Competitive Intelligence and Decision Problems

Edited by

Amos David
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PART 1

Models and Tools
Chapter 1

Model Use: From a Decision-Making Problem to a Set of Research Problems

1.1. Introduction: why model?

We “model” constantly in the course of everyday life: for each entity we encounter, be it an object, a person, or a process, we create an associated mental image that enables us to give meaning to its existence and behavior. As Valéry states in [VAL 77], “we only think using models”. A model is a formal representation of an object or a set of associated phenomena, which we attempt to circumscribe. It may be seen as an analytical tool used to describe, in a reduced and formalized manner, a particular observed object. In this way, the model acts as an intermediary between the object and the questions we ask to understand the object. Thus, the value of the model resides not in its “reality”, but in its use to explain a given object or a set of phenomena: it takes on a heuristic role in the process of generating knowledge about a given object.

We thus see that the concept of models is part of a “simplification/abstraction” dichotomy, containing aspects of both symbolic representation and reduction of the complexity of the observed object. However, although the model is only a partial representation of this object, or of a certain “reality” of the object (which implies that a large number of possible models exist for a given object), it enables us, in relation to our aims, to reduce this “reality” to a limited number of viewpoints that are intelligible and coherent for the modeler. For this reason, an “intentional” aspect is always present in the creation of a model. Modeling is a subjective activity,

Chapter written by Philippe KISLIN.
involving choices to which the user commits himself/herself. Another expression of this duality is given by Nouvel, who describes modeling as a “negligence strategy” [NOU 02]. Negligence, or the fact of not taking certain aspects of the object into account, is used intentionally to highlight other aspects of this same object. Depending on the refinement of the initial information at the base of the construction of the model, the model will appear, according to Terrasse [TER 05], as the result of a sophisticated strategy or as a form of negligence controlled by abstraction or simplification. Thus, the model plays a triple role, being subjective, projective, and intentional.

However, depending on the construction of the model and the aims of the user, a model may give a simplified or idealized vision of the reality being represented. For example, a model – in the fashion sense of the term – is chosen because he/she represents an ideal form, albeit one which is not representative of the average human physique. According to Thom [THO 03], it is thus easy, through excessive idealization or simplification, to pass from model use into the realm of “magical thinking”. Depending on the degree of freedom allowed, the model may evolve and may be perceived in very different ways. Care is needed to avoid confusing properties of the model with those of the real world, particularly in the context of competitive intelligence where digital artifacts, approximations, extractions, and data visualizations are frequent sources of errors and illusions.

Although a model is, by its very nature, simplistic and “fake”, it allows us to find answers to certain questions. A model is put to use through a process of questioning and testing. This process shows up misunderstandings and inadequate formulations that force us to reconsider the model, to look for other interactions, and/or plan new processes of observation. A main positive attribute of the model is the fact that it is a construct. Thus, we do not seek to know whether the model is “right”, but to analyze its contribution to a process of understanding (and in our particular context, mutual understanding between a watcher and a decision maker) the object constituted by the decision-making problem. Does this mean, then, that a “good” model is a useful model? This is what we will attempt to demonstrate in this chapter, showing the usefulness of a model-based approach in the process of transforming and resolving a decision problem in the context of information gathering.

In the context of this resolution, the watcher acts as the modeler of his/her own activities, both in determining what actions are necessary for the resolution of the information problem and in reducing their cognitive load, which, thanks to a support model, may be concentrated on the essential, but also because the information problem is itself a model of the larger decision problem. This model, created by the watcher, acts as an intermediary, as a pivotal document, and as a support for social and cognitive exchanges between the watcher and the decision maker and between all actors and the model. The resolution of the decision problem will not involve
comings and goings between actors and the real world, but follows a more complex pattern of three-way interactions between the actors, the model, and the context of the problem.

Based on Roy’s work [ROY 85], we define the assistance provided by the watcher in resolving the decision problem in the competitive intelligence process as the activity which, based on clearly defined but not necessarily completely formalized models, helps us to obtain aspects of a response to questions posed by the decision maker in this process, to work together to clarify or simply to favor a behavior in a way that increases the coherence between the evolution of resolution on the one hand, and the aims and preference system of the decision maker for whom the watcher is working on the other hand.

