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TECHNOLOGY AND FORESIGHT. A CHALLENGE MADE REAL

When we address present problems, we always study the repercussions this will have in the future. Today's actions impact tomorrow. Since the dawn of time, humanity has felt a need to know the future, but has not always had the means to do this. The technology available to us has changed over time. And over recent decades the pace of change has been dizzying. Although the problem of glimpsing the future exists in all areas, we must be particularly careful in areas with major social repercussions.

In this article, we discuss the application of new technology to improving classic forecasting techniques, using the opinions of a group of experts to predict future scenarios.

The Higher School of National Defense Studies is assessing the method and tools used using real case studies.

Foresight, scenarios, technology, multiagent systems

1. INTRODUCTION

It is better to be prepared for what might happen in future than to suffer the consequences without having made any attempts to offset them beforehand. We must try to understand potential future scenario and try to analyze all the elements and factors involved, in order to encourage this scenario or stop it from materializing. It should never be forgotten that the future is not predetermined and written in stone. The future is there to be made, and we can influence it significantly.

In this article we present the results of a technology[1] that enables us to sketch out potential future scenarios before they materialize, permitting us to analyze them and prepare appropriate risk-management strategies. The article includes a comparison between technical and foresight prediction, a conceptual description of the multiagent model that resolves the problem, and three case studies in which the methodology and its associated technology and tools have been applied.

2. TECHNICAL COMPARED TO FORESIGHT FORECASTING

There is nothing new about the need to predict the future. Man has always wanted to be able to predict what is going to happen[2]. Today we can divide the various meth-

1 CASTILLO, José Miguel. Una solución a la planificación de operaciones para la defensa basada en agentes inteligentes. Ministry of Defence. 2009. ISBN 978-84-9781-473-7.

2 MARTIN, Brian R. Foresight in Science and Technology. Technology Analysis and Strategic Management, 7, pp.139-68. 1995.

ods for predicting the future into four main groups: supernatural, hermeneutic, technical and anticipatory.

The most entrenched forecasting methods are technical prediction and anticipatory studies. Technical forecasting is the most widespread procedure. This is based on mathematical models for extrapolating past and present data to predict future results. Studying trends enables us to approximate future situations in stable dynamic systems. These techniques are used in sciences such as econometrics, demography and meteorology.

However, unfortunately, social systems do not always behave stably; they are usually unstable and chaotic. Moreover, when a situation includes many different and heterogeneous variables, technical forecasting becomes complicated and unmanageable.

Anticipatory techniques, which include Foresight, try to avoid the limitations of using technical forecasting in unstable systems by using the opinions of a group of experts[3][4]. An expert's opinion is based on events and variables as judged through personal experience. Extremely complicated relationships between heterogeneous events are conceived of mentally as a whole.

In the strategic area, dynamic systems are not usually sufficiently stable to allow us to generate scenarios based on predictable guidelines; therefore, anticipatory techniques are more appropriate than technical forecasting models. However, the advantages of anticipatory techniques do not preclude the use of technical predicting where the scenarios is stable and we can predict how it will develop.

3. A SOLUTION BASED ON MULTIAGENT SYSTEMS

In this section, we present a new forecasting approach based on a multiagent system[5]. Our objective is to establish a procedure that resolves the problem of modelling future scenarios from a different perspective to that of foresight methods using complex probability calculations. In this new approach, we rate possibility using linguistic labels[6] rather than probability; this makes it easier for the experts involved to contribute and facilitates their understanding. This involves using fuzzy logic techniques.

3 BAS, Enric. Prospectiva. Cómo usar el pensamiento sobre el futuro. Ariel, 1999.

4 GODET, Michel. De l'anticipation à l'action. Manuel de prospective et de stratégie. Dunod. 1993.

5 MUCH, Richard et al. Intelligent Software Agents. Prentice Hall. 1999.

6 SADE, Lofty A. The concept of a linguistic variable and its application to approximate reasoning, Parts 1-3. Information Sciences. 1975.

