying information needs may demand that members from different departments or units in the organization (each with their own vision for, understanding of, and interest in the subject) participate with each other. Consequently, the targeting approach requires implementing mechanisms to facilitate discussions between participants while allowing the collective identification of their information needs for strategic scanning in SSC context.

Thus, SSC offers an interesting context for research since it opens an opportunity for developing and evaluating a system to improve targeting in a real scenario.

3.2 Research Design

We followed an action research methodology to develop a GSS to improve strategic scanning's targeting. Action research is a research methodology whose goal is to solve practical problems while expanding scientific knowledge (Baskerville & Myers, 2004).

One can identify different forms of action research, each with its own structure, model, and set of goals (Baskerville & Wood-Harper, 1996). In this research, we adopt an information system-prototyping approach that follows an iterative method of prototype construction and user evaluation until the system achieves full functionality (Baskerville & Wood-Harper, 1998; Gregg, 2009). We were involved as experts among participants. Thus, our tasks and our participants' tasks had clear definitions: while we helped managers with expert advice, guidance, and technical knowledge, managers identified information needs for strategic scanning. We manipulated the GSS to facilitate interventions and make the best use of participants' limited time. To design, implement, and evaluate improvements to the method and the GSS, we used an iterative approach of the action research cycle. In total, we completed four iterations of the action research cycle.

We also conducted a diagnosis stage to understand in detail organizational targeting practices and the managers' information needs in strategic scanning for SSC. This stage included interviewing 50 managers from 42 organizations that operate at distinct places in the supply chain and that belong to different business sectors (Appendix A). We performed interviews using a previously tested semi-structured interview guide that included themes related to supply chain management and logistics activities, sustainable development, SSC issues, strategic scanning, and strategic scanning for SSC. We audiotaped, transcribed, double coded, and analyzed the interviews.

As a result of the analysis, we found that interviewees considered SSC as a fuzzy concept for them and their organizations. They were interested in working on strategic scanning for SSC issues, but they could not define precisely what part of their business environment their SSC activities concerned nor identify their information needs. Thus, they highlighted that they needed assistance to target strategic scanning in the SSC context. We discuss this stage in more detail in Section 5.3.2.

4 Proposing Initial Solutions to Improve Targeting

Considering results obtained from the diagnosis stage, we first proposed an adaptation of the target method to the research context in order to deal with the broad scope and crosscutting nature of SSC. Then, we designed a GSS to implement the adapted target method in order to facilitate discussions in real situations during interventions with managers.

4.1 Proposing Adaptations to the Target Method

Before interventions, we proposed two modifications to the target method (see also Figure 3):

1. We suggested lists of actors and topics, linked to SSC concerns, to participants as starting propositions to trigger and facilitate discussions and to expand their understanding on this domain. We developed the suggested lists by qualitatively analyzing the interviews collected during the diagnosis stage following a rigorous double-coding process and thematic analysis (Boyatzis, 1998; Saldaña, 2009).
2. We proposed a construct called perceived anticipatory capacity (PAC) in the target matrix as a two-level (i.e., good/not good) qualitative self-assessment indicator. We intended it to designate participants' perception about their organization's capacity to obtain scanning information about a particular AxT. Participants would use this indicator as a filtering criterion to define priorities for their subsequent scanning activities.