The model that we will now present aims, in addition to promoting the transition from a decision problem to an information-gathering problem and the various comings and goings involved (as the problem does not have a single final definition), to act as an event memory, as past events and analogy play an important role in the decision process. In designing the model, we have aimed to remain as close as possible to Ockham’s principle, that is, to avoid needless multiplication of elements of the model, while striving to be as faithful as possible to Boileau’s formula in describing the model.

1.2. General presentation of the Watcher Information Search Problem model

The Watcher Information Search Problem (WISP) model is made up of a collection of 27 interlinked elements that correspond to different “objects” handled by the watcher in the course of the watching process. These objects, which act as both containers and links, enable the watcher to organize and coordinate different steps of the transformation process – from registering the request to the presentation of results. Each of these objects has a number of attributes (title, date, reference, etc.) that describe its characteristics and promote “cognitive traceability” [KIS 09] of information, activity monitoring, and reuse (Figure 1.1).

Although this model is presented as a flow chart in Figure 1.1, the WISP is not fixed, as its name suggests (taking the meaning of the word “wisp”, and not just the WISP acronym). It is flexible and adaptable and allows for the addition of new elements, such as annotations. The square brackets [ ], which follow certain labels, indicate that the element is, in fact, a collection, that is, a group of objects.

1 For example, the two models developed by the SITE-LORIA team, namely MEPD and WISP [BOU 04, KIS 07].
For example, the element \(<Demand>\) is associated with a collection of objects, \(<Formulation>\), which correspond to the registration of different formulations and reformulations of the demand produced by the decision maker and by the watcher.

1.3. Dimensions and aspects of the model

The WISP model is a three-dimensional, multifaceted model that incorporates the notion of the following points of view:

- an analytical dimension, which encompasses the understanding of demand, stakes, and context, the definition of information indicators and all knowledge creation and analysis operations that may be carried out by studying the memorized elements;
From a Decision-Making Problem to a Set of Research Problems

- a methodological dimension which, at the first level, is constituted by the capacity for transformation of the decision problem into an information problem (then into research problems), and on a second level by research strategies through which information is identified and knowledge acquired;

- an operational dimension, corresponding to the selection of action plans and the implementation of different steps of resolution of the methodology associated with the WISP model.

The “Need” aspect permits decision-based characterization of the expression of need (the formulated demand) suitable for the stakes and the context of the decision problem being considered; it is made up of the set of information produced by the model to explain the decision problem, the demand, and the associated stakes (Figure 1.2).

The “Project” aspect links the demand to its transformation into information indicators, information problems, and their solutions, and the analysis and presentation of results to the decision maker (Figure 1.3).

The “Research” aspect connects information-gathering problems (through the formulation of the watcher’s research aims and activities) with information elements (solutions) to show the value of indicators (Figure 1.4).

Finally, the “Knowledge” aspect is made up of annotations and analyses of both the results and the process itself by the watcher and by the decision maker. These aspects can be used to determine the boundaries of the model depending on different points of view, and in learning to use the model depending on the chosen aspects.

![Figure 1.2. The “Need” aspect: explanation of requirements and contextualization of demand](image-url)
Figure 1.3. The “Project” aspect: transformation of demand to produce information indicators

Figure 1.4. The “Research” aspect: provision of indicator values through research
1.4. Description of model elements

1.4.1. Elements describing the decision problem and its context

These elements of the model (Figure 1.5) carry information provided by both the decision maker and the watcher. Their purpose is to assist the decision maker in explicitly expressing needs and in formulating a request for information perfectly adapted to this need. The aim of the watcher is to register the facts that made the decision maker aware of the existence of the decision problem and to allow the decision maker to formulate the stakes linked to this problem. This step is carried out collaboratively with the aim of sharing the first intuitive ideas of both actors.

The different information required for these elements is collected through guided interviews, by carrying out monitoring and by periodic research, the direction of which will be set out in the WISP model. Certain parameters included in these elements are destined for the decision maker alone; others may be shared with the watcher and may act as a basis for discussion.

The characterization of the decision problem involves seven elements, all of which appear at the same level in the hierarchical plan. These elements are object collections (represented by square brackets []) that may contain one or more similar items. For example, several decision aims may be involved in a single decision problem, which may also spread over multiple environments and involve a group of decision makers. For a given problem, the elements <Decision Maker>, <Organization>, <Environment>, and <Decision Aim> define the context of the

Figure 1.5. Elements characterizing the decision environment
problem; if necessary, references to previous problems or to other problems being
dealt with in parallel may also be included.