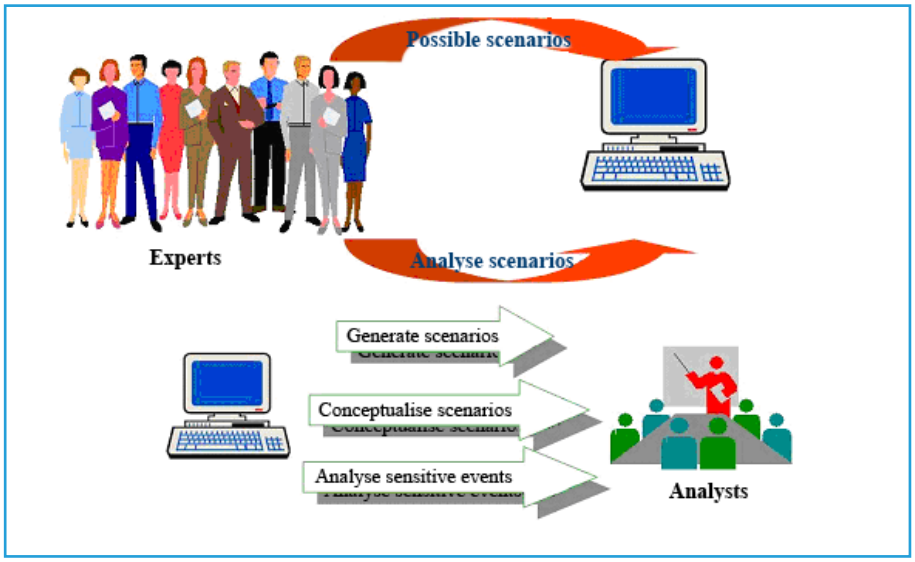

Figure 1: General process overview

The MACMILLAN[7] methodology has been used to build a software system that produces results very quickly. This methodology describes the steps and procedures involved in a software development to handle multiagent systems, resolving both strategic and tactical problems[8].

In general terms, the objective is to extract and process knowledge from experts so that the computer can draw potential inferences from this knowledge, helping strategic analysts to generate and analyze potential future scenarios.

As shown in figure 2, the knowledge extracted from the experts is used to train the classifying agent. The classifying agent can then be used to generate new scenarios. This transfers the knowledge of the experts to the multiagent system (MAS). The classifying agent has been developed using fuzzy logic procedures [9], as people usually express themselves using linguistic labels rather than numbers.

7 CASTILLO, José Miguel et al. Strategic Planning: A new approach through MECIMPLAN. Protocol of the IAT International Conference Hong-Kong (China). 2006.

8 CASTILLO, José Miguel. Una solución a la planificación de operaciones para la defensa basada en agentes inteligentes. Ministry of Defence. 2009.

9 SUGENO, Michio. Industrial applications of fuzzy control. Elsevier Science Pub. Co. 1985.

Figure 2: Conceptual model

The second agent is useful for determining the events that might be influenced in order to arrive at the scenario desired. However, this scenario may not match our expectations. In this case, the analyzing agent is responsible for searching out the events that need to be influenced to achieve an ideal scenario. Artificial intelligence procedures based on intelligent searches are used in building the analyzing agent[10].

The following chart shows a map of the processes that enable a foresight study to be carried out. The upper branch shows the various processes needed to generate future scenarios based on the opinions of the experts. If we want to analyze the implications of the scenario generated in the upper branch, or to study a specific scenario, we follow the processes shown in the lower branch, studying the influence of external events not directly related to the scenario.