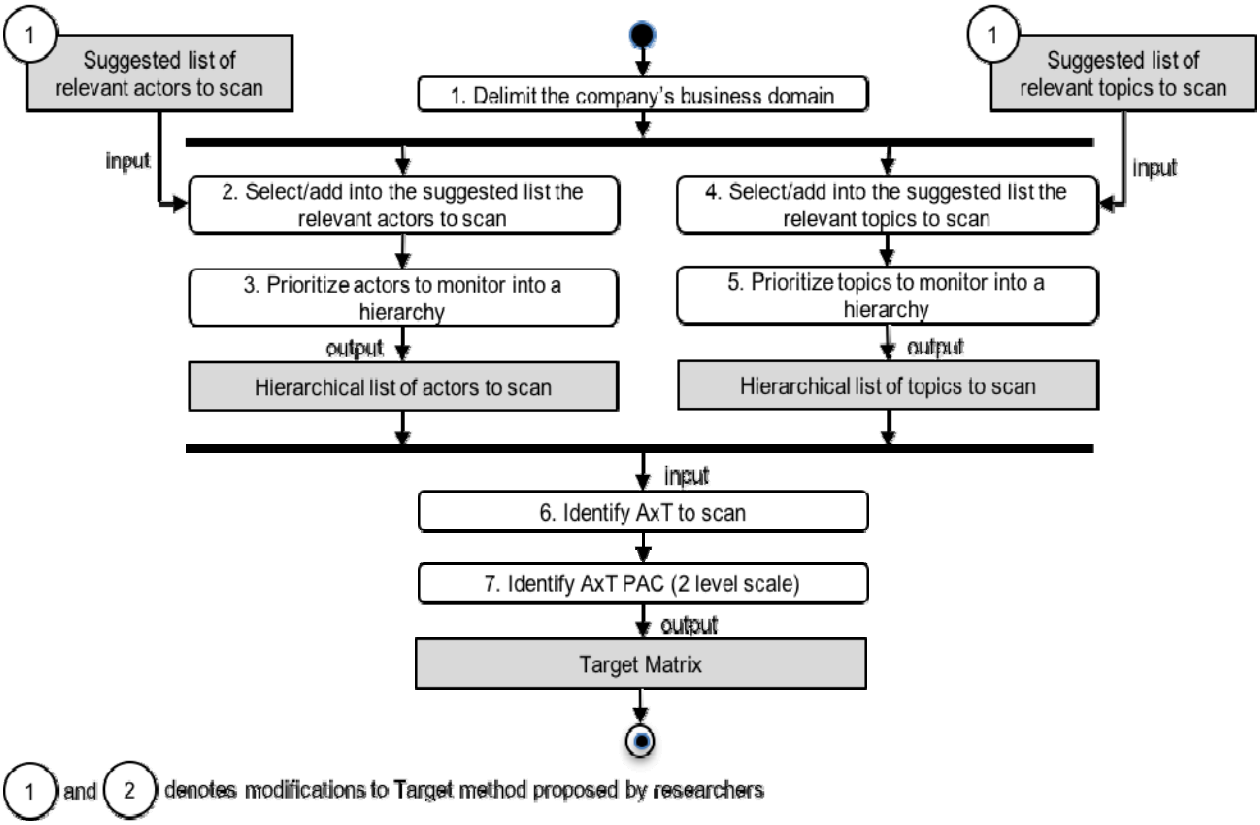

Figure 3. Adaptations of the Target Method for this Research

4.2 Using the GSS to Help Managers Target Strategic Scanning

We implemented our GSS for targeting based on the adaptation of the target method as we discuss in Section 4.1. We implemented it as a Web-based application that allowed users to access it through an Internet browser. We exceeded initial requirements. The system uses a three-tier architecture built over a PC environment running Apache, PHP, and MySQL. We used AJAX techniques to improve interactivity. We conceived the system in two modules:

- The actors/topics manager that allows users to create hierarchized lists of actors and topics that reflect their information needs for strategic scanning. It implements phases 2 to 5 of the adapted target method (see Figure 3). One can preload lists prepared for facilitating discussions in the module.
- The target matrix module that allows one to create the target matrix. One builds the matrix using the crossing of topics (vertical axis) and actors (horizontal axis) from the lists of the actors/topics manager. This module implements the phases 6 and 7 (PAC) of the adapted target method. The PAC option allows managers to filter the target matrix in order to visualize priorities when implementing the strategic scanning process.

4.3 Iterations of the Action Research Cycle

To avoid uncontrollability and contingency threats and to improve the results' validity (Kock, 2004), we studied several instances of individual users and groups involved in targeting strategic scanning and, in so doing, completed four iterations of the action research cycle. Thus, new versions considered the early feedback from managers after each iteration. As a result, we implemented three main improvements:

- We changed the PAC scale from having two (green = satisfactory, red = no capacity at all) to three levels (green = satisfactory, orange = needs to be improved, red = no capacity at all).
- We included an alternative representation of PAC for color-blind people.
- We introduced the time scale relevance (TSR) construct to allow managers to indicate the relevancy of a particular AxT in the short, mid-, or long term.

Table 2 presents a synthesis of iterations of our action research cycle and the main changes that we implemented to our research products as a result of participants' suggestions.

Table 2. Improvements to GSS and the Target Method as a Result of Participants' Suggestions

Iteration	Constructs	Target method	GSS
Iteration 1 (original implementation) Interventions: EV01	- Definition of PAC to designate the perceived organization's capacity to be informed early enough about a particular AxT.	- The use of lists of suggested actors and topics to trigger and facilitate discussions, and to expand participants' understanding about a subject. - The use of PAC as a 2 level self-assessment scale to define priorities in scanning.	**Actors/topics manager** - Selection of relevant actors/topics from lists. - Adding/editing/deleting actors/topics in lists. - Commentary support for each selected actor/topic. - Perceived importance evaluation using a four-level scale. **Target matrix module** - Filtering by actor/topic importance. - Selection of relevant AxT. - Commentary support for each selected AxT. - Filtering by PAC. - Two color PAC option control.
Iteration 2 (from participants' suggestions) Interventions: EV02		- PAC redefinition as a three-level scale	**Target matrix module:** - Color-coding for PAC control from 2 to 3 colors.
Iteration 3 (from participants' suggestions) Interventions: EV03 to EV08		- Definition and filtering of the most important actors and topics to scan in order to reduce Target Matrix size and facilitate visualization before selection of relevant AxT.	**Target matrix module:** - Alternative representation for color-blind users.
Iteration 4 (from participants' suggestions) Interventions: EV09 and EV10	- Definition of TSR as an indicator to designate the relevancy of a particular AxT in the short, mid- or long term.	- The use of TSR as a three-level temporal indicator to define priorities in scanning.	**Target matrix module:** - 3 level TSR option control. - Filtering by TSR and/or PAC. - Control to display only desired elements on each cell

5 Evaluation

In this section, we present our results. We detail the interventions and discuss two examples and our evaluation procedure. When we discuss our evaluation procedure, we also present the results concerning the evaluation of the perceived acceptance of our GSS, the impacts on the social setting, and the evaluation of targeting outputs obtained from interventions.

5.1 Interventions

We conducted active interventions in organizations from France that were interested in identifying their information needs in strategic scanning for SSC. Primarily, we focused on helping managers with targeting strategic scanning in a context that they initially identified as fuzzy for them and their organizations. We conducted the interventions with 28 managers in the headquarters of 10 French organizations. At this stage, we were interested in representatives from medium- to large-sized organizations coming from different places in their supply chains and belonging to different industries whose operations could benefit from integrating SSC. Table 3 lists all participating organizations in these interventions.

