

# Evolution Stages in Web Applications

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## INTRODUCTION

Among the many important contributions that information technology (IT) applications provide to organizations, Internet based applications may be considered the most important for strategic purposes, according to different authors like Porter (2001).

Initially, companies tried many different alternatives for using the great potential of the Web and a great number of completely new businesses that were enabled by the new technology. However, there were many failures (not only successes) and the situation has changed since the late 1990s. Thus, the time of experimentation is over and a business-oriented approach is required (Chen & Tan, 2004; Souitaris & Cohen, 2003). The Internet has indeed represented an opportunity, if properly used, for small and for big enterprises anywhere in the world (Drew, 2003; Kula & Tatoglu, 2003; Wresch, 2003).

This article describes the initial steps of an ongoing research that intends to compare the phases of Web dissemination in organizations with the adoption stages of traditional computer systems, based on Nolan's six stage model (Nolan, 1979). This approach could help describe and predict the integration of WWW into the work of organizations as well as provide a basis for improving management policies and decisions (Laurindo, Carvalho, & Shimizu, 2003).

Nolan's model (Nolan, 1979) is still an important and widespread known reference. In 1977, ARPANet (the network that gave origin to the Internet) had only 107 hosts (Ruthfield, 1995). This number increased to 317 million of hosts in January of 2005 (ISC, 2005).

This article is based in secondary data collection, some interviews with professionals from companies present on the Web, research on Web sites, in addition to a bibliography about the issue.

## BACKGROUND

### Nolan's Four Stages Theory

Gibson and Nolan (1974) presented a theory where the evolution of computer utilization was divided in four stages:

1. **Initiation:** New concept, exploring the possibilities of technology use.
2. **Expansion:** Some applications are developed. People are required for developments.
3. **Formalization:** Costs begin to be considered. Some effective controls are developed.
4. **Maturity:** The technology is being well integrated and managed.

### The Six Stages of a Reviewed Theory

Nolan (1979) reviewed his pioneering theory and published a new study, showing the evolution of computer implementation in an organization as happening in six stages, and that is known as stages theory:

1. **Initiation:** When the first computers are purchased for labor reduction and reduce paper handling.
2. **Contagion:** When IT is expanded to other functions like invoice, inventories, and checks emission. There isn't, however, the concept of information integration.
3. **Control:** The growth of the use of information systems in the organization is explosive. IT department is professionally administered.
4. **Integration:** The restructuring demanded by the previous stage is completed in response to the pressure for better administration; information sys-

tems are guided to support needs of different managerial levels. Information has better quality as a direct result of centralization of the IT department under a single administrative structure and as a consequence of the use of databases management systems.

5. **Data Administration:** Is dominated by database technology. IT department recognizes that information is a very valuable resource that should be accessible by all users along the organization.
6. **Maturity:** Information is considered as patrimony of the organization. Users are active and responsible, and IT growth is planned and organized. Applications portfolio is complete and its structure reflects the organization and their information flow.

## WEAVING THE STAGES

The introduction of the Web in companies has followed, in some way, a similar pattern established on Nolan's stage theory. As it is usually possible to take advantage of the structure and resources of preexisting IT applications, the first initial elementary steps are generally soon overcome. Web applications implementation usually begins when the company already can be classified in the integration stage of computer implementation (Anghern, 1997).

Seybold and Marshak (1998) establish that there are five stages for e-business initiatives: enterprise information (*brochureware*); customer support and interaction; electronic transactions support; customer's personalized interactions; and community promotion. Galliers and Sutherland (1994) defined six stages: *ad hocery*; starting the foundation; centralized dictatorship; democratic dialectic and cooperation; entrepreneurial opportunity; and integrated harmonious relationships. Anghern (1997) proposed the idea of four virtual spaces that companies would successively pass in the Internet: information, communication, distribution, and transaction. McKay, Marshal, and Prananto (2000) suggested a model named SOG-e (stages of growth for e-business), where the stages are defined as: no presence, static online presence; interactive online presence; Internet commerce; internal integration; and external integration.

This article proposes a classification that follows the same evolutionary classification, integrated with Nolan's stages.

## Beginning the Weaving

The Internet's first use in companies is usually e-mail, a demand of personal and inter-organizational communication. Initially, own domains are not used, but access

provider domains. However, as soon as own domain is registered, initiation in the Web begins, what usually happens timidly from isolated initiatives. Commonly it is made by IT professionals, since they know how to deal with the Web, and they can easily learn HTML.

Web pages are designed by professionals with technical, but no "artistic" skills. Thus, pages are usually visually poor, with graphic elements collected from other sites and with animation usually generating visual conflicts that are not always coherent when coupled with the presented content.

It is not just the form that doesn't adhere to company business. Also content often reflects the taste of the person that made the pages, with links to sites that are unrelated to company objectives and concerns.

Publication is usually made with several "under construction" areas awaiting information of other departments, which are never received, since executives of the company still do not clearly visualize or understand Internet potential (Evans & Wurster, 1999).

An example is the site of a small electronic manufacturer, which produces switching power supplies. This company sells as an OEM manufacturer and does not have final user customers. Many products are developed under customer specification and main clients are in the electronic products industry. This manufacturer has several product families, and its site (an own domain site) is a collection of static pages showing these products. There are no search engine or database queries to find specific characteristics. The page design can be considered adequate, with some appeal, although there are some "under construction" pages. The site is disconnected from the business: it is only a "show room". There are no private pages for specific customers and the only way to contact the company is by e-mail or phone.

## Contamination

With the intensification of domestic and professional Internet use, companies and managers pay attention to the need for better site structure and for more accurate information. IT professionals are demanded for these requirements; however, they are not prepared to cope with these desires while simultaneously performing their habitual activities.

Each executive has his or her own idea of how to use the Internet. They start to understand the Web as a resource to generate financial incomes; although, it is not clear to them how it can be done. However, due to lack of coordination, no project really is able to achieve expressive results.

In order to implement the Web in a company, Internet training is provided to IT personnel; although, this, by itself, doesn't represent an effective site evolution for the

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