The information problem, or problems, is also found at this level. Each of
these problems includes <Demand>, <Stakes>, <Research Problem>, <Result>,
and <Analysis> elements, along with their derived elements and all associated
dependencies. Finally, at the end of the information process, we find the elements
<Decision Solution> and <Decision>, which encompass, respectively, the whole
range of alternatives and possible solutions, and the chosen solution. Each of these
elements has several parameters, which may be static, that is, which do not vary
through different problems (e.g. the identity of a decision maker), or which may be
dynamic, in which case their characteristic information changes in relation to given
problems, is highly context dependent, or simply evolves, as when dealing with
the level of experience of the decision maker. Transversal (invariable) parameters
are imported as they are, will be duplicated for each new problem, and adapted as
necessary and memorized.

The <Decision Maker> element contains individual characteristics of the
decision maker: identity, initial training, functions, cognitive style, personality traits
(such as Myers Briggs type indicator (MBTI)), and his/her level of expertise for the
problem in question. Bouaka [BOU 04], taking inspiration from Hermann’s work
[HER 99], suggests adding an emotional dimension to take different emotional
reactions into account, reactions that may influence the decision maker during the
decision process. Although some of these parameters have not yet been completely
formalized, they are mainly intended for use in self-diagnosis and are not intended
to be transmitted. In addition to this information, we also find references to the
decision problems under consideration. These operations are repeated for each
decision maker involved in the decision project.

The <Organization> element contains information about the company.
This includes not only data about the company (corporate name, site, legal status,
sector of activity, clients, competitors, domains of expertise, resources, etc.) but also
information on the way the company is perceived by the decision maker from
his/her specific viewpoint. What, then, according to the decision maker, are the
strengths and weaknesses of the company? What are its innovational niches? The
main function of a business clearly depends not only on the company, but also on
the points of view of the individuals that make up the company. The viewpoints of
shareholders, employees, syndicates, and management have some similarities, but
also palinodes and divergences, and may share doubts and uncertainties that should,
in our opinion, be included in the model. In addition to these internal perspectives,
we might add external impressions, for example, those of political and economic
actors (the region, the state, etc.) and the viewpoints held by competitors and the
media. The modeling of any of these different visions may be the subject of specific
research in the framework of specialized scouting activities. They may be integrated into this element depending on the nature of the problem and of the aims. Other parameters may also be considered, the nature and number of which vary depending on the depth of the analysis desired. Examples of such parameters include the description of different operational functions of the business (production, service, sales, accounting, R&D, support, etc.), the identification of certain dysfunctional elements, the structure of the information system, its communication policies, its attitude to information in general (circulation, memorization, protection, patents, etc.), the measurement of its economic impact and various indicators (dashboard, indicators of direction, and performance, etc.), its originality, its history, and the way the company is managed. This element may be duplicated depending on the number of entities under consideration and the breakdown of the chosen structure (by subsidiaries, by departments, etc.) or in cases where the decision situation involves several organizations (e.g. an extended company), for example, in the case of a partnership.

The <Environment> collection of elements describes and defines the company’s relationships with the outside world. It aims to identify the factors that the decision maker considers to be environment sensitive, to assist in capturing weak signals, and to identify opportunities and threats. This perception is highly subjective and is subject to implementation. This subjectivity is a source of interest to the watcher, as it is this which provokes strategic action from the decision maker and triggers the problem. This “problem premonition”, which occurs before any decision-making activity, is made up of observations, interpretations, and incorporations of environmental stimuli, showing up filters and biases on the part of the decision makers and certain aspects of their preference system.

We will use Porter’s five competing forces as parameters of the <Environment> element: the description (and perception) of competitors, partners, suppliers, the market, and the clients, to which the results of different specialized scouting activities may be added depending on the domain or domains under consideration. However, we will not attempt to divide the environment into sectors, but rather cover as many domains as possible. Using these parameters, it is also possible to characterize the environment in terms of turbulence, uncertainty, and complexity, and to define endogenous and exogenous indicators to measure and monitor the factors, which the decision maker considers to be critical. The information required to establish these indicators can come from different elements of the model, be the result of specific research activities, or have been collected using questionnaires that, coupled with a Likert scale, for example, allow us to measure the intensity of the revealed factors.

The <Decision Aim> element contains the aim or aims of the decision project or projects concerned. The decision aim, in our opinion, has a triple function: it is
a particular and contextual expression of the strategy and current priorities of the business, a partial transformation of the stakes involved in the decision problem, and finally, the source of the information needs of the decision maker for this particular problem. This element may be broken down using a tree of intermediary aims and subgoals (operational, strategic, tactical, etc.) or be duplicated for each of the envisaged aims. It may also contain elements of the business plan that the decision maker considers to be useful.