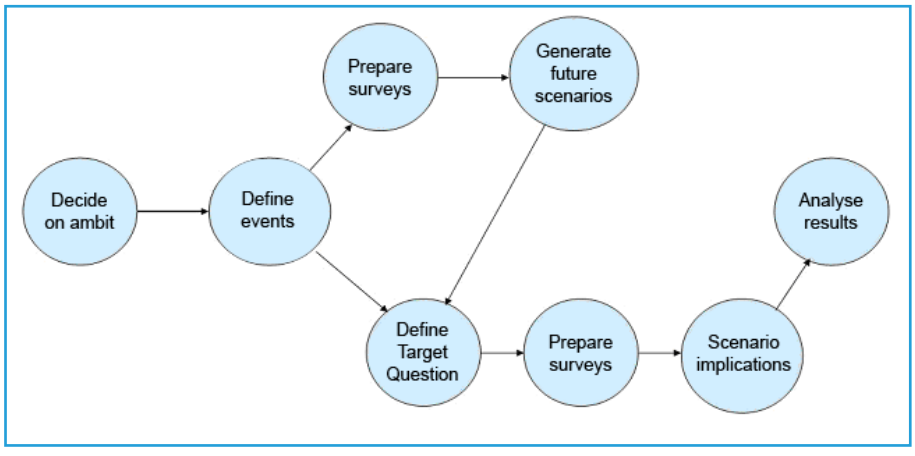

Figure 3: Process map

10 NILSSON, Nils J. Artificial Intelligence: A new synthesis. Mc-Graw Hill. 1998.

4. CASE STUDY 0: FORESIGHT ANALYSIS OF MIGRATIONS IN EUROPE TO 2015

4.1. Introduction

The problem set in this annex is taken from one of the geopolitical scenarios for strategic planning set by the former Army College, now the Warfare College.

The number of events analyzed by the experts has been reduced to decrease the scale of the problem; this does not undermine the nature or results of the study.

The issue is the need for a study of strategic planning into the impact of migrations on European stability to 2015.

The purpose of the study is to obtain a possible scenario from a small, finite number of events. This problem is initially resolved by analyzing the most likely scenario using new technology, specifically using the agent-based method[11].

4.2. The hypothetic scenario

Europe will face pressure from the south and east as it continues to attract migrations. To the south, Mediterranean countries (the Maghreb and Turkey) and Sub-Saharan Africa will continue to export labour to European countries, despite the closing of frontiers that originated with the 1973/74 recession. There appears to be no end to this pressure. There is no lasting substitute for migration: demographic expansion, under-employment and the attraction of political and cultural liberalism all contribute to larger numbers of migrants.

In the east, the expected major exodus to western regions has not occurred; however, uncontrolled migrations have intensified. The main destinations are Germany and Austria, particularly as they are surrounded by populations with Germanic roots. The former-Soviet Union, Poland, the Czech Republic, Slovakia, Hungary and Rumania are all providing a substantial volume of migrants to the reunified Germany. People from Russia are also heading for Poland and Hungary in search of work or because of local business activities. These countries are also both attracting Rumanian emigrants.

50 events related to this area of study were initially proposed. After sifting, the analysts generated a list of the eight most significant; these are shown below.

11 CASTILLO, José Miguel et al. Strategic Planning: A new approach through MECIMPLAN. Protocol of the IAT International Conference Hong-Kong (China). 2006.

Events

1. Laws on obtaining nationality are strengthened throughout the EU
2. The EU expands to the countries of the east
3. There are major racial disturbances in European cities
4. Further financial crises occur in the world
5. The birth rate in Europe is persistently negative
6. Central Africa suffers the worst epidemic in its history
7. Europe implements major support measures for African economies
8. There is a persistent famine in the Russian Federation

4.3. Consultation with the experts

Once the events had been selected, a number of forms were prepared detailing the various combinations. The selection of these forms is key, as they must include the most representative combinations of situations.

The events are classified by their existence; in other words, whether they are an integral part of the scenario or not:

- Exists
- Does not exist

In this study, the experts classified the possible appearance of a scenario into three categories:

- Very likely
- Possible
- Unlikely

For the purposes of this study, 11 forms were prepared with the most representative combinations as of a global scenario.

There are 10 experts in the group.

The forms are sent to the experts, who complete the lower section showing the possibility of the global scenario occurring.