Table 3. List of Participating Organizations in Interventions

Organization	Business sector	2012 net sales (US$ millions)	Meetings	Participants	Combined duration
EV01	Medical and surgical equipment	1070	1	1	2h45
EV02	Toys distribution	170	1	1	1h25
EV03	Hand tool manufacturer	450	3	10	7h40
EV04	Lamps and lighting	140	1	1	1h15
EV05	Pharmaceutical products	10800	2	2	2h10
EV06	Leisure sporting goods	320	1	2	1h55
EV07	Flexible composite materials	210	1	2	2h40
EV08	Health services	790*	1	1	2h05
EV09	Pharmaceutical products	1130	1	4	1h50
EV10	Electronic components	390	1	4	2h00
*Operating budget					

We co-built with managers the target outputs for SSC during meetings and used our GSS as a supporting system for discussion. Based on the adaptation of the target method (Figure 3), managers carried out the following stages:

- Using the actors/topics manager module, we asked participants to designate, discuss, and retain from our suggested lists the actors and topics they considered relevant in terms of strategic scanning for SSC in their organizational context and to explain the reasons for their choices.
- Afterwards, participants used the target matrix module to select and discuss AxTs they considered relevant in terms of strategic scanning for SSC for their organizations and explained why. Also, we asked participants to evaluate and discuss PAC and TSR, where it applied, for each selected AxT.

We collected data using a participant-observation approach (Baskerville & Wood-Harper, 1996). The meetings lasted an average of two hours. We audiotaped and transcribed word-by-word the meetings for analysis. We saved the experiences and feedback of the researcher who managed the GSS during the meetings in a logbook. We conducted interventions until we reached a saturation point when participants mentioned neither new suggestions nor significant negative comments about the GSS, the targeting method, or the new constructs.

5.2 Illustrative Examples

To illustrate our approach, we present two examples from our interventions below.

The first example concerns EV06, an organization from the sector of leisure sporting goals. The two participating managers retained 12 actors and 21 topics they judged as relevant to scan. As such, they initially produced a huge 21x12 target matrix (Figure 4a). Thus, the organization needed a mechanism to identify its priorities.

Since the managers did not retain all the actors and topics with the same importance, we could filter the matrix excluding those retained with a low importance rating. The organization's managers chose to work with only topics with an importance rating of 4 and actors with a rating of 3 and above. As a result, we could identify 40 relevant AxT from all possible crossings in a reduced 10x7 matrix (Figure 4b).

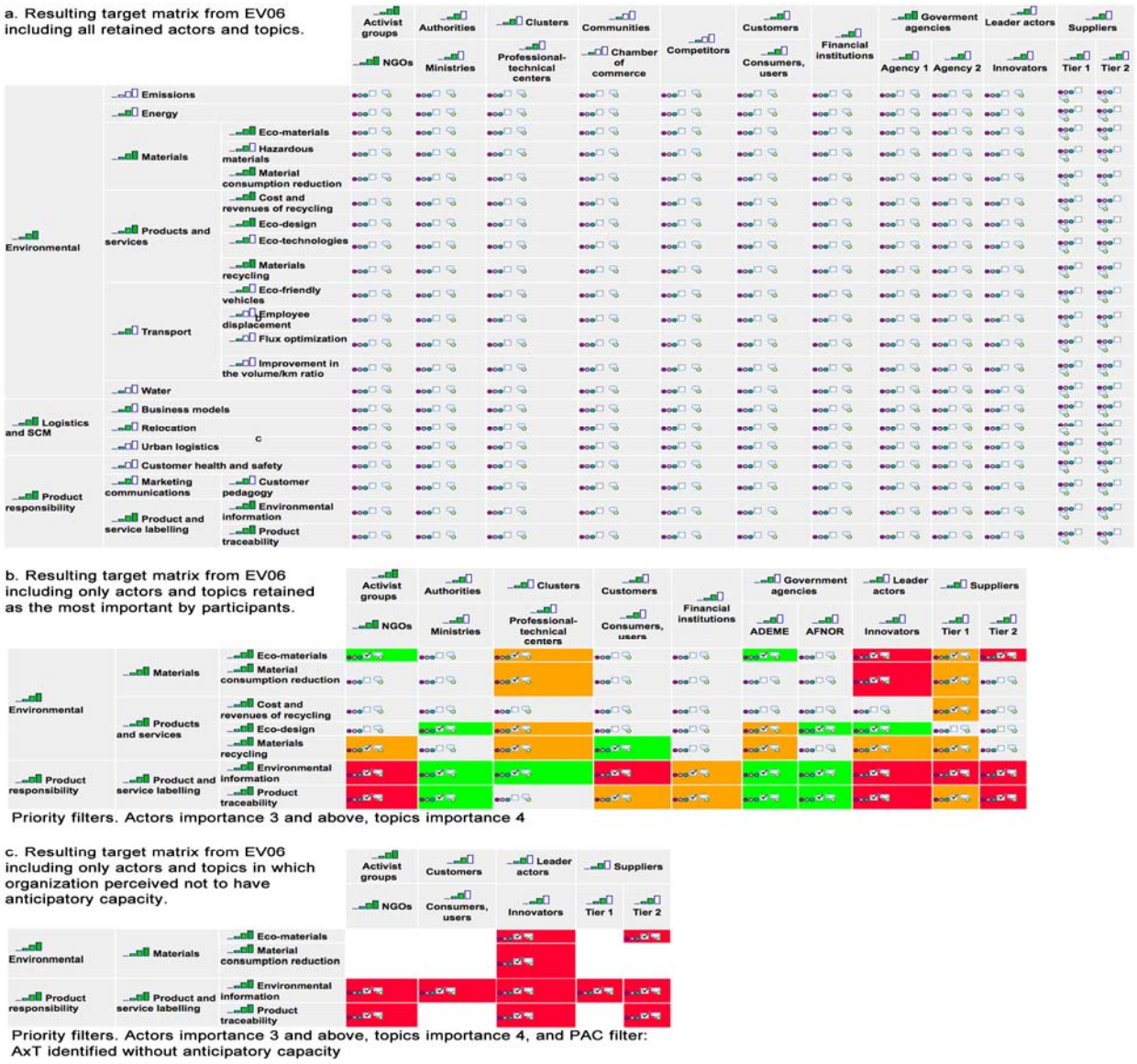

Figure 4. Screenshots of the Application of Importance and PAC-based Filtering of the Target Matrix from the Intervention in EV06

Next, the participants used PAC to evaluate their capacity to be informed about the retained AxT. Thirteen AxT received a "satisfactory" score (in green), which means that managers considered they were well informed on these AxT. The managers scored 16 AxT as "needs to be improved" (in orange), which means they felt they were insufficiently informed about these AxT. They scored 11 AxT as "no capacity at all" (in red), which means they considered they were not informed at all about these AxT. Managers then decided to focus only on those identified with "no capacity at all" since they identified a fault in their capacity to obtain information about AxT they considered as strategically important, which also served as the "starting point" for their strategic scanning activities on SSC.