1.4.2. Chosen solutions and the final decision

The two final elements, *<Decision Solution>* and *<Decision>* , regroup the different intentions and alternatives for solving the problem, which may be used by the decision maker. These elements allow the actors involved in the project to assess the project, adjust it by, for example, creating new demands, and “plan” the decision. They also aim to refine what Endsley calls “situation awareness” [END 00] for each actor, that is, the understanding of existing relationships between perceived elements of the environment and the mental projection of the evolution of these elements following specific envisaged solutions.

The *<Decision Solution>* element collection contains the description of different alternatives. It corresponds to the selection of possible choices for the problem being considered. The parameters (hypothesis, projection, and solution) of these elements contain projections of hypothetical futures based on different scenarios and allow the decision maker to define critical indicators, then to look for the variables that influence these indicators. The other parameters (resources, risks, cost, and validation) regroup the means available and those required to implement the envisaged solution. Each of these may also contain additional specifications; for example, within “resources”, we may find human, financial, and temporal resources alongside raw materials.

The *<Decision>* element or elements contain the details of the chosen decision and, possibly, a plan of action. It, or they, also contains the link or links to the decision solution to implement (as presented in the previous element) and, in certain cases, the resulting negotiations.

These two elements only mark a provisional solution to the decision problem, as this problem may depend on another problem, be part of a larger problem, or, like the ouroboros, create new problems in a dynamic spiral process. Can we, then, truly believe that a “final” decision might exist, or that a problem could be solved once and for all, and “closed?”
1.4.3. Supporting elements of the information problem

The <Information Problem> or problems – more often the latter – are part of the decision problem through this collection of elements and constitute the point of origin for the transformation of a decision problem into information problems. Several information problems, then, are attached to one decision problem or demand for information. We will explain the reasons for this choice later on.

Six elements (Figure 1.6) are at the root of the problem: the <Demand> that contains the different formulations and reformulations of need in terms of information, the <Stake(s)> involved in the decision problem associated with the demand and its context, the group of information <Indicator(s)> that constitutes a validated expression of the demand, the <Research Problem(s)> that stem partly from the demand and partly from the assignment of values to indicators, and finally the <Result> and <Analysis> elements that contain, respectively, the information produced and the analysis carried out, both on the results and on the decision process.

These elements will be filled in by the watcher and supervised by the decision maker. Additionally, some of these elements (particularly those included in, and derived from, the <Research Problem>) will benefit from computer support, which, due to its capacities for automatization, will allow the association of data with certain parameters of these elements in a way easily understandable by the watcher.

1.4.4. Demand, stakes, and context

This first group, made up of 10 collections of elements, is the Demand–Stakes–Context (DSC) group (Figure 1.7). This links the four elements representing the
context, imported from the decision problem, to two elements representing the demand and four others that will be used to define stakes. This group will also be superposed onto the “need” aspect of the model. The DSC group allows the watcher to contextualize the demands made of him/her (and, through the demand, the need for information that it expresses) and to link the two to the origin of the decision problem and to the environment.

![Diagram of DSC model](image)

**Figure 1.7. Constituent elements of the DSC**

The `<Demand>` element has certain particularities: it alone plays the role of a “wrapper”, acting as an “envelope” for the `<Formulation>` set of elements. For each decision problem, there is one single demand, but one that may be made up of several formulations. In the same way, a multiple demand would require the simultaneous coexistence of several decision problems. In our model, we will distinguish between “multiple” and “plural” demands. A multiple demand, which corresponds to multiple stakes, leads to the creation of several decision problems. For example, if a business wishes to improve its brand image and create new markets, it is easy to see that two decision problems may be involved. A plural demand, on the other hand, involves several demand elements. Thus, to improve brand image, a demand may encompass a study of the competition, a quality audit carried out at client level, and a media campaign project, the substance of which requires definition.