An example form is shown below

Form 1 for defining scenarios

	Events	Existence
1	Laws on obtaining nationality are strengthened throughout the EU	Exists
2	The EU expands to the countries of the east	Exists
3	There are major racial disturbances in European cities	Exists
4	Further financial crises occur in the world	Exists
5	The birth rate in Europe is persistently negative	Exists
6	Central Africa suffers the worst epidemic in its history	Exists
7	Europe implements major support measures for African economies	Exists
8	There is a persistent famine in the Russian Federation	Exists

SCENARIO (Choose one option)

THE LIKELIHOOD OF THE SCENARIO MATERIALIZING:

(Very likely, Possible, Very unlikely)

4.4. Generation of the fuzzy inference module

After receiving all the forms filled in by the experts, their content was translated into rules for creating the fuzzy inference module.

Discrepancies and divergences in the experts' answers are smoothed out to achieve a convergent solution by adapting the whole set of rules appropriately.

It is worth noting the discrepancies in two of the proposed scenarios: the scenario that only features event 1, classified as "possible" by eight experts, but as "very unlikely" by two experts. Likewise, the scenario in which events 2, 4, 5, 7 and 8 are considered "very likely" by three of the experts, but are classified as "possible" by the other experts.

Then two rules with different specific weightings are generated for each of the situations, as shown below.

Specific weighting of the rules

Questionnaire number	Rules	Weighting
3	If (E2, E4, E5, E7, E8), then Very Likely	0.3
4	If (E2, E4, E5, E7, E8), then Possible	0.7
7	If (E1), then Possible	0.8
8	If (E1), then Not Likely	0.2

4.5. Knowledge transmission

Once we have generated the rules and trained the fuzzy inference module, we need to develop the classifying agent to obtain the results; this provides an answer to the possibility of a certain scenario arising based on the set of events presented.

This initial set of basic rules is used to train a software agent specialized in classifying rules. As a result, we get an output describing the probability of the set of events included in the input occurring, based on a specific number of input rules or events.

4.6. Searching for the most likely scenario

Tecnalia's HELP IT system is used to analyze the experts' opinions submitted to the fuzzy inference module. It capabilities include identifying the most likely scenarios from among the 256 combinations of the 8 events.

HELP finds that the most likely scenario is one featuring events 1 and 4, specifically:

1. Laws on obtaining nationality are strengthened throughout the EU
2. Further financial crises occur in the world

Based on this information, strategic analysts can study the actions required to encourage or impede the possible scenario.

5. CASE STUDY 1: THE FUTURE OF THE COMMON SECURITY AND DEFENCE POLICY IN EUROPE TO 2020

This project was carried out by the Higher School of National Defense Studies and Tecnalia in 2010.

The objective of the exercise was to forecast the future for the Common Security and Defence Policy to 2020.

5.1. Definition of scope

A group of Higher School of National Defense Studies analysts chose the scope for the foresight study. In this case, the future of the Common Security and Defence Policy to 2020.

5.2. Definition of events

The same analysts, assisted by experts from Tecnalia, defined the general events related to the study. The list of events was chosen paying particular attention to their independence. The following seven events were finally chosen:

Event 1: Public opinion in member states presses their governments for greater development of the CSDP.

Event 2: Structures are rationalized to empower the planning and performance of CSDP missions, with integrated use of civil and military capabilities.

Event 3: There is a change in the European-Atlantic security architecture as a result of redefinition of the roles of NATO and the EU, or a change in the position of important parties such as the USA and Russia.

Event 4: The CFSP is developed in a way which is consistent with the instruments planned in the Treaty of Lisbon.

Event 5: The European Council unanimously decides to launch a common European Defence in accordance with the provisions of Article 27.2 of the Treaty of Lisbon.

Event 6: The Capability Objectives (military and civil) set by the EU to replace 2010 capabilities are met.

Event 7: The EU establishes adequately trained and equipped crisis-management forces, capable of being rapidly and flexibly deployed.

5.3. Questionnaire design

Once the scope of the study and the associate events were defined, Tecnalia designed the questionnaires to be answered by the experts. The number of questionnaires cannot be too high in order to facilitate calculations, but must represent the full range of possible scenarios.

The experts were chosen by the Higher School of National Defense Studies. 14 experts in international politics were chosen.