At last, by filtering the Target Matrix using the PAC criteria, we focused the organization's attention on only 11 priority AxT rather than 40 (Figure 4c). This result was useful for the participants because they obtained a clearer and more precise view of which AxT represented a priority in the strategic scanning process. Thus, they knew exactly what decisions to take to cover actual blind spots (i.e., red AxT).

Our second example took place in EV10, an organization from the electronics components sector. We asked the four participating managers to retain actors and topics they considered important to scan from the two proposed lists. As a result, we obtained a reduced 5x10 matrix in which they chose 32 relevant AxT (Figure 5a).

Using PAC allowed the managers to evaluate how informed they felt they were about the 32 retained AxT. They scored 23 AxT in red (PAC = "no capacity at all") and realized at this point that they had no information for more than half of retained AxT (Figure 5a). Consequently, at this stage, they realized their weakness and the urgency for collecting information on identified AxT.

After using PAC, managers used TSR to evaluate the importance of AxT according to a temporal scale they defined as: short term = half a year or less, mid-term = half a year to three years, and long term = three years or more. TSR allowed the managers to realize that they identified ten AxT as relevant in the near future (Figure 5b). From those ten AxT, three also scored a low PAC, which allowed the managers to mobilize resources to cover these urgent blind spots. They could also plan measures to cover the six AxT identified with "not satisfactory" PAC and as relevant in the short term. Thus, TSR allowed the organization to establish temporal horizons and, thus, concentrate its resources to cover prior and urgent faults.

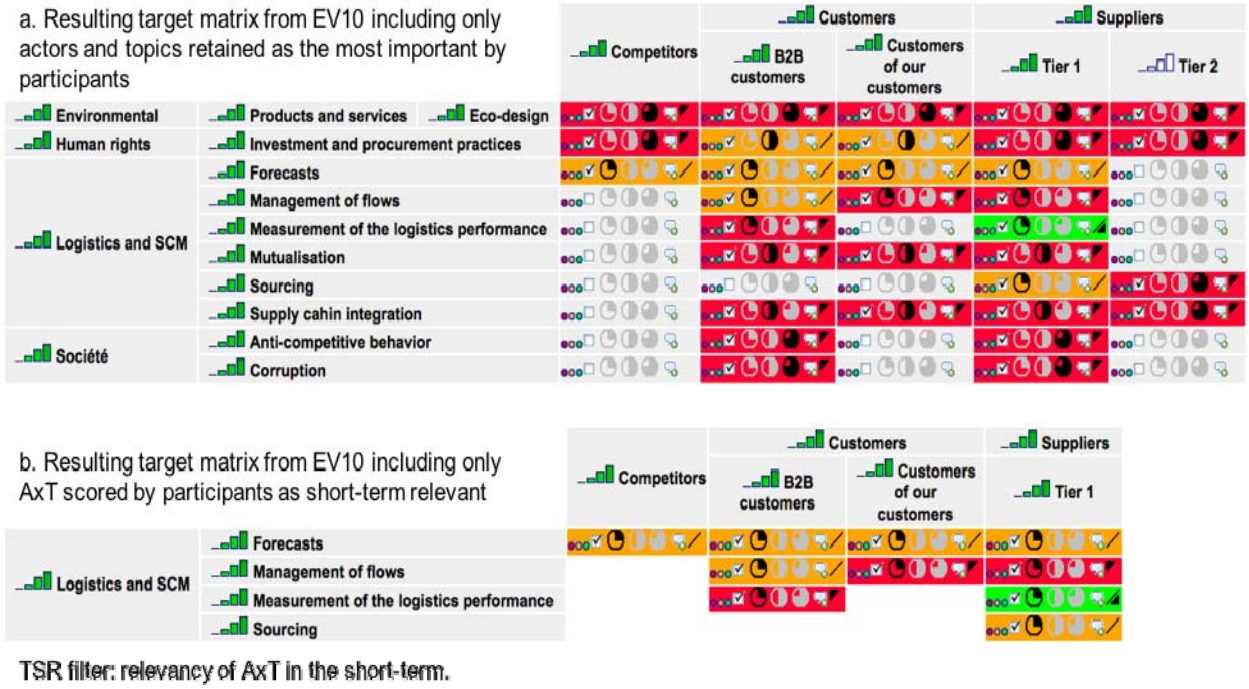

Figure 5. Examples of Applying TSR-based Filtering of the Target Matrix from the Intervention in EV10

5.3 Evaluation Procedure

We evaluated our improvements for targeting while considering: 1) user acceptance, which we evaluated through a semi-structured assessment we conducted after each intervention (Appendix 2); 2) the relevance of the improvements to solve the contextual problem, which means how well they overcame the limitations to identify information needs in SSC context; and 3) improvements' relevance to identify priorities, which could guide forthcoming strategic-scanning activities in the participating organizations.

