

STRATEGIC USE OF BUSINESS GRAPHICS: A STAKEHOLDER APPROACH

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ABSTRACT

In this article, the concept of Stakeholder is borrowed from the strategic management literature. Our question is, "which graphics format will influence a stakeholder network in the most efficient way?" To answer this question we define two categories of business graphics: (i) "circulation" graphics intended to circulate from node to node inside a network and (ii) "terminal" graphics in which the specific use is localized at only one node in a network. With the help of the GRAFEDIT, GRAFANA and CINEDATA software packages, we generate various graphic formats (line charts, pie charts, bar charts, size pictograms, number pictograms and 3D charts). Finally an exploratory field experiment is set up to verify the following hypothesis: for a given problem and for a multiple stakeholder network, managers manipulate graphics formats to inform and influence different stakeholders in different ways.

RÉSUMÉ

Nous empruntons dans cet article le concept de "stakeholder" à la littérature en gestion stratégique des organisations. En cherchant quel type de graphique influence le plus efficacement un réseau de "stakeholders", nous définissons deux catégories de graphiques de gestion: (i) les graphiques de "circulation" qui se déplacent de noeud en noeud à l'intérieur d'un réseau et (ii) les graphiques "terminaux" dont l'utilisation spécifique est localisée en un seul noeud du réseau. A l'aide des logiciels GRAFEDIT, GRAFANA et CINEDATA, nous pouvons réaliser des graphiques de différents formats: cercle, histogramme, ligne brisée, pictogrammes déformés ou multipliés et histogrammes en 3 dimensions. Une expérience exploratoire est finalement préparée pour vérifier l'hypothèse suivante: devant un problème défini et de multiples réseaux de "stakeholders" à informer le manager manipule le format du graphique, pour informer et influencer, de différentes façons, les différents stakeholders.

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1. Introduction

Most researchers base their work on a rational or economic perception of the organization or enterprise, and focus on the use of graphics as rational input to the decision making process. Our approach is original because we study the behavior of the producers of business graphics rather than the users.

On the other hand, today's literature on "strategic management" encourages a multidimensional approach to understanding organizations. This approach draws attention to the cultural and socio-political dimensions of organizations (1) which complicate the pseudo-rational model. Even MIS researchers are not free from these concerns, and the notions of culture (2) and power (3) now appear in their literature.

In our view, the individual who chooses the graphic forms in which data will be distributed throughout the enterprise has considerable latitude to influence the impact of the information in desired ways. This latitude will be best used by those who best understand human information processing characteristics specific to the graphics display method (4).

The present study aims to establish, by means of exploratory research, the hypothesis that for a given problem, managers may use business graphics strategically by informing each stakeholder network, be it internal or external to the enterprise, using graphics formats (line charts, bar charts, circle charts, size pictograms, number pictograms and 3D charts) which are most likely to influence this network's members.

The graphics used in this study were constructed using the following software packages: GRAFANA (5), GRAFEDIT (6) and CINEDATA all of which were developed by N. Magnenat-Thalmann and D. Thalmann.

We borrowed the notion of "stakeholder" from R. Edward Freeman (7).

2. The stakeholder approach and "communications"

"The point of a stakeholder approach to organizations is to force organizational managers to be more responsive to the external environment". Hence Freeman's definition of external stakeholder: "any group or individual who can affect or is affected by the achievement of the firm's objectives". The groups mentioned by Freeman are: employees, environmentalists, suppliers, governments, local community organizations, owners, consumer advocates, customers, competitors, media... "Each of these groups has a stake in the modern corporation", hence the terms "stakeholder", "stakeholder model or framework", or "stakeholder management". Freeman also considers the notion of "internal stakeholder": "Quite simply, the internal stakeholder must be seen as the conduit through which managers can reach other external stakeholders". Freeman finally develops "typical stakeholder maps" according to the managers's function: marketing, manufacturing, finance, public relations, and personnel.

This approach especially defines consistency networks, which are communication networks in which games of influence, inside a given network, or between different networks, are played.