A website was set up where the experts could complete the questionnaires online (www.escenariosprospectiva.es), in order to make it easier to collect their opinions.

Seven events were identified by the analysts. Therefore, there are 128 possible scenarios. This is the number of different event combinations (2^7). Fifteen of these 128 possible scenarios were chosen as being the most likely. Each expert then gave an

opinion as to whether the probability of each scenario existing was “very high”, “high”, “average”, “low” or “very low”. The following table shows the experts' answers to each questionnaire. Each column contains the number of responses for that classification.

Very High	0	1	0	2	2	1	0	0	0	0	1	1	1	0	2
High	0	1	1	4	1	2	1	5	3	0	1	1	1	3	3
Average	0	2	1	8	8	5	2	5	7	3	2	3	2	9	6
Low	2	6	5	0	3	5	4	4	3	1	5	4	4	2	3
Very Low	12	4	7	0	0	1	7	0	1	10	5	5	6	0	0
Total	14	14	14	14	14	14	14	14	14	14	14	14	14	14	14

Table 1. Experts' answers

It should be noted that most of the answers follow a normal distribution around a central value.

5.4. Generation of future scenarios

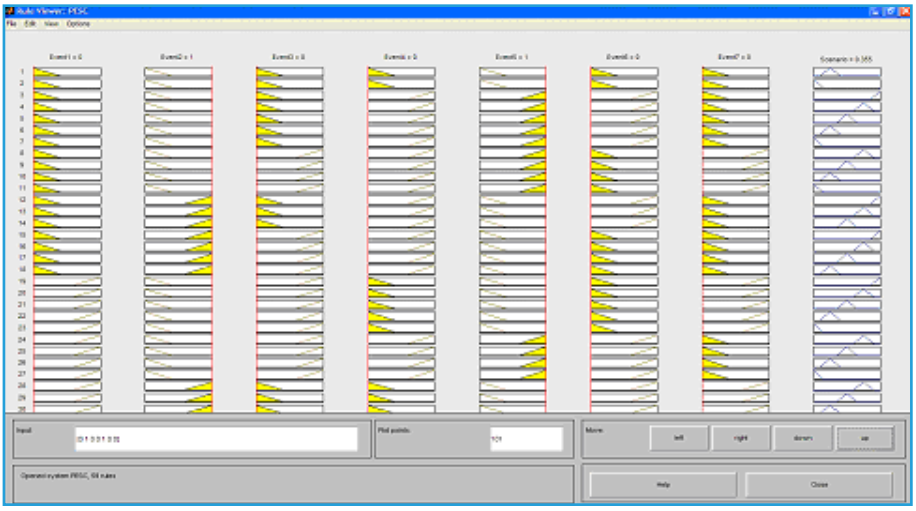

Figure 4. Rules generated by the experts

The purpose of this process is to treat the information logically and formally. To do this, the results of all of the questionnaires are translated into logical rules. Fifteen questionnaires with five possible answers give seventy five rules. However, the experts did not choose all of the possible rules: they only chose fifty nine of the seventy five possible. These fifty nine rules have been identified as the main elements to be addressed as part of the multiagent system. In other words, these fifty nine rules will be the core of the classifying agent.

A fuzzy inference module was developed to process all of these rules. The following table shows the quantitative results for each questionnaire. The ‘VALUE’ columns gives the results of the fuzzy module for each questionnaire.

	EV1	EV2	EV3	EV4	EV5	EV6	EV7	VALUE	LIKELIHOOD
Q1	0	0	0	0	0	0	0	0.115	Very low
Q2	0	0	0	1	1	1	0	0.337	Low
Q3	0	0	1	1	1	0	1	0.266	Low
Q4	0	1	0	1	0	1	0	0.605	Average
Q5	0	1	1	1	0	0	0	0.498	Average
Q6	1	0	1	0	0	0	1	0.443	Average
Q7	1	0	1	1	1	1	0	0.289	Low
Q8	1	1	0	0	0	1	1	0.519	Average
Q9	1	1	1	0	0	0	0	0.486	Average
Q10	1	1	1	1	1	1	1	0.227	Low
Q11	0	0	0	0	1	1	1	0.335	Low
Q12	0	1	0	0	1	0	0	0.355	Low
Q13	1	0	0	1	1	1	0	0.326	Low
Q14	1	1	0	1	0	1	0	0.515	Average
Q15	0	1	1	0	0	0	1	0.530	Average

Table 2. Fuzzy inference module results

The probability of a scenario with no events (Q1) occurring is "very low", as we can see from the table. Likewise, the probability of a scenario in which all the events occurs (Q10) is also "low".