5.3.1 Acceptance Evaluation

To deal with subjectivity and improve the results' validity (Kock, 2004), we performed a rigorous double-coding process that we validated by inter-coder consensus. The first and second researchers coded transcriptions based on the coding scheme in Table 4. Both researchers coded interviews and commentaries about the GSS into three categories: positive criticism, negative criticism, and development suggestions. The inter-coder agreement rate, based on pairwise agreements between coders (Rust & Cooil, 1994), was 83.80 percent. This value exceeds the recommended minimum for exploratory studies (i.e., 70 percent) (Nunnally & Bernstein, 1994).

Table 4. Coding Scheme for Interventions

Artifact	Code	Description
GSS	SYSposit	Positive criticism of the system
	SYSnega	Negative criticism of the system
	SYSsugg	System development suggestion
Target method and constructs	METposit	Positive criticism of the method and constructs
	METnega	Negative criticism of method and constructs
	METsugg	Method development suggestion

We used positive (SYSposit, METposit) and negative criticisms (SYSnega, METnega) to evaluate participants' acceptance according to two criteria (Davis, 1989): 1) perceived usefulness, which refers to the degree to which a person believes that using a particular solution would enhance their job performance; and 2) perceived ease-of-use, which refers to the degree to which a person believes that using a particular solution would be effortless. Table 5 shows the coding results of interventions using the coding scheme. As the table shows, the system (SYS) and the adaptations of the target method (MET) received more positive than negative criticisms.

Table 5. Content Analysis Results from Interventions

Codes	EV01	EV02	EV03	EV04	EV05	EV06	EV07	EV08	EV09	EV10	Total
SYSposit	1	6	1	0	0	1	0	4	10	12	35
SYSnega	5	0	0	0	0	0	0	0	4	0	9
SYSsugg	17	2	25	0	0	1	0	0	5	0	50
METposit	4	3	23	9	5	19	3	11	16	37	130
METnega	8	9	39	5	5	0	1	0	1	0	68
METsugg	2	0	23	6	3	2	17	0	7	3	63
Totals	37	20	111	20	13	23	21	15	43	52	355
Each column shows the number of coded verbatim fragments per intervention											

Table 6 synthesizes the results of the thematic analysis. This table shows that participants perceived the GSS as a ludic and useful system for targeting strategic scanning that helps managers obtain condensed results and identify priorities to scan. However, they identified an acceptance problem related to readability of the results in the target matrix module. This situation caused some participants to feel discouraged about the real contribution of the GSS in enhancing their strategic-scanning performance. We solved this problem by emphasizing the definition of actor and topic importance in the third iteration and with a functionality to display only the desired elements in each cell in the fourth iteration.

Table 6. Verbatim Fragments from Thematic Analysis

Evaluation criteria	Positive criticism	Negative criticism
Perceived usefulness	A useful approach for targeting strategic scanning that offers condensed real-time results. - *It's simple like that [with the GSS] because you have everything at the end.* (EV02) - *What is interesting for me is the immediate visualization in squares and the matrix approach.* (EV09) - *We get a clear synthesis. We can see all the topics we dealt with and that is very clear.* (EV10) A useful approach for identifying scanning priorities. - *It is the first structured and guided deliberation about a kind of development that concerns the future. It provides us with elements to think and to influence decision-making. It would be useful when we have several options to arbitrate.* (EV08) - *They [results] serve primarily to prioritize, that's it, and to have a slightly clearer picture.* (EV09)	Hardly readable results depending on matrix density and size. - *It is not really familiar. It is a little dense. The result that we get is large. We filtered over priority and you see … we have so many actors. We do not have selected a lot but at the end we have a large packet.* (EV01) - *The interior of the squares seems very difficult for me. There are a lot of things. When there are a lot of things, I see nothing. So, what is important? [Asking to researchers].* (EV09)
Perceived ease-of-use	A ludic, simple-to-use approach. - *I find it visual enough, easy enough.* (EV06) - *A question or two explanations helped me understand the meaning of the choices that were available […] I like it, because it is visual, it is functional, it is interactive, and it is alive. I think that doing this on paper would be more tedious.* (EV08)	

5.3.2 Impacting the Social Setting: Overcoming Limitations to Identify Information Needs in SSC Context

From analyzing the interviews we performed at the diagnosis stage, we found that interviewees considered SSC as a fuzzy concept. They were interested in working on strategic scanning for SSC issues, but they weakly understood SSC's meaning, implications, and/or scope. Two participants verbalized their concern as follows:

> *It [SSC] really is a subject that is, in quotation marks, relatively recent. Frankly, I do not know how to define it. Out of curiosity, how do you define it? [Asking interviewer]* (INT19)

> *For me it is very simple, we have to define what is SSC! After that I could take action, but only if there is a definition that means something.* (INT37)

This condition restricted their capability to identify and target their information needs to perform strategic scanning for SSC and, thus, highlighted that they needed assistance for conduct strategic scanning for SSC. Therefore, interviewees identified strategic scanning's targeting as crucial in this context to allow efficiency and useful results. Participants articulated their concerns related to identifying and targeting information needs as follows:

> *In sustainable development there is a multitude of subjects, and of course, this [supply chain] forms an integral part of it. Concerning strategic scanning for SSC, which ones seem to be the issues that are more relevant to scan? Do you have something from where I can choose? [Asking interviewer.] That would be helpful.* (INT19)

> *For me, conducting it [strategic scanningfor SSC] without dividing on sectors is a barrier. If it is not well defined on a particular topic, we will obtain a lot of diverse information. If it is not well*

> *targeted, we can lose them [managers], I think that they could say: 'Well, that is very difficult." So, the solution could be targeting on sectors, that's it! Or targeting on topics!* (INT39)

Managers' perceptions about their initial problems (lack of understanding about SSC and the need of guidance for identifying their information needs) changed at the end of the interventions. The GSS allowed managers to overcome their limitations to understand SSC and to broaden their vision by including actors and topics they had never thought of before:

> *I would say yes [it was useful], at least for me, because I doubted at the beginning when I was in a 'business logistics' logic, whereas in fact we see that it [SSC] is much larger than that. So, in quotation marks, I restrained my brain at the beginning, when what we needed was to open it.* (EV10)

> *This is a huge topic, a very, very huge topic, that implies many, many actors. If you listed them, it is because you know that there are a lot. It implies thousands of actors from different countries and plenty of trades. This is a truly global context and a complicated economic environment. So, yes. I found it [the approach] very useful. Now, I see we will get something to work with.* (EV02)

As a GSS, the system facilitated discussions between participants, which allowed them to collectively identify their information needs for SSC matters:

> *At the beginning, there were a lot of things, a lot of information and I asked myself thousands of questions. Now, I think we come to the end. The result is what counts. The crossings in the matrix, etc., and that is interesting.* (EV05)

> *I think the method may be used also on marketing, or on innovation, or on other fields. That's why it seems interesting for me. It is that by following this collective approach, even when none of us is specialized in SSC, we get to identify what we will have to scan.* (EV03)

5.3.3 Targeting Outputs

Table 7 synthesizes the obtained targeting outputs and participants' declarative perceptions about accepting the GSS. It includes the size of the resulting matrix by experiment, the total number of selected AxT in the target matrix, whether PAC functionality was used or not, and the number of AxT for each PAC category as the participants in the experiments identified.

Table 7. Targeting Outputs from Interventions

Outputs	EV01	EV02	EV03	EV04	EV05	EV06	EV07	EV08	EV09	EV10
List of relevant actors for strategic scanning	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
List of relevant topics for strategic scanning	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Target Matrix	Partial	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Size of target matrix containing most important AxT	11x46	9x36	9x4	4x15	11x6	10x7	7x3	6x4	5x4	5x10
Total selected AxT	N/A*	N/A*	26	41	29	40	11	14	18	32
PAC use	No	N/A*	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
AxT with PAC = no satisfactory at all	N/A*	N/A*	8	41	10	11	4	4	10	21
AxT with PAC = needs to be improved	N/A*	N/A*	13	0	11	16	4	6	6	10
AxT with PAC = satisfactory	N/A*	N/A*	5	0	8	13	3	4	2	1
Declared user acceptance	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
*Not applicable because target matrix was not finished.										

Participants considered the obtained target matrix as succinctly representing their information needs in strategic scanning. In eight out of 10 interventions, the participants satisfactorily completed the target matrix, and, in 9 out of 10, participants overall accepted the system as a solution for targeting strategic scanning.

However, the participants could not finish the target matrix in the first two interventions (EV01 and EV02). Even when participants prioritized actors and topics to scan in their respective lists, the resulting target matrices were simply too big to deal with (EV01 with a matrix size of 11x46 and EV02 with a size of 9x36). Their size did not adequately present matrices that managers could use in practice. As such, we put even more emphasis on defining the most important actors and topics to scan from lists. We proposed the managers begin by selecting the only five actors and topics they considered as the most important to scan (those that actually capture or concentrate the most concerns on SSC for the organization at present). Then, during discussions, participants added other actors or topics that they considered as important to scan. As a consequence of this change, we could produce acceptable and actionable target outputs in the remaining eight interventions.

In two interventions (EV01 and EV04), participants did not use PAC's color-coding because they took a monochromatic approach and adopted a radical position about their capacity to obtain information based on the presumed capacity of other co-workers that they needed to inform. In the first case (EV01), the participant decided to color code all the AxTs in green because he presumed that there must be someone in the organization with the capacity to be informed at the right time about the retained AxT without knowing who the person might be. In the other case (EV04), the participant adopted the opposite heuristic: he decided to code everything in red because the AxT were very important, according to him, but he did not know whether anyone in the organization had the capacity to be informed at the right time. During the eight other cases, participants colored the resulting matrices following their perception about the organization's capacity to be informed at the right time.

6 Discussion and Conclusions

In this paper, we examine how one can improve targeting by using a GSS conceived to help managers in this task. After learning lessons in designing, implementing, using, and evaluating the system gained through four iterations in 10 interventions, we identify our contributions to strategic scanning literature in this section.

6.1 Contributions of the Research to the Target Method

We propose four significant improvements to the target method that the strategic scanning literature has yet to mention (Figure 6):

- Introduce lists of actors and topics to participants as starting points to trigger and facilitate discussion.
- Use perceived importance to identify and prioritize the most important actors and topics to scan to produce smaller and more manageable target matrices.
- Introduce PAC as a qualitative self-assessment to evaluate the perceived organization's capacity to be informed early enough about a particular AxT.
- Introduce TSR to evaluate the relevancy of a particular AxT in the short, mid-, or long term.

Our results introduce temporality and anticipatory capacity concepts as new theoretical contributions in the strategic scanning field.

Time scales of short, mid-, and long term represent temporality. Temporality depends on both the organization's decisional context and the speed of change in its business environment. Considering temporality entails increasing the information needs dimensions from two (actors and themes) to three (actors, themes, and time). This change allows one to more deeply reflect on what the priorities and blind spots to scan are and for whom and in what time frame. Also, it increases our understanding about what "anticipating" means. Anticipating does not necessarily mean to contemplate too far in the future but to do it on different time scales based on perceived priorities. Seemingly, introducing this concept contributes to a better acceptance of targeting. Without it, our targeting results would not have been useful for participants in some of our interventions.