Currently, these networks, both internal and external, are being modified by technological changes and are moving closer and closer to the "communications" phenomenon defined by A. Oettinger (8). Office automation (word processing, decision support systems, data storage, retrieving and copying...) mixed with local networks and videotex will lead to "blurred boundaries between work and home-telecommuting" (9) and between an organization and its external stakeholders.

It is reasonable to believe that stakeholder maps will become electronic maps, and that the format of business graphics circulating inside a given network, or between networks, will be of strategic importance for researchers and managers.

3. Presentation and decision aid graphics vs "circulation graphics"

As we are interested in dynamic communication networks, the distinction between presentation graphics and decision aid (and strategic planning (10)) graphics does not seem to generate mutually time-exclusive categories of graphics.

In other words, a presentation graphic created by A may well become a decision aid graphic for B; and a decision aid graphic for A

may be later used to justify a decision to B. We live in a complex communication network, and, from node to node, the same graphic may take on a different nature depending on whether it is used as input for X's decision, or as output to justify X's decision to another node of the network.

We suggest that business graphics design should not be restricted to a single specific application (node A in a decision process of nature X); graphics should rather be designed in such a way that they may circulate through the communications network (s) of the organization and/or its environment where they should be understandable by everyone. Depending on whether we are dealing with a decision's input or output, graphics will serve as presentation or decision aid graphics.

We may then define two kinds of graphics: (i) those which are designed to circulate throughout a network; these are mixed presentation/decision aid graphics, and (ii) those which will never leave the network node at which they were developed; these lose all utility as soon as they have been used at point A in a given node (decision aid or presentation). These graphics will be called respectively (i) circulation graphics and (ii) terminal graphics.

4. An exploratory field experiment

In order to test the relationships between graphic format (as the dependant variable), a stakeholder network and a problem (as independent variables), we first chose an organization, a problem, and a series of business graphics to illustrate the problem for different managers (staff and line) in relation to active internal and external stakeholders.

Organization choice: One of the authors knows several people involved in the area of commercial fisheries in the Gulf of St-Lawrence. So, we chose as the site for our study the Canadian Federal Ministry of Fisheries and Oceans, Office of the Gulf Region, Memramcook, N.B.

Several pressure groups (the main species management committees, producers and consumers associations, fishermen and plant workers' unions, ecologists, chambers of commerce, other municipal and provincial governments...) are stakeholders in this organization. We can even pinpoint internal stakeholders: the protection service (for the fisheries' officers), the communications service (for the media, and for the bulletin distributed to fishermen), the statistics service (which answers public requests and transmits data to the federal ministry of fisheries in Ottawa), the biology and economy servi-

ces (which make people aware of pertinent issues, and maintain links with research centers and universities) all serve as contacts between stakeholders and the organisation.

Business graphics: Many business graphics series were produced during Fall 1984 in order to adjust the choice of colors, to draw the pictograms with the help of GRAFEDIT, and to carry out a pre-test in order to select business graphics likely to be appreciated by managers in need of "circulation graphics". Some examples of these graphics are presented at the end of this article.

Problem choice: Two problems, simple to state, but difficult to solve, and likely to be of interest for the chosen organization's stakeholders, are proposed.

- (i) Lobster landings have been going down for several years, and the scientists have diagnosed over-exploitation: what kind of graphics format would you use to make the different internal and external stakeholders aware of the eventual closure of that fishery?
- (ii) Salmon landings (value in \$) has been increasing over the past few years, and the economists are pressuring for higher fisherman quotas: what kind of graphics format would you use in order to influence the internal and external stakeholders in a way which would result in the fisheries minister allowing higher quotas?

As the experiment is still under development, final results will be published in a future paper.

5. Software description

All plots shown in this paper have been produced using two interactive systems: GRAFANA (5) and CINEDATA.

GRAFANA is a two-dimensional program which allows the user to produce cartesian plots, bar charts, network diagrams and pie charts. Two other kinds of charts may be generated as shown in our example:

- 'size' charts where each value is represented by a pictogram, whose size is proportional to the value;
- 'number' charts where each value is represented by a small number of similar pictograms. This number is directly proportional to the value that it represents.