A neurone network is trained as part of the classifying agent in order to extrapolate the results of the inference module to the 128 possible questionnaires. Following the conceptual model shown in chart 2, when a set of events is used as an input for the model, we obtain the possibility of this scenario as an output. This output should be understood as the answer given by all the experts taken as a whole for this specific input.

The HELP application generates the most likely scenarios from the 128 possible scenarios. This gives the following results:

- Scenarios with very high probability: none
- Scenarios with high probability: 7
- Scenarios with average probability: 57
- Scenarios with low probability: 56
- Scenarios with very low probability: 8

	Ev1	Ev2	Ev3	Ev4	Ev5	Ev6	Ev7
Scenario 1							
Scenario 2							
Scenario 3							
Scenario 4							
Scenario 5							
Scenario 6							
Scenario 7							

Table 3: Scenarios with high probability

The high probability tables shows that events 2 and 4 will occur in all of the most likely scenarios. We can therefore assert that, according to the experts, events 2 and 4 will occur in the period to 2020. In other words:

- Event 2: Structures are rationalized to empower the planning and performance of CSDP missions, with integrated use of civil and military capabilities.
- Event 4: The CFSP is developed in a way which is consistent with the instruments planned in the Treaty of Lisbon.

6. CASE STUDY 2: TOWARDS COMMON EUROPEAN DEFENCE BY 2020

6.1. Introduction

In 2011, the Higher School of National Defense Studies proposed a study should be carried out to assess "Common European Defence to 2020".

This study is the result of the 2010 foresight exercise and the strategic interest of this issue.

This study was carried out using innovative technological resources, including online consultation of experts; elaboration of expert opinions using fuzzy techniques; and generation of the most likely scenarios based on pattern analysis.

Tecnalia played an important role in the study as a technology partner, responsible for providing the knowledge of new technology required to carry out this study.

6.2. Selection of events

The Institute's analysts selected the most representative events that might define a future scenario for defining common European defence.

The selection of events was an important part of the study.

The events have to be independent of each other and sufficiently few in number to ensure they are manageable for computational purposes.

The IEEE's analysts decided that the following events were representative for this issue:

Event 1: The European Council unanimously decides to launch a common European defence in accordance with the provisions of Article 42.2 of the European Union's Treaty of Lisbon.

Event 2: The EU establishes a new, single civilian-military structure for strategic planning of CSDP operations and missions, increasing consistency in civilian and military matters, this being a specific added value from the Union.

Event 3: The European Union has the capability to achieve the level of ambition established in the 2008 "Council Declaration on Strengthening Capabilities" for the CSDP's military missions.

Event 4: The main military capability initiatives launched are successfully completed, taking as a reference the Capability Development Plan (CDP) approved by the EDA in July 2008.

Event 5 : Development and optimization projects are carried out on the EU's military capabilities, including combining efforts, specialization and cost sharing, based on operational and economic efficiency criteria.

Event 6: A European Defence Technological and Industrial Base (EDTIB) is achieved that is capable of responding to the requirements of EU member states and to support the CSDP, based on the strategy set out by the EDA in May 2007.

Event 7: The EU's capacity to anticipate, react, plan and implement civilian missions is improved to ensure rapid and effective deployment, in accordance with the "Civilian Capability Objective 2010".

6.3. Questionnaire selection

The next step after selecting the events that might be part of a future scenario is to prepare the questionnaires to be answered by the experts.

There are 128 possible scenarios for these seven events.