In reality, in our model, the decision problem and the associated demand pertain to the element `<Object of stakes>`. We have chosen a hypothesis where, for as long as the object of the stakes does not change, we are dealing with the same decision problem, of which different formulations will undoubtedly be necessary to outline the demand as clearly as possible. These formulations therefore correspond either to a development in the understanding of the problem or to changes in the context.
(or even the development of an unexpected situation), which lead to corrections, precisions, or modification of the demand. However, if the emergence of this situation, the detection of new signals, or the incorporation of new factors change the stakes involved in the problem (and thus the object), we consider that the decision maker is now faced with a new problem. Depending on particular cases, this may imply the cessation of activity on the current problem and transformation to deal with the new problem, or replication and division of the current problem into as many problems as proved necessary. Thus, when multiple stakes are involved (the objects of which may conflict), we will be able to look at different solutions to the decision problems and choose one, benefiting one aspect to the detriment of another (e.g. environmental stakes over economic stakes).

The <Formulation> element collection contains different formulations and reformulations of the demand by actors. Although we initially chose to create “formulation” and “reformulation” elements in the model, based on the understanding that the decision maker is responsible for formulation and the watcher for reformulation, in practice we decided to use only formulations, which are, nevertheless, distinguished by author and date information. Thus, in the case of a stipulated demand, the decision maker will be the first “formulator” of the demand. In the case of an implicit demand, the watcher may be responsible for the formulation of the demand based on what he/she understands of the need; the decision maker will then reformulate this first formulation, and so on. In our opinion, reformulation is necessary as it satisfies the need for mutual and shared understanding. It also allows specification of concepts and agreement on common meanings for each concept. From these formulations, the watcher identifies key concepts (or themes of the demand) that will be attached to the <Demand> element itself.

The <Stakes> collection of elements, itself made up of three collections, is used to characterize the stakes involved in the decision problem from the point of view of the decision maker and opposes them to the demand and the context.

The <Object of Stakes> is the target on which the decision maker wishes to act, the <Signal> is what incites the decision maker to begin considering the decision problem, and the <Hypothesis> corresponds to the perceived risks and gains and to the envisaged consequences of a lack of action on the part of the decision maker. These parameters justify the decision aims, and the attainment of this goal contributes to their fulfillment. The action taken by the decision maker is logical from his/her point of view, based on what the decision maker stands to gain or lose during the resolution of the project, that is, through the identified stakes. While these stakes are often multiple, ambiguous, and sometimes contradictory, we consider that these stakes relate to the quality of perceived information, to environmental constraints, to the preferences of the decision maker, and to the
decision maker’s value judgments. With a better perception of the stakes involved, the watcher is able to understand, via the formulated demand, which parameters of the decision problem hold the greatest importance for the decision maker. However, we are aware that part of these stakes will not be communicated to the watcher. Is the watcher, then, responsible for bringing forth results, based on personal reflection, from the hidden stakes of the decision maker? Does the watcher need to develop “psyops” [DAU 82] to “win over the heart and spirit” of the decision maker? These aspects are sensitive and the watcher must define the borders of his/her investigative territory and not overstep the limits. The relationships between actors themselves involve “risks and stakes which are decisive in self-image, defense of territory, maintenance or breaking of links” [PIC 06]. Thus, personal issues (concerning identity, territory, and position) always intervene as overlays to professional issues; once again, the watcher should act intelligently and show proof of good sense. Moreover, as Salomé emphasizes [SAL 02], it is difficult to establish a respectful and tolerant partnership when one of the two actors is not free (from hidden stakes in particular), as this will mean priority is given to former allegiances. Nevertheless, the decision maker must find the means of breaking free from the circle of prejudices; the formulation of stakes seems, to us, to be a suitable means of doing this.

After obtaining the titles of stakes involved, the watcher will establish a typology of stakes based on the different domains of the business (economic, strategic, commercial, social, etc.), depending on projections (short, medium, or long term) and, finally, based on the priority accorded to each by the decision maker.

1.4.5. Information indicators

The creation of a group of indicators constitutes the core of the WISP model and corresponds to the validated translation of the demand into a particular “documentary” language. The concept of indicators used here is not dissimilar to that of performance indicators used in the dashboard of the decision maker. However, it differs in that an information indicator does not measure performance, but characterizes, by its attributes, a notion for an individual and at a given moment (“what Z understands by X…”). Nevertheless, the similarities with performance indicators are not negligible, as they synthesize information in a limited data set with a presentation chosen to correspond to the decision maker’s preferences. We will consider the information indicator as a meaningful document, the result of an element of information, a means of processing, or a method defined by attributes with observable and qualifiable properties and which may be evaluated in relation to an information demand formulated by the decision maker and analyzed in the light of stakes perceived by the watcher.