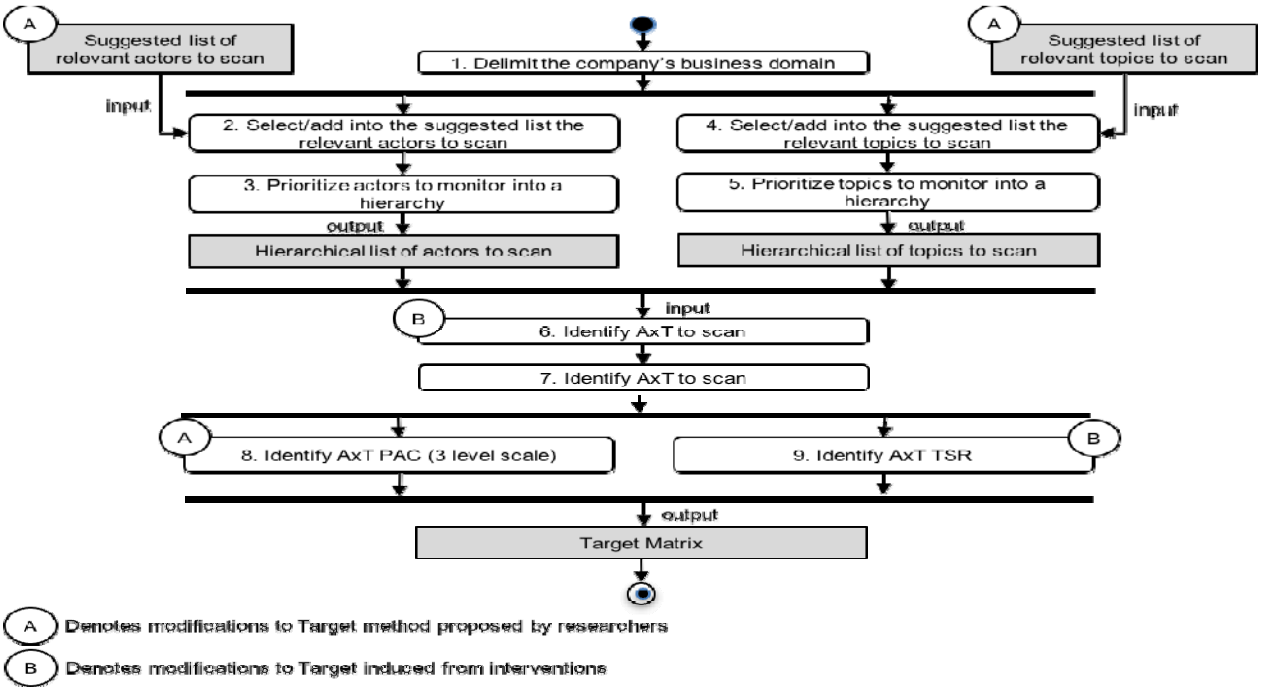

Figure 6. Improvements to the Target Method Through the Action Research Process

Anticipatory capacity refers to the set of resources, skills, and knowledge that an organization can use to identify changes in its business environment to act early on them. Resources can be human, technological, and informational. Using them helps organizations to build information threads. Skills refer to an organization's ability to mobilize relevant, diverse, and complementary sources of information. Knowledge to determine organizational information needs relates to how one understands the actors and themes from which changes could come and also of organizational priorities, weaknesses, and blind spots.

Anticipatory capacity needs to be dynamic to see coming changes in a moving environment. It suggests developing the resources, skills, and knowledge used to identify new themes and actors. Our GSS is a first step to assess and support the development of these dynamic anticipatory capacities. An avenue for future research would be to develop more accurate and actionable indicators for anticipatory capacity.

6.2 Contributions of the Research to Targeting Activity

This research may help managers through their decision process by helping them:

1. Identify information needs to strategically scan fuzzy subjects: managers could not initially identify their information needs for strategic scanning because they found SSC as a fuzzy concept. Using both the target method and the GSS enabled them to produce condensed results that represented their priorities in strategic scanning, were relevant for their context, and coincided with their strategic objectives.
2. To efficiently use resources for intelligence activities: since organizations do not have unlimited budgets to scan their entire business environment, reducing the scope of strategic scanning can provide them with effective and useful results. In this research, we probe the definition of actor and topic importance and the use of PAC and TSR as mechanisms to identify priorities to scan. This reduction of scope is of strategic importance in situations where the context is fuzzy or too large, when participants want to explore new dimensions of their environment, when they are starting strategic scanning activities, or when they have no previous experience with this activity.
3. Reduce risks of strategic scanning failure: using the GSS and the target method allows managers to successfully deal with several failure factors for setting up and running strategic scanning that the literature has already identified (Lesca & Caron-Fasan, 2008), such as having no clear or consensual priority, divergent interests among stakeholders, absence of a shared interest, unclear objectives, or a scanning focus that is too wide.

4. Assess organizational scanning capacities: in our study, participants used PAC to evaluate their organization's capacity to be informed at the right time about a particular AxT. This assessment allows them to identify blind spots and define priorities to scan to establish a starting point to initiate scanning activities or to make decisions to improve their capacity to be informed at the right time according to their priorities.
5. Identify scanning priorities according to a temporal horizon of decisions: decisions do not all have the same temporal horizon. In our study, participants suggested and tested TSR as a mechanism to identify their information needs priorities for strategic scanning in the short, mid- and long term. Doing so allowed them to have a clear picture of where to concentrate their scanning efforts according to their strategic horizons and the nature of the decisions they needed to make. Previous publications have not highlighted such an insight.
6. Foster teamwork participation: as a GSS, the system offers a ludic and interactive environment that triggers and encourages the discussion and participation of members from different departments or units in the organization. Some of these members neither exchange ideas regularly nor share the same vision, understanding, or interest about a subject. Interventions with our GSS and the adapted target method allow diverse viewpoints to come together to identify information needs and facilitate individuals to accept the results at the end of interventions.
7. Broaden their understanding of social situations: during the interventions, using suggested lists of actors and topics facilitated and triggered discussion about a subject that the participants weakly understood. Lists also allowed managers to broaden their environment understanding by including actors and topics that they had never considered before. However, constructing the lists is a long process that individual organizations will find difficult to perform in practice. We believe that a new system or functionality would be necessary to help automatize or assist managers in building lists of actors and topics relevant for each new strategic scanning context.