Presenting 128 questionnaires to the experts covering all the possible scenarios is not possible. Therefore, we need to select the most relevant scenarios based on the events included.

TECNALIA made this selection based on information supplied by IEEE analysts and the importance of the events.

The selection procedure is exhaustive, aiming to cover the full range of possible scenarios whilst choosing the most representative. Too many questionnaires would wear the experts out, affecting the quality of their responses. However, if there are not sufficient questionnaires, some scenarios might have been overlooked. Thirty questionnaires were initially proposed to the IEEE; these were reduced to twenty at the Institute's request given the availability of the experts. These range from a scenario in which none of the events occur to one in which they all occur.

6.4. Selection of the group of experts

The IEEE selected experts with deep knowledge of the study area.

Selecting the experts is a critical part of setting up the project. There are two basic factors in setting up the group of experts. First, the experience of the experts, which has a direct impact on the reliability of their answers. Second, the number of experts in the group. The IEEE selected the experts based on their knowledge and experience in the subject. In this case, the answers of all the experts were awarded the same weighting and credibility. There was therefore no need to weight the experts' answers, although the agent-based method permits this. The IEEE decided that the minimum adequate number of experts was fifteen. Fewer experts might generate insufficient information, whilst too many experts might result in redundant answers, complicating communication and control of the schedule for completing the questionnaires.

6.5. Expert consultation

TECNALIA has developed a website for online consultation with the experts. This offers many advantages, making it easier for the experts to respond from anywhere with an Internet connection, with responses being received for processing immediately.

The experts were sent individual emails with a link to the website so they could access the questionnaires.

6.6. Elaboration of data

Once the questionnaires had been answered, Tecnalia analyzed the data received to extract the information and generate potential future scenarios.

Four clearly differentiated stages were established in studying the data:

- Grouping responses around the average
- The variability of the experts' responses
- Generation of the rules for the possible future scenarios
- Weighting of rules

The spreadsheet below shows the experts' responses to the questionnaires.

Very High	0	3	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
High	0	5	4	3	11	4	6	2	2	2	0	2	2	2	1	3	1	1	0	0
Average	1	6	11	13	4	7	7	3	4	6	7	8	8	6	6	6	7	7	8	6
Low	3	4	1	3	3	7	5	8	7	7	6	5	4	5	7	3	5	5	2	2
Very Low	15	1	2	0	0	0	1	6	6	4	6	4	5	6	5	7	6	6	9	11
Total	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19

The first check of the reliability of the method is to analyze the trend in responses around a central value. The trend in the responses usually follows a normal distribution.

Any other distribution would suggest that the question could be interpreted ambiguously or that it is not well formulated.

As we can see from the spreadsheet above, the responses to most of the questionnaires are grouped around a central value, except for questionnaires 19 and 20: in these questionnaires most of the responses are grouped in Average and Very Low.

The first step in processing the data is to convert the experts' responses into rules. The set of events in the potential scenario form the background to the rule, whilst the possibility that the scenario will arise is the corresponding consequence. There are five possible responses for each questionnaire.

The twenty questionnaires and five possible responses give a total of one hundred rules.

6.7. Obtaining information

The agent-based method[12] is based on individually-supplied expert opinions, which are then combined with the opinions of the rest of the group. The rules and scenarios selected by the largest number of experts are given a higher weighting factor.

The fuzzy inference module enables us to quantify the response of the experts as a group to each of the twenty questionnaires. As the rules describing each scenario are weighted, the quantified values obtained are expressed relative to the total set of scenarios in the questionnaires. In this way, a particular rule will have greater weight compared to all the rules as a whole the more experts select it.

12 CASTILLO, José Miguel. Una solución a la planificación de operaciones para la defensa basada en agentes inteligentes. Ministry of Defence. 2009.