CINEDATA is a three-dimensional program that is used to produce two main types of charts:

- three-dimensional bar charts;
- figurative charts where a symbol represents a certain number of elements as in the 'size' charts of GRAFANA.

In our software, symbols are two-dimensional and constructed as a combination of filled polygons. The objective of this technique is to take into account the hidden surfaces of the drawing.

GRAFANA and CINEDATA are elements of a very complete information provider system designed for TELIDON, the Canadian videotex system. The complete system produce TELIDON pages using two graphical editors, GRAFEDIT (6) and HORIZON (11), the MIRA (12) graphical programming language, GRAFANA and CINEDATA. The software has been implemented using MIRA, which is a graphical extension of PASCAL. It runs on a DEC VAX 11/780 with VMS. Images may be produced either on TELIDON terminals or on various graphical terminals. In this paper, pictures were produced using a TEKTRONIX 4027.

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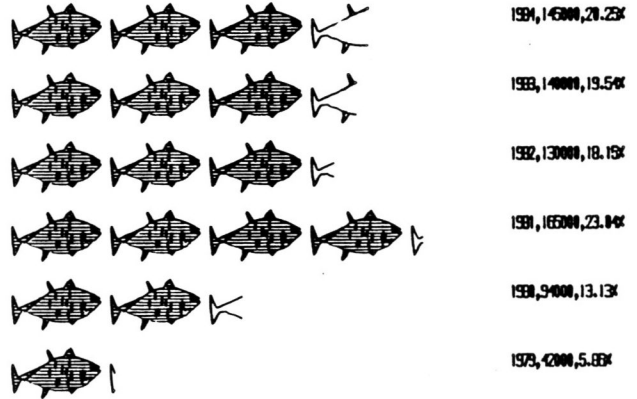


Figure 2: "number" pictogram

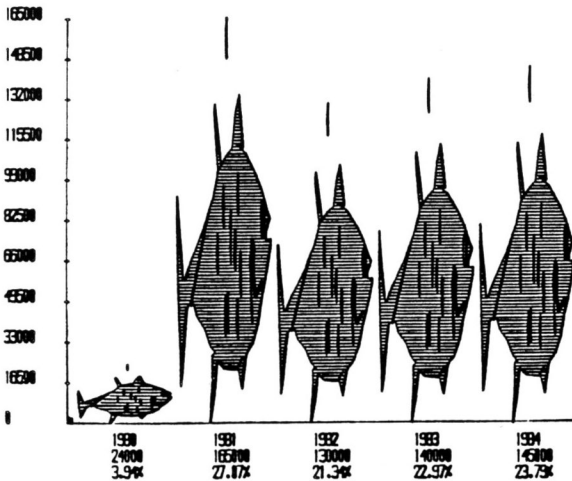


Figure 1: "size" pictogram (proportional in only one dimension)

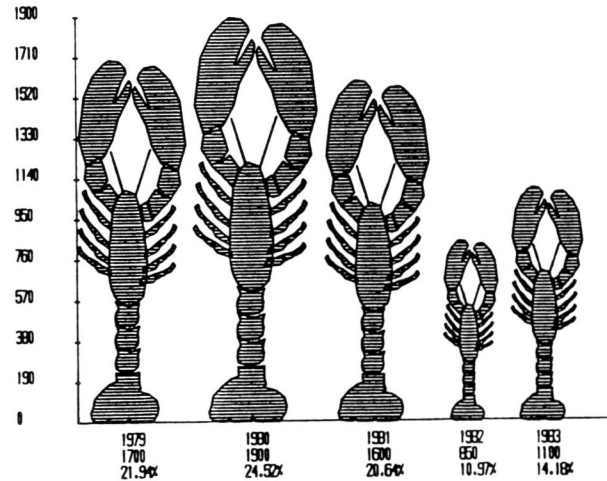


Figure 3: "size" pictogram (proportional in two dimensions)