6.3 Results Validity and Limitations

This research has several limitations. Even though the experiments allowed participants to suggest improvements for the GSS, the same participants who suggested improvements did not backward validate the introduced changes—a consequence of the incremental nature of the research in real situations with various organizations. Finally, we only partly evaluated perceived ease of use because users did not manipulate the system themselves. They actively participated in meetings, but we manipulated the system.

6.4 Future Work

As for the target method, future research could more deeply study the value of PAC and TSR as prioritizing criteria for targeting strategic scanning and enhancing strategic scanning outputs' utility for decision making in organizations. As for the GSS, further research could evaluate if managers take ownership of the system in scenarios where they use it themselves without researcher assistance. Future work could also focus on testing the adaptation of the GSS to contexts other than SSC. However, developing mechanisms to facilitate the creation of lists of actors and topics to suggest in each context seems necessary to fit the method to any particular strategic scanning context.

Additionally, the GSS as a Web system has the potential for use in environments other than meeting rooms, such as remote or asynchronous scenarios, or as a large-scale Internet service available for different business sizes or sectors. We need to develop the system's interoperability with other strategic scanning systems, especially with systems oriented to searching information on the Web.

Targeting in military context is another interesting line of investigation one could explore. For instance, the "situation awareness" notion deals with awareness about what happens in battlefields in order to understand how some information or events will force staff to change their mission objectives both immediately and in the near future. "Attention", which concerns the ability to accurately perceive multiple items, limits situational awareness. However, in dynamic environments, the number of these items can increase drastically, which can lead to an information overload issue. In this context, the target method could be an interesting alternative to help one pre-identify priorities to scan. Such connections would open new avenues for useful applications to improve human attention in the battlefield.

The high value target, which designates an objective (a person or a resource) that a commander must manage to capture, is another interesting military concept to explore. The point here is not to identify value

target actors or related topics but to identify relevant crossings among them. Identifying relevant crossing where information is lacking would trigger a debate for identifying which information is needed and where to collect it. Thus, the target method could help in this case to characterize one's information needs about specific targets.

Acknowledgments

We thank the PREDIT 4 and the ADEME for their confidence and funding for this research project. We also thank the members of the VLD Project for their contribution to the data collection and analysis: Marie-Christine Chalus-Sauvannet and Olivier Lavastre.

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Appendix A: List of Interviews with Participating Organizations in the Diagnosis Stage

Table A1. Participating Organizations in Diagnosis Stage

Organization	Business sector	Interviewees	Modality	Duration
INT01	Electronic components	2	Face to face	0h47
INT02	Packing and packaging materials	1	By phone	0h50
INT03	Industrial electronics	1	By phone	1h00
INT04	Personal protection gear	1	By phone	1h00
INT05	Cosmetics, toiletries and hygiene	1	By phone	0h57
INT06	PCs and consumables	1	Face to face	1h30
INT07	Cereal and grain processing small-medium industry	1	Face to face	0h50
INT08	Dairy products small-medium industry	1	By phone	1h00
INT09	Gastronomic specialties small-medium industry	1	By phone	1h00
INT10	Candy and chocolates small-medium industry	1	By phone	1h00
INT11	Dairy products small-medium industry	1	By phone	0h40
INT12	Candy and chocolates small-medium industry	2	Face to face	1h00
INT13	Hand tool manufacturer small-medium industry	1	Face to face	1h30
INT14	Alcoholic drinks distributor	1	By phone	0h50
INT15	Printer and photocopiers service provider	1	Face to face	1h00
INT16	Pet product distribution	1	By phone	1h00
INT17	Lamps and lighting distribution	2	Face to face	1h04
INT18	Distributor-owned logistics service provider	1	By phone	1h15
INT19	Distributor-owned logistics service provider	2	By phone	1h10
INT20	Logistics service provider	1	By phone	0h55
INT21	Logistics service provider	1	By phone	0h50
INT22	Logistics service provider	1	By phone	0h46
INT23	Logistics service provider	1	By phone	1h10
INT24	Logistics service provider	1	By phone	1h15
INT25	Logistics service provider	1	By phone	1h10
INT26	Freight forwarder	1	By phone	0h40
INT27	Port traction provider	1	By phone	0h50
INT28	Fresh food forwarder	1	By phone	1h15
INT29	Port services	2	Face to face	1h15
INT30	Logistics infrastructure manager	1	By phone	1h10
INT31	Waterway manager	2	By phone	1h20
INT32	Scientific and technical research	1	Face to face	1h10
INT33	Urban community	1	Face to face	1h30
INT34	Inter-communal organization	2	By phone	1h27
INT35	Local authority	2	Face to face	1h00
INT36	Competitiveness cluster	1	By phone	0h50
INT37	Consulting office for management	1	By phone	0h55
INT38	Documentation and information service	1	By phone	1h02
INT39	Consulting and auditing in information systems	1	By phone	1h15
INT40	Consulting office for communications	1	By phone	1h00
INT41	Consulting office in supply chain management	1	By phone	0h55
INT42	Independent truck operator union	2	By phone	1h00

Appendix B: Intervention Semi-structured Assessment Guide

- Does the method seem useful to obtain targeting results? Why?
- Does this approach seem redundant with other practices that you already have? With which ones?
- Does the computer system seem useful to obtain targeting results? Why?
- How the system should be improved to have a value for your business?
- Does the approach is easy to understand?
- Could you easily reuse this approach?
- What should be done to make the approach easier to understand and use?
- Does this approach something that you could/would use again?
- What should be done to make the approach more acceptable in your business?

About the Authors

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