The quantified values for each questionnaire after the creation of the fuzzy inference module are shown in the table below:

	EV1	EV2	EV3	EV4	EV5	EV6	EV7	VALUE	RATING
Questionnaire 1	0	0	0	0	0	0	0	0.151	Low
Questionnaire 2	0	0	0	0	1	1	0	0.538	Average
Questionnaire 3	0	0	1	0	0	0	0	0.529	Average
Questionnaire 4	0	0	1	1	1	0	0	0.5	Average
Questionnaire 5	0	1	0	1	0	0	0	0.624	Average (High)
Questionnaire 6	0	1	0	1	1	1	0	0.469	Average
Questionnaire 7	0	1	1	1	1	0	1	0.504	Average
Questionnaire 8	1	0	0	1	0	1	0	0.328	Low
Questionnaire 9	1	0	1	0	0	0	0	0.345	Low
Questionnaire 10	1	0	1	0	0	1	1	0.379	Average
Questionnaire 11	1	0	1	1	1	0	0	0.332	Low
Questionnaire 12	1	1	0	0	0	0	1	0.411	Average
Questionnaire 13	1	1	0	0	1	0	0	0.41	Average
Questionnaire 14	1	1	0	0	1	1	1	0.377	Average
Questionnaire 15	1	1	0	1	0	1	0	0.348	Low
Questionnaire 16	1	1	1	0	0	0	0	0.403	Average
Questionnaire 17	1	1	1	0	1	0	1	0.362	Low
Questionnaire 18	1	1	1	1	0	0	0	0.362	Low
Questionnaire 19	1	1	1	1	0	1	1	0.332	Low
Questionnaire 20	1	1	1	1	1	1	1	0.286	Low

0: The event does not exist in the scenario 1: The event exists in the scenario

6.8. Obtaining possible scenarios

Once the information had been analyzed using the computer-assisted system, the following results were obtained:

- Scenarios with Very High likelihood of occurring: NONE
- Scenarios with High likelihood of occurring: 43
- Scenarios with Average likelihood of occurring: 85
- Scenarios with Low likelihood of occurring: NONE
- Scenarios with Very Low likelihood of occurring: NONE

The HELP application provides a list of scenarios ordered from the highest to the lowest likelihood of occurring. From the High likelihood scenarios, below we show the one identified by HELP as the most likely.

Solution 1

Event 3: The European Union has the capability to achieve the level of ambition established in the 2008 "Council Declaration on Strengthening Capabilities" for the CSDP's military missions.

Event 4: The main military capability initiatives launched are successfully completed, taking as a reference the Capability Development Plan (CDP) approved by the EDA in July 2008.

Event 5: Development and optimization projects are carried out on the EU's military capabilities, considering combining efforts, specialization and cost sharing, based on operational and economic efficiency criteria.

Event 6: A European Defence Technological and Industrial Base (EDTIB) is achieved that is capable of responding to the requirements of EU member states and to support the CSDP, based on the strategy set out by the EDA in May 2007.

Event 7: The EU's capacity to anticipate, react to, plan and implement civilian missions is improved to ensure rapid and effective deployment, in accordance with the "Civilian Capability Objective 2010".

7. CONCLUSION

In this article we have presented the idea of using foresight analysis of scenarios to foresee potential situations of crisis or risk. Using a simple technology tool that is applicable to strategic studies facilitates rapid preparation and analysis of information. We have examined in detail the processes for obtaining information from a group of experts in order to build future scenarios. A similar process may be used to analyze the implication of potential scenarios compared to other unrelated scenarios.

And because the HELP application helps in the analysis of scenarios and using this technology avoids the need for complex statistical methods, it is easy to repeat foresight studies, if the scenario changes or new events unexpectedly arise.

Comparing this work with classical methods reveals the following advantages:

- It is more natural to use linguistic labels rather than probability to define the likelihood and scale of events.
- It achieves a common opinion from a group of experts, without needing to use the Delphi method[13,14].
- It studies the implications of a future scenario by analyzing events that could be changed to achieve an ideal scenario.

Finally, the applicability of this technology has been demonstrated through three real case studies.

It is worth highlighting the need to continue to monitor the future scenario designed, as the set of events influencing the scenario may vary as the future unfolds. For this reason, it is recommendable to review foresight studies of future scenarios on a biennial basis, at least.

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